The Mere Exposure Effect and Classical Conditioning

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Abstract

This study investigated Zajonc's hypothesized link between the mere exposure effect and classical conditioning. In the first part of the experiment, participants were presented a photograph of a person. Each photograph was followed by a presentation of an emotionally positive image, a neutral image, a negative image, or a blank screen. Then, participants were asked to rate the faces presented the first part of the experiment, as well as some novel portraits, on a 6-point Likert scale. Faces that had been presented previously differed significantly from faces not previously seen. However, only faces in the 20 Repetitions + Positive Image condition were rated significantly higher than faces in the new condition. These results suggest some support for Zajonc's hypothesis because only the strongest positive associations led to a mere exposure effect, but this conclusion must be considered carefully given the mixed statistical support.

Introduction

The Mere Exposure Effect

In 1968, Robert Zajonc conducted a study which found that repeated exposures to neutral stimuli, such as nonsense words and Chinese characters, led to those stimuli being rated more highly on Likert scales than stimuli that had never been presented. This effect was later named the "mere exposure effect." Zajonc's experiments have been repeated with other stimuli, such as photographs of college students and polygons, and the mere exposure effect endures as a fairly replicable psychological phenomenon (Bornstein, 1989). In fact, the mere exposure effect has been witnessed across cultures and even across species (Monahan et al., 2000).

One of the first influential explanations for the mere exposure effect was the perceptual fluency/attributional model (Bornstein and D'Agostino, 1994). The theory of perceptual fluency states that after a greater number of presentations, people will process a given stimulus faster. After people are shown a stimulus multiple times, they are usually not aware that their ability to process that stimulus has been enhanced. The ease of processing the stimuli is misinterpreted by the brain as an increase in liking. Thus, the mere exposure effect occurs. Most of the support for the perceptual fluency/attributional model comes from various studies conducted by Bornstein. For example, in a 1992 study by Bornstein and D'Agostino, subjects were presented with photographs of college women at suboptimal (5 millisecond) levels or optimal (500 millisecond) levels. At suboptimal levels (usually at around 4-8 milliseconds), stimuli are presented so rapidly that it would appear as though the subjects had seen nothing at all. After the presentations, the subjects were asked to choose which stimulus they liked more and which stimulus they recognized when presented with a choice of two stimuli. One of the stimuli was present in the previous suboptimal presentations and another was one which had never been presented. At suboptimal levels, subjects could not recognize previously presented stimuli from the new

stimuli, but liking ratings for previously presented suboptimal stimuli were significantly higher than new stimuli. However, at optimal levels, subjects could readily identify which stimulus they recognized, but the liking ratings between previously presented stimuli and new stimuli did not differ. Bornstein and D'Agostino hypothesized that, at the optimal levels, subjects could readily attribute their perceptual fluency to the greater number of presentations. Thus, the subjects' minds automatically corrected their liking ratings and the mere exposure effect was not established. However, at the suboptimal levels, subjects could not readily identify the source of their perceptual fluency. Thus, they misattributed the perceptual fluency as greater liking for that stimulus.

However, studies by Monahan et al. (2000) questioned the validity of the perceptual fluency/attributional model. In their first study, Monahan et al. put subjects in two groups. In the single exposure condition, participants saw 25 different subliminal stimuli once while subjects in the repeated exposure condition saw 5 different subliminal stimuli five times. When asked about their mood in general, with no reference to the stimuli, people in the repeated exposure condition reported having more positive moods than those in the single exposure condition. Thus, it was hypothesized that the mere repetition of stimuli was enough to create an increase in mood. This "diffuse happiness" would eventually end up being projected on the stimuli, causing the mere exposure effect. In order to test this hypothesis, Monahan et al. ran another experiment with the same single- and repeated-exposure conditions. However, after the exposures, subjects were asked to rate different types of stimuli: stimuli they had previously seen (old), stimuli that resembled the stimuli they had previously seen but were actually new (novel similar), and stimuli that were new and looked very dissimilar from those previously seen (novel different). In both conditions, the old stimuli had the highest liking ratings, followed by the novel similar stimuli,

and then the novel different stimuli. These results can readily be explained by the perceptual fluency/attributional model. However, the perceptual fluency/attributional model could not account for the fact that all types of stimuli had higher liking ratings in the repeated-exposure conditions compared to the single-exposure conditions. Thus, these results demonstrated that the diffuse happiness created through repeated exposures could be expressed through greater liking for all stimuli, but the effect was amplified for the repeated stimuli or stimuli that resembled the repeated stimuli. Thus, this diffuse happiness could also be a contributor to the mere exposure effect.

