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## The Impact of Stimulus Age on Emotional Face Recognition

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**The Impact of Stimulus Age on Emotional Face Recognition**

University Honors Program Senior Capstone

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### **Abstract**

Research supports the theory that stimuli, including experiences, words, and faces, with an emotional connotation are more easily remembered than stimuli with a more neutral connotation. The scientific community has expanded this theory by manipulating a variety of variables, including participant age, time between encoding and retrieval, and “taboo” words in comparison to more neutral categories, to name a few. The current study seeks to expand upon the previous findings by examining emotional and neutral facial stimuli while manipulating the age of the stimulus face. To do this, participants were shown 10 photos in each of the following categories: young neutral, young angry, young smiling, old neutral, old angry, and old smiling faces. Each image was shown for 2.5 seconds, followed by a 1-second blank screen. After the stimuli were shown, participants took a recall test to determine which category had the highest recall accuracy. After analyzing the data, researchers found that there was a main effect between the recall accuracy of old happy and old angry faces. More specifically, participants were more likely to remember the faces in the old happy category than they were in the old angry category. In regard to the main hypothesis, there was no main effect between the recall accuracy rate of young emotional (smiling and angry) and old emotional faces. While the results were not significant, the findings help further the field in that researchers now know how to better guide the participants rather than allowing them to take the survey independently. Future studies can replicate this study in a laboratory setting to better understand the true effect of old and young facial memorability.

## **The Impact of Stimulus Age on Emotional Face Recognition**

The human memory has been studied for centuries, beginning as early as 300 BC with Epicurus' study of memory and the soul (Kerferd, 1971). Since then, researchers have discovered a multitude of confusing components and facets. An introductory psychology course may describe elements such as short-term memory, long-term memory, encoding, retrieval, rehearsal, sensory memory, and semantic memory, to name a few. Despite the breadth of knowledge on this subject, at the end of the day, people are more likely to remember emotion rather than neutrality. This is applicable to emotional words, emotional experiences, and emotional faces (Kensinger & Corkin, 2003; Brown & Kulik, 1977; Liu et al., 2014). The current study seeks to build off of past research by evaluating the effect of age variation in facial stimuli on emotional memory retrieval.

One early study, performed by Brown and Kulik (1977), found that emotional experiences are more easily remembered than are neutral or average experiences. The authors used the example relevant to that time period and claimed that most people can recall exactly where they were and what they were doing when they heard that President Kennedy was assassinated. Their memory for an emotionally arousing event was very detailed, a phenomenon also known as flashbulb memories. This significant finding further developed the field because researchers found that the effect was present for memories of events, even events that had been encoded in memory years prior. This was important for all future studies, including the current study, because it laid the foundation by supporting the theory that emotion is more easily remembered than neutrality. By laying the foundation, future

researchers were able to manipulate different variables to discover the extent of this phenomenon.

Some 25 years later, researchers found that emotions enhance memories not only for events, but for simple words and phrases. This study, performed by Kensinger and Corkin (2003) supported the hypothesis that emotional words, such as “sorrow,” had a higher recall accuracy than neutral words, such as “think.” While these two studies significantly furthered the field of memory, they did little to examine this phenomenon on different populations.

Brown and Kulik studied American adults aged 20-60, while Kensinger and Corkin studied just 18 male MIT students. This small subset of the population was a limitation that future studies would soon begin to manipulate.

Throughout the years, researchers began to study how this phenomenon affects different populations. A 2004 study examined emotional memory recall in bilingual individuals, particularly those that learned their second language at a relatively late age (around 12). They concluded that recall for emotional stimuli had a higher accuracy rate than neutral stimuli in the participants’ first and second languages (Ayçiçeğ̃i & Harris, 2004). Researchers have also examined how self-injurious populations encode and retrieve emotional and neutral phrases. Bresin et al. (2019) recruited college students with depression for their experimental group and students with no depressive symptoms for their control group. Their findings were in support of the hypothesis that all participants were better able to recall emotional words than neutral words, regardless of the presence of depression. Participant manipulation is an important contribution because researchers now know the effect is present in a wide variety of populations and demographics and can begin manipulating other variables.

