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Emotion and Memory: The Most Opposed Elements under the Blanket Term Psychology with Levine's Case of Sentiment

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Abstract: Emotion and memory are two of the most opposed elements under the blanket term psychology. Memory is logical, if sometimes inaccurate, while emotion is irrational and rash. Despite these clear differences, many studies show that emotion and memory are closely related and that emotion enhances memory. However, these studies are often misunderstood due to the use of confusing terminology, resulting in the theories presented being difficult to apply in everyday life. This paper seeks to clear up the misunderstandings and propose a few possible applications of the presented theory.

Keywords: Memory, Emotion, Arousal, Sentiment

1. Introduction

Memory is never the most reliable place to search for factual recollections of a time long past, but at the very least, our memories can be regarded as generally accurate. On the other hand, emotion is a term used to describe what is usually regarded as the most biased element under the blanket term of psychology. Emotion and memory are two topics that, at first glance, may seem only distantly related and categorized under the same blanket term "psychology." However, the two have a surprising relationship that is, while unexpected, useful in many ways. Of course, like most things, this relationship does not come without a few consequences, with confusion about already existing terms, such as the difference between emotion and sentiment, resulting in the theory of emotional memory being easily misunderstood as sentimental memory and passed on wrongly to others. Other times, it is the theory itself that is completely misunderstood, and the result is a complete lack of understanding as to what effect emotion has on memory, and how emotions may affect the way we remember things.

This paper will seek to clarify a few of the more confusing terms to present the theories of emotional memory clearly and effectively and to remove misconceptions about these theories.

2. Emotion and Sentiment

When discussing the theories of emotional memory, one must first discuss the difference between emotion and sentiment. While the two are used interchangeably and are listed as synonyms in the Merriam-Webster dictionary, there are many differences between the two terms as defined in cognitive science.

In cognitive theory, emotion is defined as a mental state brought on by neurophysiological changes. Emotions are usually associated with thoughts, feelings, and behavioral responses, and can

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produce different physiological, behavioral, and cognitive changes [1]. Sentiment, on the other hand, is generally defined as a view of or attitude toward a situation or event [2].

2.1. The Differences Between Sentiment and Emotion

One of the larger differences between emotion and sentiment lies in the fact that emotion is an unconscious reaction, while sentiment is conscious and will remain an obvious feeling as long as one is consciously considering a topic. Conversely, emotion will fade away by itself after a period of inactivity.

2.2. Memory

Memory is defined as the ability of the mind to store and retrieve information and is divided into two large classifications, which act as blanket terms for more specific forms of memory. These two sections are implicit and explicit memory. Explicit memory is the conscious storage and recollection of information, while implicit memory is the unconscious storage and recollection of information [3]. While the studies of emotion and memory go far back and far across every possible field of memory, the following theory mainly focuses on iconic (visual) memory.

2.3. Arousal-Biased Theory

One of the most prominent theories regarding the relationship between emotion and memory is a theory called "Arousal-Biased Theory". This theory states that "Thus, due to a mixture of factors…emotional stimuli are likely to have high priority. Furthermore, arousal (evoked either by those same stimuli or by another source) should increase the competitive advantage of the emotional stimuli over lower priority stimuli" and proposes that an object that brings about emotional arousal will be prioritized before an object that does not bring about emotional arousal [4]. Similarly, this theory proposes that there is a mirrored effect between emotion and memory and that a more emotionally aroused memory will be more highly prioritized – and therefore remembered more clearly – providing ample evidence to back up this hypothesis. One such piece of evidence is from an experiment conducted to either prove or disprove the hypothesis. In this experiment, participants were asked to fixate on a point. One group of participants would then be exposed to an arousing sound while the other group is exposed to a neutral sound instead.

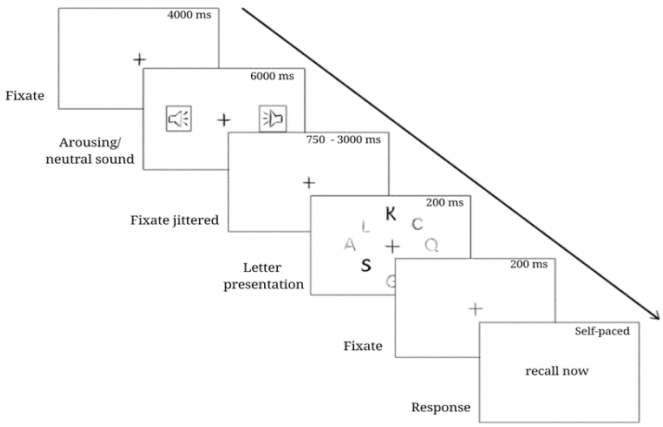

Figure 1. Sequence presented for each trial of Sutherland & Mather experiment

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The results of the experiment showed that an arousing sound would cause the high-priority objects to be easier to recall, but also results in low-priority objects being more easily disregarded or missed. The experiment results, therefore, suggest that to apply the theory in everyday life, one should put forth an idea with an arousing factor, and make sure that the information that they wish for others to remember is a highly prioritized object; e.g. making the most important points in a presentation the biggest.

