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Zachary Laborde is a psychology major and computer science minor from Metairie, Louisiana. His research interests include cognitive and computational neuroscience, artificial intelligence/machine learning, and affective and cognitive psychology. While enrolled in his Advanced Research Methods course, Laborde's interest in nostalgia was sparked when he watched a YouTube video on the VSauce channel. He found the emotional nature of nostalgia to be fascinating and realized that he could examine it by measuring how a person perceives time while they are feeling nostalgic. During his undergraduate career, Laborde has served as a research assistant in Dartmouth College's Heatherton Lab in Affective Neuroscience where he analyzed MRI images.

Nostalgia and the Perception of Time

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Abstract

This study looked to determine the psychological nature of nostalgia. Nostalgia and its correlation with perceived time and emotional affect were explored. Potential emotional arousal in subjects was determined by measuring their subjective perceptions of time, a phenomenon found in previous studies. Twenty students from a southeastern university watched a three-minute nostalgia-inducing video and filled out both a pre-test and a post-test. Nostalgia was repeatedly measured with Batcho's Nostalgia Inventory, which determined the degree each participant missed certain aspects of their childhood. Emotional affect also was repeatedly measured using the Positive and Negative Affect Schedule, asking participants to measure how much they were feeling various emotions. Time perceived was measured based on the participants' own estimations. The study found that nostalgia has no significant effect on time perception. Nostalgia was determined to have no significant correlation with negative affect. However, this study found a strong correlation between gain in nostalgia and gain in positive affect. Nostalgia was shown to have very strong likelihood of being an emotional event with positive affect. These results were found to affirm the hypotheses of previous studies, implying that nostalgia is an emotional coping mechanism used in times of isolation or extreme negative affect.

Key Terms:

- Nostalgia
- Time Perception
- Time Dilation
- Arousal
- Positive and Negative Affect Schedule

Introduction

Whether in history books, Facebook pages, or even our own minds, humans are always looking to the past. While a myriad of emotions are tied to our memories, the most significant one is nostalgia; that is if nostalgia even is an emotion. Nostalgia is a bittersweet longing for something or someone from the past (Baker & Kennedy, 1994) that can no longer be experienced (Holbrook and Schindler, 1991).

There are three distinct categories of nostalgia: real, simulated, and collective (Baker & Kennedy, 1994). Real nostalgia is what most people think of as nostalgia. This stems from moments that one experiences first-hand. Simulated nostalgia, on the other hand, relates to moments of which one has knowledge without direct experience. The origins of simulated nostalgia are usually related to others' memories as well as to historical events. For example, people may feel simulated nostalgia at Gettysburg or the World War II museum. The third form of nostalgia, collective nostalgia, is shared by an entire generation. Collective nostalgia can be experienced by a Baby Boomer seeing footage of Woodstock or a person from Generation X watching a video of the fall of the Berlin wall. These events do not have to be witnessed first-hand, rather they are events that everyone within a movement, culture, or generation can relate to equally as a characterization of something larger than themselves. This variation in how one can experience nostalgia shows the underlying significance the past has on everyday life.

Sedikides, Wildshut, Arndt & Routledge (2006) performed a study finding that, ultimately, the main trigger of nostalgia is memories of the self. Most of these memories tend to occur in one's 20s and teens (Rathbone et al., 2008). One has more memories of his/her youth because so many first-time experiences

happen in this timeframe. This increase in memories is called the Reminiscence Bump (Rathbone et al., 2008). When recalling autobiographical memories, more good memories are found than bad ones. Thus, nostalgia is much more likely to associate with positive memories than with negative ones (Leboe & Ansons, 2006). However, negative memories have been shown to be the more salient, likely due to their association with significant changes in one's life (Sedikides et al., 2006). Change is the primary reason for the Reminiscence Bump, and the dividing line between memorable events and unmemorable ones (Rathbone et al., 2008). The purpose of nostalgia is thought to be involved in strengthening social bonds and creating a sense of meaning in one's life (Sedikides et al., 2006). While this may explain the evolutionary function for nostalgia, some of its elements are still unclear. Because it is coupled with affective content, nostalgia may be an emotion of its own.

