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**Coloring Expression Perception:
An Attempt at Altering the Automatic Perception of Strangers**

An Honors Thesis submitted in partial fulfillment of the requirements for Honors in
Psychology.

By
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Under the mentorship of Dr. Shauna Joye

ABSTRACT

Western society is filled with metaphors that carry through generations. Perhaps the most commonly known metaphor is that involving the colors black and white. Black is the color of choice for villains and demons while white is the color chosen for angels and heroes. The current research sought to explore exactly how far this metaphor might be carried over in real life in a series of two experiments. In the first experiment, neutral faces were surrounded in black and white to see if participants would perceive the faces in black as more aggressive than those surrounded by white. Results indicated that the color of background did not significantly alter the perception of aggression. In the second experiment, participants were asked to wear either a white or black shirt and then read and respond to a story about a man who when taking out the garbage is nearly hit by a car. Results indicated that participants expected the man to respond the same way regardless of the color of shirt they were assigned. These results help us to get a better understanding of how perception of self and others can be effected by everyday stimuli. This information helps us to represent ourselves in the best possible light during any social and work situation.

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Coloring Expression Perception:

An Attempt at Altering the Automatic Perception of Strangers

It was dark and stormy night, and the blackened clouds hung low. She wore a red dress. His black hair hung over his blue eyes. Today's literature is heavy with overshadowing and context cues that revolve around color. In this example, the reader knows immediately that something nefarious, and perhaps a bit scandalous, is going on in the story because the clouds were black, she was wearing red, and his innocence peeped through his hanging cloak of danger. Readers are exposed to these context clues every day, and not just in novels and movies.

Our minds have been conditioned through literature to see these colors in specific ways, and this conditioning carries over into real life. We see the man standing with the black trench coat as a danger to be avoided. We view the woman in white as angelic and innocent. The child in black is going down a dark path and needs someone to help him. The child in white is taking a break from her numerous volunteer activities and is likely considering setting up a lemonade stand. These colors have been ingrained for centuries as either evil or innocent, and this carries, even now, into the ways in which we perceive others.

Grounded Cognition

According to Barsalou (2008), grounded cognition refers to how a situation, language, movement, sight, smell, or any other cue might play a role in the mind's ability to process information. Specific stereotyped meanings are attached to the ways people walk, the things they talk about, who they are, and how they look. Color, like any other stimuli, can also take on symbolic meaning, which in turn impacts the way a person

thinks when he/she views that color. The color acts as a cue for the mind, giving a set of behaviors that are heavily associated with it. These behaviors become more likely to be acted upon, as they are what the mind has done when in this same type of situation in the past.

Often, people are not aware of what has been grounded in their minds. Much of memory is recorded subconsciously, meaning that a person has little to no control over what gets recorded in the mind. Further, it has been found that subconscious thoughts that give way to meanings directly impact the ways in which a person behaves, even without that person ever knowing it (Bargh & Pietromonaco, 1982). In their experiment, Bargh and Pietromonaco asked 108 male participants to react to flashes on a computer screen. The flashes were actually 80%, 20%, or 0% hostile words; the other words were neutral. Each flash of a word lasted only 100 milliseconds, which was not long enough for words to be consciously recognized. After words were flashed, participants were given a short narrative that described a man in semi-hostile situations (e.g., refusing to answer his door when someone knocked on it). They were then asked to rate the man on a 12-trait scale that included hostile and negative traits such as unfriendliness and conceited. Results illustrated that the more a participant was subconsciously primed with hostile words, the more negatively that participant rated the man.

Another way the subconscious can affect perception was illustrated with the work of Durante, Norman, and Martie (2008). This study discovered that fluctuations in women's hormones over the course of their menstrual cycle can impact their clothing selection. Women subconsciously dressed for mating on their fertile days (i.e., when ovulating) more than on the days during which they were menstruating. In this study, 88

women had pictures taken of their outfits on different days of the month. Participants were also asked to draw an appropriate outfit on a female paper doll for a social gathering situation. It was found that the women who were sexually active tended to dress the most sexually during ovulation (determined by in-lab testing). In addition, it was found that the paper doll tended to be drawn with more skin showing when the women were ovulating at the time of drawing than when they were menstruating. These fluctuations in clothing selection can influence the ways in which others view women. When a woman dresses more sensually, the unconscious signal to others is that she is ready to conceive and thus is a more likely partner than a woman who is not at this point in her cycle.

