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Implicit/explicit memory versus analytic/nonanalytic processing: Rethinking the mere exposure effect

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In studies of the mere exposure effect, rapid presentation of items can increase liking without accurate recognition. The effect on liking has been explained as a misattribution of fluency caused by prior presentation. However, fluency is also a source of feelings of familiarity. It is, therefore, surprising that prior experience can enhance liking without also causing familiarity-based recognition. We suggest that when study opportunities are minimal and test items are perceptually similar, people adopt an analytic approach, attempting to recognize distinctive features. That strategy fails because rapid presentation prevents effective encoding of such features; it also prevents people from experiencing fluency and a consequent feeling of familiarity. We suggest that the liking-without-recognition effect results from using an effective (nonanalytic) strategy in judging pleasantness, but an ineffective (analytic) strategy in recognition. Explanations of the mere exposure effect based on a distinction between implicit and explicit memory are unnecessary.

The *mere exposure effect* consists of the observation that repeated, unreinforced exposure to a stimulus increases judgments of liking that stimulus. The effect is of particular interest because exposure to stimuli can increase liking judgments without producing accurate recognition of the stimuli (see, e.g., Bonnano & Stillings, 1986; Bornstein, Leone, & Galley, 1987; Kunst-Wilson & Zajonc, 1980; Mandler, Nakamura, & van Zandt, 1987; Seamon, Brody, & Kauf, 1983a, 1983b; Seamon, Marsh, & Brody, 1984). This finding has led some investigators to conclude that the effect on liking is mediated by unconscious learning, which is available in implicit memory tasks (involving nonintentional, nonconscious retrieval), but not in explicit tasks (involving intentional, conscious retrieval: see Schacter, 1990; Seamon et al., 1995; Squire, 1992). We will suggest that this interpretation is unnecessary and that, instead, the effect on liking and the lack of an effect on recognition can be understood as being the result of the different strategies that people employ in using their memory to perform different tasks.

Seamon et al. (1983a, 1983b; Seamon et al., 1995) offered an explanation of the mere exposure effect that is based on the two-factor theory of recognition (e.g., Jacoby & Dallas, 1981; Mandler, 1980, 1991). That theory suggests that recognition judgments can be accomplished on either of two bases, retrieval of contextual detail or a feeling of familiarity. The feeling of familiarity is based on the fluency of processing (see Jacoby & Dallas, 1981; Kelley & Jacoby, 1990).[1] The idea is that a prior experience of a stimulus will often enhance reprocessing of that stimulus on a later occasion. In consequence, the fluency of processing can be used as a heuristic by which to judge prior occurrence. Jacoby and Dallas suggested that, in the context of a recognition task, people unconsciously attribute fluent processing to a source in the past; consciously, they experience a feeling of familiarity. There is a great deal of support for this idea. Numerous investigators have demonstrated that it is possible to cause illusions of familiarity by manipulating the fluency of performance through factors other than prior experience, such as perceptual priming (e.g., Jacoby & Whitehouse, 1989; Rajaram, 1993), semantic context (Roediger & McDermott, 1995; Whittlesea, 1993), or difficulty of presentation (Lindsay & Kelley, 1996; Whittlesea, Jacoby, & Girard, 1990). In each of these studies, enhancing the fluency of processing novel test stimuli increased claims of recognition.

The other basis for recognition, the retrieval of contextual detail, depends on the elaborateness of the original encoding and the cues presented to the subject (or generated by the subject) at test. That is, this basis depends on the principles of encoding variability and transfer-appropriate processing (see Craik & Lockhart, 1972; Morris, Bransford, & Franks, 1977; Tulving & Thompson, 1973). Retrieval of context is generally a preferred basis for recognition over familiarity, because it is more definite. For example, in encountering a person one has met before and experiencing enhanced fluency of processing, one might think, "That face seems familiar: Do I know her?" That feeling might be strong or weak, but

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it still feels like guessing or incomplete remembering. Then one might go on to retrieve contextual detail: "Oh yes, we met at Fred's last week: She was very rude." The coming-to-mind of this specific detail provides an additional warrant for believing that this is a stimulus that one has encountered before.[2]

The perception of extra fluency that sponsors the feeling of familiarity can also produce a variety of other feelings, depending on the context in which it is experienced. For example, manipulating the fluency of processing test items can cause an illusory experience of a wide variety of attributes, including duration (Masson & Caldwell, 1998; Witherspoon & Allen, 1985), loudness (Jacoby, Allan, Collins, & Larwill, 1988), knowing (Jacoby, Woloshyn, & Kelley, 1989), truth (Begg & Armour, 1991), and understanding (Carroll & Masson, 1992). In all of those cases, the illusory feelings are apparently based on misattribution of enhanced perceptual fluency, caused by prior exposure of a stimulus, to the characteristic made salient by the test. Seamon and his colleagues (e.g., Seamon et al., 1983a) anticipated these extensions of the fluency-attribution hypothesis, suggesting that this might be the basis of the pleasantness judgments observed in the mere exposure effect.

Bornstein and D'Agostino (1992, 1994) provided a similar account of the effect. They observed that the illusory liking effect is often larger when stimuli are presented subliminally in training than when they are presented supraliminally. They suggested that in the latter case, the subjects realize that their performance may be affected by the prior exposure of the stimuli. Consequently, they appropriately discount the fluency of processing to some degree in making a liking decision. In contrast, when stimuli are presented subliminally, the subjects are less aware of having seen them previously and so misattribute the fluency of perception to liking of the stimulus (see Jacoby & Whitehouse, 1989, for a similar demonstration of discounting in experiencing a feeling of familiarity).

We agree with much of the fluency-attribution account of the mere exposure effect offered by Seamon et al. (1983a) and Bornstein and D'Agostino (1992). However, that account leaves unanswered one very important question. As was indicated earlier, various investigators have observed that rapid exposure can increase liking judgments without producing accurate recognition. Given that people can use the enhanced fluency of processing caused by a prior experience with a stimulus to judge the stimulus likable, why do they not use that same enhanced fluency to judge the item old? They must be sensitive to that fluency, to use it in the liking decision, and the feeling of familiarity is based on the perception of fluency. Why do people not experience a feeling of familiarity for a stimulus and claim it to be old, when it is processed fluently enough to sponsor a feeling of liking?

Bonnano and Stillings (1986) presented evidence that is relevant to our question. They presented eight-sided polygons rapidly during training. At test, subjects were shown pairs of stimuli, one member of each pair being old and one new. Different groups of subjects were asked to perform one of three forced-choice judgments: which of a pair they preferred, which was old (recognition), or which seemed "familiar." It was explained to the subjects that the last task was not a recognition task; the subjects were told they would probably not recognize the correct alternative but, instead, should pick the shape "that initially seems most familiar to you, or pops out at you" (p. 407). Given that the subjects in this condition were told to ignore the issue of recognition but were told to judge by "pop-out," it seems fair to characterize this test as a measure of the subjects' perception of their fluency. The subjects in that study selected old items with 66% probability in the preference test, 63% in the "familiarity" test, but only 45% in the recognition test. The authors interpreted their results in terms of the two-factor theory of recognition described above, suggesting that the perceived fluency measured in the "familiarity" test is the basis of the preference judgment.

