15 Mere exposure effect

Robert F. Bornstein and Catherine Craver-Lemley

Folk wisdom tells us that “familiarity breeds contempt”, but studies suggest otherwise. Beginning with the work of Titchener (1910), psychologists have been intrigued by the possibility that repeated, unreinforced exposure to a stimulus would result in increased liking for that stimulus. Zajonc (1968) coined the term mere exposure effect (MEE) to describe this phenomenon, and since the publication of Zajonc’s seminal (1968) paper, there have been more than 400 published studies of the MEE. The MEE occurs for a broad array of stimuli (e.g., drawings, photographs, musical selections, real words, nonsense words, ideographs) under a variety of laboratory and real-world conditions. Bornstein’s (1989) meta-analysis of research on the MEE indicated that the overall magnitude of the effect (expressed in terms of the correlation coefficient $r$) was 0.26, a medium effect size. Subsequent investigations have confirmed this result (e.g., Gillebart et al., 2012; Inoue et al., 2018; Monahan et al., 2000; Seamon et al., 1998).

Without question, repeated exposure to a stimulus biases our attitude regarding that stimulus: Even though the stimulus itself remains the same, the way we think and feel about the stimulus changes as we become familiar with it (see Chapter 14 for a related discussion). In this respect, researchers agree that the MEE represents a form of cognitive bias. But is it a genuine cognitive illusion? Is our attitude regarding a repeatedly exposed stimulus changed so profoundly that we can no longer perceive and judge the stimulus accurately, no matter how much effort we devote to the task? Several decades of research can help us resolve this question.

Examples

There are numerous everyday instances of increased liking following repeated exposure to a stimulus. As these examples illustrate, not only does repeated exposure affect our attitude regarding a stimulus, but the process is so subtle that in most cases we are unaware that mere exposure played a role in altering our judgments and feelings.

Repetition and liking for music

MEE experiments have shown that repeated exposure to unfamiliar music leads to more positive ratings of this music (Aboukoumin, 2018; Moreland & Topolinski, 2010). Similar patterns emerge in real-world settings: The impact of repeated exposure on music sales is so strong that it is often illegal (and always unethical) for radio and internet hosts to accept...
any sort of compensation from music companies, for fear that this will bias song selection and produce an exposure-induced spike in sales.

**Exposure and preference for novel types of art**

When Impressionist paintings were first displayed publicly, they received scathing reviews. The same thing occurred when Cubist and Expressionist works first appeared. An initial negative reaction occurs almost any time a new art form emerges, but over time – and with repeated viewings – aesthetic judgments shift, and attitudes regarding the now-familiar style become more positive. What was once despised is now embraced.

**Unfamiliar people**

To a surprising degree, we affiliate with people we encounter most frequently. This is why first-year college students’ friendship patterns are determined in part by housing proximity, and why our attitudes regarding other morning commuters become more positive over time (even if we never exchange a word with the fellow traveler). Mere exposure to an unfamiliar person enhances our attitude toward that person.

**Relevance**

The most obvious applications of MEE principles are in product sales, and marketing researchers have incorporated findings from mere exposure research into a number of contemporary advertising programs (Ruggieri & Boca, 2013; Yagi & Inoue, 2010). Along similar lines, studies suggest that frequency of exposure is a significant determinant of the number of votes garnered by a candidate for elected office, even when other factors (e.g., popularity of the candidate’s policy positions) are controlled for statistically (Bornstein, 1989). The impact of repeated exposure on election outcome is not just statistically significant, but ecologically significant as well: The 5–10% shift in voting behavior attributable to candidate familiarity is enough to alter the outcome of many real-world elections.

Another important application of MEE principles and methods concerns intergroup behavior, with psychologists investigating the degree to which repeated, unreinforced exposure could enhance the attitudes of different groups toward each other. Findings in this area have been mixed: Although mere exposure can enhance the attitudes of unfamiliar groups, it does not produce a parallel effect – and sometimes even leads to increased tension and conflict – in groups who have initial negative attitudes. History is replete with examples of neighboring groups for whom decades of exposure have only heightened hostility (e.g., Israelis and Palestinians). Consistent with this pattern, Flores et al. (2018) found that mere exposure to photographs of transgender adults enhanced participants’ attitudes regarding members of this group – but only for participants whose attitudes regarding transgender individuals were initially neutral or positive.