Classical Conditioning

Classical conditioning was discovered through happenstance by the Russian physiologist, Ivan Pavlov (Clark, 2004). In Pavlov's experiment, dogs learned to associate stimuli with important events. For example, a bell was rung (conditioned stimulus) and the bell ringing was consistently followed by the presentation of food (unconditioned stimulus). Naturally, the presentation of food would cause the dogs to salivate (unconditioned response). With many presentations of the bell ringing followed by the food presentation, the dogs would eventually associate the ringing with food. This would lead the dogs to salivate simply when the bell was rung and the ringing was not immediately followed by the presentation of food (conditioned response). Because ringing a bell would not normally cause a dog to salivate, the emergence of the conditioned response is considered to be an example of classical conditioning.

Many experiments involving classical conditioning often involve animal subjects. In fact, some argue that conditioning cannot influence adult humans. Brewer (1974) stated that classical conditioning in adult humans occurs through subjects reacting to the demand characteristics of the experiment, and not through conditioning. Many conditioning experiments have assumed that

subjects will reflexively react to a conditioned stimulus in a certain way once it has been associated with an unconditioned stimulus enough times. For example, if a subject learns there is a relationship between viewing a stimulus and receiving an electrical shock, the subject will prepare for the shock. However, when the experimenter tells the subject that the stimulus would no longer be followed by shock, the "conditioning" did not persist. However, a 2001 study by Olson and Fazio found that classical conditioning can affect the perception of neutral stimuli under appropriate circumstances. In this experiment, participants saw various pairings of Pokémon cartoon characters and words with either positive, neutral, or negative meanings. These pairings were interspersed with presentations of other stimuli, including other Pokémon, images, and words, which were presented independently or in pairs. When analyzing two target Pokémon (one of which was consistently paired with a positive word and another with a negative word), Olson and Fazio found that the Pokémon paired with a positive word were rated more positively than the Pokémon paired with the negative word. In addition, subjects were asked to rate how confident they felt about seeing certain pairings, including the target Pokémon-word pairs. The confidence results revealed that the subjects were not explicitly aware of pairings presented because participants could not reliably identify if a Pokémon had been paired with a word with a positive valence or a negative valence. Thus, Olson and Fazio's findings could not be linked to demand characteristics because participants would be unsure whether to respond more positively or negatively if they could not identify the type of word the Pokémon was paired with.

The Mere Exposure Effect Meets Classical Conditioning

In order to address why repeated exposures would lead to an increase in diffuse happiness, Zajonc (2001) offered another explanation for the mere exposure effect: the mere exposure effect could be a form of classical conditioning. In this theory, the presented image is a

conditioned stimulus. Because no negative consequences occur after viewing the image, the lack of punishment can be viewed as the unconditioned response that is paired with the stimulus. The absence of negative consequences could be interpreted as a form of negative reinforcement that communicates that the stimulus is safe to view. Thus, after repeated exposures of the stimulus (which reinforce that the stimuli is safe to view), the conditioned response manifests in the form of increased liking for the stimulus.

Experimental Design Considerations

In most mere exposure experiments, multiple presentations of stimuli are used to obtain the mere exposure effect. Oftentimes, these experiments will utilize subliminal exposures in order to prevent participants from knowing that they have seen the stimuli in the experiment. These subliminal exposures were supported by Bornstein's (1989) meta-analysis, which found that the mere exposure effect was stronger in experiments with subliminal exposures versus those with supraliminal exposures. Bornstein and D'Agostino (1994) argued that the superiority of subliminal exposures was due to the fact that supraliminal exposures lead to increased recognition, which might inhibit the mere exposure effect. However, these findings have been contested by other researchers. Stafford and Grimes (2012) noted that Bornstein's meta-analysis included 9 studies which found a stronger mere exposure effect using subliminal exposures and compared them to over 200 studies which had not. Furthermore, there have been a growing number of experiments that have demonstrated that recognition does not inhibit the mere exposure effect, but actually is necessary for it to occur. For example, three experiments by Newell and Shanks (2007) compared recognition and liking across four conditions: 40 ms presentations with 3 exposures, 40 ms presentations with 9 exposures, 400 ms presentations with 3 exposures, and 400 ms presentations with 9 exposures. When stimuli were presented for 400