In order to determine if nostalgia is actually an emotion and not some other cognitive experience, a measure correlated with emotional experience should be used to determine its true nature. One measure found to correlate with emotion is the subjective perception of time, also known as time dilation (Droid-Volet, 2013; Droid-Volet, Fayolle & Gil, 2011). Several studies have shown that people who are feeling arousing emotions (e.g. surprise, fear, anger, etc.) perceive time more slowly. When one becomes more emotionally aroused, his/her "clock" speeds up, causing that person's time relative to others to slow down.

By measuring the intensity of nostalgic feelings and perceived time of the video they watch, this study aims to measure time dilation and its correlation to nostalgic feelings. Considering that the mean age of the participants will likely be around 20 years old, age will also be measured to ensure these slight differences do

not have a significant impact on the data. Because of the effects arousal has on perception time, it was hypothesized that an increase in nostalgic feeling would positively correlate with the perceived time experienced. This means that if nostalgic feelings increase then time would presumably be perceived as moving faster (i.e. time estimations of an event would be longer than its actual length of time). Nostalgia has shown to occur in instances of both positive and negative affect, thus it was also hypothesized that both positive and negative emotional affect would have a positive correlation with the intensity of nostalgic feelings.

Method

Participants

The participants consisted of twenty students from a southeastern university. Sixteen were African-American, one was Caucasian, two were Asian, and one was Hispanic. Sixteen participants were female and four were male. The mean age of the participants was 20.167 years old ($s = 1.81$). Informed consent sheets were read and signed by the participants.

Design

The dependent variable for the study was the perceived time of the video's length. The independent variables were levels of nostalgia, positive affect, and negative affect. The participants were given a pre-test before the video and a post-test afterwards. In order to correctly normalize the results, any outliers who were outside ± 3 standard deviations from the mean were removed from the final sample. Because of this, one participant was removed from the final sample ($N=19$). Next, a series of two-way repeated-measures analysis of variance tests (rANOVA) were used to ensure that the pre-test and post-test scores were significantly different.

To measure the first research hypothesis, the correlation between the perceived time of the video and the post-test levels of nostalgia was measured using a bootstrapped Pearson's r , which resampled the data 10,000 times to offset the small sample size ($N=19$). When testing the second research hypothesis, the nostalgia from the video and the change in affect from the video were measured using gain scores (i.e. the difference between the post-test and the pre-test). A bootstrapped Pearson's r test was used to measure the association between the gain in nostalgia and the gains in positive and negative affects respectively.

Materials

The pre-test contained questions asking the age, race and sex of the participants. In both tests, the PANAS scale (Watson, Clark & Tellegan, 1988) was used to assess the emotional affect of the participants, which asked them to measure how much they were feeling various emotions (e.g. interested, upset, strong, etc.). To measure nostalgic feelings, both tests contained Batcho's Nostalgia Inventory (i.e. Batcho's NI or BNI), using a seven-point Likert scale to determine the degree each participant missed certain aspects of their childhood (e.g. family, heroes/heroines, not having to worry, etc.; Batcho, 1995). The post-test additionally included three questions that would ensure participants had been attentive and another question that asked if they had been displaced by any hurricanes around 2005 or 2006. The video used for the experiment was downloaded from YouTube (Slacktory, 2013), cut, and saved on a USB drive. It consisted of various songs and videos from the year 2006. The video was shown using a projector.

Procedure

After informed consent was given, the examiner closed the door to the testing room and participants were asked to not look at their cellphones, their watches, or any computer

screens, as this would allow for an objective tracking of time. The participants were then handed the pre-test questionnaires. Once all of the questionnaires were handed back, the examiner presented the three-minute video with the use of a projector. The video window was adjusted so that the time-bar would not be visible. Once the video was completed, the participants were given the post-test questionnaires. Upon completion, the participants returned the post-test questionnaire to the examiner, and the study was complete.