**Research methods**

**Designs**

MEE studies use two types of designs: naturalistic and experimental. Each has certain advantages and certain disadvantages as well.
Naturalistic designs

Naturalistic MEE studies examine the relationship between the naturally occurring frequency of a stimulus and people’s attitudes regarding that stimulus. Thus, common names receive more positive liking ratings than do uncommon names, and familiar foods are rated more positively than unfamiliar ones (Bornstein, 1989). The primary advantage of a naturalistic design is that it provides a good approximation of naturally occurring MEEs. The primary disadvantage of a naturalistic design is that it does not allow firm conclusions to be drawn regarding causal relationships between exposure and affect: It may be that common names become better liked because people are exposed to them more frequently, but it is also possible that people are inclined to give their children names that are popular to begin with.

Experimental designs

In experimental MEE studies, participants are exposed to varying numbers of exposures of unfamiliar stimuli, after which they report how much they like each stimulus. Most experimental studies of the MEE use a within-participants design, so each person is exposed to an array of stimuli at different frequencies. For example, a participant might rate six different stimuli, with each stimulus having been exposed 0, 1, 2, 5, 10, or 20 times during the familiarization phase of the study. In these investigations affect ratings typically become more positive with increasing exposure frequency, leveling off between 10 and 20 exposures, then diminishing somewhat at higher exposure frequencies (Gillebart et al., 2012; Montoya et al., 2017).

The primary advantage of an experimental design is that it allows strong conclusions to be drawn regarding the causal relationship between stimulus exposures and subsequent affect ratings. The primary disadvantage of an experimental design is its artificiality: Because novel stimuli are presented under highly controlled laboratory conditions, the degree to which these findings generalize to real-world situations is open to question.

Measures

A key aspect of MEE research is assessing participants’ attitudes regarding stimuli that vary in familiarity. Three types of measures have been used.

Likert ratings

The most common outcome measure in MEE research is a Likert-type rating of each stimulus. Many different rating dimensions have been used (e.g., liking, pleasantness, attractiveness, interestingness), with the specific rating dimension based on the type of stimulus being investigated. Thus, liking ratings are commonly employed when people (or photographs of people) are used as stimuli; pleasantness or interestingness ratings are often employed when paintings or music selections are used.

Likert ratings are not only the most common MEE outcome measure they are also the most sensitive. Participants’ liking ratings of a merely exposed stimulus typically shift by one or two points on a nine-point scale (e.g., Bornstein et al., 1990; Caruso et al., 2013). Though this degree of attitude change may seem modest, it is not: If unfamiliar stimuli receive neutral (midpoint) ratings, a one-point positive shift represents a 20% increase in liking for a familiarized stimulus.
Forced-choice preference judgments

Some MEE studies use forced-choice preference judgments in lieu of Likert-type ratings (e.g., Mandler et al., 1987). In these studies, participants are asked to choose which of two stimuli they like better during the rating phase of the study, with one member of each stimulus pair being previously exposed, and the other being novel. Although forced-choice judgments are less sensitive than Likert-type ratings, they are a better approximation of preference judgments in vivo (e.g., where a person must choose between two similar products that vary in familiarity).

Behavioral measures

A small number of MEE studies have used behavioral outcome measures in lieu of self-reports (e.g., Bornstein et al., 1987; Jones et al., 2011; Siegel et al., 2019). Behavioral outcome measures include agreement with familiarized and unfamiliarized confederates in a laboratory negotiation task, voting behavior in a campus election, electrodermal responses to familiar versus novel stimuli, and willingness to sample different types of food. Most behavioral outcome measures in MEE studies take the form of dichotomous decisions (e.g., choosing between two foods), but on occasion, behavioral outcome measures are analogous to Likert-type ratings (e.g., when percentages of agreement with familiar and unfamiliar people are used; see Bornstein et al., 1987).

Moderating variables

Researchers have examined the impact of numerous moderating variables on the MEE. These can be grouped into three categories: (1) stimulus variables; (2) exposure variables; and (3) participant variables. Assessment of moderating variables is not only useful in understanding the parameters of the MEE, but also in testing competing theoretical models. Different frameworks make contrasting predictions regarding the impact of various moderating variables, and the most influential models are those that have shown good predictive power in this domain.

Two general procedures have been used to assess the impact of moderating variables on the MEE: individual experiments (Kawakami & Yoshida, 2019; Murphy & Zajonc, 1993), and meta-analytic reviews of the mere-exposure literature (Bornstein, 1989, 1992; Montoya et al., 2017). Individual experiments allow for direct assessment of the impact of a particular variable by comparing the magnitude of the exposure effect under different conditions (e.g., for complex versus simple stimuli). Meta-analyses allow for indirect assessment of the impact of a moderating variable by comparing the magnitude of the MEE across different studies (e.g., those that used a brief delay between exposures and ratings versus those that used a longer delay). As is true of research in many areas of psychology, some moderating variables have been assessed within MEE studies, others have been assessed by contrasting outcomes across studies, and still others have been evaluated using both procedures (see Moreland & Topolinski, 2010, and Montoya et al., 2017, for reviews).