While many researchers have manipulated population demographics, others have manipulated variables such as stimulus connotation and time between encoding and retrieval. More specifically, research done by Manning & Julian (1975) supported the theory that taboo categories, such as words like “sex” and “bathroom” had a higher rate of accuracy than more neutral categories. As for time manipulation, Monnier & Syssau (2008) found that emotional words are better memorized than neutral words after a relatively short period of time between encoding and retrieval. Buchanan (2007), on the other hand, found that memory for emotional words was better even after a longer time between encoding and retrieval. Again, this contribution is important because the current study can manipulate the facial stimuli without having to examine short-term and long-term effects.

A few years later, in 2014, researchers decided to manipulate facial emotion. Liu et al. found that, in comparison to neutral faces, emotional faces were remembered with significantly more accuracy. More specifically, happy and disgusted facial expressions were more easily remembered than basic emotional expressions. The researchers went on to find that happy faces were more accurately recalled than were disgusted faces (2014).

The current study uses these findings as the basis of the thesis. However, instead of simply testing emotional facial expression in comparison to neutral facial expression, the current study manipulated the age of the facial stimuli. In particular, the researchers showed emotional and neutral faces of older people and younger people to determine if age impacts emotional memory recall. Based on the previously mentioned research that supported the presence of this effect in a variety of stimuli and in mostly younger facial stimuli, it is

hypothesized that emotional faces will have a higher recall accuracy rate, more so for younger faces than older.

## **Methods**

### **Participants**

In this study, participants were recruited from undergraduate classes at the University of Nebraska Omaha (UNO). There were 21 participants ranging from age 18 to 26 ( $M = 22$ ), with four males (19%) and 17 females (81%). Their participation was compensated with extra credit points in a psychology course. The participants were sent a link to the presentation as well as the subsequent memory retrieval survey.

### **Materials**

The materials used in this study were a PowerPoint presentation, 60 facial stimuli (exported from google images), a retrieval survey (using google forms), and statskingdom.com for data analysis.

### **Procedures**

To start, participants were given a brief description of the study and an informed consent document. They could either deny participation or consent to the study before continuing. Participants were first shown a presentation of facial stimuli (see appendix A). This included 30 photos of old men (10 angry, 10 smiling, and 10 with blank expressions) and 30 photos of young men (10 angry, 10 smiling, and 10 with blank expressions). Each image was shown for 2.5 seconds, followed by a blank screen for 1 second. At the end of the presentation, participants were given a memory test. This test had 60 questions, each with a photo of one of the facial stimuli along with the question “does this man look familiar?” After viewing the



image for as long as necessary, participants were to choose “yes” or “no” for each of the 60 questions (see appendix B).

The researchers analyzed the data using a one-way ANOVA.

### Results

In comparing the accuracy of recall between young neutral and young emotional faces, there was no main effect,  $F(1, 61) = 1.59, p = .21$  (see figure 1) Similarly, between old neutral and old emotional faces, there was no main effect,  $F(1, 61) = .88, p = .35$  (see figure 2). There was no main effect between young happy and young angry faces,  $F(1, 61) = 1.74, p = .19$  (see figure 3). However, there was a main effect between old happy and old angry faces,  $F(1, 61) = 8.36, p = .006$  (see figure 4). Between young neutral and old neutral faces, there was no main effect,  $F(1, 61) = .12, p = .73$  (see figure 5). As far as the main hypothesis that young emotional faces will be better remembered than old emotional faces, it was not supported. Between young emotional and old emotional faces, there was no main effect,  $F(1, 61) = .47, p = .5$  (see figure 6).

### Discussion

The researchers hypothesized that emotional faces would be more easily remembered if they were younger rather than older. This hypothesis was not supported as there was no significant difference between recall accuracy of younger and older faces, regardless of facial emotion. In looking at past experiments, most utilize younger facial stimuli and find that young emotional faces are more easily remembered than young neutral faces. However, presently, young emotional faces do not result in a higher recall accuracy in comparison to young neutral faces or old emotional faces.

Compared to previous research, this finding is inconsistent. A similar study, performed by Liu et al. (2014) analyzed emotional/neutral facial memory in 186 college students, and their results supported the hypothesis. Emotional faces were more easily remembered than neutral faces, while that was not the case in the current study. Other studies, such as the study of emotional and neutral words, were in opposition to the current findings because they supported the hypothesis that emotion has a higher recall accuracy than neutral (Kensinger & Corkin, 2003).