Results

The differences between the pre-test and post-test conditions were found to be significantly different for both the scores on positive affect and scores on nostalgia (see Table 1). The negative affect scores, though, showed a fairly weak variation between the pre-test and post-test instances, proving to be insignificant. To test the initial research hypothesis, a bootstrapped Pearson's r test was used to resample the results of both the perceived time of the participants (resamples = 10,000) and their corresponding levels of post-test nostalgia from the BNI. The mean of every sample's correlation coefficient was used to determine mean $r = 0.034$ and $p = 0.426$ (see Figure 1). These results show no significant correlation between the perceived time of the participants and their levels of nostalgia from the post-test BNI measure. For this reason, the first null hypothesis was retained.

To test the second research hypothesis, that both positive and negative emotional affect would have a positive correlation with the intensity of nostalgic feelings, another bootstrapped Pearson's r test (resamples = 10,000) was used to find a correlation between the gain in nostalgia and the respective gains in positive and negative affects. The results showed a strong, significant correlation between the gain in positive affect and the gain in nostalgia (mean

$r = 0.611$, mean $s = 0.154$, $p < .01$, see Figure 2). However, the gain in negative affect did not significantly correlate with the gain in nostalgia (mean $r = 0.176$, mean $s = 0.325$, $p = 0.292$, see Figure 3). Thus, the second research hypothesis was only half confirmed; positive emotional affect has a positive correlation with the intensity of nostalgic feelings. More research is necessary to confirm or deny the same for negative affect.

Sex, age, and race proved to have no significant difference on the levels of nostalgic change in participants. Five participants were relocated after Hurricane(s) Katrina, Rita, and/or Wilma. There was no significant correlation between relocation and levels of nostalgic gain ($p = .114$).

Discussion

The results of the study did not find any significant correlation between time perception and nostalgia, suggesting that nostalgia itself does not give a person an increase in arousal or in attention (mean $r = 0.034$, $p = 0.426$). For the second hypothesis, involving nostalgia and emotional affect, the results show a very significant correlation between nostalgia and positive affect (mean $r = 0.611$, $p < .01$). This shows that nostalgia is a very positive affect emotion and fits well into the framework for nostalgia proposed by Sedikides et al. (2008), theorizing that nostalgia occurs in response to negative mood and loneliness. The strong emotional reaction that nostalgia can explain why advertisers use it so often, and why many people grow strong emotional ties to a specific brand, absent of any sort of logical rationale (Merchant et al., 2013). This correlation also supports a study by Leboe and Anson (2006) which found that nostalgia caused memories to be viewed more positively than they originally were.

It is unclear what these results mean for the theorized heightened salience of negative affect memories (Sedikides et al., 2006), since the correlation of negative affect to nostalgia showed high levels of variation on average (mean $r = 0.176$, mean $s = 0.325$). One possible explanation for the unusually high amount of variance could be that the video disproportionately evoked negative affect memories within the sample. This explanation would be in line with the claims made by Sedikides et al. (2006). If negative affect memories are rarer, but also more salient than their positive affect counterparts, one would expect to see a positive skew (mostly low-scoring individuals with few high-scoring outliers) in the distribution of the negative affect scores. Looking at the normal distribution of the interaction between the pre-test and post-test scores (i.e. calculating the product) for negative affect (see Figure 4), the distribution appears to have a positive skew as expected. Since all but one of these scores was actually found to be outside ± 3 standard deviations from the mean, it is unclear if the higher-scoring individuals were simply atypical or representative of those who experienced negative affect memories while watching the video. Testing the correlation between negative affect and nostalgia more directly is a promising direction for future research.

There were two flaws in the design of this study, the first being the lack of a control video. Without a control (neutral/non-nostalgic) video, the study was unable to determine how long a person would “normally” determine to be the length of a 3-minute video. Because of this, nostalgia, positive affect, and negative affect were the only variables that accounted for this estimation, leaving out various individual factors that might have contributed to each individual’s time estimation.

The second flaw in this design was the bias towards positive affect in the video. Considering that, as mentioned earlier, negative affect memories are less common than positive affect ones (Sedikides et al., 2006), it would be preferable to either use a video that shows mostly negative effect nostalgia, or, better yet, use one positive and one negative video. This sort of design would be more effective in determining the existence of negative affect nostalgia and its association with positive affect nostalgia.

