The Impact of Sexual Orientation and Temperament on Physical and Verbal Aggression

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Abstract

The initial assumptions for this study stemmed out of research that has been conducted in areas beyond traditional communication research in the physical sciences. While a neurological, physiological, or genetic conceptualization of sexual orientation is not a new concept for researchers in gay, lesbian, and bisexual studies, examining human communication through this filter had yet to be completed. While the gay, lesbian, bisexual culture clearly has its own distinctions from the heterosexual culture, understanding these differences has often been understood and researched only through a learning theory perspective. This study argues that many of these distinctions may not be learned differences as many researchers suggest, but rather biological differences that ultimately create culturally distinct behavior. This is not to say that biology creates culture, but rather that different cultural groups may be more likely to exhibit specific behaviors that have a biological foundation. The goal of this study hypothesized that there was a possible biological basis, which stems out of sexual dimorphic brain structures, for differences seen between heterosexual males, heterosexual females, gay men, lesbian women, bisexual males, and bisexual females in relation to verbal and physical aggression. The basis of this hypothesis stemmed from the research on hypothalamic differences by Simon LeVay (1991). The overall results of this study found that heterosexual males were more physically and verbally aggressive than any of the other sexual orientation categories.

Numerous reasons have been offered explaining why a good portion of people in this nation are gay, lesbian, or bisexual. In fact, when it was originally proposed by Kinsey, Pomeroy, and Martin (1948) that 10% of the men in the world were exclusively gay and even more males were bisexual or had bisexual encounters, the moral forces of the day condemned Kinsey and his colleagues. While times have changed and consistent research has proven Kinsey's initial results to be fairly accurate, the moral condemnation has continued. A number of research teams have examined the impact that physiological functions and genetics have had on an individual's sexual orientation development (Bailey & Benishay, 1993; Hammer, Hu, Magnuson, Hu, & Pattatucci, 1993; LeVay, 1993). Sadly, even with this new understanding of biological and genetic premises for an individual's sexual orientation, a growing number of anti-gay voices vehemently object to the idea that people may just simply be born gay (a male attracted to other males), lesbian (a female attracted to other females), and bisexual (a male or female who is attracted to both males and females) (Consiglio, 1991; Davies & Rentzel, 1993; Saia, 1988).

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The gay, lesbian, and bisexual co-culture is a unique cultural experience in the United States. According to Wrench (2001), a culture is "a group of people who through a process of learning are able to share perceptions of the world which influences beliefs, values, and norms, which eventually affect behavior" (p. 12). When gay, lesbian, and bisexual (GLB) people first enter into the GLB culture, they are met with new signs and symbols that they would not ordinarily face in the greater macro-culture. The major investigation of the modern GLB culture was undertaken by Browning (1994) in his book, *The Culture of Desire*. Browning found that the GLB culture was a co-culture that "survives by continually collapsing and recreating itself" (p. 229). In essence, Browning believed that the GLB culture has consistently transformed itself with each new generation. Communication researchers have often examined the GLB culture as a unique cultural group worthy of rigorous cultural research (Christiansen & Hansen, 1996; Cohen, 1991; Darsey, 1991; Jandt, 1980).

While the research on the gay, lesbian, and bisexual culture has been rhetorical in nature, these studies have clearly shown the uniqueness of this culture. Outside the field of communication studies, many cultural scholars are starting to focus on the biological basis for cultural differences. One focal point that biologists and anthropologists have used to examine human differences is "race." Scientists know that races occur because of mutation, selection, migration, and genetic drift (Washburn, 1963). Ultimately, an individual's race is a factor of her or his biological makeup. While the actual genetic variation between races is very small, race does manifest itself in some rather unique ways. Malina, Martorell, and Mendoza (1986) found that Mexican American Youth and European American Youth actually grow at different intervals when charted, even when the sample came from a very heterogeneous community. These growth rates have been shown to affect neurological functioning and hormone secretion, which ultimately has been shown to greatly impact human behavior (Malina, Martorell, & Mendoza, 1986; Sapolsky, 1998). Additionally, race is often the building block of most cultures (Washburn, 1963). Though this may seem insignificant to communication scholars, blatant genetic differences in groups of people need to be explored to see if these differences actually influence human communication behavior. Even the simplest genetic differences that can be seen in skin and hair color add to the ever growing realization that races and other groups of people are genetically distinct.