ms presentations and had 9 exposures, both recognition and liking ratings increased. However, the mere exposure effect was not present for any of the other conditions. Similar results were obtained by de Zilva et al. (2013), who generated a mere exposure effect through continuous flash suppression (CFS). In CFS, two different images are flashed to each eye. In the suppressed condition, the target stimulus is flashed in one eye while a Mondrian pattern is flashed in the other. Because of the perceptual dominance of the Mondrian patterns, the suppressed condition leads to the perception of the pattern, but not the target stimulus. The unsuppressed condition is similar to the suppressed condition, but the target stimulus is superimposed on the Mondrian pattern. Thus, the stimulus is perceived. In this study, the mere exposure effect only occurred in the unsuppressed condition.

Other researchers have found ways to induce a mere exposure without the use of subliminal exposures. One of these techniques is utilizing a divided attention task. One of the first instances of this was found in Ye and Van Raaij's (1997) experiment, where they presented Chinese students studying at a Chinese university with numerous trials consisting of pairs of commonly-used Chinese characters. In each pair, one of the characters was marked as the "attended" stimuli with an asterisk. When subjects were asked to evaluate how much they liked the characters, they were put into two groups; one group evaluated the attended stimuli, while the other group rated the unattended stimuli. The attended stimuli group's liking ratings did not differ from the control group, who were not presented any stimuli and were simply asked to rate the characters. However, the mere exposure effect did occur in the unattended stimuli group. Similar results were obtained by Sutherland et al. (1999). In this study, participants viewed slides with three advertisements arranged horizontally, and participants were asked to focus on the center advertisement. Then, three advertisements were presented in a similar manner and the

participants were asked to choose which advertisement they liked the most. They found that advertisements that were presented to the sides of the central advertisement (divided-attention condition) were more significantly preferred compared novel advertisements.

Because of the controversy surrounding the use of subliminal stimuli, supraliminal exposures were used in the present experiment since classical conditioning experiments with subliminal exposures have only shown slight attitudinal changes (Olson & Fazio, 2001). The amount of exposure time to the stimuli (2000 ms) was chosen because this amount of time was used in Zajonc's (1968) original experiment. The number of repetitions in each condition (1, 2, 5, 10, and 20) were chosen from a variety of mere exposure experiments in order to assess the effect of repetition in a number of various conditions. In the experiment, a face and then an image were shown on the screen for 2000 ms each, with the face presented first, followed by the image. After seeing all face-image pairs, participants were asked to rate how much they liked the previously presented faces as well as new faces on a 6-point Likert scale. The mere exposure effect would be indicated by higher liking ratings for previously presented than new faces. It was hypothesized that, if the mere exposure effect depends on classical condition, then the mere exposure effect would be the smallest with the faces paired with negative images because this condition would counteract the lack of negative consequence after viewing a neutral image. Then, the scores of faces paired with neutral images and the scores of faces paired with blank screen would be greater than the faces paired with negative images. Both the neutral condition and the blank condition would only be affected by the mere exposure effect, but the blank condition was included in order to replicate the conditions found in other mere exposure effect experiments (where the neutral stimulus is not followed by an image). The faces paired with positive images were expected to benefit from both the mere exposure effect and positive

reinforcement, and therefore, it was predicted that they would have the largest proportion of preferred faces.

Methods

Participants

Thirty-two subjects participated in this experiment and were either paid $10 per hour or were given General Psychology course credit for participating. 18 females and 27 males participated in the experiment. A total of 5 participants were excluded from analysis because they responded with the same answer for all trials (n=3), they did not rate positive pictures as more positive than neutral pictures (n=1), or they showed prior knowledge of the experimental hypothesis (n=1).

Materials

The stimuli consisted of 75 Caucasian male faces with neutral expressions and 60 valenced images. The faces were taken from the MORPH database (Ricanek & Tesafaye, 2006). Only Caucasian faces were included to avoid any other-race effects (Bothwell et al., 1989). Faces with neutral expressions were chosen because smiling faces have been shown to be evaluated as more pleasant and nicer, which could confound the mere exposure effect (Lau, 1982). The exclusion of female faces was done for two reasons; first, women are superior at recognizing female faces compared to men, which could affect the mere exposure effect if recognition is a key component for exposure effects to occur (Lewin & Herlitz, 2002). Second, men are more likely to spend more time gazing at female faces, particularly if they are attractive, and the additional attention paid to the attractive female faces could affect the mere exposure effect (Levy et al., 2008).