Facial Recognition

Facial recognition is a vital part of the perception of the emotional state of others. Wagner, Macdonald, and Manstead (1986) conducted a study on the ability of both sexes to send and receive facial emotional signals. They recruited 6 “senders” (3 men and 3 women) and 53 “receivers” to participate in this study. For the purposes of this experiment, they asked the senders to view emotional slides while being unknowingly videotaped to obtain information about emotional expressions at the moment of viewing the slides. Receivers first viewed a short clip in which the receiver displayed a neutral emotion, then viewed 5-second clips of the emotion videos and were asked to record what emotion was being felt by the sender. The results of this experiment found that women were, overall, more accurate at deciphering the emotional state of others. However, men were significantly more accurate in deciphering aggressive emotions than women and had a slight advantage when the face in question is also male (Wagner, et al., 1986).

Lee et al. (2013) illustrated these same results in children. This study used facial morphing technology to blend two emotions of varying intensities into one face. Participants were then asked to indicate which of the two emotions used in the morph was being displayed. As with the Wagner et al. study, they found that girls were more sensitive to emotional expressions of others. Also as in the adult study, boys tended to be more accurate in deciphering negative emotions than girls. Regardless of the gender of participants, happiness and anger were the emotions most accurately recognized. Taken together, these studies indicate that both men and women will be able to identify anger and aggression in strangers more easily than emotions of joy and sadness. More research is needed to determine what can impact the facial emotion recognition of others beyond merely gender.

Color Psychology

Certain colors are perceived as having specific emotions tied to them in Western cultures, and as such colors are vital aspects of the perception of others. Red, the color of desire and lust, has been found to make a woman seem more sexually attractive when they are wearing this color than when they are wearing any other color (Elliot, Tracy, Pazda, & Beall, 2013). The colors black and white are cited time and again as being the colors of evil and morality, respectively (Vrij, 1996; Frank & Gilovich, 1988; Shermann & Clore, 2009; Meier, Robinson, & Clore, 2004). When these colors are embedded in the clothing that is worn, perception of who a person is and how she/he behaves might be altered to more closely match the societal symbolism of the color.

The color black makes observers attribute more aggressive traits when worn by a stereo-typically aggressive group. For example, Frank and Gilovich (1988) found that

when sports players wear a darker uniform (e.g., black), they are charged with more penalties than when wearing a lighter uniform (e.g., white). This phenomenon was echoed in a later study that found when individuals are presented with the mug shot of a person in black clothing, they assumed the crime was more aggressive than when the mug shot was of a person in white clothing (Vrij, 1996). No research has yet been done investigating the colors black and white and the perception of others' facial expressions when not involving already aggressive stimuli such as sports teams and mug shots of criminals.

Little research has been done with the ability of participants to decipher facial emotions when the face is presented within a color stimulus. The goal of the current research was to address the question of whether color alters the ways we perceive another person's emotions. To answer this, we first needed to establish the suggestibility of our colors of interest (i.e., black and white) in determining the emotion of others. In study 1, we examine emotion recognition when paired with the colors black and white. For this experiment we expected that men would view the faces as more aggressive overall. We also expected that when a neutral face was surrounded by black, participants would be more likely to rate this face as being more aggressive than when the face was surrounded by white.

In our second experiment, we ask: Can the color of our clothing alter the ways in which we perceive others? That is, we were interested in whether the color of clothing that a person wears unconsciously codes his/her mind to view the world in a specific way. Our hypothesis was that participants would expect the man to respond more violently to the stimulus when they were wearing black as compared to when they were wearing

white. Because the personality of the participants could impact this relationship (e.g., if the person is hostile), data on personality were collected as well to potentially be used as a covariate in analyses.

Method

Experiment 1

Participants

A total of 100 students participated to fulfill a psychology course requirement or for extra credit. Of these 100 participants, 87 completed all parts of the experiment. Participants were recruited from an online subject pool on a volunteer basis. Of these participants, 56% reported being women, and the age of the participants ranged from 18 to 36 years of age ($M = 20.07$, $SD = 3.39$). Of the students pooled, 34% were first-year students, 11% sophomores, 18% juniors, and 19% seniors. Fifty percent reported being Caucasian, 4% Hispanic, 29% Black, and 16% other ethnicities.

Materials

Perceived Emotion. Participants were asked to rate the people in the images on level of several different emotions on a Likert scale from 1 (*disagree strongly*) to 10 (*agree strongly*); however, the only item of interest was aggression.

Demographic Information. The final section of the survey was a basic demographics survey that included questions about participants' age, gender, ethnicity, and year of education.

Procedure

Participants received an online survey link when they opted to participate. The survey included two images (one man and one woman) of a neutral face surrounded by

either a black or a white background (see Appendix A for examples of the images included in the survey). Although all participants saw both the male and female faces, they were randomly assigned to see these faces on either the white or black background. Images were presented one at a time, each time at the top of the page. Participants were asked to refer to the image as they rated the perceived emotions of the faces; they were able to view the images as they completed these questions. After answering questions about the faces, participant then completed a short demographic questionnaire.