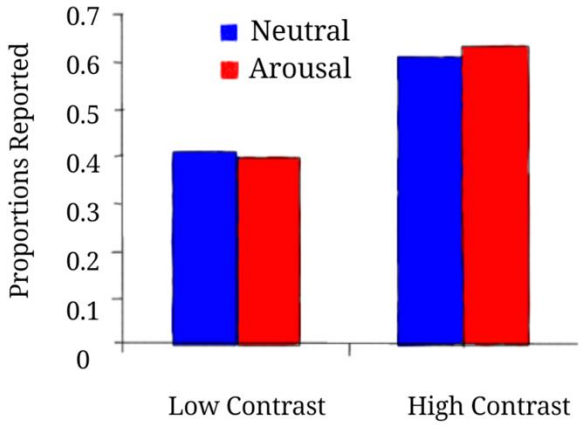

Figure 2. Experiment results

The results suggest that emotion has a positive effect on memory – that being, emotion arousal enhances memory and results in a clearer memory to retrieve at a future date. The results may also help educators improve the way they present knowledge to students – by prioritizing the most important information and by adding an arousing factor, they may be able to improve the attention span of students, allowing them to spend less time reviewing things that they have forgotten.

This is because, in the presentation of their theory, Mather and Sutherland hypothesize how their findings could extend to the realm of long-term memory. They argue that "Experiencing arousal while processing two stimuli in competition with each other for mental resources leads to even more enhancement in memory consolidation for the "winner" and impairment for the "loser," creating a "winner-take-more" effect in memory consolidation" [4].

The authors also state that there should be more experiments conducted to help bring light to the details of the relationship between emotions and memory to light, as knowing more about the topic could allow for better applications in everyday life.

3. Counterargument

In their paper "Emotion and Memory: A Grumpy Overview", Pizarro and Levine present an argument that suggests memories with emotion are commonly incorrect, especially when the memory is completely composed of an emotional reaction. Using one of Levine's studies from 1997, Pizarro presents us with what seems to be an impeccable argument – an example of emotional memories being drastically incorrect. This example explains that when former US presidential candidate Ross Perot suddenly withdrew from the election, Levine's team interviewed Perot's supporters and gathered

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data on how they felt in reaction to his sudden departure. This data applies to his argument because "For his supporters, Perot's withdrawal from the race had all the elements typically associated with the creation of vivid and lasting memories. The event was surprising, associated with intense emotion, and viewed by these individuals as being of tremendous personal and social importance" [5]. Continuing with this argument, Pizarro states that "The results showed that supporters recalled their past emotions as having been more consistent with their current appraisals of Perot than they were", meaning that the recalled feelings regarding Perot were more like the feelings they currently had regarding Perot than the ones they were asked to recall. Using this example, Pizarro argues that, if even memories of emotions themselves can be incorrect, then it is impossible to say that emotions can make memories more credible. He states that "They found that greater emotional intensity was associated with greater memory confidence but not with consistency" [5]. However, the reasoning behind Pizarro's argument collapses upon a closer inspection, as the author made a mistake that is made by many when discussing theories of emotion and memory. Instead of explaining his example from the three angles of emotion, memory, and sentiment, he uses the terms emotion and sentiment interchangeably. When proposing the theory that greater emotional intensity only increases the confidence one has when speaking about the memory, Pizarro is describing sentiment rather than emotion, the emotional level increases more and more the longer the event is contemplated, rather than slowly fading away – but still uses the term emotion as a blanket term to argue for his point.

Pizarro fails to provide both the audience and the subjects with a thorough definition of sentiment and emotion, leading to a lack of clarity and a chance for Pizarro to manipulate his use of the term emotion for his benefit.

Rather than intentionally misleading readers, it appears that Pizarro has made the common mistake of forgetting to identify sentiment and emotion as two separate terms that must be regarded differently. Instead, his use of these two terms interchangeably allows his argument to hold up.

On the other hand, if sentiment and emotion are regarded differently, then the example used in Pizarro's evidence is no longer viable for analysis to prove his point and instead works against him, and since sentiment and emotion are indeed different things, Pizarro's argument is no longer supported.

It proposes that the current appraisals of Perot are mostly the sentiment of previous emotions, and when asked to recall the emotions they felt, they instead stated a less extreme version of the sentiment because they too hold a misunderstanding of the relationship between sentiment and emotion. Indeed, the people questioned were not specified to have an understanding of the difference between sentiment and emotion.

It is therefore possible to argue that the subjects are not recalling previous emotions, but instead are stating their sentiments, as it is a fine line to walk, and the accuracy of self-reported data has always been a questionable thing. This means that the statement of "…supporters recalled their past emotions as having been more consistent with their current appraisals of Perot than they were" is of doubtful accuracy, and an invalid piece of evidence [5].

While the argument that Pizarro presents is incorrect, if very interesting, other scholars have also presented similar points, but while they seem better prepared to argue their points, they too fail to make the distinction between emotion and sentiment and create an argument based entirely on the interchangeability of the terms.

