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The roles of race and empathy on contagious yawning

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The Roles of Race and Empathy on Contagious Yawning

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Abstract

Social Psychologists often consider race to be a marker of in-group or out-group status. When looking at race, implicit bias can take forms that are more subtle than outwards racism. Two research questions were asked in this study to better understand the psychology behind racial issues. The first question was if the number of contagious yawns (CY) a person experiences depends on the race of the stimuli being viewed. Contagiously yawning more to in-group members is a phenomena seen in chimpanzees, but has not been studied in humans in a racial context. Black and white males and females were recruited to view videos of individuals from each race and gender category yawning, while the experimenter documented the number of yawns in response to each video. Contagious yawning has been linked to empathy, and our second question wanted to explore how levels of empathy affected the number of times participants contagiously yawned. A chi square analysis found that participants yawned significantly more to racial in-group members than out-group members, χ^2 (1)=7.023; p =.008. The number of times a participant yawned was not dependent on the gender of the yawner in the stimuli video, nor was it dependent the combination of race and gender. A correlation between empathy levels and number of contagious yawns was not significant (r = .064, p=.491). Our results suggest that there are other factors, independent of empathy, that could have a bigger effect on contagious yawning, and one particularly salient and powerful factor is race.

Keywords: empathy, race, in-group, out-group, contagious yawning

The Roles of Race and Empathy on Contagious Yawning

Empathy

Empathy is the ability to put oneself in the shoes of another person and to experience events and emotions the way that person experiences them (Weiner & Auster, 2007). Researchers have proposed a simulation theory to explain how empathic responses occur (Barsalou, 1999; Gallagher & Meltzoff,1996; Gallese, 2001; Gallese & Goldman, 1998). The simulation theory holds that we experience empathy when we use our previous experiences as a model to compare observed behaviors to and develop an understanding of their thoughts and emotions (Gallese, 2001). Through this process, emotional representation of the situation is formed, enabling a connection to develop (Gutsell & Inzlicht 2010).

When people connect with others, they adopt their postures, intonations, facial expression, motivational states, and emotions (Gutsell 2010; Decety & Jackson, 2004). The level of connection an individual has with someone also influences contagious yawning (Norscia & Palagi, 2011). However, this level of connection and simulation (Preston & Waal, 2001) can vary. Empathy can be viewed on a spectrum where various complex social situations (Vignemont & Singer, 2006), like social category membership (Hornstein, 1978) can influence empathy levels.

Group Membership, Race, and Empathy

Social category membership can be based on different aspects of identity, but one particularly salient social category is race. Preferences for racial in-group members have been found in infants, who respond more receptively to own-race strangers (Feinman, 1980; Kelly et

al., 2005). In adults, educational and career choices have been shown to be influenced by own-race role models (Karunanayake & Nauta, 2004; King & Multon,1996; Zirkel, 2002).

Differentiation of group membership can also be seen on a neurological level. When measuring mirror neuron system activity, there was more activity when watching in-group members compared to out-groups, with the least amount of mirror neuron system activity present in members identified as highly prejudice (Gutsell, 2010). Neural systems involved in imitation, like the fronto-parietal system (Caspers, Zilles, Laird, & Eickhoff 2010) have been shown to be influenced by the race of the person being imitated (Reynolds Losin, 2012). When watching same-race members receive needle penetration, Xu, Zuo, Wang, and Han (2009) found neuroimaging evidence that brain areas related to first person pain experience, like the anterior cingulate cortex (ACC) and anterior insula (AI) (Singer et al., 2004; Botvinick et al., 2005; Jackson et al., 2005; Hein, Silani, Preuschoff, Batson & Siner, 2010), can be influenced by racial-group membership. When individuals view racial in-group members experiencing a negative event, like physical pain (Hein et al., 2010) or failure (Cikara & Fiske, 2011), there is more activity in brain areas related to empathy, such as the anterior insula (Singer, 2006), compared to when they viewed racial out-group members in the same situation (Azevedo et al., 2013).This in-group bias was seen in both white and African-American groups, but stronger in white participants. Gutsell and Inzlicht, (2010) found that people were less likely to mentally simulate simple actions like drinking a cup of water when a racial out-group member performed the action, and this effect was exacerbated when out-group members were disliked.

