Boredom and Psychological Time Perspective on Cognition

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Abstract:

This study investigated psychological time with regards to a memory recognition task. The participants rated images on a 5-point scale of attractiveness. There were two different conditions, one having 40 male faces and the other containing 40 female faces. After they finished rating the faces, they made a retrospective time estimate of how long they thought they spent viewing the faces. Following this they took the Multidimensional State Boredom Scale (MSBS) to test what state of boredom they were currently experiencing. Finally they performed a memory recognition test. We noticed statistically significant differences between the two conditions based on target gender. Women who viewed the female condition made lower time estimates than women who viewed the male condition. Women also scored better on the recognition test in the female face condition. They also rated the female face condition overall higher on attractiveness than the male face condition. All in all, women who viewed the female condition seemed to be more attentionally engaged than women who viewed the male condition.

DEDICATION:

I dedicate this to my mother, Tricia O'Halloran, thank you for your endless support and encouragement, love you.

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LITERATURE REVIEW

Everyone experiences "time" differently. This experiencing of time is referred to as psychological time. Psychological time differs from chronological time, which is the actual or real amount of time that has passed. Psychological time is the perceptual flow of time. Humans rely on temporal cues such as pace, duration, and order of events to evaluate time. Psychological time helps people experience and interpret the world, it provides our mind with information to help us interpret our environment and respond accordingly (Zakay, 1999). These temporal experiences of time are important for human functioning. People rely on experiencing time and remembering how much time an event takes so that they can judge similar events in the future. This plays into time-management skills, which are very important for people to acquire. Temporal experiences are socially learned through encounters. There are social norms regarding time, for example, it is important for one to learn the appropriate amount of time to let pass when answering a question that was asked. It would be bizarre if someone asked you a question and it took minutes before you responded. This monitoring of temporal experiences is important to effective communication. (Boltz, 2005). This is just one example of a conversational skill with regards to time that is learned through social encounters. There are other social norms with regards to time besides conversational skills. All in all, temporal experiences are individually experienced. Some experiences seem to line up with the corresponding chronological time while some experiences seem to last much longer or shorter than the actual time it took.

Take the expression "time flies when you're having fun." There is actually reasoning behind this statement. When people are having fun, they are most likely

functionally engaged in something. When one is functionally engaged, their attentional resources are more engaged at the task at hand, leaving fewer attentional resources to pay attention to the passing of time. (Zakay 1999). When one has less attentional resources allocated to time perception, time usually seems to be experienced at a faster pace. Consider the reverse. If you are not very functionally engaged, more of your attentional resources can be used to judge the passing of time. In this case, time seems to be experienced at a slower pace.

The Attentional Gate Model (AGM) is the more recent and widely accepted model for information processing. The AGM integrates the Temporal Information Processing Model (TIP) and other existing attention models. The attentional gate model recognizes that there is a natural "pacemaker" in organisms which emits pulses. These pulses then go to pass through a "gate." The gate opens when one begins to allocate attentional resources to monitoring the passing of time. Therefore, the more one is allocating their attentional resources to timing, the longer the gate is open thus allowing more pulses and temporal information through (Lejeune, 1998). This temporal information that flows through allows us to gauge how much time is passing. This active paying attention to how much time is passing is referred to as prospective timing.

There is a difference in retrospective duration judgments versus prospective duration judgments. In prospective duration judgments, the participants are informed that they will be later asked to estimate certain time durations. However, in a retrospective duration judgment, the participant is unaware that they will be asked to make a duration judgment and only asked to do so after the event that they are judging has passed.

In prospective duration estimates, participants are aware they are going to be

making a time estimate and are allocating attentional resources to time judgment. Therefore, the cognitive load of the task at hand makes a difference. Cognitive load refers to how demanding a certain task is with regards to information processing on cognition. (Block, 2010). When cognitive load is low and non-demanding, people tend to overestimate time durations because they can allocate more time to "opening the gate" to try to keep track of the passing of time. However, when cognitive load is high and demanding, people tend to underestimate time durations because they are not able to allocate as many attentional resources to "opening the gate" and censoring time (Brown, 2008).