Take, for example, another study Pizarro presents as evidence: this time a study conducted by Safer, Levine, and Drapalski in 2002. In this study, "Safer, Levine, and Drapalski conducted an experiment that assessed college students' memories of how anxious they felt before a midterm exam. Students were randomly assigned to one of two groups. One group learned their exam grades before recalling their pre-exam emotions. The other group did not yet know their grades when they recalled their emotions" [5].

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The results of the experiment showed that "In contrast to those who had not yet learned their grades, students who learned that they had done well on the exam underestimated how anxious they had felt before the exam. Students who learned that they had done poorly overestimated how anxious they had felt. Thus, post-event information about their grades led to distortions in students' memories of their past feelings of anxiety", and once again claims that emotions are not accurately recalled. However, again, this study fails to point out the fact that emotion and sentiment are not the same thing and uses them interchangeably [5, 6].

Because the subjects are not confirmed to understand what the difference between sentiment and emotion is, the results of this study must be taken with a grain of salt. How are we to know which subjects are reporting, and how are we to know if it is the data we want?

Similar to the previous study of Perot's supporters, this study also revolves around using a subject's self-reported information, making any kind of evidence already dubious. However, if current knowledge affects what someone is recalling as the study claims the results to show, then the emergence of bias must be from conscious contemplation or the reporting of sentiment rather than emotion. Instead of thinking about the emotions, they felt during the memory, they are reporting sentiments back based on their current knowledge.

These studies show that most issues in understanding the theory of memory and emotion take root in a misunderstanding of what emotion is and mixing it up with other concepts like the sentiment. These mistakes lead up to a lack of public and professional understanding, and this lack of understanding then leads to misuse of the theory of emotional memory. The lack of understanding amongst the public can also lead to a deeper misunderstanding of the terms emotion and sentiment, with more and more people using them interchangeably.

4. Memory, Emotion, and Sentiment

Another question that this theory raises is the indelibility of memory, that is, is it possible for something to be unforgettable?

The question of whether or not memory is indelible is at best difficult and at worse impossible to answer, but the simplest answer that can be given is yes, some memories can be impossible to forget [7].

But now another question arises. Under what circumstances will an indelible memory form? An indelible memory is most likely to form under traumatic or extreme emotional circumstances, like a soldier's memory of fighting in the trenches during World War I, or one of a soldier in the Korean War crawling through the snow[8, 9].

While there are no studies that focus on the concept of indelible memory, most soldiers that were involved in a war can give a clear, accurate recollection of what happened to them during the war to the day they die. However, it must be noted that for a memory to be indelible there must be a great deal of emotional stimulus(usually negative) added to the scenario being remembered. There is no requirement for there to be any sentiment involved in the creation of an indelible memory, although when later recalling what happened, it's more than likely that there is some degree of sentiment about the recollection [10].

An interesting element of indelible memory is the great resemblance between the emotions felt during the memory and the sentiment later felt when recalling the memory. This is likely because of the strong emotional value of the memory, which causes the subject to have a consistent recollection of the scenario and the emotions felt during the time, without much of the current bias that contaminates other studies or experiments regarding sentiment and emotion.

It is a rather depressing truth that emotion and sentiment are two terms often mixed up in psychology, with the two often being confused with each other or used interchangeably. The issue with understanding the theory of emotional memory lies not in the fact that the two terms seem to have no

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connection, but in the fact that many studies fail to make the distinction between emotion and sentiment. Instead of an understanding of the two terms as they are in psychology, the audience assumes that these terms are being used as if they are in a work of literature, where the two are interchangeable. Unfortunately, that isn't true in the case of emotional memory. Emotional memory is a set of theories that, if completely understood, could be used in many fields that have high requirements for memory, such as learning in schools, but more importantly, if this theory is manipulated well, it could be used to help government officials or military officials in memorizing and recalling important, classified information under more stressful circumstances. This would help these members of society when under pressure or in a rush to fill out the information, for example, to prevent a bomb from going off when notes are not at hand, or to remember how to lock an important fragment of information away during an enemy attack. Of course, it could also have less pressing applications. This theory could be used by video game players to remember where a specific part of the map is, where enemies are located, and recipes for some items that could help them and their team win.

5. Conclusion

It could also be used by students participating in competitions, rather than reducing their stress levels during the learning process, students could purposefully increase their emotional reaction during the learning process and therefore form stronger memories. During the test, they may be able to have a clearer recollection of what they learned during the learning process and therefore get a higher score. It is in this theory that emotion and sentiment must be regarded as thoroughly different things. While most people understand emotion and sentiment as they are in literature, as synonyms that can be used to describe the same thing, when researching and conducting studies on theories of emotional memory, the key thing that most miss is the distinction between sentiment and emotion. However, even if the line between sentiment and emotion is drawn very clearly, in all previous studies the results came from the subjects themselves, which suggests that they are of dubious accuracy. A better way to measure the difference between emotional reactions would be to use a device to monitor brain activity consistently and see the reaction through more stable data from the device rather than data from the subject.

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