

Mere Exposure: A Gateway to the Subliminal

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Abstract

In the mere-repeated-exposure paradigm, an individual is repeatedly exposed to a particular stimulus object, and the researcher records the individual's emerging preference for that object. Vast literature on the mere-repeated-exposure effect shows it to be a robust phenomenon that cannot be explained by an appeal to recognition memory or perceptual fluency. The effect has been demonstrated across cultures, species, and diverse stimulus domains. It has been obtained even when the stimuli exposed are not accessible to the participants' awareness, and even prenatally. The repeated-exposure paradigm can be regarded as a form of classical conditioning if we assume that the absence of aversive events constitutes the unconditioned stimulus. Empirical research shows that a benign experience of repetition can in and of itself enhance positive affect, and that such affect can become attached not only to stimuli that have been exposed but also to similar stimuli that have not been previously exposed, and to totally distinct stimuli as well. Implications for affect as a fundamental and independent process are discussed in the light of neuroanatomical evidence.

Keywords

affect; preference; mere exposure; classical conditioning

Preferences constitute one of the fundamental sources of social and individual stability and change. They give our lives direction and our actions meaning. They influence ideological values, political commitments, the marketplace, kinship structures, and cultural norms. They are sources of attachment and antagonism, of alliance and conflict. No species would evolve if it could not actively discriminate between objects, events, and circumstances that are beneficial and those that are harmful.

Preferences are formed by diverse processes. Some objects, by their inherent properties, induce automatic attraction or aversion. Sucrose is attractive virtually at birth, whereas bitter substances—quinine, for example—are universally aversive. Preferences may also be established by classical or operant conditioning. If a child is rewarded when she sits in a particular corner of the crib, that corner will become a preferred location for her. An office worker whose colleagues notice his new tie will develop a preference for similar ties. Preferences can also be acquired by virtue of imitation, a social process that emerges in fashions. Preferences also arise from conformity pressures. In economics, preference is regarded as the product of rational choice—a deliberate computation that weighs the pros and cons of alternatives.

But among the many ways in which preferences may be acquired, there is one that is absurdly simple, much simpler than rational choice. I discuss here this very primitive way—conscious and

unconscious—of acquiring preferences, namely, the mere repeated exposure of stimuli, and I explain the process whereby repeated exposure leads to the formation of preferences.

THE MERE-REPEATED-EXPOSURE PHENOMENON

The repeated-exposure paradigm consists of no more than making a stimulus accessible to the individual's sensory receptors. There is no requirement for the individual to engage in any sort of behavior, nor is he or she offered positive or negative reinforcement. The exposures themselves are sometimes so degraded that the individual is not aware of their occurrence. Their effects are measured by the resulting changes in preference for the object. In contradiction to some early contentions (Birnbau & Mellers, 1979; Lazarus, 1982), it can now be claimed that no cognitive mediation, rational or otherwise, is involved in these effects.

It is well known that words with positive meanings have a higher frequency of usage than words with negative meanings (Zajonc, 1968). The relationship holds over all parts of speech. Not only is *good* (5,122 occurrences in a random sample of 1,000,000 English words) more frequent than *bad* (1,001), and *pretty* (1,195) more frequent than *ugly* (178), but also *on* (30,224) is more frequent than *off* (3,644), *in* (75,253) is more frequent than *out* (13,649), and even *first* (5,154) is more frequent than *last* (3,517). In fact, the words in nearly every semantic category, and even letters and numbers, show a strong correlation between ratings for preference and frequency of usage, and not only words but all kinds of stimuli have been found to increase

in attractiveness with repeated exposures. This seemingly innocent finding (Zajonc, 1968) has stimulated decades of research on the relation between cognition and affect.

Obviously, the first question to ask is that of causality, that is, whether we are more likely to seek out positive than negative experiences, and therefore favor positive stimuli, or whether aspects of the world that we experience often acquire thereby positive valence. The finding that frequently occurring numbers and letters are better liked than less frequent numbers and letters favors the latter possibility. It has been demonstrated that the mere repeated exposure of a stimulus is entirely sufficient for the enhancement of preference for that stimulus. This mere-repeated-exposure effect is found in a variety of contexts, for a wide assortment of stimuli, using diverse procedures, and among both humans and nonhuman animals. In the extreme, an exposure effect was obtained prenatally (Rajecki, 1974). Tones of two different frequencies were played to two sets of fertile chicken eggs. When the hatched chicks were then tested for their preference for the tones, the chicks in each set consistently chose the tone that was played to them prenatally. Similarly, one group of rats was exposed to music by Schönberg and another to music by Mozart to see if they could acquire corresponding preferences. They did, slightly favoring the latter composer. And Taylor and Sluckin (1964) found that domestic chicks that were exposed either to their conspecific age peers or to a match-box preferred the object to which they were previously exposed.