The difference in neural activity based on group membership, as Gutsell (2010) explains, could be because we have a harder time recognizing out-group members' faces (Sporer, 2001)

and interpreting their facial expressions (Elfenbein & Ambady, 2002); out-groups are also less likely to activate neural areas for social cognition (Harris & Fiske, 2006) and social perception (Van Bavel, Packer, & Cunningham, 2008). Likowski, Mühlberger, Seibt, Pauli, and Weyers, (2008) also found that negative attitudes towards outgroup members lead to less facial mimicry for an out-group member. This lack of mimicry, recognition, empathy, and social cognition for out-group members, or increase of it towards in-group members, has the potential to amplify racial divides.

Contagious Yawning

Empathy has been linked to contagious yawning (CY), a phenomenon where seeing, hearing, or even reading about yawning can trigger a yawn in the observer (Platek, Mohamed, & Gallup, 2005; Schurmann, et al. 2005; Platek, Critton, Myers & Gallup Jr, 2003). CY has been shown to be a manifestation of rudimentary forms of empathy (Platek et al., 2005; Norscia & Palagi, 2011; Platek et al., 2003; Senju et al., 2007), self-awareness, and theory of mind (Platek et al., 2003). Neuroimaging evidence also supports the link between empathy and CY (Platek et al., 2005; Schurmann, 2005). Not everyone is susceptible to CY; around 40-60% of the population experience CY in controlled studies (Bartholomew & Cirulli 2014), and some of that variation has also been linked to varying levels of empathy (Cooper et al.,2011). Norscia and Palagi (2011) found that a person's susceptibility to CY was linked to the familiarity and type of connection they had with the person yawning; the most yawning occurred when viewing family members yawn, followed by friends, acquaintances, and people were least likely to experience CY when viewing strangers. This clear difference in yawns supports the notion that in-group bias can affect susceptibility to CY.

Schizotypal personality traits, ones characterized by a difficulty establishing social relationships, were found to be inversely related to susceptibility to CY (Platek et al., 2003). Similarly, higher scores on psychopathy scales, which measure levels of psychopathic tendencies like being antisocial, manipulative, and lacking empathy, were associated with a lower likelihood of CY (Rundle, Vaughn, & Stanford, 2015). Autism Spectrum Disorder (ASD), a disorder known for deficits in social skills, has been linked to impairments in CY (Senju et al., 2007). Cooper et al., 2011 found a negative correlation between scores on Autism Spectrum Quotient scores and Interpersonal Reactivity Scores (IRI), a scale used to measure empathy (Davis, 1980). Those who scored higher on empathy scales showed more empathy for both in-group and out-group members (Xu et al., 2009), showing that there are individual differences in empathy, but that in-group bias can affect susceptibility to CY (Norscia & Palagi, 2011).

Chimpanzees, primates that show basic forms of empathy (O'Connell, 1995), are one of the few animal species susceptible to CY (Anderson, Myowa-Yamakoshi, & Matsuzawa, 2004). Campbell and Waal (2011) found that chimpanzees experienced more yawns when watching in-group member yawns compared to both in-group control conditions and out-group members yawn. They found no difference between watching in-group chimpanzees at rest and an out-group yawn condition, demonstrating that an in-group bias for CY, and possibly for empathy, exists in chimpanzees.

Current Study

The objective of the current study was to measure CY to determine whether individuals are more empathic towards others that are racially similar to themselves. Empathy can directly affect our behaviors and influence implicit bias, and when looking at race, bias can take forms

that are more subtle than outwards racism. These forms are important to understand to recognize the psychology behind racial issues. Lack of empathy for out-group members, or preferential empathy towards in-group members, has the potential to amplify racial divides, with dehumanizing effects. One measure of empathy is CY, but susceptibility to CY has not been studied from a racial in-group and out-group perspective.

The current study measured whether individuals differentially yawned to in-group and out-group members to determine if individuals were more empathic towards others that are racially similar to themselves. Participants completed the Interpersonal Reactivity Index (IRI), a scale used to assess multiple dimensions of empathy, and watched a series of videos of White and Black individuals yawning. The number of yawns participants experienced to the same and different race served as the measure for CY. We expected empathy levels to predict CY, and that individuals will yawn more when viewing members of their same race compared to the different race.