The images were taken from the IAPS (International Affective Picture System) and were meant to invoke positive, neutral, and negative emotions (Lang and Cuthbert, 1999). In the IAPS database, each picture is given a rating from 1-9 that assesses the pleasure and arousal induced by each picture (1 = least pleasurable/arousing, 9 = most pleasurable/arousing). Target average scores for the positive, neutral, and negative images were 2.75, 5.00, and 7.25 respectively. These scores were chosen so that images would not be excessively positive or negative, and so that the most graphic of the negative images could be avoided. Images were chosen so that all images fell within 0.2 points of the average score for each of the conditions. The mean score for the negative images is 2.74, 4.97 for the neutral images, and 7.35 for the positive images. In addition to selecting pictures based on pleasure ratings, pictures with similar arousal rates were chosen in. Arousal rates were 4.69, 4.63, and 4.70 for the negative, neutral, and positive images respectively. Images were chosen so that all images fell within 0.2 points of the average score for each of the conditions.

Figure 1. IAPS Images. *Examples of IAPS images utilized in the experiment. From left to right, positive, neutral, and negative.*

The faces and images were presented on black background on a Macintosh computer. In order to standardize participants' viewing angle, a 52 cm string was used to measure the participants' distance from the screen.

Procedure

Figure 2. Experimental Procedure. *Subjects were presented with a face from the MORPH database for 2000 ms, followed by an image from the IAPS database presented for 2000 ms, followed by a fixation cross presented for 1000 ms. In the blank condition, a black screen would replace an IAPS image and would also be shown for 2000 ms.*

Upon entering the lab, participants were told that they would be viewing images and faces. Participants were explicitly told to focus on the faces and images, as their recall for them would be tested later in the experiment. There were a total of 60 face-image pairs (including faces in the blank condition). Face-image pairs were kept consistent throughout the experiment, so that the same face was always followed by the same image. This was done in order to replicate the repetitive trials found in classical conditioning experiments, where the unconditioned stimulus (valanced IAPS image) is presented after the conditioned stimulus (face). The faces were displayed for 2000 ms. They were followed by the image which was displayed for 2000 ms. The image was followed by a fixation cross, which was displayed for 1000 ms. There were 15 trials of each valence (face followed by a positive, neutral, negative, and blank image). Each valence had 5 different display frequencies (1, 2, 5, 10, and 20 displays). For each combination of repetition and image type, there were face-image pairs for each condition. (For example, 3 separate face-image pairs would be in the 5 Repetition + Neutral Image condition.) Faces and images were randomly paired for each subject, and conditions were randomly

intermixed with a single list of stimuli. Any face that had previously been presented was considered an "old" image.

In the second part of the experiment, participants were told that they would be viewing faces and were asked to rate how much they liked the face on a 6-point Likert scale from "Greatly Dislike" to "Greatly Like." The response scales were counterbalanced across participants in order to account for any response biases. In addition to the 60 faces from the first part of the experiment, 15 new faces that the participant had never seen before were included in order to establish a rating baseline for the faces. The faces were presented until the participant responded. Then, a different face would appear on the screen.

The third part of the experiment had participants rate the IAPS images paired with the faces. Participants rated the images on a 6-point Likert scale similar to the one presented in the second part of the experiment. The images were presented until the participant responded. Then, a new image would appear on the screen. This was done in order to ensure that the participants had correctly interpreted the IAPS images as positive, neutral, or negative. Subjects that rated the categories of stimuli differently were excluded from the analysis.

Results

Ratings were coded so that -3 corresponded to Greatly Dislike and 3 corresponded to Greatly Like, and the ratings in-between were coded -2, -1, 1, and 2.

IAPS images were rated in manner consistent with their associated valence. The average ratings for the positive, neutral, and negative images were 1.97, 0.22, and -1.90 respectively.

