

The Effect of Mood on the Perception of Neutral Stimuli

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### Abstract

The purpose of this study was to explore the relationship between a recently viewed video and perception of emotionally neutral stimuli shortly thereafter. Watching emotional videos has been shown in previous research to alter the emotional state of the viewer. It was desired to determine whether this would also influence the participants' perception of the emotional nature of stimuli would be more in line with the emotional content of the video that they had just seen. 150 people participated in this study. They were divided into three groups: one that watched a positive emotion movie, one that watched a negative emotion movie and one that watched a neutral movie. After viewing the videos, participants were shown several images that were rated as emotionally neutral and their ratings of the emotional content of the images were recorded. This study found that watching an emotional video does significantly alter perception of the emotional content of the neutral images. These results provide insight into the way that people's emotional states translate from one situation to another and how they can alter the way that people perceive certain situations.

### The Effect of Mood on Perception of Neutral Stimuli

Ekman (1980) describes emotions as innate, universal, or cross-cultural, and easily seen. He also describes six universal emotions: happiness, surprise, anger, fear, sadness and disgust (Ekman, 1992). Of these six emotions, only surprise cannot be clearly labeled as positive (happiness) or negative (anger, fear, sadness, disgust) (Goren & Wilson, 2006). It is fairly common knowledge that emotions can be manipulated, particularly by specific situations (Moody, McIntosh, Mann, and Weisser, 2007). Can a person's induced emotional state alter the perception of a neutral situation, though? Is there a difference in this perception when the subject is in an positive mood or an negative mood? The context in which one finds oneself can significantly alter how people will react in the situation (Aldao & Nolen-Hoeksema, 2012).

Emotions can be classified as either negative or positive and, there are many noted differences between them. The positive emotion is happiness. Anger, fear, sadness and disgust are the negative emotions. To begin with, positive and negative emotions are processed in separate regions of the brain (Goren & Wilson, 2006). The two most established emotion processing regions are the amygdala and insula, which interpret fear and disgust, respectively, both of which are negative emotions (Goren & Wilson, 2006). These innate differences in brain structure and function suggest an inherent discrepancy between processing of positive and negative emotions, potentially indicating that these two categories will influence the perception of a neutral situation in different ways.

Additionally, there are noticeable variations in the discernment of positive and negative emotions. In general, negative emotions are easier to recognize than positive emotions (Goren & Wilson, 2006). The emotion that is most easily distinguishable is fear (Goren & Wilson, 2006). Negative emotions are regularly confused with each other, i.e. sadness mistaken for fear, anger

mistaken for disgust, etc. (Goren & Wilson, 2006). While this could potentially artificially increase the difference between negative emotion and positive emotion recognition, there is still enough of a disparity between recognition of happiness and each negative emotion, that this would not reverse the trend noted earlier (Goren & Wilson, 2006). These observations suggest that negative emotions are more easily recognized and processed by observers, increasing the likelihood that they will have an impact on perception of a situation.

Detection of negative emotional stimuli occurs significantly faster with clinically depressed or anxious participants (Kanske & Kotz, 2012). These depressed or anxious people also orient their attention to these negative stimuli quicker and have a more difficult time extricating their attention from these stimuli (Kanske & Kotz, 2012). Processing of negative emotional stimuli is altered for these people, leading to an increased sensitivity towards these stimuli (Kanske & Kotz, 2012). This data shows that the perception of emotional stimuli are strongly influenced by strong emotional states, such as depression and anxiety, demonstrating a correlation between general negative mood and effects related to negative emotional stimuli, specifically a fixation on such stimuli (Kanske & Kotz, 2012).

George Brown's measure of Expressed Emotion (EE) from 1965 is designed to measure the quality of a care-giver's attitude and ability to care for their patient (Kupiers, 1994). While the EE originally contained five scores on which care-givers were measured, three have been termed the most predictive of relapse, while two were deemed less significant and dropped from the EE. The three scales which are still used are critical comments, hostility and emotional over-involvement, which are all related to negative emotional stimuli (Kupiers, 1994). The two scales that have been dropped from popular use are warmth and positive remarks, both positively-linked scales (Kupiers, 1994).