The discrepancy between the current study and previous studies could be due to several limitations. First, participants completed the survey on their personal computers and not in a laboratory setting. They may have been distracted during the presentation and had subpar recall accuracy on all fronts. They also could have looked at the presentation during the survey, which would have resulted in above average recall accuracy. Also, the images were exported from google and not from a database, so some faces may have had distinguishing features that led to a false increase in accuracy rates (i.e., different color background, part of the torso exposed, etc.). Future research can eliminate these issues by completing the survey in a laboratory setting and showing more uniform faces to eliminate outliers.

This study had a plethora of previous research to build off, but it was novel in that researchers manipulated the stimulus age. Previous research had used facial stimuli (Liu et al., 2014) and others had manipulated participant age (Brown & Kuik, 1977), but no known studies had manipulated the age of the stimulus. While the current findings were not significant, they help narrow the scope of the field in that future researchers can replicate this study in a more formal setting. It is now known that emotional faces are not more easily remembered than

neutral faces, regardless of age, *if* participants can take the survey independently. Thus, future researchers can conduct a more guided test to determine if the setting affects the recall accuracy.

This phenomenon is important for a multitude of reasons. Memory is a complex function of the human brain, and it is something that people utilize throughout the entire day. If researchers can better understand the extent to which age and emotion plays a role in memory, they can begin to understand more real-world applications of memory, such as eyewitness testimonies, learning techniques, and more. The field of memory is a vast one, and it is becoming increasingly more understood as researchers continue to manipulate variables and advance the field.