While races have consistently been examined by researchers looking for any kind of significant difference, race is not the only variable researchers have used to find biological and genetic differences between groups of people. Many human factors have been viewed as genetically determined such as eye color, height, and handedness (Hammer & Copeland, 1994,

1998; LeVay, 1996; McCroskey & Beatty, 2000). Genetic differences have also been seen in various sub-cultures as well. Hammer, Hu, Magnuson, Hu, and Pattatucci (1993) found a genetic difference between heterosexual and homosexual males.

In the same way that radical anti-gay voices object to the biological and genetic understanding of sexual orientation, a number of radical behaviorists object to the new biological and genetic understanding of human communication, or communibiology (Condit, 2000). These researchers fear the deterministic nature of the communibiological paradigm. As noted above, scholars have consistently noted that many human behaviors are genetically driven, so why are people so afraid to add communicative behaviors to this list? Despite the fears of many scholars, a clear communibiological paradigm and research agenda has started. In the arena of communibiology, researchers have looked at interpersonal communication (Beatty & McCroskey, 1998b), communi-cation apprehension (Beatty, McCroskey, & Heisel, 1998; Beatty & Valencic, 2000; Kelly & Keaten, 2000), verbal aggressiveness (Valencic, Beatty Rudd, Dobos, & Heisel (1998), communicator style (Bodary & Miller, 2000; Horvath, 1995), interpersonal aggressiveness (Beatty, Valencic, Rudd, & Dobos, 1999), humor (Wrench & McCroskey, 2001), and numerous other communication traits.

Realizing the controversial nature of genetic and biological predispositions to both sexual orientation and human communication, the marriage of the two concepts in an attempt to further validate both was logical. If genetics play a part in sexual orientation, it is possible that the differences these genetic and biological forces create may impact human communication. This article does not suggest that culture is a pheno-menon created by biological differences, but when biological differences (such as race) do not exist, the chance that an individual would participate in a specific culture greatly diminishes. In other words, if an individual has a purely Western European genetic background, the chance that he or she will grow up in an aborigine culture in the Australian Outback is virtually nil. Even when people from a specific genetic background are raised in another culture, their genetic background still affects their development. This notion is validated in the study conducted by Malina, Martorell, and Mendoza (1986) who found that different racial groups grew at different speeds even when they were not raised in a "traditional" environment. In other words, an individual's biological framework reacts inside of her or his environment not always because of her or his environment. Since this is true of simple biological structures like growth, researchers consistently agree that it is also true that genetics influence human behavior (Beatty, McCroskey, & Valencic, 2001; Hammer & Copeland, 1994; LeVay, 1993; Rowe, 2002; Wright, 1999). To understand the reasoning behind the hypotheses in this study, an

examination of the literature related to communibiology, sexual brain structures will occur.

Communibiology

The emergence of the communibiological paradigm occurred after a lot of frustration trying to help students overcome their communication apprehension, more specifically their public speaking anxiety. In many communication courses around the United States, public speaking is the basic course that all departments teach, and most university students are required to take. McCroskey (1977) defined communication apprehension as "an individual's level of fear or anxiety with either real or anticipated communication with another person or persons" (p. 78). It was through research that McCroskey was completing in the area of communication apprehension that the pitfalls of social learning theory surfaced. McCroskey (1998) found that it predicted very little variance in human behavior. In essence, the lack of variance accounted for by communication researchers using social learning theory was an anomaly that most researchers simply overlooked. Though not a major crisis within the discipline, the lack of variance accounted for forced McCroskey to examine other possible variables that had been excluded from communication apprehension research, which ultimately led him to Hans Eysenck's (1998) three factor model of human temperament (extra-version, neuroticism, and psychoticism).