Clearly, in the recognition task, the subjects were unable to use the test items as cues to retrieve any useful information about the prior occurrence of old stimuli. That is not surprising, given the limited duration (and consequent limited elaboration) of the original exposures. However, there remains a mystery. Why did the subjects in the recognition task not use the fluency of old items to claim to recognize them, when other subjects used the fluency of the same items to claim preference or to report the stimuli as perceptually fluent in the "familiarity" test? There appear to be two possible answers to this question. One is that the subjects experienced the fluency of old items in making recognition judgments but elected not to use it; the other is that they did not experience differential fluency of old versus new items in that task, although they did so in the other tasks.

We believe that it is important to answer this question. The mere exposure effect shows that limited exposure of a stimulus can influence affective reactions without the person's being able to consciously know that that exposure occurred. In turn, that might suggest that performance in implicit and explicit tests of memory relies on two separate forms of memory, preserving different aspects of the experience. Before accepting that suggestion, we believe that it is important to know why perceptual fluency, which has been demonstrated to cause feelings of familiarity and to cause reports of recognition in many other circumstances and which apparently causes a preference effect in a forced-choice task after limited exposure, does not also produce a feeling of familiarity strong enough to claim recognition in those same circumstances.

ANALYTIC VERSUS NONANALYTIC PROCESSING

The mere exposure effect has been investigated using many kinds of stimuli, both artificial and nonrepresentational, such as geometric figures (e.g., polygons) or abstract visual symbols (e.g., ideograms), and natural stimuli, such as faces. However, the stimulus sets that have been used to study the effect have had two characteristics in common: First, none of the stimuli were specifically familiar to the subjects at the outset, and second, all of the stimuli within any particular experiment were drawn from a single category. The former characteristic is understandable: The investigators wished to avoid confounds with established habits in testing the effect of exposure on liking. However, we have not found any explanation of the latter procedural characteristic. Certainly, it is not a part of the definition of the effect, nor have we encountered any explanations of the effect that depend on it. We suspect that it simply became accepted practice following Zajonc's (1968) seminal studies. As successive researchers have attempted to generalize the effect, they have used a variety of different stimulus domains, including photographs, abstract art, and nonsense words, but have always followed the practice of presenting items belonging to a single category.

The result of this practice is that, in general, the stimuli in the set used to test the mere exposure effect in any particular experiment have had a fairly strong perceptual family resemblance. Because they were all initially unfamiliar to the subject, this perceptual family resemblance posed a severe challenge for discriminating one from another in a recognition test, particularly given the minimal exposure of items during the training phase.

We wondered if the dissociation between liking and recognition judgments might be caused by that procedural detail. We suspected that it might cause people to adopt two quite different strategies in performing liking and recognition judgments, depending on fluency for the former, but exclusively on recall of detail in performing the latter. Exclusive dependence on recall of detail is not inherent in the nature of recognition performance; people often rely on a feeling of familiarity to make a recognition decision when recall fails (see, e.g., Gardiner & Java, 1990). However, we suspected that in the context of limited training, previously unknown stimuli, and perceptual family resemblance among test items, subjects might react strategically, processing test items nonanalytically when asked to perform the liking judgment, but analytically when asked to recognize them. We further suspected that the latter strategy might prevent them from experiencing fluency and, consequently, prevent a feeling of familiarity.

The experience of enhanced fluency in encountering a repeated stimulus appears to depend on reprocessing the stimulus in the same way that it was processed earlier. For example, having seen TABLE earlier probably does not cause a perception of enhanced fluency when one encounters its parts in isolation (TAB and LE or TA and BLE) but does so when one reencounters the whole stimulus TABLE (see MacLeod & Masson, 1997).[3] We further suspect that even when the stimulus is re-presented as a whole, if the person has reason to analyze the stimulus into components at test (e.g., thinking of TABLE as TA-BLE), he or she will again not experience extra fluency in processing the components of that stimulus. That is, experiencing one's processing as unexpectedly fluent and, hence, experiencing a feeling of familiarity appear to depend on nonanalytic processing of the test stimulus.

The other basis of recognition, the retrieval of some discriminating detail about the previous episode, may be performed by remembering either an aspect of the context in which the stimulus was presented or a distinctive detail of the item itself. The former is unlikely to occur in studies of the mere exposure effect, because distinctive contexts are not usually supplied. In consequence, the subjects must rely on the ability to remember some distinctive aspect of the stimulus itself in order to claim recognition on the basis of recall. This is a common basis for recognizing items that are presented in lists (without distinctive contexts for different items). For example, a person who sees an unusual word like CORPUSCLE in a study phase may later recognize it by remembering that he or she had difficulty in deciding whether to pronounce the second C or leave it silent. People may adopt the tactic of scrutinizing each test item for distinctive, recognizable features. In that case, they are adopting an analytic approach, treating the stimulus as a collection of separate, potentially recognizable features. This analytic strategy may or may not enable the person to recognize the stimulus. However, it has another important consequence: If performed consistently, it will prevent the person from experiencing fluent reprocessing of the stimulus as a whole and, hence, prevent the person from experiencing a feeling of familiarity for that stimulus.[4]

Nonanalytic and analytic processing are not two forms of memory. They are alternate strategies for generating information about a stimulus, based, respectively, on processing the whole or its parts. These different approaches present qualitatively different cues to memory, requiring different resources and recruiting different aspects of prior experience, just as a phonological task and a semantic task make different demands on memory and reveal different aspects of one's knowledge. Nonanalytic processing allows the person to experience the quality of their performance; analytic processing may grant them access to information associated with critical features. The two strategies may be used in synergy, or people may adopt one policy or the other exclusively (see Whittlesea, Brooks, & Westcott, 1994, for a demonstration of some factors that can cause exclusive use of one strategy or the other).

We suggest that, because the stimuli in mere exposure studies are initially unfamiliar and bear perceptual family resemblance, people are motivated to process items analytically for recognition judgments, but nonanalytically for preference judgments. We suggest that the adoption of an analytic policy for recognition prevents the subjects from experiencing the fluency of processing the item as a whole and, hence, prevents them from experiencing a feeling of familiarity. We also suggest that the analytic strategy is inappropriate for the demands of this recognition task, resulting in poor performance on that basis as well. We therefore suggest that the finding that people claim to like old stimuli without recognizing them results from the procedures employed to study the effect, not because liking and recognition judgments rely on different forms of memory.[5]

We will begin by explaining why we think people adopt an analytic approach to recognition when training is minimal and targets share perceptual family resemblance. Imagine that you have witnessed a robbery in a store; you saw the perpetrator only for a brief instant. Later, you are asked to identify the perpetrator in a police line-up. The police have done their job badly: The members of the line-up differ in race, build, hair color, facial structure, and so forth. In that case, you have only to look down the line and experience a burst of familiarity for one face to discriminate the perpetrator from the other members. That feeling of familiarity is based on the fluency of processing the gestalt of the face. But imagine instead that the police have done their job thoroughly, and all the members of the line-up are similar on the salient dimensions. That is, no two look alike when compared side by side, and there is variability on a variety of dimensions, but all could be described as "large, dark-haired, about 35 years old, tough-looking face." Given the poor initial encoding of the perpetrator and the similarity of the faces, the difference in fluency of processing the various faces and the consequent differences in the feelings of familiarity will be limited. Wanting a definite identification, rather than a weakly differential feeling of familiarity, you are likely to switch over to the analytic mode, ignoring the global organization of the faces and, instead, concentrating on detail, attempting to find some distinguishing local characteristics, such as a scar or a mole. If you encoded that detail in the original encounter and notice it again in the police station, you can claim to recognize that person with confidence; but if it was not encoded in the original event, or if it is not noticed again in the identification parade, recognition will fail. That is, when test stimuli resemble each other, the feeling of familiarity is a weak discriminator. Definite recognition will depend on analysis of the stimulus, examining and evaluating one's processing of local detail, and success in that recognition will depend on having encoded that degree of detail.