## References

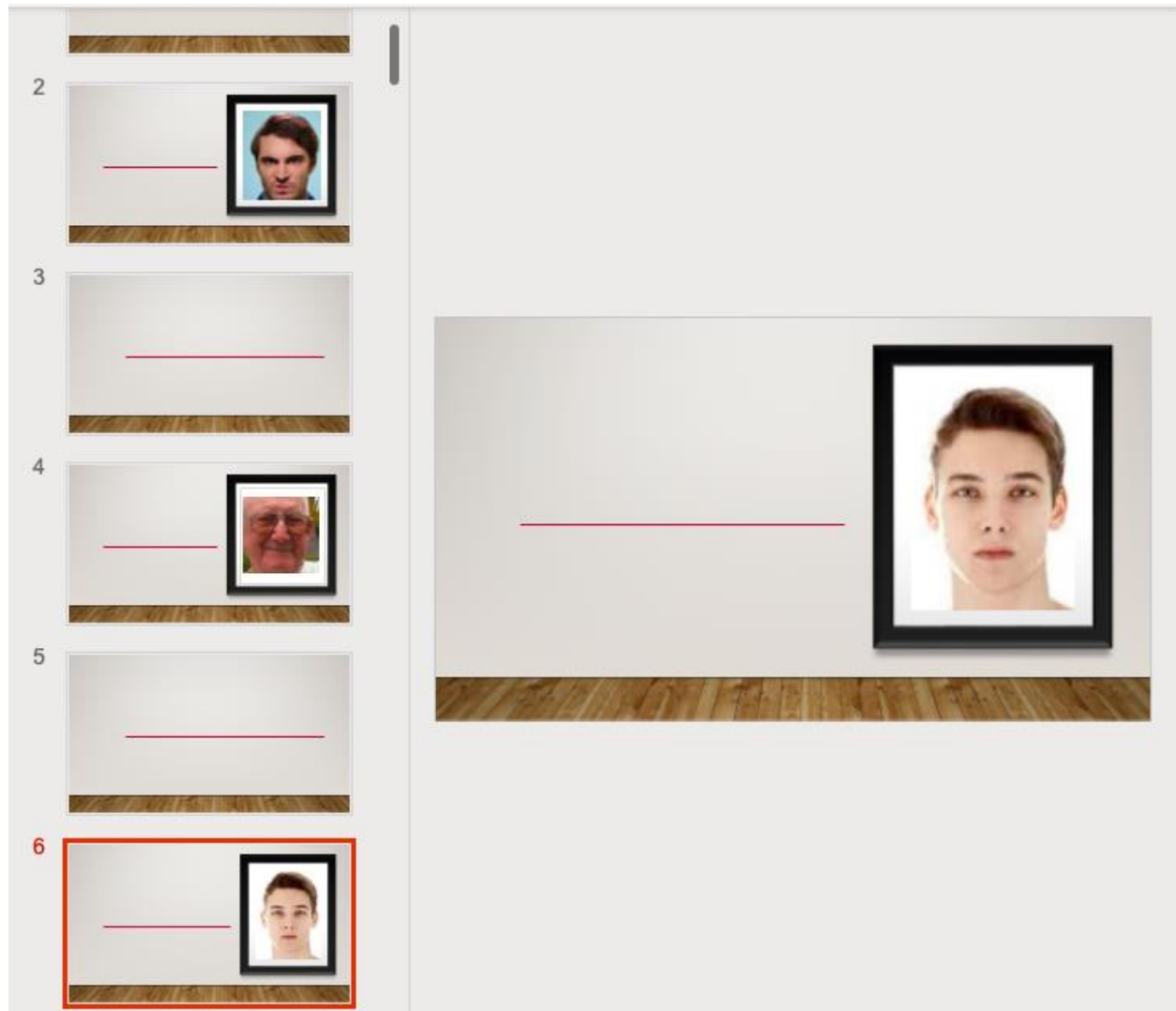
- Ayçiğeg'ı, A., & Harris, C. (2004). BRIEF report Bilinguals' recall and recognition of emotion words. *Cognition and Emotion*, *18*(7), 977–987.  
<https://doi.org/10.1080/02699930341000301>
- Bresin, K., Mccowan, K., & Verona, E. (2019). The effect of rumination on recall of emotional words: Comparison of dysphoric individuals with and without a history of nonsuicidal self-injury. *Cognition and Emotion*, *33*(8), 1655–1671.  
<https://doi.org/10.1080/02699931.2019.1595529>
- Brown, R., & Kulik, J. (1977). Flashbulb memories. *Cognition*, *5*(1), 73–99. [https://doi.org/10.1016/0010-0277\(77\)90018-X](https://doi.org/10.1016/0010-0277(77)90018-X)
- Buchanan, T. W. (2007). Retrieval of emotional memories. *Psychological Bulletin*, *133*(5), 761–779. <https://doi.org/10.1037/0033-2909.133.5.761>
- Kensinger, E. A., & Corkin, S. (2003). Memory enhancement for emotional words: Are emotional words more vividly remembered than neutral words? *Memory & Cognition*, *31*(8), 1169–1180. <https://doi.org/10.3758/bf03195800>
- Kerferd, G. B. (1971). Epicurus' Doctrine of the Soul. *Phronesis*, *16*(1), 80–96.
- Liu, C. H., Chen, W., & Ward, J. (2014). Remembering faces with emotional expressions. *Frontiers in Psychology*, *5*. <https://doi.org/10.3389/fpsyg.2014.01439>

Manning, S. K., & Julian, L. (1975). Recall of emotional words. *The Journal of General Psychology*, 92(2), 237–244. <https://doi.org/10.1080/00221309.1975.9710849>

Monnier, C., & Syssau, A. (2008). Semantic contribution to verbal short-term memory: Are pleasant words easier to remember than neutral words in serial recall and serial recognition? *Memory & Cognition*, 36(1), 35–42. <https://doi.org/10.3758/mc.36.1.35>

## Appendix A


A sample of the stimulus presentation in which participants were shown the 60 images of facial stimuli before taking the questionnaire



## Appendix B

A sample of the questionnaire that participants answered after viewing the stimuli in order to determine their recall accuracy

