

**MERE EXPOSURE: AN UNMEDIATED PROCESS**

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AN UNMEDIATED PROCESS**

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*Abstract*

The mere repeated exposure paradigm involves repeated exposures of a particular stimulus object and observes the emerging preference for that object. It is claimed here that the resulting preferences are direct and unmediated. Vast literature on the mere repeated exposure effects shows it to be a robust phenomenon that cannot be explained by an appeal to recognition memory or perceptual fluency. These effects are valid across cultures, species, and diverse stimulus domains. They have been obtained even when the stimuli exposed were not accessible to the participants' awareness, even prenatally. The mere 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 repetition experience can *in and of itself* enhance positive affect, and that such affect can become attached not only to stimuli exposed but to similar but previously not exposed stimuli, and to stimuli totally distinct as well. Implications for affect as a fundamental and independent process are discussed in the light of neuro-anatomical evidence.

The cognitive revolution of the past four decades exerted an enormous influence not only on what we investigate but how we do it. In particular, cognitive processes came to be regarded as the major mediators of most significant psychological phenomena. For example, emotional reactions must be mediated by cognitive appraisal (Lazarus, 1982), social phobias are mediated by perceived self-efficacy, and aggression instigated by frustration is mediated by perceived provocation. As of this writing, there are in *PsychINFO* 6441 references to MEDIATION. There are also 6086 references to IMPLICIT, a term that connotes a intervening process but one of which the participant is not aware. There is thus implicit memory, implicit attitude, implicit learning, implicit perception, implicit knowledge, and several others. More recently, neural processes have joined the explanatory arsenal of psychology, but it is yet to be determined whether they are mainly mediators, causes, correlates, or effects.

An overzealous and indiscriminate commitment to mediators, however, may end up in Zeno's paradox, because if a factor  $z$  mediates between  $x$  and  $y$ , then surely there will be mediators between  $x$  and  $z$ , between  $z$  and  $y$ , and so on ad infinitum. Some forms of mediation, of course, are useful or necessary, but a knee-jerk appeal to mediators may introduce unwanted complexity, even indeterminacy.

### **THE MERE REPEATED EXPOSURE PHENOMENON**

A phenomenon of substantial generality and of fundamental significance -- the mere repeated exposure effect -- is, I will show, an unmediated process. The repeated exposure paradigm consists of no more than making a stimulus object accessible to the individuals' sensory receptors, without requiring that the individual engage in any sort

of behavior, and without offering positive or negative reinforcement. The exposures themselves are sometimes so impoverished that the individual is not aware of their occurrence. Their effects are measured by the resulting changes in preference for the object or approach behavior. In contradiction to some early contentions (Birnbaum & Mellers, 1979; Lazarus, 1982), it can now be claimed on the basis of more recent evidence that no mediation is involved in these effects.

It might be useful in this context to delve into some history of the mere repeated exposure effect. More than three decades ago I had the occasion of consulting *The teacher's word book of 30,000 words* (Thorndike & Lorge, 1944) for the purpose of selecting stimuli that could be equated for frequency of usage. In working with the material, I noticed a particular uniformity: words with positive meanings had typically a higher frequency of usage. The relationship held over all lexical forms. Not only was GOOD (5122 in 1,000,000) more frequent than BAD (1001), PRETTY (1195) more frequent than UGLY (178), but also ON (30224) was more frequent than OFF (3644), IN (75253) more frequent than OUT (13649), and even FIRST (5154) more frequent than LAST (3517). In fact, nearly any semantic category, even letters and numbers, when ordered according to their frequency of usage showed a strong correlation with rated or ranked preferences. This relationship between ambient frequency and favorability turned out to be present in a variety of domains, showing consistent correlations above .8 between log frequency and favorability (Zajonc, 2000). And this seemingly innocent finding, it turned out, produced far reaching theoretical and empirical consequences for the

relative roles of cognition and emotion in behavior, and, as we shall see, for the nature of classical conditioning.