Stimulus variables

Two stimulus variables have been assessed by MEE researchers: type of stimulus (e.g., photograph versus drawing), and stimulus complexity.
Type of stimulus

Ten different types of stimuli have been used in MEE studies: nonsense words, meaningful words, ideographs, photographs, drawings, auditory stimuli, olfactory stimuli, gustatory (i.e., food) stimuli, actual people, and objects (e.g., toys). Studies contrasting the magnitude of the MEE as a function of stimulus type have generally found no consistent differences across stimulus classes (e.g., Stang, 1974, 1975; Suzuki & Gyoba, 2008). Meta-analytic data generally support this result (Bornstein, 1989), although Montoya et al. (2017) found that auditory stimuli produced significantly weaker exposure effects than did other types of stimuli, with a more pronounced downturn in ratings at higher exposure frequencies.

Stimulus complexity

The majority of experiments that compare the magnitude of the MEE produced by simple versus complex stimuli find that complex stimuli yield stronger exposure effects (Bornstein et al., 1990; Montoya et al., 2017). Two processes are involved. First, complex stimuli typically produce a more rapid increase in liking at lower exposure frequencies (i.e., one, two, and five exposures). Second, complex stimuli produce a less pronounced downturn in liking at higher exposure frequencies (i.e., ten or more exposures). It appears that simple stimuli are less interesting to begin with (hence, the less rapid increase in liking at lower frequencies), and become boring more quickly at higher exposure frequencies (leading to an “overexposure effect”).

Exposure variables

The most widely studied exposure variables in MEE studies are number of presentations, stimulus exposure sequence, stimulus exposure duration, and delay between exposures and ratings.

Number of presentations

MEE studies typically present stimuli a maximum of 50 times, although there is considerable variability in this area. In most studies MEE researchers obtain an increase in liking ratings through 10 or 20 stimulus exposures, after which ratings plateau, and gradually decline to baseline (Kail & Freeman, 1973; Stang, 1974). These frequency-liking patterns characteristic of individual MEE experiments were confirmed in two separate meta-analyses (Bornstein, 1989; Montoya et al., 2017), both which found that across different stimuli and rating dimensions, the strongest MEEs occurred following a maximum of about 10 stimulus exposures.

Exposure sequence

Significantly stronger MEEs are obtained when stimuli are presented in a heterogeneous (i.e., randomized) sequence than a homogeneous (i.e., massed) sequence during the familiarization phase of the study (Bornstein, 1989; Gillebart et al., 2012). Consistent with the results of individual experiments, meta-analytic comparisons indicated that while heterogeneous exposures produce a robust MEE ($r = 0.30$), homogeneous exposures do not ($r = -0.02$).
Exposure duration

The relationship between stimulus exposure duration and magnitude of the exposure effect is complex. Bornstein’s (1989) meta-analysis found that studies using stimulus exposures less than 1 sec produce an overall MEE ($r$) of 0.41, whereas studies that use stimulus exposures between 1 and 5 sec produce an MEE of 0.16, and those that use longer exposures produce an MEE of 0.09. Montoya et al.’s (2017) meta-analysis found stronger exposure effects for stimuli presented for less than 15 milliseconds (ms) than for those presented at durations between 16 and 999 ms; at longer durations the magnitude of the MEE increased.

Delay between exposure and rating

Seamon et al. (1983), and Stang (1975) found stronger exposure effects with increasing delay between stimulus exposures and ratings. These results not only indicate that delay enhances the MEE, but confirm that MEEs can persist for up to one week (Seamon et al., 1983), or two weeks (Stang, 1975) following stimulus exposures.

Meta-analytic data confirm these experimental results (Bornstein, 1989; Montoya et al., 2017). In addition, Bornstein’s (1989) results indicated that naturalistic MEE studies (which examine affect ratings of stimuli whose frequency varies naturally in vivo) produce a stronger exposure effect ($r = 0.57$) than do laboratory studies ($r = 0.21$). The particularly strong MEEs produced by real-world stimuli (e.g., common names) are in part a consequence of the comparatively long delays between stimulus exposures and affect ratings in naturalistic settings.

Participant variables

Participant variables have been studied less frequently than other moderating variables in MEE investigations, but in certain respects these variables have yielded the most intriguing results. Researchers have examined the effects of stimulus awareness, imagery, and individual difference (i.e., personality) variables on the magnitude of the MEE.