In retrospective duration estimates, participants are thought to not be focusing their attentional resources to the time judgment aspect because they are focused on the task at hand, unaware that they will be asked to make a time estimate. (Block, 2010). In retrospective timing, according to the Attentional Gate Model, the gate is not open as long and less pulses travel through it than in prospective timing (Zakay & Block, 1996). Since retrospective timing only occurs after the event has passed, one has to try to translate non-temporal information into temporal information. (Lejeune, 1998). Prior research has shown that cognitive load does not affect retrospective duration judgments the way it affects prospective duration judgments.

Many researchers have yet to agree on a specific definition for boredom. Generally, boredom can be described as an interactive construct. Boredom is collectively experienced; everyone at some point has felt "bored." Because of people feeling bored, some people suggest that boredom is an emotion, which can be experienced and felt. (Damrad-Frye 1989). Boredom is an emotion in which one's attention is not focused on

anything in specific and is accompanied with a slow perceptual passing of time. Some people are more susceptible to boredom than others, this is called boredom proneness. People that are high in boredom proneness have a lesser need for cognition than people that are less prone to boredom. (Farmer & Sundberg, 1986). Negative emotions usually accompany boredom such as frustration and anger. Because of these negative emotions, people usually wish to escape a state of boredom.

Why is boredom a problem in today's society? Boredom has proven to be a cause of some serious issues in the world, such as overeating. Many people eat when they are feeling bored more than when experiencing any other emotion (Koball, 2012). Overeating and obesity have been serious issues in the United States for a while now. In addition, boredom has also been correlated to negative academic achievement in schools (Pekrun, Hall, Goetz, & Perry, 2014). It is important for parents, teachers, and other learning advisors to try to limit a child's boredom if they want them to succeed in the classroom as well as other aspects in life.

In contrast, there is an alternate state to boredom, "flow," which is when all your attentional resources are utilized and there are little to none left for temporal judging. (Zakay, 2012). Michael Csikszentmihalyi first introduced the idea of flow in 1975. When one is experiencing flow, they are usually experiencing positive emotions such as happiness and satisfaction. Because of these positive emotions that accompany flow, it is considered an ideal state. Flow has become more popular in sports with elite athletes. Studies have shown improved athletic performances associated with the flow mind state. Flow in athletes is characterized by present-moment focus where one is completely immersed with the task in front of them. (Cathcart, Mcgregor, & Groundwater, 2014). If

there was a way to train athletes to be in a state of flow, they could greatly enhance their performance. In addition to athletics, flow could also be useful to a variety of professions and other circumstances.

Another important factor to consider when evaluating data is psychological sex differences. While there are few sex differences from a cognitive standpoint, from an evolutionary psychologist's perspective, many sex differences correlate with sex and reproducing. Darwin's study of sexual selection offers some insight to some sex differences. Sexual selection is the idea that only the fittest individuals from a particular species will be considered desirable mates and be able to reproduce. Evolutionary psychologists believe that there is not a hierarchy of sexes, meaning one sex is not valued more than the other. Sexes are different and require different adaptive strategies. (Buss 1995).

One sex learns from other members of their sex what is preferential in the other sex from a mate standpoint. Once these certain desirable characteristics are established in the other sex, those members that have those characteristics obtain a mate advantage over others of their sex that do not possess those qualities (Buss, 1995). As a result, certain people are seen as more "attractive" than other people based on this consensus of what is desirable. The face especially plays a principal role in sexual attraction and mate selection. (Griffey & Little, 2014).

It has been hypothesized that one would have better recognition memory for the opposite sex rather than the same sex based on the functionalistic nature of mate-selection. This idea has its roots in the evolutionary perspective of psychology. This evolutionary perspective bases its theories off of the idea of Darwin's sexual selection.

Humans have the instinct to survive and in order to survive they need to find a viable mate that can reproduce fit offspring. Therefore, evolutionary psychologists believe that people will focus their attention more intently on members of the opposite sex due to this instinctual desire to mate for purposes of producing offspring. (Maner, Gailliot, Rouby, & Miller, 2007).

Contradictory to evolutionary perspective, previous research has shown that women have a better memory for face recognition than men do. Women also have a better recognition memory for female faces than for male faces. This preference for one's own gender is called own-gender bias. (Lewin & Herlitz, 2002). One reason for own-gender bias may be that women are used to critiquing and analyzing their own face, resulting in a better understanding of facial perception in female faces. This familiarity with one's own gendered faces may be important as to figure out what is considered attractive and desirable in order to have a better understanding of where they stand when choosing a mate (Buss 1995). In addition, one might fix their attention more intently on the same sex to look for potential rivals with their own mate. This is known as mate guarding, and people feel that they need to pay attention to these more attractive members of their own sex in order to know how to adapt to keep their mate (Maner, Gailliot, Rouby, & Miller, 2007).