We suggest that the remembering task with which people are confronted in studies of the mere exposure task appears very difficult to them, both because of the limited initial presentation and because of the general perceptual similarity of test instances all taken from the same category. We further suggest that people respond to the evident difficulty of the task by thinking something like, "They all look alike; the only way I can discriminate new from old is by finding some critical feature that I recognize, some specific part that is different in this stimulus from all the others." That is, they adopt an analytic approach to the problem. However, that is exactly the wrong approach, because, given the limited duration of training instances, they are unlikely to have encoded the specific detail of particular items to any great degree. Moreover, that analytic processing of test stimuli, scanning for recognizable detail, also prevents them from experiencing the fluency of processing the item as a whole and thus prevents them from experiencing a feeling of familiarity. In consequence, they are at or near chance in the recognition test. In fact, they might better adopt a nonanalytic approach, simply looking at each stimulus and forming an impression of the fluency of processing, because they will have encoded global properties of the stimuli to some extent, resulting in some difference in processing fluency between new and old items. In consequence, they might have at least some success in distinguishing new from old stimuli on the basis of a feeling of familiarity.

In contrast, we suspect that people usually react to the liking judgment by adopting a nonanalytic approach. A picture is not made pleasant by a detail in the corner; it is the overall organization that pleases or not. We thus agree with Seamon et al. (1983a) and Bornstein and D'Agostino (1994) in suggesting that in performing the preference judgment, people often will experience the fluency of processing the stimulus as a whole and will attribute that fluency to a feeling of liking.

EXPERIMENT 1
Homogeneous Categories

We conducted two experiments to test the analytic/nonanalytic hypothesis. In Experiment 1, all the items presented within a test were taken from the same category. Consequently, they possessed a fairly strong family resemblance, which (as was discussed earlier) is usual in studies of the mere exposure effect. Across the conditions of this experiment, we required the subjects to perform either recognition or preference judgments; we also varied the incentive to perform those judgments analytically or nonanalytically.

Experiments 1A and 1B
Preference and Recognition

We first attempted to replicate the mere exposure phenomenon, presenting pictures in either a preference or a recognition test after limited training. The subjects were initially exposed to 30 items in a rapid serial visual presentation (RSVP; suggested to us by D. S. Lindsay, personal communication, November 1997). Ten of these items were presented once, 10 presented three times, and 10 presented five times, resulting in a stream of 90 pictures. In the test condition of each study, each of the 30 old items was presented in a forced-choice test along with an item that had not been presented earlier. In Experiment 1A, the subjects were asked to make a preference judgment; in Experiment 1B, they were asked which of the stimuli they had seen in the training series. We expected, on the basis of the work discussed earlier, that increasing numbers of exposures in the training phase would cause increasing rates of judging old items to be pleasant but would have little effect on recognition.

Method

Subjects. Twelve Simon Fraser University students participated in Experiment 1A, and 16 in Experiment 1B, for course credit.

Procedure. We assembled four sets of pictures, each consisting of 60 items, from the MasterClips corpus (International Microcomputer Software). One set consisted of line drawings of chairs, most of which appeared to be Victoriana. They were variously cloth-covered or wooden, had various leg and arm styles, and were simple or highly decorated. Another set consisted of line drawings of leaves of various species of trees. The variation in this case was of shape, number, and arrangement of veins, edge detail (e.g., serrations and indentations), and so on. The third set consisted of geometric drawings that were symmetric in both the *x*- and the *y*-axes. They varied in complexity, having multiple circles, squares, and various other forms arranged in a variety of ways, some overlapping each other. The fourth set consisted of pictures of mountains and mountain ranges. These varied as mountains do. We did not attempt to constrain or manipulate the perceptual family resemblance among pictures within a set; we simply used 60 unevaluated pictures from each category.

In both conditions of the experiment, each subject was tested in four blocks. In each block, they were shown one half of the stimuli in a set, selected at random from that stock for that subject, on a Power Macintosh. At random, 10 items were shown once, 10 three times, and 10 five times, resulting in a stream of 90 pictures. This series was presented in random order, with the exception that presentations of multiply presented items were separated by at least 2 other pictures. The items were presented in RSVP format at 40 msec per picture, with no interstimulus interval. (We did not synchronize to the raster; some presentations at random were more than 40 msec and some less, with a maximum error of 16.7 msec and a mean error of 0 msec). Presentations were approximately 3 in. square, with some variability in the *x*- and *y*-axes, depending on the shape of the object shown. The subjects sat at a comfortable viewing distance.

In Experiment 1A, following the training phase of each block, the subjects were shown pairs of stimuli on 30 test trials. Each trial involved a stimulus that had been shown in training and a stimulus taken from the remaining pictures, each being presented only once in the test. The pair of items were shown side by side, the old item being on the left on half the trials, and otherwise at random. The same training and test procedures were used in all four blocks. The subjects were asked to select which picture they preferred. We asked them to perform the preference judgment swiftly, acting on their first impulse, in order to encourage reliance on fluency of processing in this test. Experiment 1B was identical, except that the subjects were asked instead to perform a recognition judgment. We gave no instructions on how to perform this judgment, allowing the subjects to select their own strategy. We systematically manipulated their recognition strategy in subsequent experiments.

The forced-choice test used in these experiments is fairly standard procedure in tests of the mere exposure effect (e.g., Bonnano & Stillings, 1986; Mandler et al., 1987; Seamon et al., 1995). It eliminates one obvious explanation of a difference in sensitivity to old items in different kinds of test—namely, criterion shifting. The idea is that people may require more evidence to make a decision in one test than in the other, which could produce a difference between pleasantness and recognition tests if people are willing to use a small amount of fluency to call an item "pleasant" but are not willing to use that same fluency to call an item "old." Use of a forced-choice test prevents subjects from withholding a response when they believe they do not have enough evidence to make a decision; it forces them to make the decision, using whatever evidence they have. It thereby eliminates differences between tasks associated with gross differences in criteria.

Results and Discussion

In analyzing Experiment 1A, we first compared data across the four blocks, looking for evidence that the subjects had responded differentially to different sets of stimuli. Finding little evidence of such an effect, we collapsed across blocks, treating blocks as replications of the basic training conditions (one vs. three vs. five presentations). We thus had 40 observations per cell of the design for each subject.