Results for the face ratings are shown in Figure 3. The means of the new faces were found to be significantly lower from the means of the old faces, $t(31) = 8.37$, $SE = 0.12$, $p < 0.01$. Separate t-tests were done comparing the raw scores of the faces in the new condition from the

faces in the other conditions in order to establish the presence of a mere exposure effect. When each of the 20 (4 valence x 5 repetition) old conditions were compared individually with the new condition, only the t-test for the 20 Repetitions + Positive Image condition was significant, $t(31) = 3.39$, $SE = 0.19$, $p = 0.002$. To test whether or not the repetition and valence conditions influenced the size of the differences between old and new items, old-minus-new difference scores were computed within each condition for all subjects. A 5 (Repetition) x 4 (Valence) repeated measures ANOVA on these difference scores was conducted to test for the effects of repetition and image type. No significant results were found for the repetition condition, $F(4,$

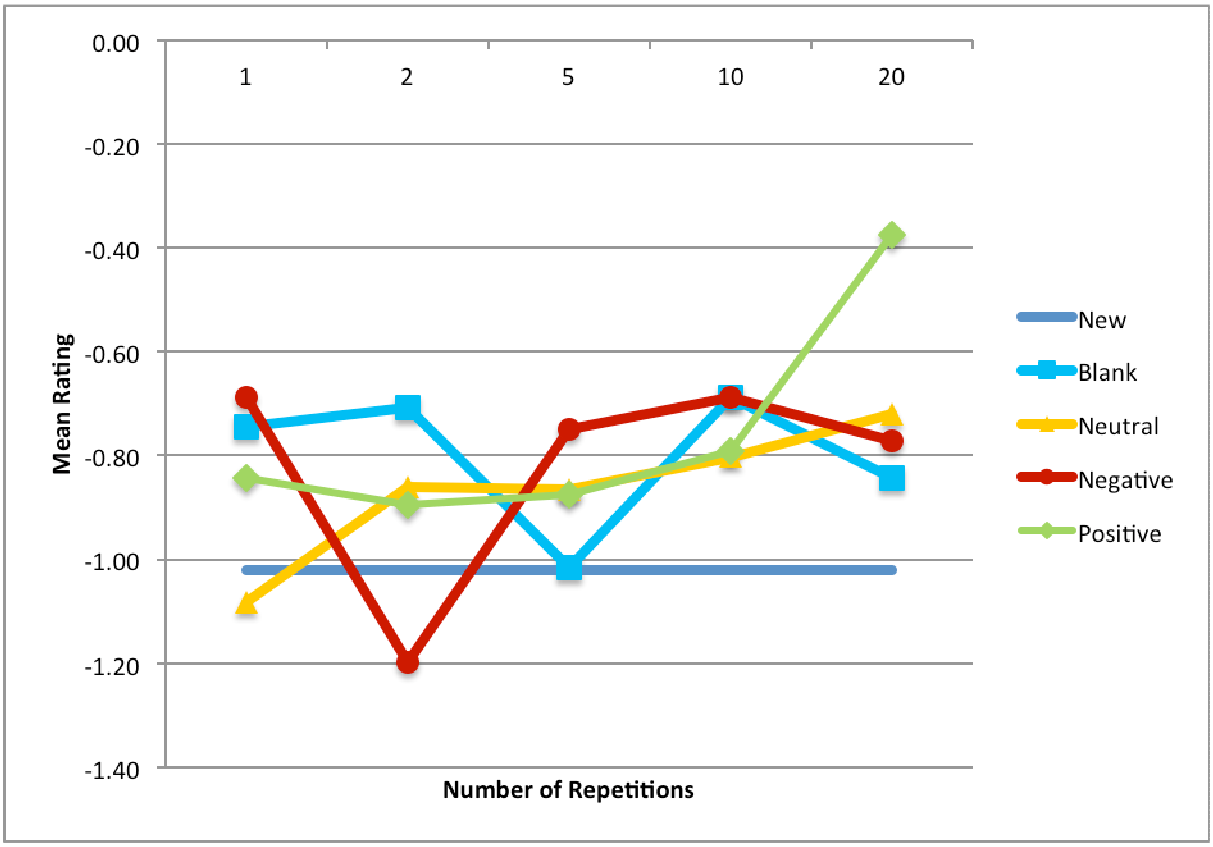

Figure 3. Mean Rating of Faces Across Repetition. *Mean ratings of faces across three separate trials of each repetition and image type. New faces were never repeated, so a straight line with no data points at each repetition level is used to represent this baseline level.*

600) = 1.035, p = 0.39 or the image type, F (3, 600) = 0.295, p = 0.83. There was also no interaction between the two conditions, F(12, 600) = 0.619, p = 0.49.