With this information, we decided to run a study that examines psychological time with respect to a face recognition test. There will be two conditions in which participants will either view all women faces or all men faces. Then we will ask for a retrospective time estimate of how long they thought they spent looking at the faces. Then they will take the Multidimensional State Boredom Scale (MSBS) test. After this,

they will take a face recognition test with both old and new faces. We predict that if we ask the participants to look at the faces and rate them on attractiveness that this might prompt them to look at them as potential mates. We predict that our results will align with the evolutionary perspective of sexual selection and the need to find a mate and reproduce. Therefore we predict that the participants that view the opposite sex will be more attentionally engaged and make lower retrospective time duration judgments than if they viewed same-sex faces. We also predict that people who score higher on the MSBS test will make longer time duration estimates. In addition, we predict that participants will report higher attractiveness ratings for the opposite sex condition than the participants that view the same sex condition as well as that participants will score higher on the recognition test for the opposite sex condition.

METHODS

Participants

The participants for this study were undergraduate students at the University of Mississippi. These students were recruited through the University of Mississippi's *Sona Systems* website. Students completed this study as a fulfillment of their undergraduate degree at the University of Mississippi. A total of 60 participants were involved, of which 45 were females and 15 were males.

Materials

The participants received and signed a consent form stating that their privacy and confidentiality would be maintained and that they could back out of the study at any time.

A person proctoring the study read verbal directions to each participant. This study was conducted using PowerPoint presentations that were turned into a video format. The participants typed their responses into an Excel spreadsheet that was pulled up on the same computer, parallel with the videos. In the first presentation, forty male or female faces (depending on the condition) were presented and rated for attractiveness on a scale ranging from 1 (very unattractive) to 5 (very attractive). Each slide contained a single image of a face and each slide was shown for exactly five seconds before switching to a new face for the participant to rate. After ranking all 40 faces, participants were prompted with the question, "Please estimate the amount of time that you spent rating the items in minutes and seconds." After typing their retrospective time estimate into the Excel spreadsheet, participants completed an 80-item recognition test covering the previously presented faces. Forty 'old' faces from the original presentation were

paired with 40 ‘new’ faces, and participants were asked to identify each face as ‘old’ or ‘new’ by typing their responses. The old and new slides were randomly mixed together.

The faces used in these PowerPoint presentations came from the “10k US Adult Faces Database” from Wilma Bainbridge with the Computational Perception and Cognition Group.

DESIGNS AND PROCEDURE

Each subject came to the lab alone to participate in this study. When they arrived, they were asked to read and sign a form of consent. There was a proctor that read aloud the same instructions to each participant. Each participant was randomly assigned to be in one of two different conditions (rating either female faces or male faces). The participant was then verbally prompted by the proctor with the following directions, "Today you will be asked to look at a number of faces and rate their attractiveness on a scale of 1 (very unattractive) to 5 (very attractive)." The participants then viewed a PowerPoint with 40 faces, one on each slide, and rated them on a five-point scale of attractiveness. They each typed their answers into an Excel spreadsheet.

After the attractiveness ratings, they were instructed to "Please estimate the amount of time that you spent rating the items in minutes and seconds." They also typed this response into the same Excel spreadsheet.

After this, they took the MSBS test, which was prompted with the statement, "Next, you will be asked a series of questions. Please type "Y" for 'yes' or "N" for 'no'." This test was comprised of 27 statements; Each participant's answers depended on whether they were currently experiencing that statement. For example, one question asked participant, "I am indecisive or unsure of what to do next" (See Appendix A for complete MSBS used).

Following the MSBS test, the participants viewed the 40 faces they had just seen randomly intermixed with 40 new faces and were prompted, "Now we are going to show you another list of faces. You saw some of these faces earlier, but other faces are new. If you have seen a face before, type "Y" for 'yes'. If you have not seen a face before, type

"N" for 'no'." Both of the conditions underwent the same procedure, with the exception that one condition only viewed female faces while the other condition only viewed male faces.

This study took approximately fifteen minutes to complete. After completing the study, students were thanked and received credit for their course.