Stimulus awareness

More than a dozen published studies have obtained robust exposure effects for stimuli that are not recognized at better-than-chance levels (e.g., Huang & Hsieh, 2013; Kunst-Wilson & Zajonc, 1980; Murphy & Zajonc, 1993; Seamon et al., 1983). Not only do subliminal stimuli produce robust MEEs, but meta-analysis of the MEE literature indicates that stimulus awareness may actually inhibit the MEE. Experiments using stimuli that were not recognized at better-than-chance accuracy produce an overall MEE of 0.53, whereas experiments using briefly presented, recognized stimuli produce an overall MEE of 0.34. The magnitude of the MEE produced by stimuli that were recognized at 100% (or close to 100%) accuracy is 0.12 (Bornstein, 1989, 1992). Consistent with these patterns, Montoya et al.’s (2017) meta-analysis indicated that stimuli presented for 15 ms or less (a conservative cutoff for “researcher defined” subliminality; see Montoya et al., 2017, p. 468) produced stronger MEEs than did stimuli with exposure durations between 16 and 999 ms.
The inverse relationship between stimulus recognition accuracy and magnitude of the MEE has been obtained in individual experiments as well. For example, Bornstein and D’Agostino (1992) found that photographs and Welsh figures (i.e., simple line drawings) presented for 5 ms during the exposure phase of a typical MEE experiment produced a significantly greater increase in liking than did identical stimuli presented for 500 ms during the exposure phase. (Follow-up data confirmed that 5 ms stimuli were not recognized at better-than-chance level, whereas 500 ms stimuli were recognized at close to 100% accuracy.)

Additional support for the existence of robust MEEs in the absence of stimulus awareness comes from studies of neurologically impaired participants (e.g., Alzheimer’s patients, patients with Korsakoff’s syndrome). These experiments confirm that even when neurological deficits obviate explicit memory for previously seen stimuli, robust exposure effects are obtained (Halpern & O’Connor, 2000). In fact, these results are so consistent and compelling that researchers now view MEE-type affect ratings as one of the most reliable indicators of implicit memory for previously encountered stimuli (Marin-Garcia et al., 2013).

Although converging results have been obtained in studies comparing MEEs for subliminal and supraliminal presentations of the same stimuli, and in investigations of patients whose neurological conditions attenuate conscious awareness of previously seen stimuli, these patterns must be qualified in two ways. First, some researchers have found stronger MEEs when stimulus presentations lead to increases in recognition memory for previously exposed stimuli (e.g., Newell & Shanks, 2007). In addition, some studies have found that the type of outcome measure employed is critical in assessing the impact of merely exposed stimuli, with subliminal stimuli leading to significant changes in implicit (but not explicit) attitudes, and supraliminal stimuli producing the reverse pattern (Kawakami & Yoshida, 2019; Smith et al., 2008).

**Imagery effects**

Given that MEEs persist for up to two weeks in laboratory studies, and almost indefinitely in vivo, repeated exposure to a stimulus must lead to the construction of a mental representation of that stimulus – a representation that is encoded deeply enough to be maintained from exposures through affect ratings (Mandler et al., 1987). In a compelling demonstration of the impact of mental imagery on the MEE, Craver-Lemley and Bornstein (2006) found that when participants were exposed to the ambiguous duck-rabbit figure and instructed to visualize the image as a duck or as a rabbit consistently throughout exposures, they showed the typical MEE at test only for a disambiguated version of the figure that matched the mental image they generated during encoding (see Compton et al., 2002, for additional evidence that merely exposed stimuli are conceptually categorized during familiarization).

Along somewhat similar lines, Bornstein et al. (2013) explored the possibility that self-generated mental images would produce exposure effects comparable to those produced by exposure-based mental images. This hypothesis was confirmed: Repeatedly exposed and repeatedly imagined stimuli yielded comparable MEEs. In a related experiment, Bornstein et al. (2013) found that self-generated imagery can moderate – or even obviate – the MEE: When participants were instructed to generate positive or negative images of facial expressions during repeated exposures of photographs of faces, subsequent affect ratings of the individuals pictured in the photographs were biased in the direction of these self-generated images (this occurred despite the fact that
participants were not asked to generate images during the rating phase of the experiment). Montoya et al. (2017) also concluded that mental imagery plays a key role in the exposure effect following their meta-analytic synthesis of research in this area, noting that “initial exposure produces a mental representation and subsequent exposures strengthen that representation” (p. 476); they went on to suggest that this interpretation of the MEE is consistent with “extensive evidence across different models of memory and with models for encoding information into long-term storage” (p. 476).