Next, we compared the probabilities of selecting the old item in the preference test given that the item had been exposed one, three, or five times in training (see Table 1). Once-presented items were not selected more often than chance would predict [$F(1,11) = 0.97, MS_e = 0.00, p < .347$], but items presented three and five times were selected about 7% more often than chance [$F(1,11) = 13.15, MS_e = 0.00, p < .004$, and $F(1,11) = 13.88, MS_e = 0.00, p < .003$, respectively]. This demonstrates that the mere exposure effect occurs under our presentation conditions (40-msec RSVP streams), at least when stimuli are presented repeatedly in training. We suspect, along with Seamon et al. (1983b), Bornstein and D'Agostino (1992), and others, that this effect is a misattribution of enhanced fluency resulting from prior exposure of the items.

We performed the same steps in analyzing Experiment 1B (recognition task). None of the three conditions (one, three, or five presentations) produced reliably above-chance performance [$F(1,15) = 1.79, MS_e = 0.00, p < .201$; $F(1,15) = 3.71, MS_e = 0.00, p < .073$; and $F(1,15) = 2.01, MS_e = 0.00, p < .177$, respectively]. Furthermore, there was no evidence that more training presentations caused more recognition, old items being selected on about 53% of the trials in all three cases: The differences between one versus three presentations, between three versus five presentations, and between one versus five presentations were not reliable [$F(1,15) = 0.57$, 0.10, and 0.07, respectively]. We do not argue that the subjects were reliably at chance; of course, using greater power, we might have observed a reliable effect of prior presentation on recognition. Instead, we simply used this as our baseline condition, observing how subjects react to the standard recognition instructions after severely limited training.

Together, these experiments demonstrate the mere exposure effect—that is, the observation that, following severely restricted training, people can show sensitivity to prior experience of an item in a preference judgment, but not in a recognition task. As was suggested in the introduction, we believe that that dissociation results from the adoption of different strategies in the two tests: that peo-

Table 1
Probabilities of Selecting Old items in a Forced-Choice Test With Homogeneous Categories in Experiment 1

	Number of Training Presentations			
Experiment	One	Three	Five	*M*
1A: Spontaneous preference	.52	.56	.57	.55
1B: Spontaneous recognition	.53	.54	.53	.53
1C: "Global similarity"	.56	.59	.62	.59
1D: "Global similarity" with justification	.52	.52	.51	.52
1E: Preference with justification	.51	.52	.52	.52

ple respond to the demands of the preference judgment by adopting a nonanalytic strategy, whereas, given their understanding of the recognition task, they adopt an analytic strategy. We attempted to test this idea by changing the situation in ways that might encourage the subjects to adopt different strategies.

Experiments 1C and 1D
Analytic and Nonanalytic Recognition

In the next pair of experiments, we focused on the recognition test, attempting to induce nonanalytic and analytic processing under instructional control. In the first of these experiments (Experiment 1C), we attempted to induce nonanalytic processing of the stimuli, thereby allowing the subjects to experience the differential fluency associated with old versus new test items. We presented training and test stimuli in the same way as that in Experiment 1B. However, we (falsely) informed these subjects that neither member of any pair had been shown previously. Instead, we told them, one member of each pair would resemble a training item. We further told them that no particular aspect of any training item would be the same in the related test item but that one of the test items in each pair would be globally similar to one training item. They were to attempt to recognize the item that was similar to a training item.

In this experiment, because the item to be selected was actually identical to a training item, the subjects could use local features to identify critical items if they wished (and if they were able). However, because they were (falsely) informed that local details had been changed, they would have no motive to analyze the stimuli for distinctive features. Instead, they would have a motive to process the items nonanalytically, attempting to judge the items through their overall similarity to training items. In doing so, they could become sensitive to the fluency of processing the item as a whole, resulting in a feeling of familiarity and above-chance discrimination between old and new items.

In Experiment 1D, the subjects were given the same instructions as those in Experiment 1C. However, on each trial, after selecting one of the pictures as similar-to-old, these subjects were additionally asked to justify that decision by pointing to one of the four quadrants of the selected picture, a quadrant in which they thought the similarity was particularly great. Because all four quadrants of the old picture of each pair were actually identical to what the person had seen earlier, this judgment could not reveal any differential sensitivity to prior experience. However, it gave the subjects a motive to process the stimuli analytically. If they used this analytic processing to perform the initial global-similarity judgment as well, we could expect these subjects not to experience differential fluency in examining old and new pictures. In consequence, they might not experience a differential feeling of familiarity and, consequently, fail to discriminate between new and old items.

Method

Subjects. Seventeen Simon Fraser University students participated in Experiment 1C and 17 in Experiment 1D, for course credit.

Procedure. The procedure in Experiment 1C was identical to that in Experiment 1B, except for the changed instructions explained above. In Experiment 1D, the test pictures were presented with a vertical and a horizontal hairline, dividing them into four quadrants. On each test trial, the subjects were asked first to select which picture was globally similar to a training item, as in Experiment 1C, but then to point to the quadrant that seemed to them to be most similar.

Results and Discussion

In Experiment 1C, when required to perform a "similarity" judgment, the subjects showed a reliable ability to discriminate old from new items. Items presented once were selected about 6% above chance [$F(1,16) = 26.02$, $MS_e = 0.00$, $p < .001$; see Table 1]. Three and five presentations each increased discrimination of old from new items by about a further 3%; the differences between one and three presentations and between three and five presentations were not reliable [$F(1,16) = 1.86$, $MS_e = 0.01$, $p < .192$, and $F(1,16) = 0.71$, $MS_e = 0.01$, $p < .411$, respectively], but the difference between one and five presentations was reliable [$F(1,16) = 7.12$, $MS_e = 0.00$, $p < .017$]. That is, in this case, items in all three training conditions were selected above chance, and there appeared to be some effect of number of prior presentations on the ability to discriminate old items from new ones. Moreover, the subjects' accuracy in selecting the training item was greater in Experiment 1C than in Experiment 1B. Comparing the grand means of the two studies, the subjects were 6% more likely to select the old item in Experiment 1C [$F(1,31) = 11.442$, $MS_e = 0.03$, $p < .002$]. Comparing those studies only on trials in which the subjects had had five prior exposures, the subjects were 9% more likely to select the old item in Experiment 1C [$F(1,31) = 9.228$, $MS_e = .06$, $p < .005$].

In Experiment 1D, in which the subjects were asked to make the "similarity" judgment but were also asked to justify their selection on the basis of an analytic comparison of the quadrants of the selected picture, none of the three conditions (one, three, or five presentations) produced reliably above-chance performance [$F(1,16) =$ 0.59, 1.03, and 0.48, respectively; see Table 1]. Furthermore, there was no evidence that more training presentations caused more recognition, old items being selected on about 52% of the trials in all three cases: The differences between one versus three presentations, between three versus five presentations, and between one versus five presentations were not reliable [$F(1,16) = 0.06$, 0.18, and 0.01, respectively]. Comparing the results of Experiments 1C and 1D, the subjects were more accurate in selecting the training item when asked to select the similar picture without justification. Comparing the grand means of the two studies, the subjects were 7% more likely to select the old item in Experiment 1C [$F(1,33) = 17.015$, $MS_e = 0.04$, $p < .001$]. Comparing those studies only on trials in which the subjects had had five prior exposures, the subjects were 11% more likely to select the old item in Experiment 1C [$F(1,33) = 13.258, MS_e = 0.08, p < .001$].