Obviously, the first question to ask was that of causality, that is, whether we are more likely to seek out positive experiences, and therefore favor positive stimuli, or whether aspects of the world that we experience often acquire positive valence. In a series of experiments we and others have demonstrated that the mere repeated exposure of a stimulus is a sufficient condition for the enhancement of affective disposition to that stimulus, *requiring no mediation*. This mere repeated exposure effect is found in a variety of contexts, for a wide assortment of stimuli, diverse procedures, among human and animal populations. In the extreme, an exposure effect was obtained prenatally (Rajecki, 1974). Tones of different frequencies were played to two sets of chicken eggs for several days before hatching. After hatching, the chicks were tested for their preference for the tones, choosing consistently the tone that was played to them prenatally. Rats were exposed to music by Schönberg or Mozart to see if they could acquire corresponding preferences. They did, slightly favoring the latter composer. Cairns (1966) exposed puppies to their conspecifics or to a television set finding that exposures produced the same level of attraction to both objects. And Taylor and Sluckin (1964) found that domestic chicks after exposures to their conspecific age peers or to a match box approached a conspecific and a match box equally often and for the same duration. The literature clearly shows that the exposure effect is a robust phenomenon, universal among cultures and among species.

The earliest explanation of the effect offered by Titchener assumed a mediation, nearly tautological, that we like familiar objects because we enjoy recognizing familiar objects. But Titchener's hypothesis had to be rejected because in numerous studies, the enhancement of preferences for objects turned out not to depend on their subjective familiarity, nor even on the ease with which they could be recognized (e.g., Moreland & Zajonc, 1979). At the theoretical level, we would expect that if the  $x \rightarrow y$  relationship is mediated by  $z$ , then there should be greater error variance in the calculated  $x \rightarrow y$  relationship than in the  $x \rightarrow z \rightarrow y$  relationship. Moreland and Zajonc (1979), however, have found just the opposite: the error variance for the exposure  $\rightarrow$  recognition  $\rightarrow$  preference was twice the error variance for the exposure  $\rightarrow$  preference relationship (p. 1088). Finally, if the exposure effect was mediated by other factors we would not expect the kind of consistency and clarity of results that experiments on exposure typically generate.

### **SUBLIMINAL INDUCTION OF AFFECT**

The cumulative results lead to the inescapable conclusion that changes in affect with repeated exposures do not depend on subjective factors, e.g., subjective impression of familiarity, but on the objective history of exposures (Zajonc, 2000). Even when exposures are reduced to subliminal levels, and even when subjects has no idea that any stimuli at all were presented, those subliminal stimuli that were repeated are liked better than those flashed infrequently (Murphy, Monahan, & Zajonc, 1995; Zajonc, 1980). No stimuli actually presented in these experiments have been identified by participants as

having been exposed. In fact, exposure effects are more pronounced when obtained under subliminal conditions.

### **ABSENCE OF AVERSIVE EVENTS AS AN UNCONDITIONED STIMULUS**

Carefully carried out experiments rule out explanations based on ease of recognition, perceptual fluency, or subjective familiarity, all virtually tautological mediators. But mere exposure effects cannot take place in total vacuum. What then is the dynamic process that is taking place? 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 (UCS), preferably within 500 msec. The paradigm also requires that this joint occurrence be repeated several times in very much the same form. It is taken as given in this context that the UCS has an innate capacity of eliciting the unconditioned response (UCR). Thus, when a bell is rung during a dog's feeding time, then after several repetitions of this joint event the bell alone will make the dog salivate. Because the response elicited by the bell alone is not quite like its innate parallel, it is conceived of as a conditioned response (CR). While the connection between the response and the UCS is innate and given, the new relationship between the CS and the CR is acquired.