Hans Eysenck originally started studying the notion of human temperament back during the 1930s. His original conceptualization was that human temperament was composed of two super traits or psychometric trait constellations: extraversion and neuroticism (Eysenck, 1998). According to Eysenck (1998), extraversion is an external rather than an internal focus. People who are highly extraverted are very sociable and outgoing; whereas, people are lowly extraverted (or introverted) are more self focused and are not sociable and outgoing. Neuroticism, on the other hand, is the tendency for an individual to exhibit hysteria and dysthymia (Eysenck, 1943). The third psychometric trait constellation, psychoticism, was developed later in Eysenck's career to fill a gap that Eysenck saw in his overall framework (Eysenck, 1998). Psychoticism referred to people who tend to be "aggressive, antisocial, impersonal, egocentric, unempathic, tough-minded, creative, cold, and ... impulsive" (Beatty, McCroskey, & Valencic, 2001). All three super traits are continua with low and high ends. Everyone exists at some point on the three super traits; people just function at different levels and different combinations. Overall, Eysenck argues that these three psychometric trait constellations are influenced by the limbic system which

serves as a biological intermediary for an individual's genetic personality (Eysenck, 1998).

McCroskey along with his colleague Michael Beatty quickly set out to create a communibiological understanding based on the works of Hans Eysenck and other psychobiologists. At the time of their initial publishing, only one carefully controlled scientific study in the field of communication studies (Horvath, 1995) had been reported, which centered on genetic influences on human communication.

Beatty and McCroskey (1998) put forth their combined conceptualization of the communibiology paradigm in McCroskey, Daly, Martin, and Beatty's (1998) book *Communication and Personality: Trait Perspectives*. Kuhn (1996) defined a paradigm as a series of models from which scientific research is generated following specific rules and standards. Beatty and McCroskey (1998) created a series of five propositions that serve as the grounding model for the communibiological paradigm. Incidentally, the five propositions served as the main body of information in McCroskey's (1998) Arnold lecture on the subject. The first proposition states, "all psychological processes – including cognitive, affective, and motor – involved in social interaction depend on brain activity, making necessary a neurobiology of communication" (McCroskey, 1998, p. 48). In other words, as Walls (1999) noted, all of our psychological and learning aspects are innately biological and neuro-logically driven.

The second proposition states, "brain activity precedes psychological experience" (Beatty & McCroskey, 1998, p. 47). Though this controversy stirs debates between mentalism (the mind is a non-biological spiritual form) and physical reductionism (everything is neural), the increasing information that we have about the brain has shown that even the size and shape of different brain structures determine different behaviors (LeVay, 1993; LeVay & Hammer, 1994).

The third proposition states, "the neurobiological structures underlying temperament traits and individual differences are mostly inherited" (McCroskey, 1998, p. 10). This is some of the basic work that Mendel did during the late 1800s, not some new phenomenon created by academic elitists in our society (Koerner, 1997). We know that certain traits are definitely genetically inherited including hair color, handedness, and even sexual orientation (LeVay & Hammer, 1994).

The fourth proposition states, "environment or 'situation' has only a negligible effect on interpersonal behavior" (McCroskey, 1998, p. 10). We know for a fact that the situational forces are not very likely to impact a person's behavior. A person who is aggressive in one situation, is more than likely going to be aggressive across situations (Beatty & McCroskey, 1997; Valencic, Beatty, Rudd, Dobos, & Heisel, 1998). Additionally, Valencic et al.

(1998) found that an individual's verbal aggression was positively related to her or his temperament (extraversion, neuroticism, and psychoticism). The implications of these findings help researchers to realize that aggression is not just a function of one's environment. In other words, watching the World Wrestling Entertainment™ does not make children more aggressive. It does provide already aggressive children more anti-social forms that they may use to express their aggression, which is contrary to years of research on the subject completed by social learning theorists with almost negligible, but occasionally statistically significant, results (Beatty, McCroskey, & Valencic, 2001; Wrench, 2001).