We suggest that, because of the false instructions, the subjects in Experiment 1C did not attempt to analyze the test stimuli, seeking distinctive local features that they could recognize. Rather, we suspect that the subjects responded to the demands and affordances of that situation (as they understood them) by processing the stimuli nonanalytically. That policy enabled them to experience a difference in the fluency of processing the two pictures, enabling them to discriminate old pictures from new ones above chance. When required to make that same decision in Experiment 1D but also to justify it, the subjects instead adopted an analytic policy; consequently, they no longer experienced the fluency associated with reprocessing the whole stimulus. Because they had encoded very little information about the detail of the pictures during the RSVP training, analytic processing in the test rendered them insensitive to the difference between old and new pictures.

Experiment 1B (standard recognition instructions) was identical to Experiments 1C and 1D in every way except for the false instructions used in the latter studies. The difference in the results of Experiments 1B and 1C and the similarity of the results of Experiments 1B and 1D suggest to us that the subjects in Experiment 1B approached the recognition task in the same way as did the subjects in Experiment 1D, processing the stimuli analytically in test in the forlorn hope of discovering some distinctive feature that they could recognize. However, the results of Experiment 1C demonstrate that such insensitivity to prior experience in recognition is not a necessary consequence of the rapid training; instead, it is the result of adopting an inappropriate strategy in performing that task.

Experiment 1E
Analytic Preference Judgments

If our argument about the basis of recognition in the mere exposure paradigm is correct, it must also be true that the sensitivity to prior experience shown in preference judgments is supported by adoption of a nonanalytic policy. To test that idea, in Experiment 1E, the subjects were asked to make the same preference judgment as that in Experiment 1A; however, they were also asked to justify that judgment by pointing to one of the four quadrants of the selected stimulus that, in their opinion, made that stimulus more pleasant than the other. If this requirement caused the subjects to process the stimuli analytically and if analytic processing causes people to experience less sensitivity to the prior experience of old items, we could expect to observe a failure of the mere exposure effect in this condition.

Method

Subjects. Seventeen Simon Fraser University students participated for course credit.

Procedure. The procedure was identical to that in Experiment 1A, except that test pictures were divided into quadrants, as in Experiment 1D. On each test trial, the subjects were asked first to select which picture they preferred, as in Experiment 1A, but then to point to the quadrant that made that picture more pleasant. Again, the old picture in each test pair was actually identical to its previous presentation in all four quadrants; the quadrant judgment was presented only to bias the subjects' processing in performing the preference judgment.

Results and Discussion

Old items were not selected more often than chance in any of the three exposure conditions [$F(1,16) < 1$, in each case; see Table 1]. Furthermore, we observed that items presented three and five times were about 5% more likely to be selected in Experiment 1A than in Experiment 1E [$F(1,28) = 4.600, MS_e = 0.014, p < .041$]. We concluded that, when the subjects were asked simply to perform a preference judgment (Experiment 1A), they interpreted that requirement as an invitation to process the stimuli nonanalytically, resulting in differential experience of fluency for old and new items; in the context of a pleasantness decision, the subjects interpreted that differential fluency as a difference in preference, producing a mere exposure effect. In contrast, in Experiment 1E, the requirement to justify preference judgments by pointing to selected quadrants made the subjects process the stimuli relatively analytically. This analytic processing prevented the subjects from experiencing the fluency that would result from reprocessing of the stimulus as a whole. In consequence, the subjects became insensitive to the prior experience of those stimuli, resulting in a failure of the mere exposure effect.

Thus, we argue, observing that recognition scores are at chance in a mere exposure study (Experiment 1B) does not mean that the subjects are insensitive to the prior presentation of those items or that they do not have appropriate memorial resources to recognize them. It simply means that they have adopted an inappropriate strategy for using memory to discriminate between old and new items. When prompted to use a more appropriate (nonanalytic) strategy (Experiment 1C), people can discriminate old from new items at least as well in a recognition task as in a preference judgment. Similarly, finding above-chance sensitivity to prior experience in a preference task while recognition scores are at chance does not mean that those tasks depend on different forms of memory. Instead, it means only that people spontaneously adopt an appropriate (nonanalytic) strategy in judging preference (Experiment 1A). When prompted to adopt an inappropriate (analytic) strategy, people cannot discriminate old from new items, either in a recognition task (Experiment 1D) or in a preference task (Experiment 1E).

EXPERIMENT 2
Heterogeneous Categories

We have suggested that subjects in mere exposure studies engage in analytic processing in recognition tasks and that this strategy fails because they cannot effectively encode information about local details during the rapid training series. We have also suggested that the motive for doing this analysis is not the recognition task itself but, rather, the subjects' awareness that the stimuli all come from the same category and generally look alike (given their limited knowledge of those particular stimuli). We attempted to test that suggestion in the next experiment.

Experiment 2A
Recognition

In Experiment 2A, we used the same number of training and test stimuli in each block as in previous studies and presented them in training for the same duration. As in Experiment 1B, we told the subjects that one member of each test pair was old and that the task was item recognition; we gave no further instructions about how to perform the discrimination. The difference was that the 30 training items in each block were now selected from 30 different categories. Consequently, a subject might see a bird, a pair of scissors, a truck, an abstract pattern, and so forth on successive training exposures within a block. We suspected that the subjects might respond to the perceptual distinctiveness of the items by spontaneously processing test items nonanalytically, using the fluency of processing and a consequent feeling of familiarity to judge which item was old.

Method

Subjects. Twenty-one Simon Fraser University students participated in Experiment 2A for course credit.

Stimuli and Procedure. We selected 120 pictures from the MasterClips corpus, scaled to the same size as the pictures in the earlier experiments. As in the previous experiments, some pictures, selected at random from the stock for each subject, were presented one, three, or five times in training, in a random order, resulting in a stream of 90 pictures in each block; the remainder were reserved for test, as novel items in a pair. In this experiment, we conducted only two blocks of training and test trials, collapsing the data across blocks, as before. We thus had 20 observations per cell of the design for each subject. One picture in each test pair was old, and 1 was new; these were presented at random to the left or right side of the screen. The subjects were instructed to select the old picture on each trial. Because all the pictures were taken from different categories, the old and new pictures on each trial were different perceptually and also in category name.

Results and Discussion

The results are shown in Table 2. Once-presented items were not selected above chance [$F(1,20) = 0.96$, $MS_e = 0.01$, $p < .339$]. However, items presented three times were reliably selected more often than items presented once [$F(1,20) = 7.03$, $MS_e = 0.02$, $p < .015$], and items presented five times were reliably selected more often than items presented three times [$F(1,20) = 6.70$, $MS_e = 0.01$, $p < .018$].

We compared these results with those of Experiment 1B, which was also presented as a straight recognition test but which used items from a single category in each block. It is, of course, not possible to exactly equate the memorability of two different sets of pictures, so a comparison between this experiment and Experiment 1B has to be treated with caution. However, there is evidence that the new set of pictures was not simply more memorable: Once-presented items of the new set were not recognized more often than once-presented pictures of the previous set ($p = .52$ in Experiment 2A, and .53 in Experiment 1B).