The earliest explanation of the effect was offered by Titchener. It proposed a virtual tautology, namely, that we like familiar objects because we enjoy recognizing familiar objects. But Titchener's hypothesis had to be rejected because in nu-

merous studies, the enhancement of preferences for objects turned out not to depend on individuals' subjective impressions of how familiar the objects were (Wilson, 1979).

SUBLIMINAL INDUCTION OF AFFECT

The cumulative results lead to the inescapable conclusion that the changes in affect that accompany repeated exposures do not depend on subjective factors, such as the subjective impression of familiarity, but on the objective history of exposures (Zajonc, 2000). Even when exposures are subliminal, and subjects have no idea that any stimuli at all have been presented, those subliminal stimuli that are flashed frequently are liked better than those flashed infrequently (Murphy, Monahan, & Zajonc, 1995; Zajonc, 1980).² In fact, exposure effects are more pronounced when obtained under subliminal conditions than when subjects are aware of the repeated exposures.

ABSENCE OF AVERSIVE EVENTS AS AN UNCONDITIONED STIMULUS

Careful experiments have ruled out explanations of this phenomenon based on ease of recognition, an increased perceptual fluency, or subjective familiarity. But mere-exposure effects cannot take place in a total vacuum. What, then, is the process that induces preferences by virtue of exposures? One possibility that cannot be ruled out is that we have here a form of conditioning, unique to be sure, but nevertheless a form that features the essential conditioning factors. The classical paradigm of classical conditioning requires that the conditioned stimulus (CS) be followed

by an unconditioned stimulus (US), preferably within 500 ms. The paradigm also requires that this joint occurrence be repeated several times in very much the same form. It is taken as given that the US has an innate capacity of eliciting the unconditioned response (UR). Thus, a dog will salivate (UR) when presented with food (UC), and if a bell is rung (CS) during the dog's feeding time, then after several repetitions of this joint event, the bell alone will make the dog salivate. The elicitation of salivation by the bell alone is evidence that conditioning has been successful, and salivation has become a conditioned response (CR). Although the connection between the response and the US is innate, the new relationship between the CS and the CR is acquired.

In the mere-repeated-exposure paradigm, the repeatedly exposed stimuli can be viewed as CSs. We can also think of the preference response as the CR. But where is the US? The mere-exposure paradigm requires that no positive or negative consequences follow exposures. And no response other than maintaining sensory access to the exposed stimulus is required of the participant. But just because the experimenter does not provide a US does not mean that there is no event that, from the point of view of the participant, could constitute a US. In fact, there is such an event. Contiguous with exposures (i.e., the presentations of the CS) are events characterized by a conspicuous absence of noxious or aversive consequences. Hence, the very absence of a noxious consequence could well act as a US. The absence of aversive consequences constitutes a safety signal that is associated with the CS. As in classical conditioning, after several CS-US occurrences, in which the US is simply the fact that the individual does not suffer any untoward experiences, the CR—an approach

tendency—becomes attached to the CS, now communicating that the current environment is safe.

On the initial presentations, when the stimulus is novel, both avoidance and approach responses are elicited, and the tendency to explore (approach) is tentative. But because the aftermath of the CS is invariably benign, avoidance and escape drop out to leave only approach responses. It is thus that positive affect can be attached to a stimulus by virtue of mere repeated exposures. Some forms of imprinting (Zajonc, 2000) can be conceptualized in the very same manner.

REPEATED EXPERIENCES AS A SOURCE OF POSITIVE AFFECT

How can we inquire into the dynamics of this conditioning paradigm in which even the CS is inaccessible to awareness and the very presence of the US is a matter of conjecture? We can assume that the absence of an aversive event that engenders approach behavior to the exposed object generates positive affect. Therefore, because a condition such as an absence of an aversive event is diffuse and unattached to any particular object in the immediate environment, not only should the exposed object become more attractive, but the overall affective state of the individual should become more positive. We should expect an enhancement of the individual's general affect and mood state just by virtue of the repeated exposures themselves. Monahan, Murphy, and I (Monahan, Murphy, & Zajonc, 2000) inquired into the effects of sheer stimulus repetition by subliminally exposing two groups to Chinese ideographs. One group was exposed to 5 ideographs, five times each in random order. The other group was exposed to 25 different

ideographs, each shown but once. All exposures lasted 4 ms. Following the exposures, the participants in the repeated-exposures condition were in better moods and felt more positive than the participants who were exposed to 25 different ideographs.