Methods

Participants

Participants were recruited through James Madison University's Department of Psychology Research Participant Pool, an online database of the different studies conducted in psychology research labs. All students enrolled in PSYC 101 or 160 are expected to earn three units of credit by participating in these research studies (or alternative activities), and these credits count towards their final course grade. In the study's description on Participant Pool, one of the requirements listed was that participants had to identify as either white or black. Since

JMU is a predominately white school, the researchers also recruited students in the Centennial Scholarship Program (CSP), a university program that aids underrepresented minorities. Students recruited from CSP received community service hours, a requirement of the scholarship program, in return for their participation. Researchers also contacted students at the Center for Multicultural Student Services to recruit black participants. These students volunteered to participate and were not compensated for their participation. Because this was the first study looking at contagious yawning and race in a systemic way, participants who identified as any race other than white or black were ineligible. Participants who were mixed race were also ineligible. There were a total of 119 participants. 25 black male participants (BMP), 28 black female participants (BFP), 32 white female participants (WFP), and 32 white male participants (WMP).

Measures & Materials

Questionnaire. Participants were first asked to fill out a questionnaire composed of demographic questions. Additionally, the questionnaire asked questions related to how much sleep they received the past night and how long they had been awake. The second part of the questionnaire was the full Interpersonal Reactivity Index (IRI). The IRI is a 28-item 5 point Likert scale administered to assess two different components of empathy, cognitive and affective. Cognitive empathy comprises of p*erspective taking* and *fantasy*, which is the tendency take on a different point of view, and to translate oneself into the feelings of fictitious characters, respectively. Affective empathy comprises of *empathic concern*, and *personal distress,* which measure feelings of sympathy and concern for those less fortunate and feelings of personal anxiety in tense interpersonal settings (Bartholomew, 2014; Cooper et al., 2011; Davis,1980;

Davis, 1983). The IRI is composed of a series of statements and situations where participants are asked to rate how well the prompt describes them. The scale ranged from 1-5, with 1 being "does not describe me well" and 5 being "describes me very well". Participants can obtain a score anywhere in the range of 7-108 for overall empathy scores, with lower scores indicating lower levels of empathy and higher scores indicating higher levels of empathy.

Contagious yawning. CY was measured by counting the participant's number of yawns while watching yawning stimuli.

Yawning video stimuli. The stimuli for the videos were composed of videos found on Youtube. The videos were downloaded into Windows Media Player where they were also edited. The final videos were uploaded to Youtube again, this time on a private account, so only the researcher who had access to the Youtube account could access the videos. They yawners in the video were of varying ages and the videos were taken from different angles as well.

The duration of the yawning video stimuli was 6 min 53 s. The video was broken up into four blocks; black male stimuli (BMS) (1 min 33 s), black female stimuli (BFS) (1 min 25 s), white male stimuli (WMS) (1 min 40 s), and white female stimuli (WFS) (1 min 48 s). There were a total of six yawners in each blocked section. Participants saw each yawning clip three times (i.e. black male yawner #1 yawn clip was played 3 times in a row, then black male yawner #2 was played 3 times in a row...until all 6 black male yawners were displayed to the participants). There was 0.5 s transition between each yawning clip and a 1.5 s transition between stimuli blocks. During this 1.5 s transition, participants were presented with an image of

a landscape. There were four different versions of this video with blocks counterbalanced for race and gender.

Yawning ratings. Participants were asked to rate how realistic the video's yawns were on a scale of 1-5, from 1 being "not realistic at all" and 5 being "very realistic". These ratings ensured that participants were watching the videos. The ratings also served as a measure between yawning video stimuli; if certain videos were consistently rated as unrealistic across participants, it could potentially affect the total number of yawns to that certain stimuli group.

Procedures

When participants first arrived, they were given a consent form and made aware of all their rights as participants. They were told the purpose of the study was to rate yawning videos on how realistic the yawn was, and highly rated yawns would be used in future studies. Deception was used to ensure that any occurring yawns were natural. Once consent was given, participants were asked to complete the online survey that asked for demographic and background information in addition to the IRI questionnaire.