In contrast, five presentations of the items in Experiment 2A resulted in 19% more accurate claims of recognition than did the same condition in Experiment 1B [$F(1,35) = 32.291$, $MS_e = 0.01$, $p < .001$]. Apparently, providing items from different categories enabled the subjects to be much more accurate in recognition, or to put it differently, using items that share perceptual similarity, as is common in tests of the mere exposure effect but not in other studies of recognition, impairs recognition.

The advantage for the subjects in Experiment 2A was not due to training circumstances: the subjects in this condition had as little opportunity to encode details of the pictures as did the subjects in the previous experiments. Instead, it is clearly due to a difference in how the subjects dealt with perceptually and categorically dissimilar items in the test. There are two ways in which this factor might be of advantage to the subjects. One is that, trial by trial, old items are more distinctive from each other; the other is that, within a trial, the two test items (old and new) are more distinctive from each other. How does this distinctiveness help the subject? We do not think it makes analysis easier (focusing on local features of stimuli) because neither test (Experiment 2A or 1B) was time limited, so that subjects could scan around the stimuli as much as they liked in either study. Instead, we suggest that it helped because it removed the impetus to perform analytic processing in the test, which would involve looking for distinctive local features that had not been well encoded and that, therefore, could not be recognized. It thereby allowed the subjects to perform nonanalytic processing and so experience a feeling of familiarity from their fluency of processing the whole.[6]

Table 2
Probabilities of Selecting Old items in a Forced-Choice Test With Heterogeneous Categories in Experiment 2

	Number of Training Presentations			
Experiment	One	Three	Five	*M*
2A: Recognition	.52	.64	.72	.63
2B: "Changed part"	.50	.50	.49	.50
2C: "Global similarity"	.54	.61	.64	.60

Experiments 2B and 2C
Nonanalytic and Analytic Recognition

We conducted two further experiments in order to provide convergent evidence for our conclusion that the subjects in Experiment 2A spontaneously adopted a nonanalytic strategy for the recognition test. In these experiments, items within a test pair were again taken from different categories, so that if that was the source of success in Experiment 2A, we should see that success repeated in these experiments. However, the subjects in

Experiment 2B were (falsely) told that both items in each test pair had been exposed during training. They were further told that one quadrant of one of the pictures had been altered from the training presentation; they were to select the changed picture, pointing to the quadrant containing the altered detail. In fact, of course, one picture was identical to the training presentation(s), and the other was new in all four quadrants. Consequently, accuracy in selecting the correct quadrant was not at issue. In effect, the subjects' task was to discriminate between an old and a new picture, just as in Experiment 2A, and we scored the subjects' responses in the same way. However, in Experiment 2B, that task was presented to the subjects as requiring a finer, more detailed examination of the pictures.

In principle, there were two ways for subjects to proceed with this task. One was to begin nonanalytically, attempting to get a global impression of which picture was unchanged and which changed and then attempting to perform a finer discrimination within the picture that felt unfamiliar. If the subjects performed in this way, they could experience a difference in fluency in processing the two pictures, because one was actually old and the other wholly novel. They could use this difference to decide that the old picture was unchanged; they could then examine the new picture in detail, eventually selecting one of its quadrants as being changed. In consequence, they could effectively discriminate between new and old items, as in Experiment 2A, although of course, their selection of a particular quadrant from the new item would be meaningless. Alternatively, the subjects could perform analytically from the outset, proceeding directly to an examination of the quadrants, without making a judgment about which item seemed familiar as a whole. In this case, they would actually be examining four old quadrants and four new ones. They could still discriminate new from old items on this basis, if they could experience a differential feeling of familiarity for old versus new parts. However, as was discussed earlier, we suspected that prior experience of whole items in the RSVP training would not substantially enhance the fluency of processing their separate parts in the test. In that case, the subjects would be unable to discriminate between new and old parts and so unable to discriminate between new and old items. Consequently, if the subjects adopted an analytic approach to performing this recognition judgment, we could expect lower sensitivity to the actual presentation status of the pictures, as compared with Experiment 2A.

However, in subdividing the pictures into four quadrants, we superimposed lines on the pictures (as in Experiments 1D and 1E). One might imagine that the visual presentation of these lines might be responsible for any difference observed between Experiments 2A and 2B, perhaps by making the test pictures less perceptually similar to training presentations. We examined that possibility in Experiment 2C. In that experiment, pictures from different categories, one old and one new, were again presented side by side with quadrant lines superimposed. However, in this case, the subjects were told that both stimuli were new but that they had seen pictures of both categories previously, in the training series. We also told the subjects that one of the two present pictures was globally similar to the picture of the same category shown earlier, whereas the other was quite different from the picture of that category shown earlier. They were to select the picture that resembled the one seen earlier. We also pointed out that the pictures would be subdivided into quadrants but explained that those lines were for other subjects in a different experiment and were irrelevant for their purposes. If the visual presentation of pictures subdivided into quadrants is in itself sufficient to induce analytic processing, we should observe similar performance in Experiments 2B and 2C. However, in this case, we expected the subjects to adopt a nonanalytic strategy, like the subjects in Experiment 1C, in response to the fact (as they understood it) that one member of each test pair was globally similar to a training item.

Method

Subjects. Fifteen Simon Fraser University students participated in Experiment 2B, and 15 in Experiment 2C, for course credit.

Procedure. The stimuli in these experiments were identical to those in Experiment 2A, except that each test picture was subdivided into four quadrants through the superimposition of horizontal and vertical lines. The procedure was also the same, except that the subjects in Experiment 2B were told that all the test pictures were old, whereas the subjects in Experiment 2C were told that all the test pictures were new but of the same category as pictures already seen. Furthermore, the subjects in Experiment 2B were told that one quadrant of one picture was changed; they were to identify the picture containing the changed element and the quadrant containing that element. In contrast, the subjects in Experiment 2C were told that one test picture of each pair globally resembled a training picture and one (although of the same category as a training picture) did not; they were to select the picture that was similar to a training item.

Results and Discussion

In Experiment 2B, none of the three conditions (one, three, or five presentations) produced reliably above-chance performance [$F(1,14) = 0.02, 0.01$, and 0.12, respectively; see Table 2]. Furthermore, there was no evidence that more training presentations caused more recognition, old items being selected on about 50% of the trials in all three cases: the differences between one versus three presentations, between three versus five presentations, and between one versus five presentations were not reliable [$F(1,14) = 0.00, 0.10$, and 0.22, respectively]. The difference between performance in this experiment and that in Experiment 2A is dramatic: When asked to examine the detail of the pictures, the subjects no longer demonstrated any sensitivity to the difference between factually old and novel test stimuli.

Experiment 2C was identical to Experiment 2B, except in the instructions about the oldness or newness of the items and the request to identify a changed part versus a globally similar picture. In this experiment, once-presented items were not selected above chance [$F(1,14) = 2.47$, $MS_e = 0.01$, $p > .138$], but three- and five-times presented items were [$F(1,14) = 16.62$, $MS_e = 0.01$, $p < .001$, and $F(1,14) = 13.73$, $MS_e = 0.01$, $p < .002$]. The difference between three and five presentations was not reliable [$F(1,14) = 0.53$], but the differences between one and three presentations and between one and five presentations were $F(1,14) = 6.47$, $MS_e = 0.01$, $p < .021$, and $F(1,14) = 6.77$, $MS_e = 0.01$, $p < .023$, respectively. Comparing the results of Experiments 2B and 2C, the subjects were more accurate in selecting the training item when asked to select the similar picture without justification. Comparing those experiments on trials in which the subjects had had five prior exposures, the subjects were 15% more likely to select the old item in Experiment 2C than in Experiment 2B [$F(1,29) = 10.17$, $MS_e = 0.18$, $p < .004$].