Individual differences

Several individual difference variables have been examined in MEE studies, including need for approval, social anxiety, tolerance of ambiguity, evaluation apprehension, boredom-proneness, and sensation-seeking. For the most part, these variables had modest moderating effects, with three exceptions. Bornstein et al. (1990) found that boredom-prone participants produced significantly weaker MEEs than did non-boredom-prone participants. Kruglanski et al. (1996) found that high levels of evaluation apprehension undermined the MEE. Siegel et al. (2019) found stronger MEEs for pictures of angry faces in socially anxious than non-anxious participants.

Text box 15.1 Mere exposure classroom demonstration

This is a simplified version of Bornstein et al.’s (1990) Experiment 2. It focuses on the mere exposure effect for relatively small frequencies and its possible downturn for larger frequencies.

Method

Participants

Because MEE effect sizes are typically moderate, an ideal sample size for this experiment is about 80 participants. Gender does not moderate the MEE, so the distribution of women and men is unimportant (55 women and 45 men participated in the original experiment).

Materials

Deviating from the original experiment, only one set of stimuli is used. Six line-drawn visual illusions taken from Gregory (1968): the Hering illusion, Wundt’s converse of the Hering illusion, the Necker illusion, the Zöllner illusion, the Poggendorf illusion, and a reversible figure-ground drawing. (These are all available on the internet.)

The stimulus set contains 43 slides. Stimuli are presented at the following frequencies: 0, 1, 2, 5, 10, or 25 (the original study also included a 50-exposure condition). Order of stimuli within the stimulus set is random, and counterbalancing is used to ensure that different stimuli are presented at different frequencies in different participants. Across participants, each stimulus should appear in each frequency condition approximately the same number of times.
In Bornstein’s (1990) experiment, booklets were used during the rating phase of the experiment; these consisted of one copy of each visual illusion per page, along with two nine-point rating scales for each stimulus: like–dislike, and simple–complex. Each rating scale was anchored with the terms Not at all____ (1) and Very_____ (9). Within each booklet, stimuli were presented in random order. You can follow this procedure as well, or obtain ratings by presenting the stimuli on PowerPoint, one at a time, after the stimulus exposure portion of the experiment is complete.

**Design**

This demonstration uses a one-factor within-participants design: Each participant provides ratings of stimuli at all six exposure frequencies. The primary dependent measure is participants’ like–dislike ratings.

**Procedure**

Participants can be tested in class. The experimenter provides standardized instructions:

This is a study of people’s responses to visual stimuli. You will be presented a series of images one at a time, and you should examine each image as it’s presented. After all the images have been presented, I’ll ask you some questions about your reactions to the stimuli. There are about 40 stimuli in all, and this part of the experiment will take about 4 minutes.

After answering any questions, the experimenter presents stimuli on PowerPoint slides, one stimulus per slide. Exposure times for each stimulus may be manually controlled by the experimenter, or set automatically so that PowerPoint advances each slide after five seconds.

Immediately following stimulus presentations, participants are given the rating booklet, and asked to provide ratings of each stimulus. Participants circle the number on each rating scale corresponding to their rating of the stimulus pictured on that page.

**Analysis**

The analysis consists of a one-factor within-participants analysis of variance (ANOVA), with stimulus exposure frequency (0, 1, 2, 5, 10, and 25) as the independent variable and participants’ like–dislike ratings as the dependent variable.

**Results**

Results of this experiment should parallel those of Bornstein et al. (1990, Exp. 2) as summarized in Figure 15.1. Liking ratings of visual illusions should increase through five exposures, and then gradually decline to baseline (i.e., 0-frequency level). Statistically, there should be a significant main effect of exposure frequency (with liking ratings increasing through five exposures, then declining).
Example of a mere exposure experiment

This section describes Bornstein et al.’s (1990) Experiment 2, illustrating two important principles relevant to a broad array of laboratory and real-world exposure effects: (1) the moderating impact of stimulus complexity; and (2) the downturn in the frequency–affect curve that often occurs after many stimulus exposures. A simplified version of this experiment may be used as a classroom demonstration (see Text box 15.1).

Method

The experiment tested 100 participants with two sets of stimuli. Simple stimuli consisted of seven line drawings (figures 8, 10, 20, 33, 42, 55, and 66) from the Barron-Welsh Art Scale (Barron & Welsh, 1949). Complex stimuli consisted of seven line-drawn visual illusions taken from Gregory (1968). Within each stimulus category, stimuli were presented at the following frequencies: 0, 1, 2, 5, 10, 25, or 50. Order of stimuli within the stimulus set was random, and counterbalancing was used to ensure that different stimuli are presented at different frequencies in different participants. Across participants, each stimulus appeared in each frequency condition approximately the same number of times.