In the mere repeated exposures paradigm, the repeatedly exposed stimuli can be viewed as CS's. We can also think of the preference response as the CR. This CR is analogous to the UCR which is elicited in the form of an exploratory tendency evoked

in the absence of threat. But where is the UCS? The mere exposure paradigm requires that no positive or negative consequences follow exposures. And no response other than attending to the exposed stimulus is required of the participant. But just because the experimenter does not provide a UCS, it does not mean that there is no event -- in particular, an endogenous event -- that, from the point of view of the participant, could constitute a UCS. In fact, there is such an event. Following exposures, i.e., the presentations of the CS, are events characterized by a conspicuous *absence* of a noxious or aversive consequences. Hence, the very *absence* of a noxious consequence could well act as a UCS. As in classical conditioning, after several joint CS/UCS occurrences, where the UCS is simply the fact that individual did not suffer any untoward experiences, CR -- an approach tendency -- becomes attached to the CS. On the initial presentations, when the stimulus is novel, both avoidance and approach responses are recruited, and exploratory tendency is tentative. But because the aftermath of the CS is exclusively benign, avoidance responses drop out to leave only approach responses. It is thus that positive affect to a stimulus can be obtained by virtue of mere repeated exposures. Some forms of imprinting (Zajonc, 2000), especially other than those involving filial attachment, 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 in which the very presence of the UCS is a matter of conjecture? We can assume that the absence of an aversive event that conditions approach behavior to the exposed object can be viewed as generating

positive affect. Therefore, because a condition such as an absence of an aversive event is diffuse and undedicated, 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 Zajonc (2000, in press) have thus inquired into the effects of sheer stimulus repetition. Two groups of participants were subliminally exposed to Chinese ideographs (stimuli neutral and novel to all of them). One group was exposed to five ideographs, five times each in random order. The other group was exposed to 25 Chinese ideographs, each shown but once. All exposures were at 4 msec. Following the exposures, the participants were not asked about their affective disposition to the particular stimuli, but instead measures of their overall mood were obtained. The participants in the repeated exposures condition were in better mood and felt more positively.

We can conclude that repetitions of an experience are *in and of themselves* capable of producing a diffuse and gross positive affective state. And if that is one of the consequences of repetition of exposures, then we can expect another effect: the changed mood, while gross, diffuse, and undedicated, could well become attached to stimuli that are presented just afterwards. We do know from previous research that following exposures the attitudes toward the exposed stimuli is enhanced. We suspect from previous research that following exposures of a set of stimuli, positive affect can also be generated to stimuli that were previously not exposed but are similar in form or substance. An even further conjecture suggests itself. If the affect generated by

repetition of exposures is diffuse, gross, and temporarily undedicated, then *any* stimulus, if it follows a “benign repetition experience” would become infused with positive affect. Thus, the first part of the previous experiment was replicated but instead of subsequently 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 stimuli totally distinct -- 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 each but once. And in all cases the ratings were above those obtained from a control group which was not primed with any prior exposures.

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Figure 1 here

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### **AFFECT AS INDEPENDENT OF COGNITION**

This array of findings supports not only the proposition that affect need not be mediated by cognitive appraisal but the contention that and cognition may well be independent process. When I first published this hypothesis (Zajonc, 1980), claiming that affect may have temporal primacy over cognition, there was no neuro-anatomical or neuro-physiological evidence to support it. Eventually, however, LeDoux (1996) and Zola-Morgan, Squire, Alvarez-Royo, & Clower (1991) published results confirming the original hypothesis that affect and cognition, although participating jointly in behavior, are separate psychological and neural processes which can be influenced independently

of one another. Especially important was the work of Zola-Morgan and his colleagues who have shown that, in monkeys, lesions to the amygdala impair emotional responsiveness leaving cognitive functions intact, whereas lesions to the hippocampus impair cognitive functions while leaving emotional responsiveness intact. And LeDoux (1996) has demonstrated that the sensory thalamus-amygdala pathway has fewer synapses than the pathway from the sensory thalamus to the hippocampus. This configuration allows the amygdala response to occur 40 msec faster than in the hippocampus, supporting the affective primacy hypothesis.

Another set of neuro-anatomical studies confirm other aspects of the processes of unconscious induction of affect. Thus, Elliott and Dolan (1998), taking PET (Positron Emission Tomography) measures, replicated the Kunst-Wilson/Zajonc study of 1980. The stimuli were presented subliminally. Yet significant affective changes resulting from repeated subliminal exposures were obtained in the absence of stimulus recognition. Elliott and Dolan also found different sites for 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.