Discussion

The mere exposure effect was obtained, as evidenced by the presence of a significant t-test between the old condition versus the new condition, which showed that faces in the old condition were rated more highly than faces in the new condition. However, the ANOVA found no significant results for the effect of repetition or image type on face ratings. Furthermore, the only significant t-test was found in the 20 Repetitions + Positive Image condition.

It may seem somewhat contradictory that the overall t-test between the old and new conditions yielded significant results, while the ANOVA did not. Simultaneously, the only individual condition t-test that showed significant effects was the 20 Repetitions + Positive Image condition. One would expect that, since the overall t-test yielded significant results while the ANOVA did not, that all of the individual t-test conditions would be significant since the only factor affecting ratings would be previous exposure (regardless of repetition of image type). On the other hand, if the overall t-test and the individual condition t-test yielded significant results, one would expect that the ANOVA would find repetition and image type effects (since the only individual condition t-test that was significant supports the hypothesis that both a larger number of repetitions and a positive image would lead to higher ratings). A possible explanation for these results could be found in the high level of noise in the experiment. This is most likely due to the low number of trials (3) utilized for each individual condition. Three trials were used because a low number of trials were used in previous mere exposure effect experiments, with most experiments having between 3-5 trials per repetition condition. The high level of noise can

be seen in Figure 3, where the ratings for the individual conditions vary greatly and unsystematically across conditions. In addition, the standard deviation for face ratings across all of the old conditions was 0.11, while the standard deviation for the face ratings the individual old conditions ranged from 0.99 – 1.48. The greater variability in the individual old conditions may account for the finding of a significant overall old vs. new condition t-test coupled with only one individual old condition t-test being significant. Thus, future studies should consider adding more trials to each individual condition in order to get more reliable results.

Among the individual t-tests conducted for each condition, only the face ratings in the 20 Repetitions + Positive Image condition were significantly higher than ratings in the new condition. Although the evidence for a stronger mere exposure effect is mixed, we will discuss the possible implications of such a result as if it were reliable. Zajonc's (2001) hypothesis proposed that the absence of a negative consequence could be the cause of the mere exposure effect, and we found that a positive unconditioned stimulus enhances the mere exposure effect more than a negative unconditioned stimulus inhibits the mere exposure effect. These results could be considered supportive of Zajonc's hypothesis, since Zajonc was more concerned about the increase of ratings on neutral stimuli in the absence of negative consequences, not the effect on ratings in the presence of negative consequences. Thus, it is logical that the antithesis of a negative consequence (a positive consequence) would yield greater mere exposure effects than the absence of negative consequences. However, because of the lack of significant results from the ANOVA, these interpretations should be considered with caution.

Because only a weak mere exposure effect was obtained with this experiment, it is difficult to assess the effect of classical conditioning on the mere exposure effect. This is because the ANOVA did not yield significant results for the effect of repetition or image type.

Because of this, it is pertinent to examine why a stronger mere exposure effect was not obtained in this experiment given that the mere exposure effect has been found to be highly replicable using other experimental paradigms, including ones that varied in exposure time (subliminal exposures to 2000 ms) and stimuli type (faces, Chinese characters, polygons, etc).

Another possible explanation for the weak mere exposure effect could due to the possibility that the faces used in the experiment were not truly neutral stimuli. In a study by Zajonc, Markus, and Wilson (1974), participants were shown faces of Chinese men. One experimental group was told that these men were prominent scientists in various fields (positive condition), while another group was told that these men were prisoners found guilty of differing crimes (negative condition). When the participants were asked how much they liked the faces on a 6-point Likert scale, the mere exposure was only found in the positive condition. In the negative condition, there was no effect of repeated presentations on the ratings of the faces; the faces were consistently rated across all repetition conditions, and were rated more negatively in general. Note that these results are consistent with Zajonc's (2001) hypothesis; in the presence of a negative consequence (information that the faces viewed belong to criminals), the mere exposure effect does not occur. In the present experiment, the faces tended to be rated negatively; the average of all faces in the old condition was -0.81. A t-test was conducted in order to determine if the ratings of the stimuli differed from the neutral point of zero, and it was found that the ratings in the old condition did differ significantly from the neutral point, $t(31) = -7.27$, $SE = 0.11$, $p = 0.03$. These results could explain why this experiment found only a weak mere exposure effect.