RESULTS

A total of 60 participants partook in this study, 45 females and 15 males. Therefore, there were 30 participants in each condition. For analysis purposes and because of the dearth of male participants, male responses were omitted from the statistical analyses. Therefore, there ended up being 26 women in the female rating condition and 19 women in the male rating condition. We ran four different independent samples t-tests to test several key hypotheses.

Our first research question addressed whether women would find the male faces or the female faces more attractive. We tested this prediction by using an independent samples t-test and compared the average attractiveness rating for the male faces with the average attractiveness rating for the female faces (when judged by female participants). Our prediction was that women would rate the male faces as more attractive than the female faces. Conversely, the results showed the opposite trend (See Appendix D for a graph of results). The result was statistically significant, $t\ (44) = 2.12$, $p < .05$, in which women reported higher attractiveness ratings for the female condition than they did for the male condition.

The next research question we wanted to address was whether women would make longer time estimates for either the male or female condition. We predicted that the women who viewed the male faces would make lower time estimates than the women who viewed the female faces. However, the reverse observation was made (See Appendix B for a graph of results). The results were statistically significant, $t\ (44) = -2.31$, $p < .05$. Thus, the women reported that they experienced time passing faster when rating the female faces than when rating the male faces.

We were also interested in seeing which condition, male rating condition or female rating condition, women scored better on the recognition test. There are four cases to consider when scoring the recognition test. The first is a "hit," which is when the participant correctly identifies a picture as one he or she has see before. The next case is a "correct rejection," which is when the participant correctly rejects a picture as not being seen before when it was indeed a new picture. Another case is a "false alarm;" this is when the participant says he or she has seen the face before, but in reality it is a new face that they have not seen before. The last case is a "miss," which is when the participant has seen the face before but they say that they have not. Considering these cases, and to account for any potential response biases, we took the "false alarms" and subtracted them from the "hits." This hits minus false alarms (H-FA) score was what we used to create a discriminability score for each participant. We predicted that women would score better on the recognition test for the male face condition than for the female face condition. However, the opposite result was observed (See Appendix C for a graph of results). Statistically significant results were found, t (44) = 4.28, $p < .0001$, in which women had better recognition memory for women's faces than for men's faces.

Additionally, we wanted to find out if a person's MSBS score correlated with their retrospective time duration estimate. We anticipated that people who scored higher on the MSBS, indicating that they were in a state of higher boredom, would make longer time duration estimates. We did not find statistically significant results, t (44) = -.55, $p > .05$; therefore, we did not find a relationship between MSBS scores and time estimates.

DISCUSSION

There were several limitations to this study. First, this study only analyzed results from female participants due to the lack of male participants in each condition. If this study were repeated, it would be interesting to see what results would be found for male participants in both conditions.

On another note, our results with respect to the correlation between the MSBS scores and the retrospective time estimates may represent a Type II error. If we had used a five-point scale, as opposed to a 'yes' or 'no' response query, we may have obtained a different outcome. Instead of using a five-point scale, we simply had the participants respond "yes" or "no" if they were experiencing each statement. It would be interesting to see if significant results would be found if this study was repeated using a five-point scale for the MSBS scores.

It was hypothesized that women would feel like they spent a shorter amount of time viewing the male face condition rather than the female face condition. Our hypotheses aligned with the evolutionary perspective that people focus more attention on the opposite sex for reasons of sexual selection and mate selection. However, the results from our study were in the opposite correlation. Women viewing the female condition felt that they spent less time than women viewing the male condition. Similar results have been found in previous studies. This could result from people having their attention fixed more on members of their own sex for reasons of recognizing potential rivals.

We may have seen different results that aligned more with our original hypotheses if we had the participants originally rate the faces on a different measure. Perhaps it would have been different if we had asked the participants to rate the faces on how likely

they would be to go on a date with the person or if we had asked them to rate each face based on whether they could see the person as a potential mate. Participants could have been more attentionally engaged in the opposite sex condition than the same sex condition. Changing what the participants were thinking about when viewing the faces could have altered their responses and the results we found.

Overall, there is much more research that could be done regarding psychological time and boredom on cognition. This study is just an extension of existing research on gender differences and motives for one being attentionally engaged.