Thus, instructions encouraging analytic processing eliminated the subjects' sensitivity to the difference between new and old items, whereas instructions encouraging nonanalytic processing restored that sensitivity. We concluded that the perceptual and categorical differences between pictures within a test trial were not sufficient to produce the accurate recognition observed in Experiment 2A; instead, success in that task also required adoption of a nonanalytic processing strategy.

The difference in recognition success between Experiments 1B and 1C demonstrated that poor discrimination between new and old items is not an endemic problem associated with recognition testing after rapid presentation of training stimuli, even when those stimuli are taken from the same general categories. Instead, it depends on the strategy that people adopt to perform the recognition task. The difference in success between Experiments 1B and 2A demonstrated that people can spontaneously use either an analytic or a nonanalytic strategy to perform recognition; which they choose depends on the categorical relatedness of test items and their consequent family resemblance. However, that factor is not part of what is supposed to be interesting about the mere exposure effect. We concluded that the finding, reported by Seamon et al. (1983a), Kunst-Wilson & Zajonc (1980), Mandler et al. (1987), and others, that recognition may be at chance although liking judgments are influenced by prior presentation, does not reveal anything fundamental about the relationship between liking and recognition or about the relationship between implicit and explicit effects of memory. It simply demonstrates that, in performing recognition, people have the option of processing analytically or nonanalytically, that the choice is affected by people's understanding of the demands and possibilities of the current situation, and that when offered a choice between a poor alternative (use a weak feeling of familiarity to discriminate new from old) and a bad alternative (search for distinctive features, when they were rarely encodable), people may select the bad option, because it seems to offer the only hope for success in the required task.

GENERAL DISCUSSION

The finding that limited exposure to a stimulus can influence affective reactions without the subject's being able to recognize that stimulus has been interpreted by several investigators within the implicit/explicit memory dichotomy. For example, Seamon et al. (1995) demonstrated that stimulus duration and frequency can produce dissociations between recognition and preference. They concluded that the preference effect reflects implicit memory uncontaminated by explicit memory.

The implicit/explicit dichotomy divides performance into that which is based on a nonintentional, nonconscious influence of memory and that which is based on an intentional, conscious use of memory. We believe that it is a distinction that does more harm than good. It is a distinction made from the point of view of the consciousness of the subject, the consumer of memory's products, rather than from the point of view of the mechanisms of memory that produce those products. It is a consciousness-chauvinist description.

In the act of experiencing fluency of processing as pleasantness in a preference decision, the subject is unconsciously interpreting that fluency in terms of the dimension made salient by the task. The interpretation is based on an unconscious inference about the source of the perception of fluency. That inference is a misattribution, because it is based on the perception of a processing characteristic that is caused by prior exposure, a variable that is unrelated to the target dimension of pleasantness. However, it causes the person to become aware of what they intended to become aware of—namely, a value on the dimension of pleasantness. Similarly, in the act of experiencing fluency of processing as familiarity in a recognition decision, the subject is also unconsciously interpreting that fluency in terms of the dimension that is salient in that task. Again, the interpretation is based on an unconscious inference about the source of the perceived fluency. That inference is an appropriate attribution, because it is based on a processing characteristic that is related to the target dimension of oldness. It also causes the person to become aware of what they intended to become aware of—namely, a value on the dimension of oldness. The mechanism by which the person comes to a conscious appreciation of the salient dimension in these two cases is identical. The only difference is the appropriateness of the attribution: The former is an error, whereas the latter produces a subjective state that corresponds to the true source of the variation in fluency.

One might wish to think that the appropriateness of the attribution corresponds to an important distinction between pleasantness (an "indirect" measure of memory) and familiarity (a "direct" measure). But consider a recognition experiment in which fluency of processing the test item is also varied through a source other than prior experience, such as masked priming (Jacoby & Whitehouse, 1989), degree of masking (Whittlesea, Jacoby, & Girard, 1990), fragmentary presentation (Lindsay & Kelley, 1996), or semantic context (Roediger & McDermott, 1995; Whittlesea, 1993). In those cases, the subjects appropriately experience enhanced fluency resulting from prior exposure as familiarity. However, they also experience enhanced fluency resulting from the other source as familiarity, and that experience is also based on an unconscious inference about the source of the fluency. That inference causes the person to become aware of what they intended to become aware of—namely, a value on the dimension of oldness. However, it is an *inappropriate* attribution, because it is based on a variation of fluency that is not related to the target dimension of oldness.

Examining the attribution of fluency in this way, we believe that it is clear that the implicit/explicit memory distinction does not discriminate between any important aspects of the processing. Deliberate attempts to use memory to recognize an item are mediated by exactly the same unconscious processes as nonintentional, unaware use of prior experiences in performing a preference decision. The intentionality or unintentionality of the use of prior experiences and the correspondence between the feeling that the person eventually becomes aware of (a feeling of pleasantness or a feeling of familiarity) and the source of the fluency that they use to become aware of that feeling are not important factors in the processes that produce the eventual conscious feeling. Instead, in each case, the person becomes aware of some task to perform on some stimulus (judge it for oldness or for pleasantness). Unconsciously (nondeliberately), the person adopts a strategy for performing that task on that stimulus, processing it analytically or nonanalytically. Consequently, attention is brought to bear on either the stimulus as a whole or some selected part(s). The similarity of the selected unit to those in prior processing experiences will determine the fluency of processing that unit; prior experiences of processing a stimulus holistically will facilitate reprocessing that stimulus in the same way but will have less influence on processing its parts (MacLeod & Masson, 1997). The fluency with which the processing of the selected unit occurs is evaluated unconsciously; an unconscious inference is made about that fluency with respect to the target dimension. That unconscious inference is passed back to consciousness as a value on whatever dimension was made salient by the task, causing a feeling of familiarity or pleasantness. This process is no more direct or the product of deliberation in the case of "explicit" memory tasks than it is in "implicit" memory tasks.

The consciousness-chauvinism of the implicit/explicit dichotomy has been perpetuated by an emphasis on varying the characteristics of past experiences (frequency, elaborateness of processing, etc.) and observing the effects of these variations on remembering versus nonremembering activities. Consider, instead, a case in which we have worked out a number of the factors that cause a certain person to be pleased with some stimuli, such as shininess, expensiveness, and solidity, and in which we manipulate those factors in the context of both a pleasantness and a recognition judgment. We present a variety of items, bearing various combinations of these factors. Now we present a novel item that is designed to be highly pleasing to the person: It has values that are high on each of the relevant pleasantness dimensions. The person will surely judge it as pleasant, but they are also likely to judge it as old. We do the same with an item that is maximally unpleasant, resulting in the opposite attributions on both tests. The two test items are equally similar to the set of items that we exposed earlier: The effect on recognition judgments is thus not mediated by their relative similarity to past experiences. Instead, false recognition of the pleasant item is a misattribution of its desirability to prior experience: It is a case of "implicit pleasantness," an unconscious, nondeliberate use of desirability to make a recognition judgment.