The fifth, and last proposition states, "differences in interpersonal behavior are principally due to individual differences in neurobiological functioning" (McCroskey, 1998, p. 11). We act differently and respond differently in different situations because we are basically different neurobiologically. Now some would say that these differences are situationally controlled or socially taught, but when culturally determined anti-social behavior is seen repeatedly in a subject that was neither taught nor reinforced to behave in such a way, a neurobiological explanation is realistically all that is left.

Overall, these five propositions laid the ground work for what has become known as the "communibiological paradigm." One of the communication behaviors that the communibiological paradigm was used to explain was verbal aggression. Beatty and McCroskey (1997) set forth the premise that an individual's tendency to react in verbally aggressive manners is temperamentally determined. Verbal aggression has been commonly defined as message behavior that attacks another person's self-concept in order to deliver psychological pain (Infante & Wigley, 1986). Statements that purposefully are used to hurt another person are considered verbally aggressive. Previous research in the neurosciences has also noticed a biological foundation in physical aggression (Adams & Victor, 1993; LeVay, 1991, 1993, 1996; Marieb & Mallat, 1992; Panksepp, 1982, 1986). As noted by Richmond, Wrench, and Gorham (2001), physical aggression is a form of anti-social communication.

After examining the literature related to communibiology and aggression seen in previous research, the following hypothesis is warranted:

H1: Psychoticism and neuroticism will be positively related to verbal and physical aggression.

Sexual Brain Structures

As McCroskey and Beatty (2000) noted, the brain is a phenomenal instrument that definitely impacts the way that people relate to one another. The very front part of the brain is commonly referred to as the new brain or cerebral cortex. This part of the brain is about 1/8" thick and contains what most people would consider cognition (Marieb & Mallatt, 1992). It is in this part of the brain that neural synaptic connections are created during learning (Walls, 1999). As noted by McCroskey and Beatty (2000), "When we say that humans utilize 10 percent of the brain, we mean 10 percent of the cerebral cortex, which makes up about 40% of the brain's total mass" (p. 4). This means that 60% of the brain is either cortical tissue or exists to perform basic regulatory functions (Gray, 1991). In many ways, the brain is the last truly unexplored region to humans. While humans have conquered land, water, and space, our understandings of our own neural make-ups is just beginning.

While many functions of the brain impact human sexual behavior and even have been shown to be different between people of different sexual orientations, the present study predominantly focuses on the hypothalamus gland because it has been linked to aggression in humans (LeVay, 1993). The primary center for aggression has been seen in the amygdala, which is composed of two regions: corticomedial and basolateral. The basolateral region of the amygdala connects mainly with the medial preoptic area (MPA) of the hypothalamus (LeVay, 1993). Aggression has also been linked to the hypothalamus in the ventromedial nucleus (Gray, 1991). Overall, linking aggression to the hypothalamus gland has been done by a number of scholars (Adams & Victor, 1993; LeVay, 1991, 1993, 1996; Marieb & Mallat, 1992; Panksepp, 1982, 1986).

In addition to linking the hypothalamus to aggression, scholars have also noted that the hypothalamus gland is related to sexual behavior. First, and foremost, LeVay (1993) argues that there are male and female typical sex behaviors that are rooted in the hypothalamus gland. While LeVay does not discuss normal versus pathological sex acts when he talks about male and female "typical sex behaviors," he does believe that males and females generally play different sexual roles during copulation (e.g., males take the insertive role and the females take on the receptive role). Additionally, LeVay's assumption that sexual behavior is rooted in the hypothalamus gland does not mean that the feelings involved with sex stem from the hypothalamus gland, rather the hypothalamus plays a key role in triggering them in the cerebral cortex.

In past scientific research, three basic types of studies have been done to examine the effect that the hypothalamus plays in sexual behavior: ablation, stimulation, and experimentation. The first type of research,

ablation, is the deliberate destruction of small regions of the brain in order to determine what they did once they no longer exist. This line of research was originally done in rats, but eventually was applied on humans as a means to decrease pedophilia in adult males (LeVay, 1996). In rats, Dorner, Docke, and Hinz (1969) found that when a rat's hypothalamic gland was operated on, he could change a homosexual rat into a heterosexual rat.