The stimuli were presented with a slide projector exposing each stimulus for five seconds. Subsequent to the presentation phase, participants rated the seven stimuli from each set on two nine-point rating scales: like–dislike, and simple–complex, both rating scales anchored with the terms Not at all (1) and Very (9).
Results

As Figure 15.1 shows, liking ratings of visual illusions increased through five exposures, then gradually declined to baseline (i.e., 0-frequency levels). Liking ratings of Welsh figures increased slightly through five exposures then declined below baseline levels at higher exposure frequencies. Statistically, a $2 \times 7$ within-participants ANOVA showed (1) a significant main effect for stimulus type, $F(1, 99) = 98.88, p < .0001$ (with visual illusions receiving more positive ratings than Welsh figures); (2) a significant main effect of exposure frequency, $F(6, 594) = 17.79, p < .0001$ (with liking ratings of both types of stimuli increasing through five exposures, then declining); and (3) a significant Stimulus Type $\times$ Exposure Frequency interaction, $F(6, 594) = 2.44, p < .05$ (with visual illusions showing a more rapid increase in liking than Welsh figures through five stimulus exposures).

Two follow-up ANOVAs assessed the effect of stimulus type and exposure frequency on participants’ liking ratings. The first ANOVA assessed the effect of stimulus type and exposure frequency on liking ratings at 0, 1, 2, and 5 exposures; the second assessed the effect of these variables on liking ratings at 5, 10, 25, and 50 exposures. The first ANOVA yielded a significant interaction between stimulus type and exposure frequency, with liking ratings of visual illusions increasing more rapidly than liking ratings of Welsh figures through five exposures. The second ANOVA yielded significant main effects for stimulus type and exposure frequency, but no interaction: Liking ratings of visual illusions and Welsh figures both declined at higher exposure frequencies, with visual illusions continuing to receive more positive ratings than Welsh figures through 50 exposures (see Figure 15.1).

Figure 15.2 summarizes the effects of stimulus type and exposure frequency on simple–complex ratings. As this figure shows, there was a significant main effect of stimulus type on complexity ratings, with visual illusions receiving higher complexity ratings than Welsh figures at all exposure frequencies.

Discussion

The results of this experiment illustrated three aspects of the MEE: (1) Liking increased with increasing stimulus exposures. This is the classic MEE, and it is reflected in the significant increase in liking for both types of stimuli at lower exposure frequencies. (2) Stimulus type moderated the MEE. As noted earlier, complex stimuli tend to yield stronger MEEs than do simple stimuli. This is reflected in the significant Stimulus Type $\times$ Exposure Frequency interaction at lower exposure frequencies. (3) The downturn in liking ratings for both types of stimuli illustrates the “overexposure effect”: At higher exposure frequencies stimuli become predictable and boring, and as a result, liking ratings decline.

Neurological correlates

Paralleling findings obtained with Alzheimer’s and Korsakoff’s patients, studies have shown that robust MEEs are obtained in patients who suffer from transient global amnesia (Marin-Garcia et al., 2013). Along similar lines, Greve and Bauer (1990) found that patients suffering from prosopagnosia prefer familiarized faces over novel ones, though they do not recognize the familiarized faces as having been seen before. Both sets of results are consistent with findings indicating that robust MEEs occur even in the absence of conscious awareness of stimulus exposures (Monahan et al., 2000).
Two studies have found enhanced MEEs for faces presented to the left visual field, and therefore processed primarily in the right cerebral hemisphere (Compton et al., 2002; Zarate et al., 2000). In addition, two studies have used functional Magnetic Resonance Imaging (fMRI) to examine the neurological correlates of the exposure effect. In the first, Kongthong et al. (2014) found increased gamma activity in the parietal-occipital region in participants who showed strong MEEs. Ballard et al. (2017) found that magnitude of change in activation in the ventral tegmental area scaled with magnitude of self-reported preference change in an experiment wherein participants consumed a novel fluid over ten days, with liking ratings and fMRI data collected on days 1 and 10. These studies suggest some promising avenues for continued research, but as yet do not offer definitive conclusions regarding the neurological underpinnings of the MEE.

**Theoretical accounts**

Though the neurological underpinnings of the MEE remain open to question, considerable effort has been devoted to delineating the psychological processes that underlie the effect. Since publication of Zajonc’s seminal (1968) paper, more than a dozen theoretical frameworks have been developed to explain the psychological processes that help account for the MEE (see Bornstein, 1989, 1992; Montoya et al., 2017; Moreland & Topolinski, 2010; Whittlesea & Price, 2001; Zajonc, 2001). Four of these models continue to be influential.
The Nonspecific Activation Model

Mandler et al.’s (1987) nonspecific activation model contends that MEEs result from activation of previously encoded stimulus representations. The basic premise of this perspective is that repeated exposures lead to increasingly elaborated mental images of a stimulus. When participants are asked to provide liking ratings during the test phase of the study, the elaborated stimulus representations are easily primed, and participants interpret the resulting ease of processing as evidence that they like the stimulus (cf. Chapter 11 on availability).