These findings taken together allow considerable certainty in the proposition that emotions can be evoked without the participation of cognition. Under some, perhaps many, circumstances affect might be the earliest process in the response chain. More important implications follow as well. The concept of affective primacy makes greater evolutionary sense than cognitive primacy, for in contrast with cognition,

affective capacities can claim phylogenetic and ontogenetic priority and generality. Because emotional responses can be evoked with a minimum participation of symbolic processes, their primacy has a significant adaptive value especially when reactions of extremely short latencies, such as escape, are required. For non-symbolic species such an arrangement is a matter of survival and extinction.

Given the independence of affect, we can also explain why is it that subliminal exposure effects are clearer and stronger. For if a given process depends on the participation of cognitive appraisal, different individuals will access different cognitive content and the meanings of the stimuli will be diverse. Hence, the between-participant variability will be increased. In the absence of cognitive processes, affective influences which are necessarily less diverse will dominate behavior, yielding a more homogeneous array of reactions.

## CONCLUSION

The mere exposure effect, when viewed as classical conditioning with the unconditioned stimulus consisting of absence of aversive consequences, make for a very simple yet effective unmediated acquisition process of *fundamental* adaptive value. For the mere exposure effects provide for a flexible means of forming selective attachments and affective dispositions, achieved with remarkably minimal investment of energy. The consequences of the repeated exposures benefit the organism in its relations to the immediate animate and inanimate environment. They allow the organism to distinguish among objects and habitats that are safe from those that are not, and at the level of

collectivities, because they are the most primitive basis of social attachments, they form the basis for social organization and cohesion.

## References

Birnbaum, M. H., & Mellers, B. A. (1979). Stimulus recognition may mediate exposure effects. *Journal of Personality and Social Psychology, 37*, 1090-1096,

Cairns, R. B. (1966). Attachment behavior in mammals. *Psychological Review, 73*, 409-426.

Elliott, R., & Dolan, R. J., (1998). Neural response during preference and memory judgments for

Kunst-Wilson, W. R., & Zajonc, R. B. (1980). Affective discrimination of stimuli that cannot be rec

Lazarus, R. S. (1982). Thoughts on the relations between emotion and cognition.

*American Psychologist, 46*, 352-367.

LeDoux, J. (1996). *The emotional brain*. New York: Simon and Schuster.

Monahan, J. L., Murphy, S. T., & Zajonc, R. B. (2000). Subliminal mere exposure: Specific, general and diffuse effects. *Psychological Science* (In press).

Moreland, R. L., & Zajonc, R. B. (1979). Exposure effects may not depend on stimulus recognition. *Journal of Personality and Social psychology, 37*, 1085- 1089.

Murphy, S. T., Monahan, J. L., & Zajonc, R. B. (1995). Additivity of nonconscious affect: Combined effects of priming and exposure. *Journal of Personality and Social Psychology, 69*, 589-602.

Rajecki, D. W. (1974). Effects of prenatal exposure to auditory or visual stimulation on postnatal distress vocalizations in chicks. *Behavioral Biology, 11*, 525-536.

Taylor, K. F., & Sluckin, W. (1964). Flocking in domestic chicks. *Nature, 201*, 108- 109.

Thorndike, E. L., & Lorge, I. (1944). *The teacher's wordbook of 30,000 words*. New York: Teachers College, Columbia University.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35*, 151-175.

Zajonc, R. B. (2000). Feeling and thinking: Closing the debate over the independence of affect. In J. P. Forgas (Ed.) *Feeling and thinking: The role of affect in social cognition*. Cambridge: Cambridge University Press.

Zola-Morgan, S., Squire, L. R., Alvarez-Royo, P., & Clower, R. P. (1991).

Independence of memory functions and emotional behavior. *Hippocampus, 1*, 207-220.

## Recommended Readings

Bornstein, R. F., Leone, D. R., & Galley, D. J. (1987). The generalizability of subliminal mere exposure effects: Influence of stimuli perceived without awareness on social behavior. Journal of Personality and Social Behavior, 53,

Harrison, A. A. (1977). Mere exposure. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol. 10). New York: Academic Press.