Thus, repetitions of an experience in and of themselves are capable of producing a diffuse positive affective state. And if that is one of the consequences of repeated exposures, then the changed mood, although diffuse and unspecific, could well become attached to stimuli that are presented just afterward. Previous research has demonstrated that repeated exposures enhance preferences for the exposed stimuli. The exposures can also generate positive affect in response to additional stimuli that are similar in form or substance—even though they were not previously exposed. But if the affect generated by repetition of exposures is diffuse, and nonspecific, then any stimulus, if it follows a benign repetition experience, would become infused with positive affect. In a new experiment (Monahan et al., 2000), we again presented 5 stimuli five times each to one group of participants and 25 different stimuli once each to another group. Afterward, however, instead of measuring the participants' overall mood, we asked them to rate three categories of stimuli: Chinese ideographs that were previously shown, Chinese ideographs that were similar to those previously shown but novel, and totally distinct stimuli—random polygons. In all cases, the group that was exposed to repeated ideographs rated the stimuli more positively than the group exposed to 25 ideographs one time each. Also in all cases, the ratings of the repeated-exposure group were more positive than those obtained from a control group that had not experienced any prior exposures of the stimuli (see Fig. 1).

THE INDEPENDENCE OF AFFECT AND COGNITION

This array of findings supports not only the proposition that affect may be elicited without a prior cognitive appraisal, but also the contention that affect and cognition may well be independent processes, because in the context of exposure effects, prototypical cognition is measured by recognition memory, whereas prototypical affect is measured by preference judgments. (For a more detailed discussion of the distinction, see Zajonc, 2000, pp. 46–47.) When I first published this hypothesis (Zajonc, 1980), claiming that affective reactions may precede cognitive reactions, and thus require no cognitive appraisal, there was no neuroanatomical or neurophysiological evidence to support it. Eventually, however, LeDoux (1996); Zola-Morgan, Squire, Alvarez-Royo, and Clower (1991); and other investigators published results confirming the original hypothesis that affect and cognition, although participating jointly in behavior, are separate psychological and neural processes that can be influenced independently of one another. Especially important is the work of Zola-Morgan and his colleagues, who have conducted experiments with monkeys, showing that lesions to the amygdala (a brain structure that is responsive to affective qualities of stimulation) impair emotional responsiveness but leave cognitive functions intact, whereas lesions to the hippocampus (a brain structure that plays an important role in memory) impair cognitive functions but leave emotional responsiveness intact.

Other neuroanatomical studies have confirmed that affect can be induced unconsciously. Thus, Elliott and Dolan (1998), taking PET (positron emission tomography)