Participants then watched the yawning videos. While the participants were watching the video, the researchers remained in the far left corner of the room, out of the participant's field of vision. While the participant was watching the videos, the researcher counted and documented the number of yawns the participants experienced. The placement ensured the researcher could discreetly count the participant's yawns without the participant noticing. A mirror was also placed in the far right corner of the room amongst a stack of papers and miscellaneous objects. The mirror served to provide the researcher a front view of the participants face visible to the

researcher if the side view was obstructed by things like hair, large scarves, or by how the participant was sitting. Most participants did not notice the mirror, and those who did see the mirror did not appear distracted by it.

The number of yawns the participants experienced while watching each set of stimuli (BMS, BFS, WMS, WFS) was recorded by the researcher. To ensure participants watched the videos intently for the duration of the video and to align with the fake purpose of the study, researchers asked participants to rate how realistic they found each yawn. Once participants finished watching the video, researchers debriefed participants on the true nature of the study, answered questions, and offered the researcher's contact information if they had any further questions.

Results

Do individuals yawn more to an in-group member yawning than an out-group member?

Three different chi-square tests of independence were conducted; one across all groups, χ^2 (9)= 7.023; p =.171, one across race, χ^2 (1)= 7.023; p =.008, and one across gender, χ^2 (1)= 1.303; p =.254. The only chi square test that was significant was the one across race, with both black and white participants yawning significantly more than expected to racial in-group members and significantly less than expected to racial out-group members. Figure 1 provides a

bar graph comparing the number of expected yawns to the number of observed yawns across racial in-group and out-group.

Do empathy levels predict CY?

A correlation revealed that overall empathy score did not predict the number of contagious yawns (r = .064, p =.491). In addition to an overall empathy score, the IRI breaks empathy into four categories - *perspective taking, fantasy*, *empathic concern*, and *personal distress.* Scores for all four types of empathy were obtained for each participant. A correlation between overall empathy scores and it's subscales were ran with the number of yawns viewers experienced to stimuli that were both race and gender matches, stimuli that were both gender and race mismatches, only gender matches, and only race matches. Table 1 provides the obtained correlation coefficients; no significant results were found.

While empathy levels did not predict the number of contagious yawns a participant experienced, it did predict how realistic participants rated the yawning stimuli. Individuals with higher empathy scores found the yawning stimuli to be more realistic (r=.240, p=.011).

Descriptives

Tiredness/hours asleep/hours awake. There were no significant differences in participants' self-reported tiredness levels F (3,115) =1.95, p=.125, η^2 = .048, or number of waking hours that day F (3,115) =1.589, p=.196, η^2 = .040 across groups. When comparing the

amount of hours slept the previous night, there was a significant difference among conditions (F (3,115)= 3.079, p=.030, η^2 = .074), with WFP sleeping about an hour more than BFP, t(58) = 3.152, p=.003. Hours slept the previous night was run as a covariate for analyses involving number of yawns.

Empathy scores. A comparison of empathy scores across groups revealed that there was a significant difference in mean empathy scores, F (3,118) =5.279, p=.002, η^2 = .121. Tukey's post hoc analysis revealed that WMP averaged 8.65 points fewer on the empathy scale than WFP (t(64)= 3.258, p=.002) and 8.04 points fewer than BFP (t(60) = 2.787, p=.007). Table 2 provides mean empathy scores and standard deviations. When comparing empathy across only gender, female participants (FP) had a significantly higher level of empathy score than male participants (MP), t(117)= 3.940, $p < .000$. There were no significant differences in empathy score across race, t(117) = .460, p=.646

Number of yawns experienced by the viewer. There was a significant difference in the number of yawns experienced by participants across conditions, F(3,115)=3.273, p = .024, η^2=0.079, with Tukey's post hoc analysis indicating that BMP yawned more than WFP, t(25)=2.63, p = .014. Comparisons across only gender indicated that MP yawned more than FP, t(95)=2.041; p =.044. Comparisons across race revealed that black participants (BP) yawned more than white participants (WP), though this difference was not significant, t(91)= 1.863, p =.066.

Number of yawns experienced to stimuli. There was no significant difference in the number of yawns each stimuli block received when taking race and gender into consideration, F (3,12) = .161, p=.920, η^2 = .039.

Ratings. A comparison of the mean realistic score each group of stimuli received revealed that there was a significant overall difference, F (3, 417) =15.576, p =.000, η^2 = .101. Post hoc analysis indicated that BM received higher ratings than BF, t(196)=-5.743, p<.000, WF, t(201)=-6.62, p<.000, WM, t(201)=-5.00, p <.000, but no other differences between ratings score existed between the other groups.