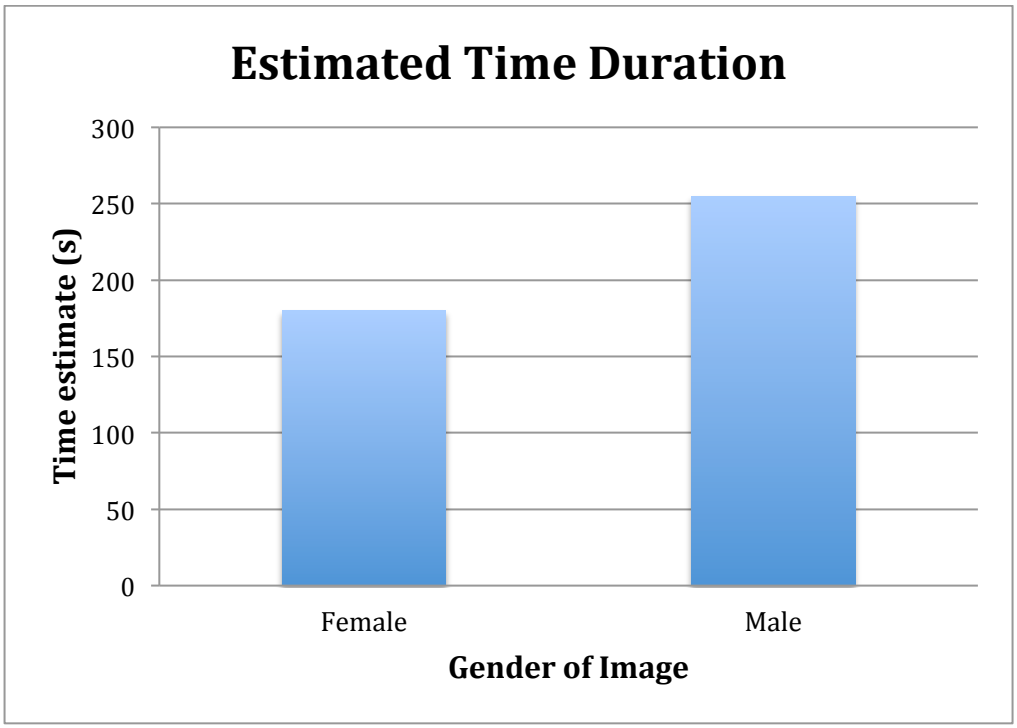
APPENDIX A

Multidimensional State
Boredom Scale (MSBS) 2013

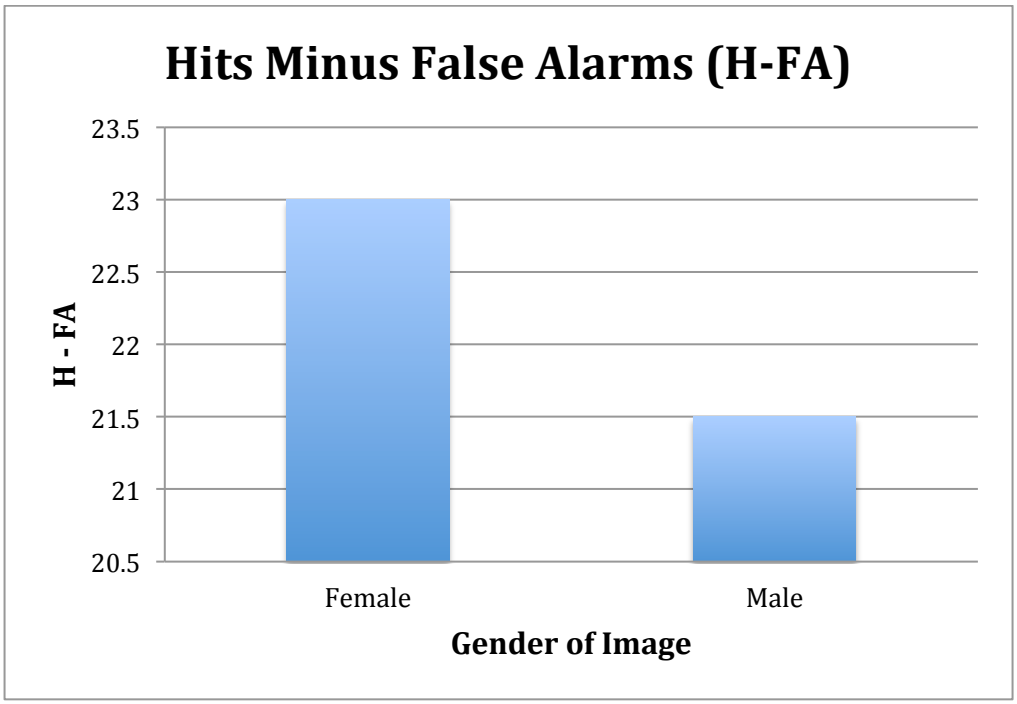
1. Time is passing by slower than usual.
2. I am stuck in a situation that I feel is irrelevant.
3. I am easily distracted.
4. I am lonely.
5. Everything seems to be irritating me right now.
6. I wish time would go by faster.
7. Everything seems repetitive and routine to me.
8. I feel down.
9. I seem to be forced to do things that have no value to me.
10. I feel bored.
11. Time is dragging on.
12. I am more moody than usual.
13. I am indecisive or unsure of what to do next.
14. I feel agitated.
15. I feel empty.
16. It is difficult to focus my attention.
17. I want to do something fun, but nothing appeals to me.
18. Time is moving very slowly.
19. I wish I was doing something more exciting.
20. My attention span is shorter than usual.
21. I am impatient right now.
22. I am wasting time that would be better spent on something else.
23. My mind is wandering.
24. I want something to happen but I'm not sure what.
25. I feel cut off from the rest of the world.
26. Right now it seems like time is passing slowly.
27. I am annoyed with the people around me.