It is interesting to note that the strongest predictors of increased symptomatology in the patients are all associated with negative emotional stimuli, similar to what was found with the depressed and anxious subjects from Kanske and Kotz's study (2012). This suggests a strong link between mind set or mood and perceptual differences of the environment. Kanske and Kotz's participants were frequently in a mood associated with negative emotions, hence their diagnosis of depression or generalized anxiety disorder. Patients whose care-givers score high in critical comments, hostility or emotional over-involvement are also living in an environment dominated by negatively emotional stimuli. There is a strong correlation between the situations in which these subjects and patients are living and their perception of and interaction with their environments. However, there is no experimental connection between these studies and the implied conclusion. No direction of causality can be inferred here. This is where this study proposes to pick up. By altering the mood of subjects that are not currently diagnosed with a mood disorder, it will become apparent whether the mood causes the participant to perceive the environment in these ways.

There are differences between positive and negative emotions in terms of memory and recall. In general, memory for emotional events, either positive or negative, is better than for neutral events (D'Argembeau & Van, 2005). Contextual details are more likely to be remembered, and with a greater degree of accuracy, for emotional events than for neutral events (Schmidt, Patnaik & Kensinger, 2011). One possible reason for this memory enhancement is that emotion can become a mnemonic device that is used to better encode the emotional memory, as compared to the neutral memory (Schmidt et al., 2011).

In particular, negative events and pictures usually have better accuracy when recalling the event or picture. Negative pictures are often more vividly recalled than either positive or neutral

pictures (D'Argembeau & Van, 2005). Physiological differences are seen when a participant is looking at a negative picture, as opposed to neutral pictures (D'Argembeau & Van, 2005). This could aid in the better storage of the negative memories. Negative emotion also serves to enhance aspects of episode memory (D'Argembeau & Van, 2005). Schmidt et al. (2011) notes that negative valence of situations benefits contextual memory of the event and better recollection of specific details, such as thoughts or feelings during the event.

Positive emotions also aid in memory, especially when in high-arousal situations. With high-arousal pictures, or pictures that convey stronger emotions, positive emotions become more beneficial to memory than negative emotions (Schmidt et al., 2011). The largest memory advantage can be noted when studying high-arousal, positive items (Schmidt et al., 2011). It can also be observed that processing information with regards to oneself is particularly efficient for positive information, demonstrating another advantage of positive emotions with memory (Schmidt et al., 2011).

There are multiple theories why emotions act as such a strong mnemonic device for memories. Emotions allow for a clear advantage of these memories over neutral memories; they can be recalled after longer periods of time with more detailed recollection (D'Argembeau & Van, 2005). One of the more common theories which attempts to explain this phenomenon is that the degree of emotion during the event to be remembered allows for enhanced attention to and encoding of the event (D'Argembeau & Van, 2005). Emotion directs the executive control of attention to the event (Kanske & Kotz, 2012). This, in turn, allows for greater processing of the details and better memory creation of the event (Kanske & Kotz, 2012). It is also believed that higher arousal will improve the binding of details in the memory through an increase in selectivity of attention and making the features associated with the object more noticeable

(Schmidt et al., 2011). Negative pictures seem to capture attention more and for longer periods of time than positive or neutral images (D'Argembeau & Van, 2005). This causes the negative images to be encoded more distinctly and allows for greater recall of details later on (D'Argembeau & Van, 2005). This could also explain the correlation noticed earlier between the depressed and anxious subjects in Kanske and Kotz's study and the patients whose care-givers were rated by the EE and the effect of a negative environment on their behavior. If negative stimuli seem to capture attention and be encoded more vividly, it makes sense that these subjects and patients would be so affected by their negative environments.

In the context of the current experiment, these differences in memory and recall for different emotional stimuli are important to be aware of, especially with respect to attention. Participants in this experiment will not be asked to recall specific details of their emotion-inducing experience. However, they will form memories of their experience which could influence their cognition and perception in later tasks of the experiment. Therefore, it is important to understand how these memories may be affected by the video which was watched, as this could potentially influence results of the current study.