Results

To determine whether men viewed the photos as more aggressive, data were analyzed using an independent-samples *t*-test. Results indicated no difference in aggression ratings between male and female participants, $t(83) = -.48, p > .05$ for male participants and $t(83) = -.78, p > .05$ for female participants.

To determine whether color affected aggressiveness ratings, data were analyzed using a one-way ANOVA, with color as the independent variable and ratings of male and female aggression as the dependent variables. Color background marginally affected ratings of aggression for male faces, $F(1,86) = 3.23, p = .08$. Contrary to our hypothesis, male faces surrounded by white ($M = 2.53, SD = 1.24$) yielded higher aggression perception scores than male faces surrounded by black ($M = 2.08, SEM = 1.05$). This color effect was not seen for female faces, $F(1,86) = .43, p > .10$.

Experiment 2

Participants

A total of 44 students participated to fulfill a psychology course requirement or for extra credit. Participants were recruited from an online subject pool on a volunteer

basis. Of these 44 participants, 69% reported being women, and the age of participants ranged from 17 to 23 years ($M = 19.22$, $SD = 1.16$). Of the students pooled, 31% reported being first-year students, 53% were sophomores, 9% were juniors, and 7% were seniors. Sixty percent reported being Caucasian, 36% African American, and the remaining 4% other ethnicities.

Measures

Narrative. All participants received the same narration depicting a man who was met with an unpleasant stimulus: nearly being hit by a car. The narrative was three small paragraphs in length depicting a man first performing the mundane task of taking out the garbage. At the end of the narrative, the man was faced with a negative stimulus: a car speeding past and honking. Throughout the narration, the man does not display any emotion, as this is left for the participants to infer. The full narrative given to participants can be found in Appendix B.

Perceived Aggression. Participants were asked to indicate how they believed the stranger in the narrative would react to the unpleasant stimulus of the speeding car. They were given a range of options from smiling and waving to throwing rocks at the passing car. The full list of the possible choices given to participants is located at the end of Appendix C. The results of this question allowed researchers to get an understanding of how aggressive or passive participants believed the stranger would be.

Big Five Inventory. Next the participants were asked to complete the Big Five Inventory (BFI; John, Naumann & Soto, 2008). The BFI measures five major personality traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. This inventory allowed researchers to get a better understanding of the

participants, especially in examining the personality traits that might have impacted the results of the measures mentioned above. This was especially useful in secondary analysis of the data.

Demographics. Participants were asked to record their age, gender, ethnicity, major, grade-point average, and year in school (see Appendix D). The last question asked participants if they or anyone they knew had ever been seriously injured in a car accident, as an affirmative answer to this question might account for a hostile reaction to the narrative.

Procedure

Participants were randomly assigned to be given either a black or white plain t-shirt to wear over their clothing. They were given the choice of a size large or extra-extra-large t-shirt. After putting the t-shirt on over their clothing, participants then received a brief narrative to read. Once finished reading the narrative, participants returned the paper and received a small questionnaire packet that included the perceived aggression question, BFI, and demographic information page.

Results

To determine whether color of shirt affected expected reaction of the man in the narrative, data were analyzed using a one-way ANOVA. Shirt color did not affect predicted severity of response, $F(1,44) = .41, p > .05$. When BFI composites were entered as covariates, shirt color still did not significantly impact predicted severity of response $F(1,44) = .65, p > .05$. That is, the personality of the participant did not significantly impact the perception of the participants. Further, whether participants or someone close to them had ever been in a serious car accident did not affect these results ($p > .05$).

Discussion

Against expectations in the initial study, the color of the background presented to the participants did not affect perceived aggression of the faces presented. Male faces were only marginally affected by the color of the stimulus while female faces did not indicate any effect of color; opposite to the hypothesis, however, faces surrounded by white tended to be interpreted as more aggressive than those surrounded by black. When comparing the gender of participants, men and women tended to have similar aggression ratings indicating that gender of participant does not have an impact on the perceived aggression of the faces. This goes against previous studies that suggest men are perceived as having more negative emotions than women (Sasson et al., 2010).

These results may have been impacted by the lack of experimenter control, as the study was conducted online. Further, the experiment allowed participants to spend as little or as much time as they felt they needed examining the photos, perhaps leading to some error. Still, the results are interesting as they suggest that color might not be important in regard to facial recognition. The differences in aggression ratings between the colors black and white, while not significant, are interesting in that participants tended to rate the man as more aggressive when wearing white. It could be that when participants are wearing white they perceive themselves as more innocent, thus making the actions of others seemingly more aggressive. More research is needed in this area to fully understand what might impact the perception of facial emotions and what, like the color background, might not.