Nostalgia has shown to be a non-arousing emotion with a strong, positive affect. While it is still unclear as to what sort of role this emotion plays in memories with negative affect, nostalgia helps in memory regulation and self-continuity. Nostalgia and time dilation are both central to how the human mind perceives time, but their lack of correlation is representative of how different our view of the past is from our view of the present. Both are skewed and warped to fit our reality, and that reality is what defines us all.

Table 1: Repeated Measures ANOVA between Pre-Test and Post-Test Scores

Variable	$F(1,18)$	p -value
Positive Affect	11.57	.0032 ***
Negative Affect	2.18	.1573
Nostalgia	15.95	.0009 ***
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$		

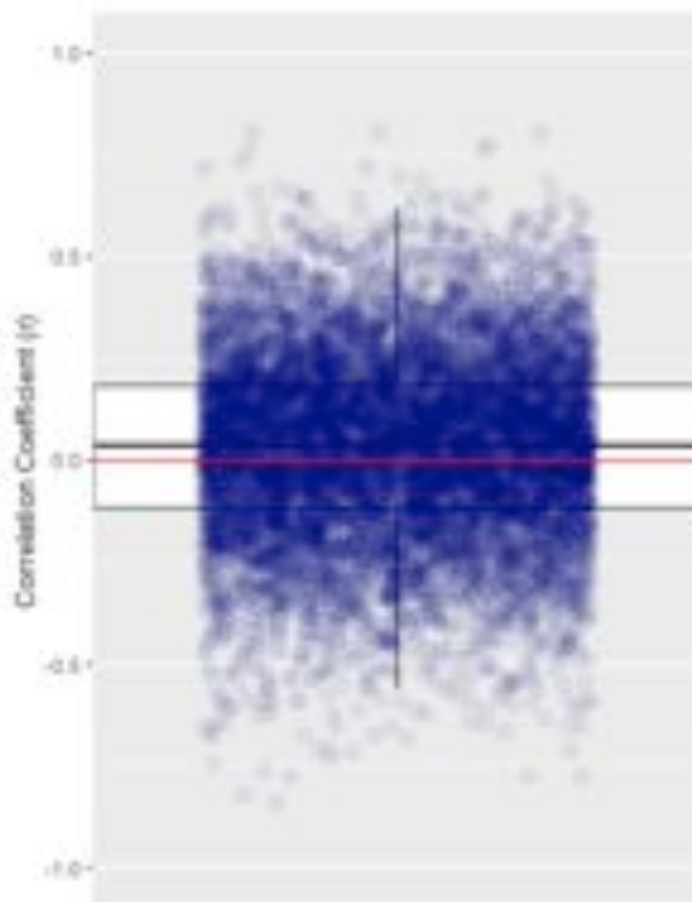
Figure 1. Bootstrapped Pearson's r Correlation Coefficients between Post-test Nostalgia and Time Perception ($resamples = 10,000$)

Figure 2. Bootstrapped Pearson's r Correlation Coefficients between the Gains in Nostalgia and Positive Affect (resamples = 10,000)