In Moody and coworkers' study (2007), subjects' moods were successfully manipulated by having subjects listen to clips from soundtracks from specific movies. The lack of visual information during the manipulation in Moody et al.'s (2007) study was a noted limitation for that study. The current study will take this manipulation one step further by using clips with video and audio to increase manipulation of emotions and moods of subjects.

Showing video clips to participants is a common method used to manipulate participants' emotions (Moody et al., 2007). Therefore, it is very important to know exactly what effects this strategy has on how the subjects perceive their environment after the presentation of the video.

This way, future experimenters will have a better idea of how this method will affect their subjects. In this experiment, participants' moods will be manipulated, in order to measure the degree to which this manipulation method influences participants' perception of and responses to later questions and stimuli. This will be done by measuring participants' perception of the emotional content of neutral pictures. The amount of variation from a neutral rating will indicate the success of the mood manipulation and, in turn, the degree to which the manipulation affects perception in this scenario. By using a neutral stimulus to measure the manipulation effect, this will allow for a better baseline comparison.

Moody et al. (2007) studied Rapid Facial Reactions (RFRs), in normal and induced-fear settings (2007). RFRs are the subconscious mimicry of an observed facial expression, which often occurs subperceptually (Moody et al., 2007). RFRs are seen as a reflection of the observer's emotional state, which might not necessarily be the same as the expression which they are observing (Moody et al., 2007). After the successful mood manipulation, subjects in Moody's study were shown various facial stimuli which had been selected based on their emotional valence and arousal (2007). There were significant differences observed between the two groups' RFRs when they were watching angry and fearful faces, both negative emotions (Moody et al., 2007). Participants' RFRs did not directly match the facial stimuli which they were observing. Instead, they displayed context relevant expressions consistent with their emotional state and the significance of the stimuli which they had just seen (Moody et al., 2007). Furthermore, subjects that were in the induced-fear condition had increased activity to fear faces, as compared to their control counterparts (Moody et al., 2007). While Moody et al. only had an induced-fear group, the current experiment will go further by having two experimental groups: a Positive Emotion Group and a Negative Emotion Group.

If participants' ratings of neutral images significantly differ from the standard ratings provided by the IAPS, then it will be possible to verify the hypothesis that watching a movie that has a high emotional level, whether positive or negative, will impact how people will view an emotionally neutral situation, causing them to perceive a more positive emotional situation if they watched a positive emotion movie or a more negative emotional situation if they watched a negative emotion movie.

## Methods

### Participants

Participants were selected from the University of Notre Dame student body and surrounding area. Participants were contacted through advertisements and were offered either extra credit for their psychology class or ten dollars for their time. A total of 150 participants were used in this experiment. Ages ranged from 19 to 50. Of these participants, 72 were female. 113 participants were caucasian; 23 were black, of African descent; 6 participants were Asian; 6 participants were Middle Eastern; 2 participants were Native American; 23 were Hispanic. An additional 25 participants were selected in the same manner to pre-rate the videos that the main group of 150 participants would be watching.

### Materials

Prior to the start of the experiment, a separate group of participants rated sections of movies for emotional valence and arousal. The three movies used were a positive emotion movie, *Airplane!*, a negative emotion movie, *Schindler's List* and a neutral movie. For descriptions of the movies, refer to Appendix A. Every ten minutes, the movie was paused and participants were asked to rate the emotional content of the previously viewed scene. Ratings were obtained using a Likert-type scale ranging from -7 to 7, where -7 was the most negative

scene ever viewed, +7 was the most positive scene ever viewed and zero was a neutrally emotional scene. They were also asked to rate the arousal level of the previously seen segment of the video, using a Likert-type scale ranging from 0 to 5, where 0 was not at all intense and 5 was very intense.