We have written at this length about the implicit/explicit dichotomy because we see a real danger of reifying that construct as a principle of memory itself, rather than simply as a handy description of the subject's task. For example, in an otherwise completely admirable article, Seamon et al. (1995) write: "We conclude that although the mere exposure effect is the result of implicit memory for previously viewed stimuli, it is based on a different type of implicit memory representation than that which is responsible for object decision priming" (p. 720). In this way of describing the issue, we believe that two quite separate issues are becoming mixed up, memory as store and memory as use of that store. The first use of "implicit memory" in that sentence can be understood as referring simply to the fact that the subjects did not become aware of the source of influence on their behavior, which is an entirely appropriate comment. However, the second use of that term, "a different type of implicit memory representation," implies that there are two forms of memory stores or two types of knowledge that people can access, one implicitly and one explicitly, and furthermore, that there are subtypes of the implicit memory store, preserving different types of implicit knowledge. We are not sure that Seamon et al. meant to imply that there really are separate memory systems that are open to consciousness or not, but other authors certainly do (e.g., Schacter, 1990; Schacter, Cooper, Delaney, Peterson, & Tharan, 1991; Squire, 1992).

We argue that there is only one memory system, which preserves all experiences and is used in all tasks (see Whittlesea, 1997; Whittlesea & Leboe, 2000). It is never directly accessible by consciousness. As was argued earlier, the coming-to-mind of a feeling of familiarity for an old item in a recognition task is as indirect as the coming-to-mind of a feeling of pleasantness for that item in a preference task. It is not that one can actually become aware of one's past experiences in some circumstances, but not in others, or that those past experiences can influence one unconsciously in some circumstances, but consciously in others. Rather, the influence of prior experience is always unconscious. One sometimes develops the appropriate attitude that one's current processing is due to past experience when it is and sometimes develops the inappropriate attitude that one's current processing is due to the likeability of the object when it is not, but the development of the attitude and its appropriateness or inappropriateness do not reveal consciously accessible versus inaccessible representations in the memory store. The same representations may sponsor an appropriate conscious attitude on one occasion and an inappropriate conscious attitude on another, depending on the strategy used to interrogate them. The correspondence or lack of correspondence between the attitude and the actual source of fluent performance does not reveal two types of memory store but, rather, two types of outcomes of using a single store for two different purposes.

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NOTES

1. More accurately, the feeling of familiarity is based, not on the fluency per se, but on the discrepancy between the actual fluency of processing (enhanced by the prior experience of the item) and the fluency one could normatively expect to experience for that item (Jacoby & Whitehouse, 1989; Whittlesea & Williams, 1998, 2000, 2001a, 2001b).

2. In fact, re-generation of context may often be a more compelling or useful basis for making claims about the past than is use of the feeling of familiarity, but it is, in principle, no more secure. There have been numerous demonstrations of false recall (e.g., Johnson, Hashtroudi, & Lindsay, 1993; Lindsay & Read, 1994; Roediger & McDermott, 1995) in parallel to demonstrations of false feelings of familiarity (Jacoby & Whitehouse, 1989; Lindsay & Kelley, 1996; Whittlesea, 1993). Leboe and Whittlesea (2000) argue that both are heuristic activities and are based on the same principles of production and evaluation (see the SCAPE account, Whittlesea, 1997).

3. Of course, having seen TABLE might assist one on a later occasion to generate TABLE from the fragment TAB__. Furthermore, if one processed TABLE as TA-BLE in training and again in test, one would process it that way faster in test and could experience enhanced fluency in doing so. Our point is that the element TAB itself is not experienced as fluently processed as a consequence of having seen TABLE. Analytic processing at test that breaks a stimulus into isolated components that were not processed that way in training will prevent facilitation of processing the parts.

4. It is necessary to discriminate between analytic versus nonanalytic processing and global versus local processing. For example, both Schacter, Cooper, Delaney, Peterson, and Tharan (1991) and Seamon et al. (1995) presented old and new possible and impossible objects in a mere-exposure paradigm. The subjects in the study by Schacter et al. were required to make an impossible– possible decision or a recognition decision; Seamon et al. required, instead, a preference or recognition judgment. The possible–impossible judgment requires both global and analytic processing: The decision rests on the goodness of the relationship among all parts of the figure. In contrast, the preference decision may be based on global but nonanalytic processing: The impression one forms may be based on processing the stimulus as a whole, but the goodness of the structural relationships among particular parts is not at issue. However, analytic processing is not necessarily, or even usually, associated with global processing: It is characterized by a concern with the significance of parts, but not necessarily all of the parts. We suggest that the subjects in our Experiment 1B attempted to recognize stimuli by focusing selectively on salient parts, in isolation from other parts. Their processing would thus be characterized as analytic and local. In contrast, nonanalytic processing probably is usually associated with global processing, because its essence is not discriminating among parts. In encountering a stimulus without separately identifying, differentially weighting, or comparing its parts, people are likely to form an impression on the basis of their processing of the stimulus as a whole.

5. Showing people items drawn from a single category can also have the opposite effect. For example, Roediger and McDermott (1995) showed subjects a series of related items, such as BED, NIGHT, DREAM, and so forth. Following this training, their subjects produced high false recall and recognition of lures, such as SLEEP. This effect probably occurs because the novel target matches the training list on many semantic features, causing a false feeling of familiarity. In that case, unlike the mere exposure paradigm, the subjects perform the recognition decision on a nonanalytic basis (resulting in illusions of familiarity). The motive to do so is probably that that basis is so easy to use (the false-familiarity effect is strong).

6. We believe that both Experiments 1C and 2A involved nonanalytic processing. However, we also observed that five presentations of items in Experiment 2A resulted in 10% more accurate claims of recognition than in Experiment 1C [$F(1,36) = 10.745$, $MS_e = 0.01$, $p < .002$]. One major difference between the experiments was that the test items in Experiment 2A were perceptually distinct, whereas the items in Experiment 1C shared a family resemblance, as was described earlier. The greater accuracy of recognition in Experiment 2A might thus suggest that perceptually distinct items caused greater differences in fluency between new and old items. However, the items in Experiment 2A were not only perceptually distinct, but also members of different categories, with different names. In consequence, the subjects could also use the differential familiarity of the category names of the stimuli to claim recognition. That basis of judgment was not available to the subjects in Experiment 1C, in which all the items came from the same category. We eliminated that basis of judgment in Experiment 2C. In that experiment, pairs of test items were again perceptually distinct, but we (falsely) told the subjects that they had seen other items of the same category as both test items in the training phase. Given that understanding of the situation, the subjects could not use feelings of familiarity for the category labels to judge recognition. In that experiment, we observed no difference in accuracy from Experiment 1C [$F(1,33) = 0.51$]. We concluded that the difference in accuracy between Experiments 2A and 1C was due to the use of familiarity for the category labels and that sensitivity to prior experience through perceptual fluency per se was no greater when the pictures were of different categories than when they were of the same category.

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