Fahlman, Mercer-Lynn, Flora, & Eastwood. "Development and Validation of the Multidimensional State ..." 2013. Web. 1 Oct. 2015.

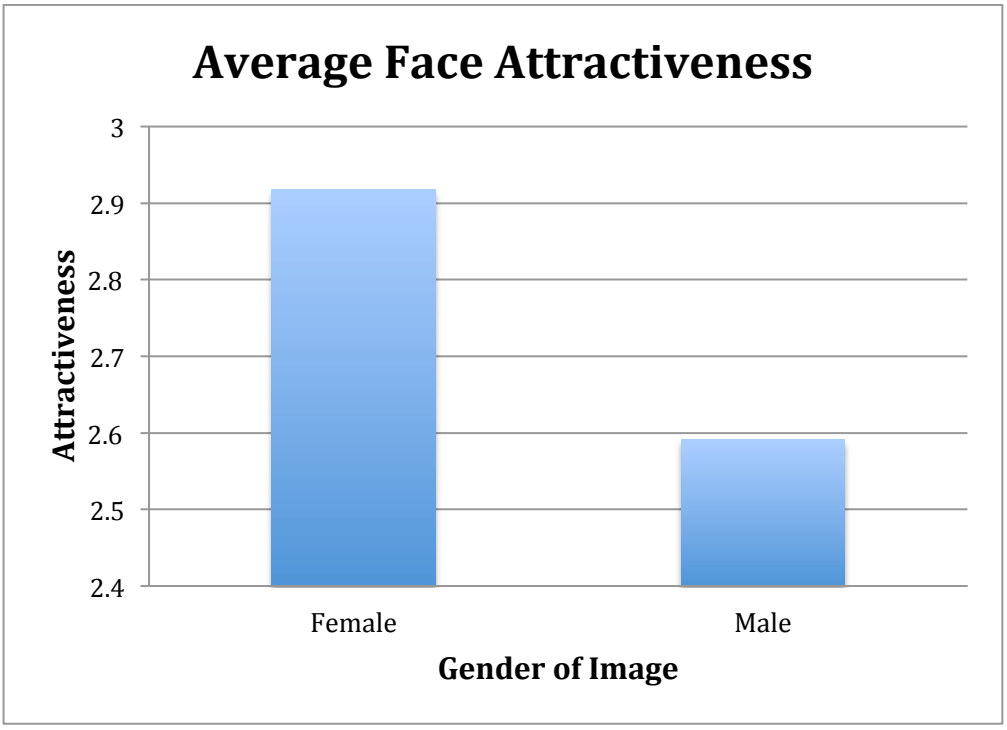
APPENDIX B


Estimated Time Duration
Time estimate (s)
300
250
200
150
100
50
0
Female
Male
Gender of Image

APPENDIX C


Hits Minus False Alarms (H-FA)
23.5
23
22.5
22
21.5
21
20.5
H - FA
Female
Male
Gender of Image

APPENDIX D


Average Face Attractiveness
3
2.9
2.8
2.7
2.6
2.5
2.4
Attractiveness
Female
Male
Gender of Image

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