Discussion

Two research questions were asked in this study to better understand the psychology behind racial issues. The first question asked if empathy levels can predict CY, a behavior shown to be a manifestation of rudimentary forms of empathy (Platek et al., 2005; Norscia & Palagi, 2011; Platek et al., 2003; Senju et al., 2007), self-awareness, and theory of mind (Platek et al., 2003). The second question was if the number of CY a person experiences depends on the race of the stimuli they are watching. The number of CY a person experiences has been shown to vary according to familiarity of the person yawning (Norscia & Palagi, 2011). Chimpanzees, who display rudimentary forms of empathy, yawn significantly more times to in-group members than out-group members (Campbell & Waal, 2011). We expected there to be a relationship between empathy levels and CY, and that participants would yawn more to the stimuli of racial in-group members than out-group members.

We found that participants yawned significantly more to racial in-group members and less to out-group members across both races; that is, the number of yawns a participant experienced was dependent on the race of the yawner in the stimuli video. Black participants yawned significantly more than expected to black stimuli videos, and white participants yawned more than expected to white stimuli videos. Number of yawns was not dependent on if the gender of the yawner in the stimuli video was an in-group or out-group member, nor was it dependent the combination of race and gender.

Contrary to the research hypothesis and previous findings (Norscia & Palagi, 2011; Rundle, Vaughn, & Stanford, 2015; Platek et al., 2003) this study found no link between obtained empathy levels and contagious yawning. Our tool to measure empathy levels, the IRI, is a commonly used scale (Azevedo et al., 2013) that measures self-reported empathic tendencies (Corte, Buysse, Verhofstadt, Roeyers, Ponnet, & Davis, 2007). Bartholomew and Cirulli (2014), who also had participants fill out the IRI and watch yawning videos, found no link between empathy and contagious yawning. When comparing empathy scores, we found that females had significantly higher levels of overall empathy than males, replicating previous findings (Christov-Moore, et. al, 2016; Cohn, 1991; O'brien, Konrath, Gruhn, & Hagen, 2012). However, males yawned significantly more than females in our study. Table 4 provides a comparison of the number of participants in each group, the number of participants who yawned, and the total number of yawns experienced per group. If empathy scores and number of yawns were related, it would follow that there should be a larger proportion of female yawners or a higher number of yawns by females, but that was not found.

Although empathy score wasn't significantly correlated with number of yawns, empathy score was significantly correlated with the ratings participants gave the yawning stimuli. Both answering the questions on the IRI and rating a person's action, a yawn in this situation, requires intentional thought and a certain level of self-awareness. Contagious yawning, on the other hand, is a much more unconscious behavior. The actions that require conscious effort were more related to one another than one that is unconscious. On the surface level, participants may report, and believe, that they respond to all situations the same. Their higher levels of empathy lead them to answer questions in a specific way, and rate stimuli a certain way. However, unconsciously, they still are yawning more to racial in-group members than out-group members, indicating that they are still subject to racial in-group and out-group bias. Despite empathy levels, people unconsciously pay better attention to or pick up on more cues from racial in-group members than out-group members. These findings suggest that while empathy could be related to CY, there are other factors, independent of empathy, that have a bigger effect on CY than empathy. Our results suggest that one factor that influences CY more than empathy is race.

Implications

Unintentionally paying more attention and taking cues from racial in-group members, despite having high empathy levels, has subtle but powerful implications when looking at institutions in the United States. According to The Washington Post, the 114th Congress's House is composed of 79.8% white representatives, while 94% of the senators are white (Bump, 2015). From a policymaking perspective, lawmakers may be more inclined to listen to, and identify with, in-group member constituents. This becomes an issue when the vast majority of lawmakers are a fairly homogenous population, white, but their constituents that they are supposed to

represent are mostly out-group members. A possible mitigation of this issue is to increase the representation of minorities in congress. It's been found that black members of congress are more supportive of black policies than their white counterparts (Whitby & Krause, 2001). Furthermore, Tate (2001) found that black constituents rate being significantly more satisfied with their representative when the representative was black after controlling for social characteristics like age, gender, education, and years the representative spent in their community.