A key prediction of the nonspecific activation model is that MEEs should occur for a variety of stimulus judgments, including (but not limited to) affect ratings. In support of this prediction, Mandler et al. (1987) demonstrated that repeated exposure to polygon stimuli led to increases in judgments of stimulus brightness – and stimulus darkness – in addition to the usual increases in liking ratings.

The Two-Factor Model

Stang’s (1974) two-factor model contends that MEEs reflect two interacting processes: learning and boredom. Learning leads to increased liking for a stimulus at lower exposure frequencies, as the participant becomes familiar with the properties of the stimulus. Boredom leads to a downturn in the frequency-liking curve at higher exposure frequencies, as the stimulus becomes predictable and uninteresting.

Myriad experiments demonstrating that stronger exposure effects are obtained for complex than simple stimuli support this latter prediction of Stang’s (1974) two-factor model (Bornstein, 1989): Simple stimuli do indeed become boring more easily than complex stimuli with repeated exposure. Moreover, not only do complex stimuli produce stronger MEEs than simple stimuli, but participants who score high on a measure of boredom-proneness show weaker exposure effects than participants who are not boredom-prone (Bornstein et al., 1990, Exp. 1). Montoya et al. (2017) also concluded that the two-factor model accounts for a broad array of findings in the MEE literature.

The Perceptual Fluency/Attributional Model

Bornstein and D’Agostino’s (1992, 1994) perceptual fluency/attributinal (PF/A) model conceptualizes the MEE in terms of increased perceptual fluency (i.e., ease of perceptual processing) for repeatedly exposed stimuli. Consistent with the perspective of Mandler et al. (1987), the PF/A model contends that participants in typical MEE studies misattribute perceptual fluency to increased liking for a stimulus. The PF/A model extends earlier thinking in this area by positing that to the degree that participants attribute increased fluency to the stimulus familiarization procedure (rather than to properties of the stimulus itself), they will adjust their liking ratings downward, inferring that their reactions to the stimulus are the result of repeated exposure.

The initial portion of the PF/A model is a variation of Mandler et al.’s (1987) hypothesis that repeated exposures lead to the construction of increasingly elaborated mental representations of a stimulus. The latter (“attributional”) portion of the PF/A model is supported by findings which indicate that: (1) subliminal stimuli produce significantly stronger MEEs than do clearly recognized stimuli; (2) delay between stimulus exposures and ratings enhances the effect; and (3) naturalistic MEE studies yield stronger
exposure effects than do laboratory MEE studies (Bornstein, 1989, 1992). All three variables – subliminality, experimentally determined delay, and in vivo delay – interfere with participants’ ability to attribute familiarity to stimulus exposures, and prevent them from adjusting downward their liking ratings of the stimuli.

**The Affective Primacy Model**

Zajonc (1980) argued that MEEs represent a “pure” affective response that occurs with minimal intervening cognitive activity beyond rudimentary encoding of stimulus properties. The existence of MEEs in primates and other mammals supports the affective primacy hypothesis, and – as noted earlier – in recent years some progress has been made in identifying the neurological underpinnings of exposure-based affective responding in humans, even in the absence of higher-level cognitive processing of stimulus elements (Marin-Garcia et al., 2013; Zarate et al., 2000).

Zajonc’s (1980) affective primacy hypothesis is consistent with findings demonstrating robust MEEs for subliminal stimuli (Murphy & Zajonc, 1993), and with results showing affective “spillover” effects to related – and even unrelated – stimuli following repeated, unreinforced exposures (Caruso et al., 2013; Monahan et al., 2000). Bornstein et al.’s (2013) finding that repeated association of merely exposed stimuli with self-generated positive or negative images altered participants’ affective reactions is also consistent with the affective primacy hypothesis. The affective primacy hypothesis does not account for the downturn in liking ratings at higher exposure frequencies.

**Conclusions**

Few psychologists question the robustness of the MEE, but researchers continue to debate the processes that underlie the effect. Some researchers favor an affect-based model of the MEE; others focus on the cognitive processes that mediate and moderate the effect. Compelling evidence has been obtained in support of both positions, and in certain respects these two viewpoints are actually quite compatible. It may be that MEEs occur in stages, the first of which is a “pure” affective response that requires minimal cognitive processing beyond rudimentary encoding of stimulus properties. This initial affective response is then moderated by more extensive cognitive processing of the mental representation of the merely exposed stimulus.