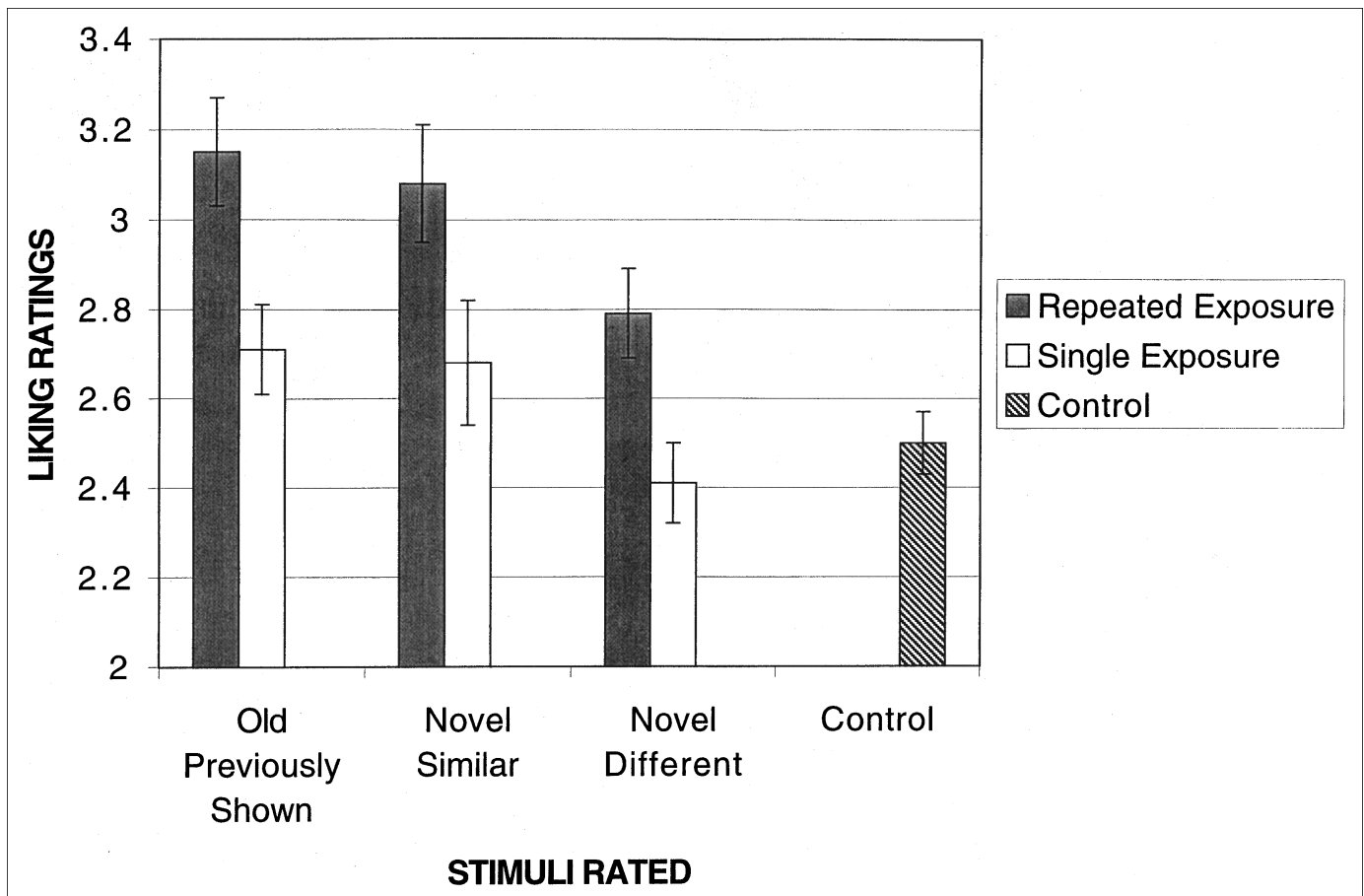


Fig. 1. Preferences for diverse stimuli as a function of exposure condition (adapted from Monahan, Murphy, and Zajonc, 2000).

measures, examined preference acquisition as a function of subliminal repeated exposures and inquired into the neuroanatomical correlates of these effects. They found that different regions of the brain were activated during subjects' affective reactions and memory judgments. Recognition judgments were localized in the frontopolar cortex and the parietal areas, whereas preference reactions showed right lateral frontal activation. This finding that recognition and preference are associated with different brain structures further supports the hypothesis that cognition and affect are independent systems.

Given the independence of affect, we can explain why it is that repeated-exposure effects are clearer and stronger when the ex-

posures are subliminal than when subjects are aware of them. If a given process depends on cognitive appraisal, different individuals will access different cognitive content and attach different meanings to the same stimuli. Hence, the between-participants variability in reactions will be increased. If cognitive processes are not involved in a behavior, however, affective influences, which are necessarily less diverse than cognitive influences, will dominate the behavior, yielding a more homogeneous array of reactions.

CONCLUSION

The mere-exposure effect, when viewed as classical conditioning

with the US consisting of the absence of aversive consequences, is a very simple yet effective process for acquiring behavioral tendencies of adaptive value. The mere-exposure effect provides a flexible means of forming selective attachments and affective dispositions, with remarkably minimal investment of energy, even when exposures are not accessible to awareness.

The consequences of repeated exposures benefit the organism in its relations to the immediate animate and inanimate environment. They allow the organism to distinguish objects and habitats that are safe from those that are not, and they are the most primitive basis of social attachments. Therefore, they form the basis for social organization and cohesion—the basic

sources of psychological and social stability. Imprinting effects manifest substantial permanence. It remains to be demonstrated, however, how permanent are preferences induced by mere repeated exposures, under supra- and subliminal conditions. It is also not yet known if repeated-exposure effects are more readily established in younger than in older organisms, and what processes can reverse or extinguish them.

Recommended Reading

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Acknowledgments—I am grateful to Hazel Markus for her helpful suggestions.

Notes

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2. The fact that the stimuli were actually below participants' awareness was tested by a forced-choice method developed by Eriksen (1980).

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