Another important institution in our society is education. According to a State of Racial Diversity in the Educator Workforce report (2016) released by the U.S. Department of Education, 82% of the teachers in public schools are white. In education, primarily in elementary education, teachers may unintentionally pick up on more subtle cues from students that are of the same race. Rosenthal (1964) found that teacher expectations affect their interaction with their students, which in turn affected the student's success in school. Stereotypes of out-group member's academic abilities could affect teacher expectations, which in turn can affect their academic performance. Increasing the amount of diversity within teachers could help mitigate some issues seen in the school system. Pitts (2005) found that teacher diversity was shown to have a positive impact on dropout race and SAT performance, but a negative impact on Texas Assessment of Academic Skills pass rates, noting that diversity is a complex issue that has various effects on different performance measures.

According to the Association of American Medical Colleges (2014), about 49% of the physicians in the US are white. In healthcare, proper diagnosis and treatment is critical for helping patients who are ill. Again, if the majority of the doctors are a racially homogenous population and their patients are mostly out-group members, they may be less likely to pick up

on subtleties in the symptoms out-group patients are experiencing. Mistrust between the African American and Black community for physicians has been well documented (Jacobs, Rolle, Ferrans, Whitaker & Warnecke, 2006; Suite, La Bril, Primm, & Harrison-Ross, 2007; Armstrong, Ravenell, Mcmurphy, & Putt, 2007), and these subtle racial biases can play a role in the reported lack of interpersonal skills (Jacobs, Rolle, Ferrans, Whitaker & Warnecke, 2006) that leads to this mistrust the African-American community has for healthcare providers.

The government, education system, and health care system are all systems that affect an individual's access to resources and opportunities. When the majority of the people with power in these systems (lawmakers, teachers, doctors), are of the same race, it has the potential to affect subtle forms of institutional racism, despite being well intended, or having high levels of empathy.

Limitations and Areas for Future Studies

One limitation with the study is that there were a number of participants who would stretch, sigh heavily, and display other signs that are associated with yawning without overtly yawning. There were also participants who, once debriefed, said they held back their yawns or tried to not yawn. Future studies should systematically find a way to account for these heavy sighs and stretches. Some of the stimuli had the yawner in the video stretching along with the yawn, so the heavy sighs or yawns could be interpreted as imitative behaviors. Researchers should also incorporate asking participants how tired they felt while watching the videos and if they held back the urge to yawn. While there were participants who reported suppressing the urge to yawn during this study, this was information volunteered from the participant. Since

there was deception used in the study, researchers could not explicitly tell the participants to refrain from suppressing their yawns. Future studies should find a way to tell participants to feel free to yawn without making it obvious. The researchers tried to bring this up conversationally when explaining the task to participants by saying things like "don't feel bad if you yawn" when participants brought up to the researcher that they would probably yawn. Doing this systematically as a part of the protocol would reduce the number of participants who were coded as non-yawners even though they could have been yawners. This could also affect the lack of relationship seen between empathy score and contagious yawning.

In the future, researchers should also collect information from the participants about the amount of contact and interactions they have with people of a different race. The amount of contact someone has with members of an out-group could influence how they view out-group members (Pettigrew & Tropp, 2006). They could also use a questionnaire that measures the level of in-group and out-group bias someone has. Age of the participant has been shown to affect CY (Bartholomew & Cirulli 2014), and future studies should explicitly collect this information to run as a covariate. Future studies should continue to have gendered conditions to see if WF still yawn at significantly lower rate. Video recordings of the sessions should also be considered, as it could reduce any errors occurred from the researcher missing a yawn that occurred.

Finally, incorporating another factor into the study, the Mirror Neuron System, may shed light on some gray areas about empathy and CY. Mirror Neuron System activity has been associated with aspects of empathy like perspective-taking abilities (Gazzola et al., 2006), and empathic concern (Kaplan & Iacoboni, 2006). Frontal human Mirror Neuron System activation has been correlated with both empathic behavior and imitating interpersonal skills (Pfeifer,

Iacoboni, Mazziotta, & Dapretto, 2008). Mirror Neuron System has also been linked to CY (Haker, Kawohl, Herwig, & Rossler, 2013; Campbell & Waal, 2011). Seeing as how the Mirror Neuron System is linked to both empathy and CY, measuring this system's activity with an EEG machine could provide supplemental information to current findings.