Does this man look familiar? \*

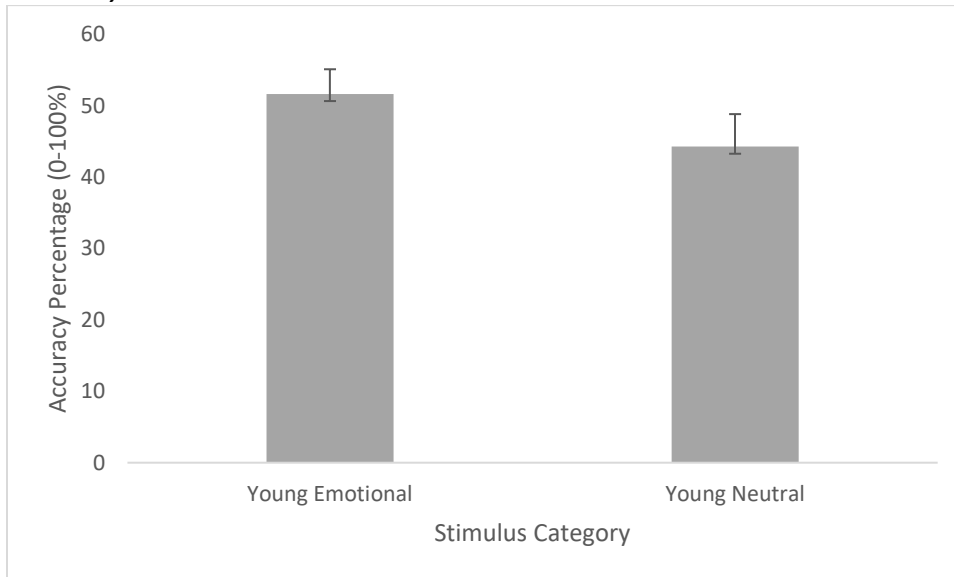


Yes

No

Unsure

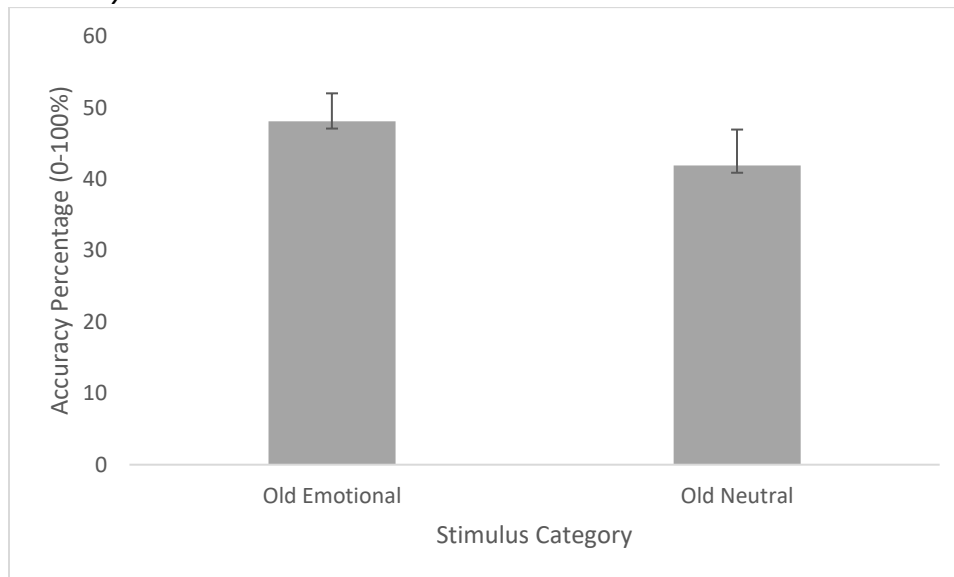
**Figure 1**  
*Accuracy Rates*



*Note.* Researchers measured accuracy rates based on the number of times a participant considered the face familiar out of the 20 young emotional stimuli (10 smiling and 10 angry) and the 10 young neutral stimuli. Error bars represent the standard error. There was no main effect between the accuracy rates of the young emotional group and the young neutral group.