This line of research will go a long way in understanding why we feel toward strangers the way that we do. If our initial interaction with a person leaves us with the

notion that the stranger is an angry and aggressive person, it would help to understand how that perception could have been made more intense or nullified by other factors. For example, Coyne et al. (2008) found that the gender of the stranger impacts how aggressive the stranger actions are viewed. This is just one of many factors that directly impact how we view others. Knowing each factor that impacts perception could help immensely, too, in the acts of presenting ourselves to others. We could discover exactly the right way to present ourselves to get the reactions we want.

Yet it is not enough to have an understanding of how our surroundings impact the way others perceive us. We need also to know how our choices might impact the way we see others. Both sides of the story, after all, are necessary to develop a full picture. For this reason, the second experiment was conducted specifically to see how the color of our clothing might impact our perceptions of strangers.

Our second study did not yield the expected results. Regardless of the color of t-shirt, participants perceived the stranger as reacting in similar ways. This could have several different explanations. First, the colors selected in these experiments might not have had the expected meaning associated with them. For the purposes of this experiment, as with previous experiments, it was expected that black would inspire aggressiveness. Specifically, previous literature suggests that when it comes to sports teams (Frank & Gilovich, 1988) and mug shots (Johnson, 2012), dark colors are associated with aggressiveness. Perhaps in a non-aggressive context, such as a lab setting, dark colors do not show the same grounded cognition; that is, it could be that these colors no longer hold these specific meanings.

A second explanation for the unexpected results could be that simply wearing the t-shirt for the duration of the experiment (never more than 10 minutes total) was not long enough to alter the subconscious. Perhaps what each person had worn all day had a greater impact on their perception than what they had worn for only 5 minutes. It could be that the *choice* to wear a certain color has a bigger impact on our perception of others than being assigned to wear a specific color. We did not collect data on what color shirt the participants wore the day of the experiment, so this is an area for future research.

Other unexpected results were that the big five personality factors did not affect the perception of the stranger. Regardless of personality, participants expected the stranger to react similarly. This effect could be due to a too strong voice in the narration itself. The story could have been written in a more neutral way, and that might have allowed participants to infer more about on the emotional reaction of the stranger.

This line of research is important in learning more about our impact on the world around us, as understanding the effects of color on social interactions can help us better prepare for them. If we unconsciously prepare ourselves to view the world in one way, then we color every interaction, every scene, and every memory with the perception we have coded ourselves to have. This could impact how we view our work, our friends, our families, even interactions with strangers on the bus. This could interfere with our wellbeing and our state of happiness without us ever knowing it.

The current studies did not yield the expected results, but they did help to identify holes in research. There is much more that needs to be discovered in the literature of clothing and perception. For example, how much do our clothing choices impact the

ways in which others perceive us? How do alterations in our daily wardrobe impact the ways in which we behave, and further the ways in which we perceive others?

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Appendix A
Stimulus Images



Appendix B

Narrative

Around 8:00 pm, a man stands at home in his kitchen. He notices that his trash can is mostly full and remembers that trash pick-up will occur early the next morning. Deciding to take the garbage out, he grabs the corners of the bag and removes it from the can. He takes the corners of the bag and ties them together to seal the bag. He then carries the full garbage bag out of the kitchen through the back door, then down the driveway to large outdoor can located on the left hand corner of the driveway, closest to the street.

The man stands in the street just off the curb in order to lift the heavy lid of the outdoor can and drop the garbage bag inside of it. Just as he closes the lid, he hears a loud honk that prompts him to look up and down the empty road.

A large car speeds toward the man. The driver of the car holds the horn down the whole way. The speeding car seems to be heading directly toward the man. The car just misses hitting the man, and the driver yells out as the car passes the man: "Hey stupid, get out of the street!"

Appendix C Questionnaire

Please use the preceding prompt to respond to the following question. Please select the most fitting response to the following sentences based on the previous prompt.

Very likely, the man will respond to the car by:

- A. Jumping up and down with excitement
- B. Smiling and waving
- C. Ignoring it
- D. Rolling his eyes
- E. Shouting curses
- F. Throwing rocks
- G. Chasing after the car

Appendix D
Demographic Information

Please respond to the following questions about yourself:

Age: _____

Gender (*circle one*): male female other

Ethnicity or Ethnicities: _____

Major: _____

Current GPA: _____

Year of study (*circle one*): first year sophomore junior senior graduate student

Have you or someone close to you ever been in a car accident where someone was seriously hurt? (*circle one*): yes no