The ratings obtained from this test group agreed with each other 90% of the time, when agreement is defined as an individual rating being within 1 of the mean score for that segment of the video. Based on this information, the videos were then edited to a length of twenty minutes. They were edited so that the average arousal scores were the same for both the negative and the positive emotion videos and so that the valence scores accurately reflected the desired mood manipulation level: neutral (control), positive emotion or negative emotion.

In a manner similar to Becker and Leininger, the current study used a mood manipulation check to assess the success of the mood manipulation through watching the video, as described below (2011). This scale measures participants' mood after an experimental manipulation through the use of several questions on a seven point Likert-type scale (Becker & Leininger, 2011). Some of the questions are reverse-coded so as to prevent participants from choosing answers based on social desirability, or some other external influence other than the mood manipulation being measured (Becker & Leininger, 2011). See Appendix B for the list of questions for this assessment. At the end of the experiment, pictures were used that had previously been rated as neutral by the IAPS (Lang, Bradley & Cuthbert, 1997). Participants rated these pictures in the same manner as was used by IAPS to create their ratings (Lang et al., 1991).

## **Procedure**

The first group of 25 participants individually watched the negative emotion movie, *Schindler's List*, then the neutral movie and, finally, *Airplane!*. In between each film, participants had a fifteen minute break. During this break, their attention was drawn away from the previously viewed film by having the participants discuss events that had occurred earlier in the day. The neutral movie was viewed as a control, to test the accuracy of their ratings. Based on the ratings provided by these participants, the videos were edited to twenty minute clips. The scenes that were shown to the test subjects were selected so that the emotional valence for the positive and negative emotion videos were of a similar degree, i.e. so that the amount of negative emotion seen by the negative emotion group is about the same amount of positive emotion seen by the positive emotion group. These videos were also controlled for emotional arousal.

Participants were randomly assigned to one of three groups: a control group, the Neutral Emotion Group; or one of two test groups: a Positive Emotion Group or a Negative Emotion Group. Everyone, individually, watched a twenty minute video clip, based on their group assignment. Once the video had ended, the participants then completed the Mood Manipulation Check to assess whether the mood manipulation was successful (Becker & Leininger, 2011). Participants then viewed a series of twenty pictures which were rated as emotionally neutral by the IAPS (Lang et al., 1997). The participants rated the emotional valence of these images using a Likert-type scale ranging from -7 to 7, where -7 was the most negative scene ever viewed, +7 was the most positive scene ever viewed and zero was a neutrally emotional scene.

### **Data Analytic Plan**

A three group ANOVA was used to determine if there was a significant difference between ratings of the emotional valence provided by the three different groups. If participants' ratings significantly differ from those of participants' in another group, then it will be possible to

verify the hypothesis that watching a movie that has a high emotional level, whether positive or negative, will impact how people will view an emotionally neutral situation, causing them to perceive a more positive emotional situation if they watched a positive emotion movie or a more negative emotional situation if they watched a negative emotion movie.

### Results

In this sample, 48% ( $n = 72$ ) of the participants were female and 52% ( $n = 78$ ) were male. The ages of the participants ranged from 19 to 50 ( $M = 27.21$ ,  $SD = 8.53$ ). Most participants, 75.33% ( $n = 90$ ), were Caucasian. 15.33% ( $n = 23$ ) were African American, 15.33% ( $n = 23$ ) were Hispanic. The minority of participants were Asian (4%,  $n = 6$ ), Middle Eastern (4%,  $n = 6$ ), and Native American (1.33%,  $n = 2$ ).

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Insert Table 1 about here  
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After watching the appropriate video clip, participants rated the emotional valence of a series of pictures that had been previously rated as neutral by the IAPS (Lang et al., 1999). A Likert-type scale with values ranging from -7 to 7 were used to rate the neutral pictures. The Neutral Group's ratings ranged between -3 and 3 ( $M = .24$ ,  $SD = 1.533$ ). Ratings given by the Negative Emotion Group had a range of -7 to 0 ( $M = -4.26$ ,  $SD = 1.454$ ). Scores in the Positive Emotion Group had a range of 0 to 7 ( $M = 1.88$ ,  $SD = 1.507$ ).