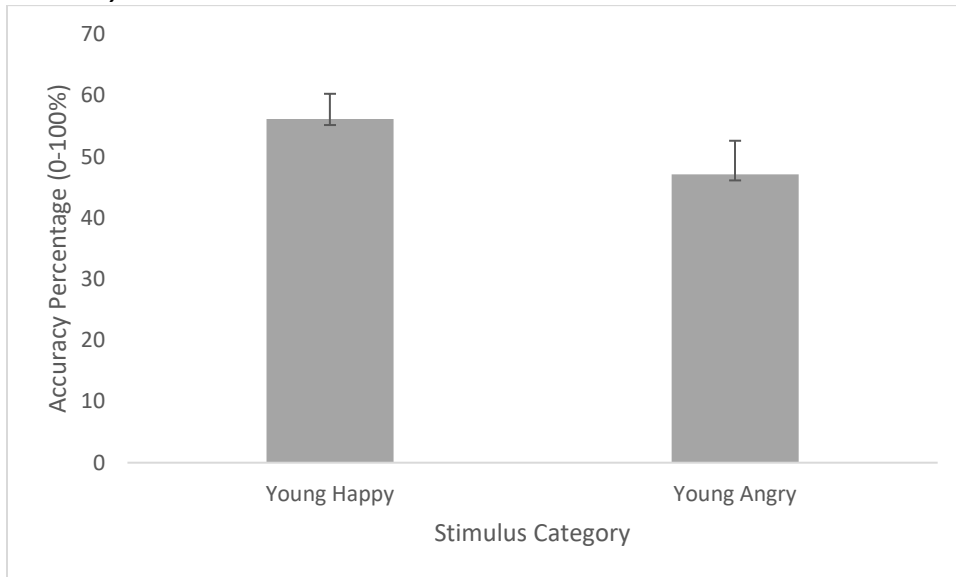


**Figure 2**  
*Accuracy Rates*



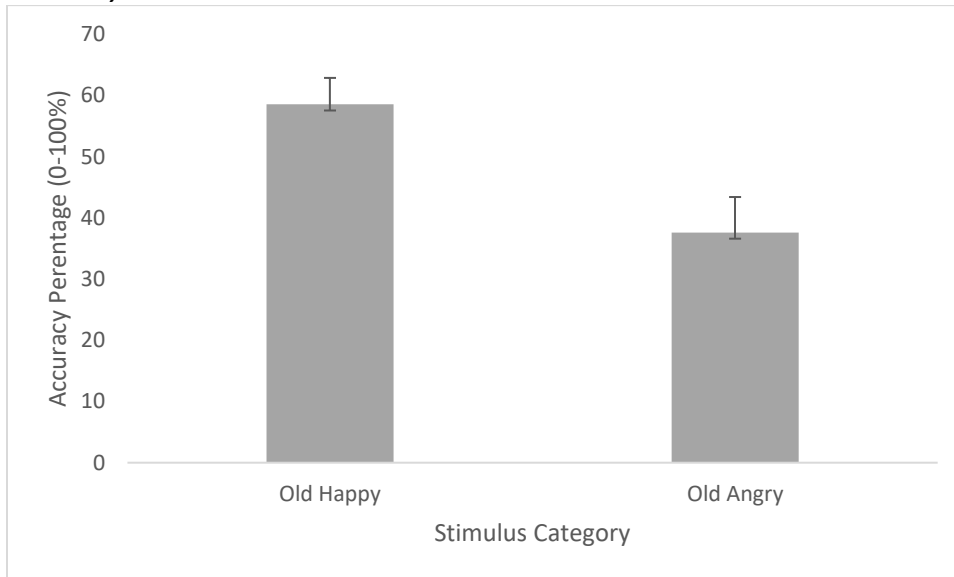
*Note.* Researchers measured accuracy rates based on the number of times a participant considered the face familiar out of the 20 old emotional stimuli (10 smiling and 10 angry) and the 10 old neutral stimuli. Error bars represent the standard error. There was no main effect between the accuracy rates of the old emotional group and the old neutral group.