Although it is not clear why the stimuli were perceived as negative, there are several possible reasons why this occurred. First, although the MORPH database uses faces from public

sources (Ricanek & Tesafaye, 2006), several participants mentioned that they disliked rating the faces of "inmates." This misconception could have arisen from the fact that the faces were chosen on a variety of factors, including gender (male) and facial expression (neutral), which might have suggested to participants that they were viewing "mug shots." Second, faces were selected for neutral expressions, which meant that any faces that were smiling were excluded. In both previous mere exposure effect studies utilizing photographs of people, it is very likely that smiling faces were used. In the study by Zajonc, Markus, and Wilson (1974), Chinese faces were taken from *Who's Who in China: 1936*, which is a book that features photographs of prominent people from China. In the study by Bornstein and D'Agostino (1994), faces were black-and-white photos of women taken from a college yearbook. It is very likely that people would smile if their picture was going to be displayed in a book. Since smiling faces are rated more highly than non-smiling faces (Lau, 1982), the exclusion of smiling faces from the present experiment could have lead to a decrease in liking. In addition, some of the IAPS images featured people smiling (Ricanek & Tesafaye, 2006). This could have drawn even more attention to the fact that the MORPH database faces were not smiling. Finally, because of the numerous constraints on stimuli selection, it was not possible to only select faces that appeared to be near the age of the college student participants (between the ages of 18-24). Research by Rodin (1987) suggests that young adults are far better at recognizing faces near their age range, compared to middle-aged and elderly faces. If the mere exposure effect depends on the recognition of the stimuli, the inclusion of some middle-aged adults could have affected the mere exposure effect. Regardless of the reason why the stimuli were perceived as initially negative by the participants, it might be possible that only after the maximum number of repetitions (20) and repeated pairings with a positive image do participants rate an initially negative stimulus as more positive.

It is also possible that the design of the experiment could have weakened the mere exposure effect. Despite the fact that the current experiment was designed to replicate the design used in many previous mere exposure effects, this exact design has never been utilized before. The major difference between previous mere exposure effect studies and the current experiment is the introduction of another image after the stimuli, which was done in order to study the effect of classical conditioning on the mere exposure effect. Although it is not clear how this manipulation might have affected the mere exposure effect, it is possible that the mere exposure effect might be stronger under conditions where all of the stimuli are similar or when similar stimuli are presented under relatively rapid conditions with only a fixation cross separating the presentations of target stimuli. The introduction of the image after the face may have been thought of as a second kind of stimulus to the participants, so it may be that the mere exposure effect must have clear targets in order to be established. It is also possible that the mere exposure effect may depend on the timing between stimuli. In previous mere exposure effect experiments, stimuli were presented in a very predictable order separated by regular intervals (stimuli, fixation cross, stimuli, etc.). These time intervals could range anywhere from 4 ms to 2000 ms. In the current experiment, this regular pattern might have also been disrupted by trials with no image presented after the face. Because the vast majority of the trials are accompanied by an image, faces in the blank condition could have thrown off the regular pattern the participants expected, which could have prevented the mere exposure effect from occurring.

However, since the 20 Repetitions + Positive Image condition did have ratings that were significantly higher than baseline, this seems to suggest that it may be possible to obtain higher ratings using this experimental design with the proper stimuli. Further studies would need to be

conducted before the effect of experimental design or set time intervals between presentations can be properly assessed.

In order to more effectively study the link between the mere exposure effect and classical conditioning, some experimental considerations must be taken into account when conducting a future experiment. First, a preliminary study should be done in order to assess how neutral the rated stimuli are. Because there are many considerations one must consider when using faces, it may be more beneficial to utilize other neutral stimuli, such as the pseudo-Chinese characters used in Zajonc's 1968 experiment, which are less complex than faces and, thus, have fewer considerations that experimenters need to take into account. Another preliminary study should be conducted in order to establish if the mere exposure effect can be obtained with these stimuli. Once these studies have been conducted, it will be far easier to assess the effect of classical conditioning on the mere exposure effect using this experimental design, and an experiment utilizing a greater number of trials could help one obtain more reliable results.

Conclusions

A weak mere exposure effect was obtained, but only the t-test for the 20 Repetitions + Positive Image condition was significant and the ANOVA found no significant effects of Repetition or Image Type. These results do support aspects of Zajonc's hypothesis, but these results must be considered with caution because of weak mere exposure effect obtained. Future experiments should consider utilizing more neutral stimuli, less complex neutral stimuli, and higher trial counts in order to more accurately assess the effect of timing and classical conditioning on the mere exposure effect.

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