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Insert Table 2 about here  
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It was hypothesized that watching a movie that has a high emotional level, whether positive or negative, will impact how people will view an emotionally neutral situation, causing them to perceive a more positive emotional situation if they watched a positive emotion movie or a more negative emotional situation if they watched a negative emotion movie. A one-way, three group ANOVA, with a post hoc Tukey comparison, was used to test this hypothesis.

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Insert Table 3 about here  
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Results indicated that there was a significant relation between type of film viewed and later rating of neutral pictures ( $F(2,147) = 225.086, p < .001$ ), such that the mean rating given by the Neutral Group ( $M = .24, SD = 1.533$ ), the mean rating given by the Negative Emotion Group ( $M = -4.26, SD = 1.454$ ) and the mean rating given by the Positive Emotion Group ( $M = 1.88, SD = 1.507$ ) are all significantly different from each other.

### **Discussion**

The purpose of this study was to investigate how seeing an emotionally charged video would alter later perception of neutral stimuli. This study examined the effects of watching a positive emotion video and a negative emotion video on the perception of neutral pictures on an emotional level, as compared to first watching a neutral video. The results of this study demonstrate several between groups effects. After watching the positive emotion video, participants rated the neutral pictures significantly higher than those that watched either the neutral video or the negative emotion video. Those that watched the negative emotion video rated the neutral pictures significantly lower than those that watched either the neutral video or

the positive emotion video. Therefore, there were significant differences in ratings between each group.

These results are important because it provides insight into how the effects of one situation can carry into another, different situation. These results show that your mood after watching the video affects, not only your mood later on, but also how you then perceive another situation. Even though the pictures that were viewed after the videos were emotionally neutral images, participants rated their emotional content differently, depending on what video they had seen. A potential explanation can then be offered as to why different people will interpret the same scene in different ways. If one person is very happy, they will have a different perception of the situation from someone who is very angry or sad, as shown by this study.

There were several limitations that need to be kept in mind while interpreting the results of this study. The foremost limitation to this study is that there was no control for gender. Many gender stereotypes center around differences in emotion, especially with females being more sensitive to others' emotions and more emotionally expressive (Losonczy-Marshall, 2008). There is experimental evidence to support the claim that there are gender differences in various aspects of emotion-related topics (Losonczy-Marshall, 2008). Especially relevant to the current experiment are noted gender differences in encoding and decoding of emotions (Hall, Carter, & Morgan, 2000; Fischer & Manstead, 2000). It is possible, in light of this evidence, that gender differences could have an influence on the effects seen in this experiment.

Another limitation in this study is seen in the age distribution of the participants in this study. There were far more younger participants, under the age of 30, than there were older participants, over the age of 45. It is possible that there could be an effect of age that would skew the results noticed above. Yeung, Wong, and Lok (2011) showed that older and younger

adults differ in the types of emotion regulation strategies, leading to an influence in emotion expression. The conspicuous absence of many older adults could indicate that these results are not applicable to an older population. There is also a lack of children participating in this experiment. Therefore, these findings would not be applicable to children, either.

Additionally, this study grouped several emotions together into one category, referred to as the “Negative Emotion Group”, including anger, sadness, fear and disgust. In actuality, these four emotions would probably have different effects on the perception of neutral stimuli, since they each produce different reactions in people (Ekman, 1992). Having lumped these four emotions into one category, their individual effects on the participants were not measured.

Based on these limitations, there are several areas for future research. One such possibility would be to perform a similar test, but with an introduced control for gender. This would allow for the exploration of the effect of gender in this situation. A similar approach could be taken with respect to age. Furthermore, it would be interesting to see if the results seen in this experiment could be replicated across several different cultures. There are many cross-cultural differences in reported emotions and other such emotion variables (van Hemert, Poortinga, & van de Vijver, 2007). Performing a cross-cultural study would explore the possibility of whether this experiment is affected by cultural differences. Another extension idea would be to explore the individual effects of disgust, anger, sadness and fear, Ekman’s four negative emotions (1992). There could be interaction effects between these negative emotions that are resulting in the results seen, while the individual emotions would have produced significantly different results.