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Figure 1

Comparisons across Number of Yawns for Racial In-Group and Out-Group Members

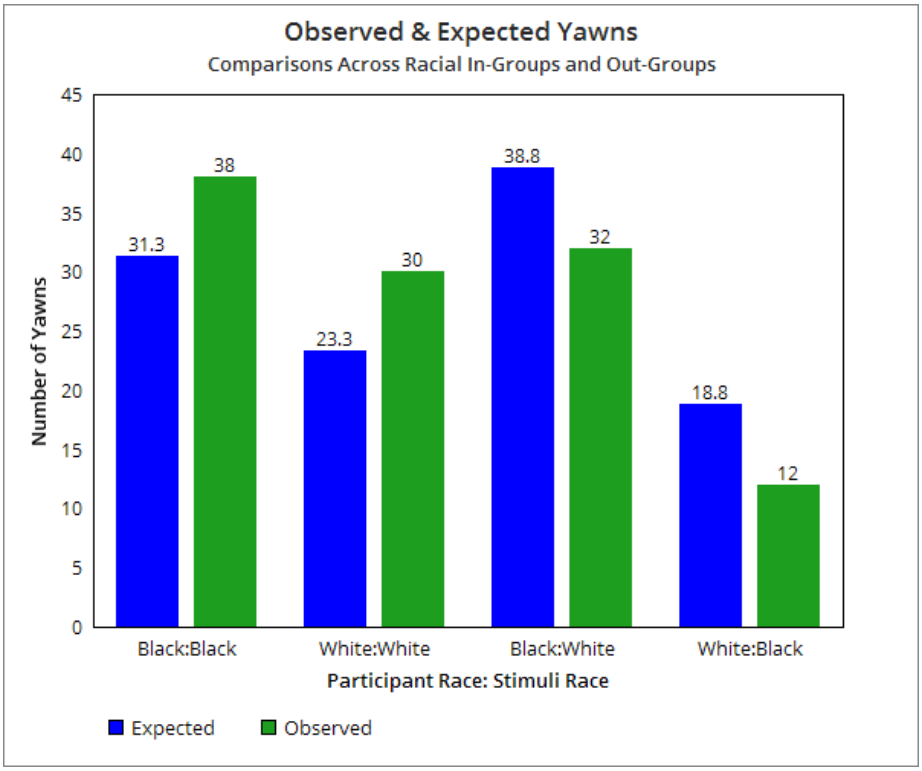

Table 1

Correlation Coefficients Between Empathy Scores and the Number of Yawns

Measure	# of yawns to a race and gender match	# of yawns to a race and gender mismatch	# of yawns to a gender match	# of yawns to race match	Total # of yawns
Overall Empathy	.005	.052	.008	.066	.064
Fantasy	-.002	-.027	-.023	-.008	-.006
Empathic Concern	-.074	-.120	-.138	-.124	-.149
Perspective Taking	-.059	-.078	-.074	-.056	-.067
Personal Distress	-.039	.126	-.021	-.059	-.008

Table 2

Mean Empathy Scores

Race	Male	Female	Total
White	62.4 (11.7) * ◆	71.0 (8.72) ◆	66.7 (10.21)
Black	64.2 (9.64)	70.4 (10.7)*	67.3 (10.17)
Total	63.3 (10.7) ❖	70.7 (9.71) ❖	

◆ indicates significant differences ($p<.05$) between groups

* indicates significant differences ($p < .05$) between groups

❖ indicates significant differences ($p < .05$) between genders

Table 3

Mean Number of Yawns Experienced

Race	Male	Female	Total
White	1.18 (1.98)	0.13 (.421)*	.67 (1.53)
Black	1.48 (2.55)*	1.18 (1.77)	1.32 (2.16)
Total	1.31 (2.23) ❖	0.62 (1.34) ❖	

* indicates significant differences ($p<.05$) between groups

❖ indicates significant differences ($p < .05$) between genders

Table 4

A Comparison of Total Participants per Group, Number of Yawners, and Number of Yawns

Group	Number of participants	Number of yawners	Number of yawns
BFP	28	12	33
BMP	25	13	37
WFP	32	3	4
WMP	34	13	40