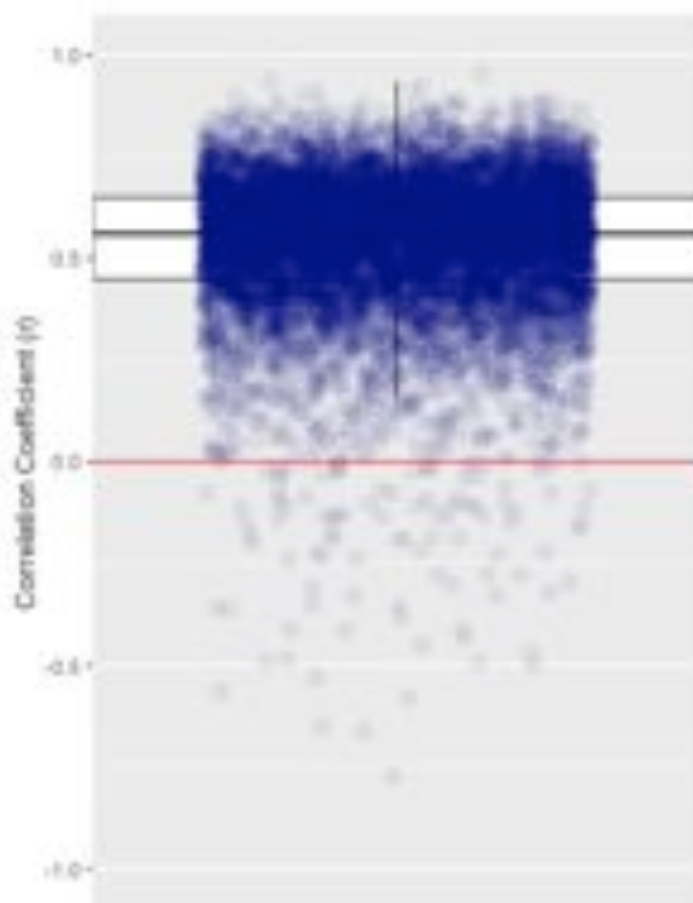


Figure 3. Bootstrapped Pearson's r Correlation Coefficients between the Gains in Nostalgia and Negative Affect (*resamples = 10,000*)

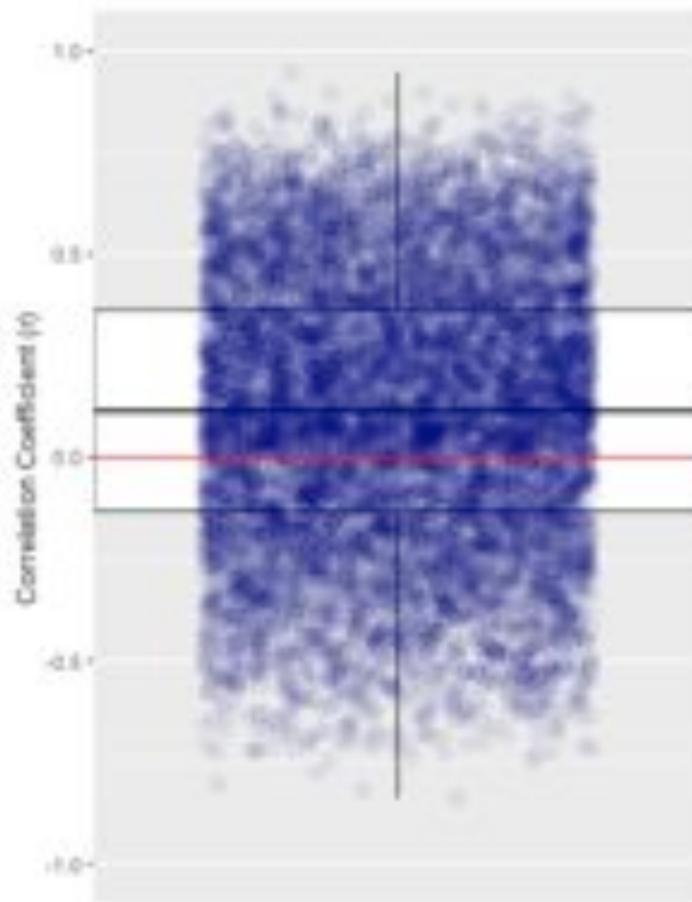
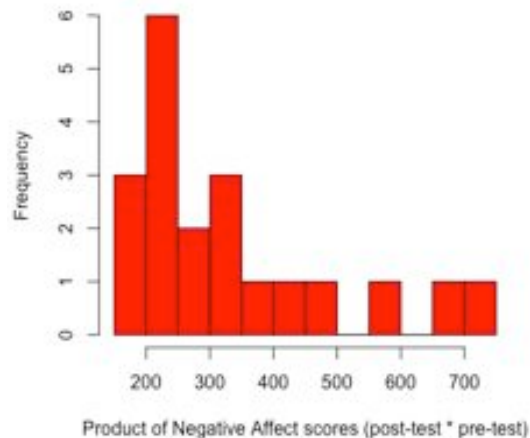


Figure 4: Histogram of the Interaction between Pre-test and Post-test Scores in Negative Affect



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