Whatever psychological and neurological processes underlie the MEE, there is no doubt that this phenomenon has important implications for a broad array of psychological phenomena. In the cognitive arena, the MEE paradigm has been increasingly applied to the investigation of implicit memory and schema-priming effects (e.g., Whittlesea & Price, 2001). Social researchers have used MEE procedures to examine the impact of familiarity on intergroup attitudes and behaviors (Flores et al., 2018; Kruglanski et al., 1996). Developmental psychologists have become interested in a very different aspect of the MEE: Because infants actually show a reverse MEE (i.e., preference for novel over familiar stimuli), while toddlers and older children show typical exposure effects, developmentalists have begun to explore the processes that delay the onset of the MEE beyond the first two years of life (Berg & Sternberg, 1985).

In this context it is worth noting that the MEE overlaps to some degree with two other phenomena that may also qualify as cognitive illusions. The illusory truth effect (Chapter 14), which refers to the impact of repetition on the perceived validity (that
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is, truthfulness) of information, represents an example of the way that mere repeated exposure alters peoples’ perceptions of messages (e.g., political statements). Moreover, the validity effect is consistent with the PF/A model of the MEE, because when repeated messages are processed more easily than unfamiliar ones, ease of processing is misattributed to the veracity/truthfulness of the message (see Renner & Renner, 2001). Along somewhat similar lines, the recognition heuristic may represent yet another example of the misattribution of perceptual fluency to other types of judgments (see Hilbig et al., 2010). Although the recognition heuristic typically refers to the impact of familiarity on inferences (i.e., the conclusion that a true or correct solution exists) rather than preferences, Oeusoonthornwattana and Shanks (2010) obtained preliminary results extending the recognition heuristic from inferences to preferences.

The question remains: Given what we know about the MEE, can this phenomenon be described as a genuine cognitive illusion? The answer to this question is yes. Robust MEEs are produced with a complete absence of stimulus recognition on the part of participants (Zajonc, 2001). Even in situations where participants are aware of having been exposed to stimuli, they rarely attribute their liking for a stimulus to repeated exposure, instead believing that some property of the stimulus itself is particularly attractive or interesting (Bornstein & D’Agostino, 1994). It is here that the crux of the illusion lies: Although repeated exposure does not alter a stimulus at all, it alters attitudes regarding that stimulus. Insofar as people attribute their positive attitude to properties of the stimulus – not familiarity with the stimulus – the true source of this positive attitude remains unknown, and the illusion remains strong.

Summary

• The mere exposure effect (MEE) refers to increased liking for a stimulus that follows repeated, unreinforced exposure to that stimulus.
• MEEs are obtained for a wide variety of stimuli (e.g., visual, auditory, gustatory), in a broad array of contexts, including both laboratory and field settings.
• MEEs have numerous real-world implications, helping explain voting behavior, advertising effects, preferences for different types of music and art, and attitudes toward people encountered in everyday life.
• Boredom is a limiting condition on the MEE: Simple stimuli and a homogeneous exposure sequence weaken the effect, and liking ratings tend to decrease after a large number of stimulus exposures.
• Stimulus awareness inhibits the MEE: Stronger effects are produced by stimuli perceived without awareness than those that are consciously recognized (although these subliminal–supraliminal differences are in part a function of the type of measure used to assess preference and attitude change).
• Myriad theoretical models have attempted to explain the MEE, and it appears that the effect is a product of two processes: A rapid, reflexive affective response followed by more controlled, deliberate cognitive processing of stimulus content. The formation of mental images of merely exposed stimuli plays a key role in the MEE.

Further reading

Zajonc’s (1968) monograph summarizes the history of the MEE, and the relationship of the effect to other psychological phenomena; Moreland and Topolinski’s (2010) extensive review provides
an excellent summary of contemporary MEE research, as do Bornstein’s (1989) meta-analysis of early research on the MEE, and Montoya et al.’s (2017) meta-analysis of more recent findings in this area. Kunst-Wilson and Zajonc’s (1980) experiment has served as a model for most subliminal MEE studies during the past 35 years. More recently, Whitttlesea and Price’s (2001) experiments have demonstrated how participants’ information-processing strategies can enhance or undermine the effect, Zajonc’s (2001) review discusses the implications of the MEE for models of unconscious mental processing, and Kongthong et al.’s (2014) study provides preliminary evidence regarding cortical activity patterns that may mediate the MEE.

References