Jacoby, L. L. (1983). Perceptual enhancement: Persistent effects of an experience.

Journal of Experimental Psychology: Learning, Memory, and Cognition, 9, 21-38.

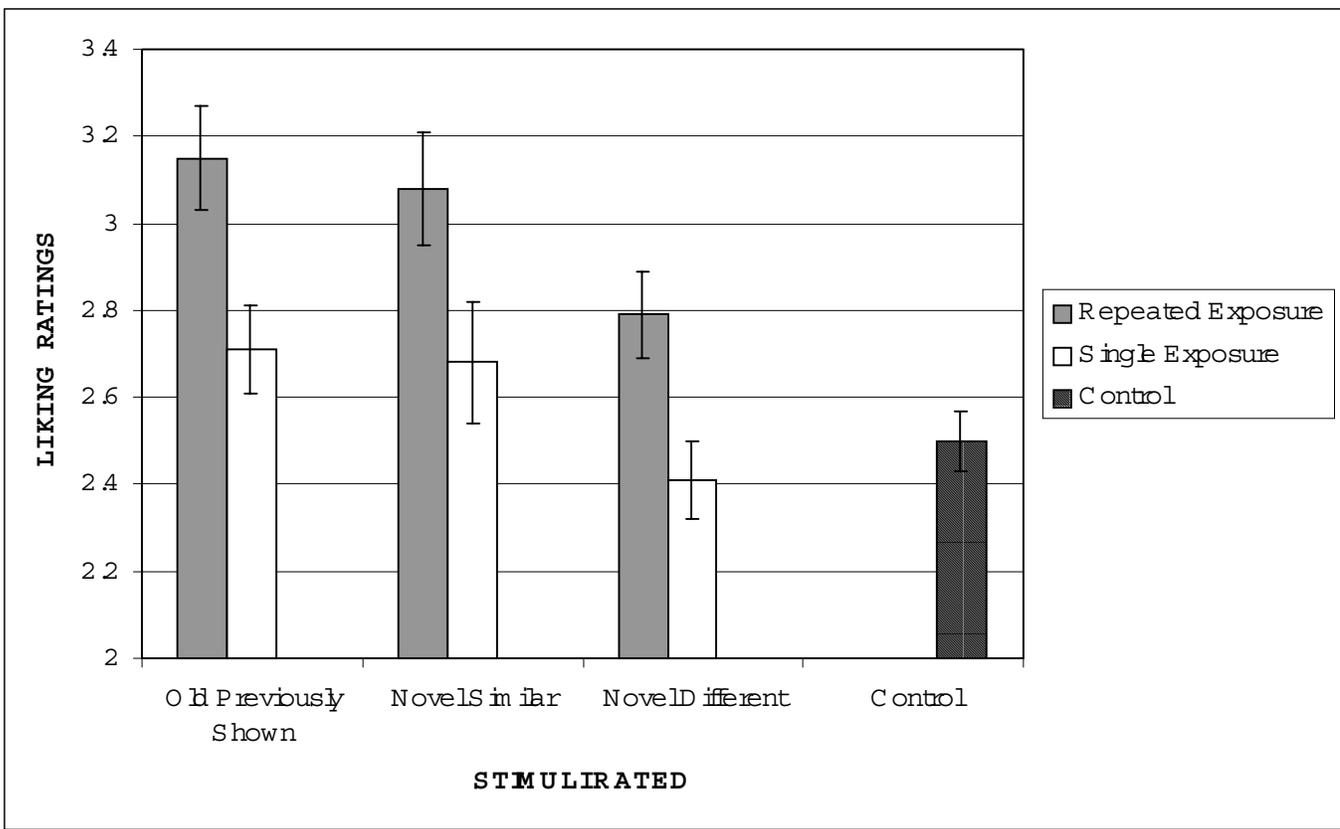


Figure 1. Preferences for diverse stimuli as function of exposure conditions (from Monahan, Murphy, and Zajonc, 2000).

## Notes

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