**Figure 3**  
*Accuracy Rates*



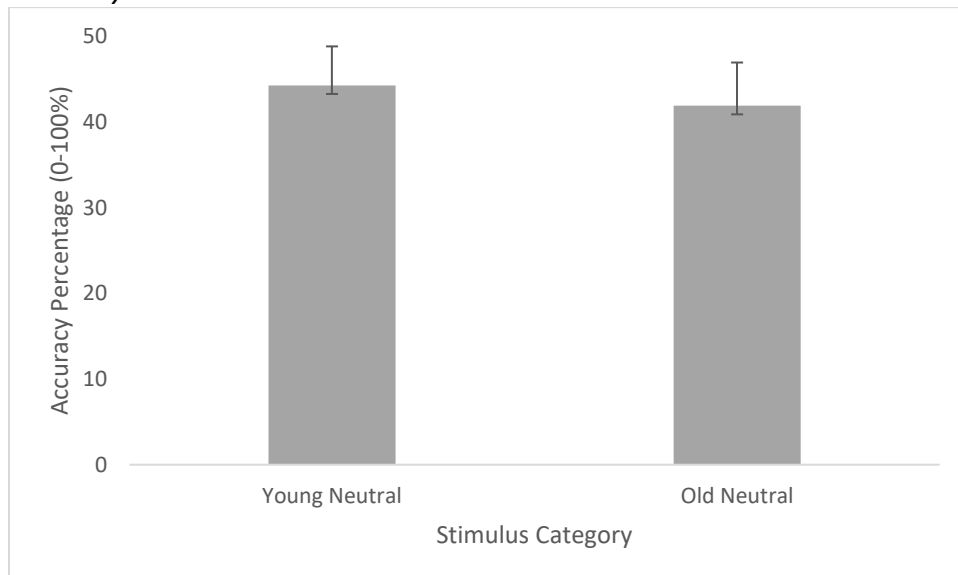
*Note.* Researchers measured accuracy rates based on the number of times a participant considered the face familiar out of the 10 young happy stimuli and the 10 young angry stimuli. Error bars represent the standard error. There was no main effect between the accuracy rates of the young happy group and the young angry group.

**Figure 4**  
*Accuracy Rates*

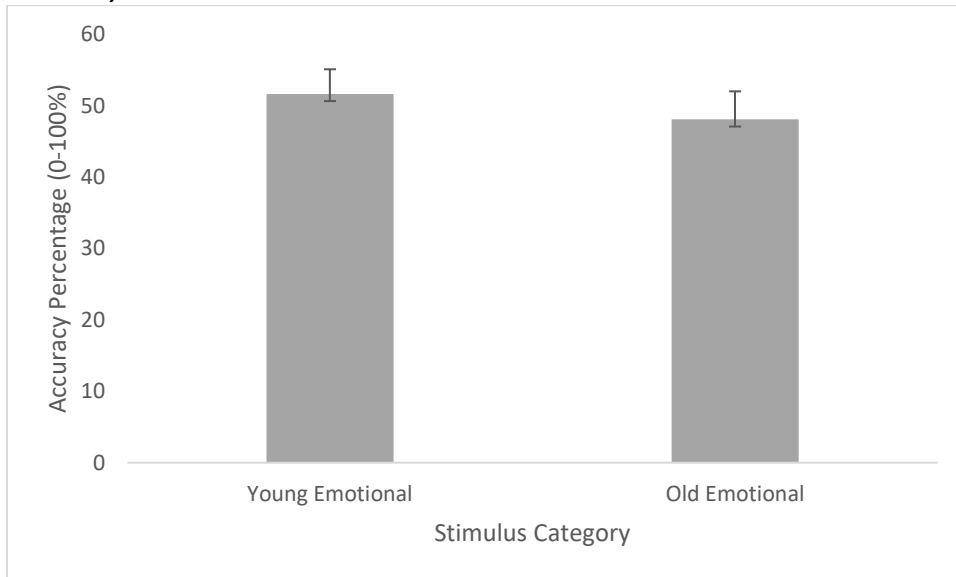


*Note.* Researchers measured accuracy rates based on the number of times a participant considered the face familiar out of the 10 old happy stimuli and the 10 old angry stimuli. Error bars represent the standard error. There was a main effect between the accuracy rates of the old happy group and the old angry group.

**Figure 5**  
*Accuracy Rates*



*Note.* Researchers measured accuracy rates based on the number of times a participant considered the face familiar out of the 10 young neutral stimuli and the 10 old neutral stimuli. Error bars represent the standard error. There was no main effect between the accuracy rates of the young neutral group and the old neutral group.

**Figure 6***Accuracy Rates*

*Note.* Researchers measured accuracy rates based on the number of times a participant considered the face familiar out of the 20 young emotional stimuli (10 smiling and 10 angry) and the 20 old emotional stimuli (10 smiling and 10 angry). Error bars represent the standard error. There was no main effect between the accuracy rates of the young emotional group and the old emotional group.