In spite of these limitations and recommendations for future areas of research, this experiment demonstrates an important finding about how emotions and mood transfer from one

situation to another. It has been shown that, after watching an emotionally charged video, participants will then perceive the emotional content of a neutral stimulus differently. This has consequences for real life scenarios, such as eyewitness accounts. It also partially explains why different people will interpret the same event in different ways. Their emotional state upon entering the situation will alter how they perceive the situation. A specific instance where this information would be useful would be with eyewitness accounts. Individual eyewitness accounts always vary considerably (Kassin, Tubb, Hosch, & Memon, 2001; Woocher, 1977). Knowing that the witness's emotional state will alter their perception of the occurrence can help police detectives and other interviewers know what might be affecting their recall of the event and can help them to ask better questions to get to the truth.

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## Appendices

### Appendix A – Movie Descriptions

The neutral (control) movie showed a group of people sitting on benches at a park. Occasionally, other people or animals, such as ducks or dogs on a walk, would move through the scene. For the most part, however, the video focused on the same group of six people sitting at the park.

The positive emotion video showed clips from the movie *Airplane!* (1980). This film was chosen since many people consider it to be very funny and happy, examples of positive emotions, without having a sad or otherwise negative emotion subplot. Furthermore, this movie is well known, allowing it to be possible to show select scenes without confusing viewers and distracting them from the mood manipulation. The clips that were shown were those segments that were selected by the first group of participants.

The negative emotion video showed clips from the movie *Schindler's List* (1991). Again, this film was selected because it is a rather well-known film, allowing for certain scenes to be shown to participants without them becoming confused about the plot of the film. Also, this film covers several aspects of negative emotions, including sadness and anger. The selected scenes that were shown to participants were those selected by the first group of participants that rated the movies.

### Appendix B – Mood Manipulation Check

The mood manipulation check consisted of the following questions. The response to question 1 was reverse coded and then averaged with the response from question 3 to obtain an index of mood. This index could range from 1 to 7, with a higher score representing more



**Appendix C – Tables and Figures**

Table 1

*Descriptive Statistics for Participant groups*

	Neutral Group	Negative Emotion Group	Positive Emotion Group	Total
	50	50	50	150
Gender	28 males (56%) 22 females (44%)	26 males (52%) 24 females (48%)	24 males (48%) 26 females (52%)	78 males (52%) 72 females (48%)
Ages	Range = 19-45 M = 26.78 SD = 8.47	Range = 19-47 M = 28 SD = 9.04	Range = 19-50 M = 26.86 SD = 8.17	Range = 19-50 M = 27.21 SD = 8.53
Ethnicity	30 Caucasian (60%) 7 Hispanic (14%) 8 African American (16%) 3 Asian (6%) 1 Middle Eastern (2%) 1 Native American (2%)	32 Caucasian (64%) 7 Hispanic (14%) 5 African American (10%) 3 Asian (6%) 2 Middle Eastern (4%) 1 Native American (2%)	28 Caucasian (56%) 9 Hispanic (18%) 10 African American (20%) 0 Asian (0%) 3 Middle Eastern (6%) 0 Native American (0%)	90 Caucasian (60%) 23 Hispanic (15.33%) 23 African American (15.33%) 6 Asian (4%) 6 Middle Eastern (4%) 2 Native American (1.33%)

Table 2

*Descriptive Statistics for Group Ratings of Neutral Pictures*

	Neutral Group	Negative Emotion Group	Positive Emotion Group	Total
	50	50	50	150
Mean	.24	-4.26	1.88	-.71
Std. Deviation	1.533	1.454	1.507	3.000
Minimum	-3	-7	0	-7
Maximum	3	0	7	7

Table 3

*Results of ANOVA Analysis*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1010.653	2	505.327	225.086	.000
Within Groups	330.020	147	2.245		
Total	1340.673	149			