The second type of research done in this area has been in neural stimulation. This research has been primarily conducted using rats and monkeys. In this line of study, Oomura, Aou, Koyama, and Yoshimatsu (1988) noticed that when electrical impulses were given to the preoptic and hypothalamic areas in macaque monkeys' brains, the monkeys would feign sexual intercourse without an actual orgasm. In essence, the hypothalamus triggered sexual impulses, but alone could not constitute actual sexual relations.

The third type of research, experimental, is most important to the study of human communication because it is the most ethical and most realistic form of research when dealing with humans. Most hypothalamic research involves examining postmortem cadavers' brains, taking slivers of the brain, mounting them on slides, and analyzing them under a high power microscope looking for differences. While magnetic resonance imaging (MRI) technology has allowed researchers to see which parts of the brain are functioning under different conditions, researchers are still unable to examine physical structures within a brain while humans are alive. However, these experimental tests have led to a further under-standing of the differences between male and female neurological structures.

The term "sexual dimorphism" refers to structural differences between men's and women's bodies (LeVay, 1993). If sexual dimorphism does exist in the brain, sexual dimorphism in the nuclei would be responsible for male-typical sexual behavior, which might bring us a step closer to understanding the biological component of homosexuality. The medial preoptic area (MPA), which lies toward the anterior end of the hypothalamus, is one nucleus responsible for producing male-typical sexual behavior (LeVay 1996). Research done using rats found that a region of the medial preoptic area seems to control sexual preference (Gorski, Gordon, Shryne, & Southan 1978). When slices from the MPA of both female and male rats were stained, it was found that this region was about eight times larger in males than in females (LeVay 1996). This region of the MPA was named the sexually dimorphic nucleus (SDN).

Gorski and Shryne (1984) showed that the size difference in the SDN between female and male rats was due to differences in androgen levels circulating in the blood of the rats during the critical period, which is around the period before birth. Further research found that when fetal female rats

are administered testosterone a few days before birth and shortly thereafter, the rats later show male-typical sexual behavior and their SDN size is similar to a wild-type male (Gorski & Shryne, 1984). Likewise, when males are given estrogen-receptor blockers in the critical period, they also fail to have a SDN of normal size. Their SDN is smaller than that of a normal male and shows a sexual preference towards males.

With the success of rat research, researchers have started looking for sexual dimorphism in human brains. If homosexuality reflects a sex-atypical process of brain development, then one might expect to find signs of this most readily in the sexually dimorphic structures (Hirshfeld, 1996). Allen and Gorski (1990, 1991) found that sexual dimorphism exists in the interstitial nucleus of the anterior hypothalamus (INAH). There are four such nuclei: INAH1, INAH2, INAH3, and INAH4. It was discovered that INAH2 and INAH3 are significantly larger in men than in women (Allen & Gorski, 1991). These results were corroborated by others and strengthened by the finding that at all ages the sizes for the INAH3 were different between the sexes. LeVay (1991) tested Allen and Gorski's (1990) data to see if the INAH3 sizes not only differed between the sexes, but also between humans with different sexual orientations. His hypothesis was that the size of INAH3 (and/or INAH2) would be correlated with sexual drive directed towards females; that is, it would be larger in heterosexual men and lesbian women and smaller in heterosexual women and gay men (LeVay 1996). He found that the INAH3 of homosexual males was two to three times smaller than that of heterosexual males. Instead, homosexual males' INAH3 was identical to that of heterosexual females' INAH3 region of the hypothalamus. According to LeVay (1993), this greatly strengthens the notion that the development of sexual orientation, at least in men, is closely tied to the prenatal sexual differentiation of the brain, which has also been seen in other animals.

After analyzing the communibiological literature and sexual brain structures, the following hypothesis can be posed:

H2: Heterosexual males will exhibit significantly higher scores on verbal and physical aggression when compared to heterosexual females, gay men, lesbian women, bisexual men, and bisexual women.

One possible limitation to LeVay's (1991) study was that the hypothalamus samples came from homosexual men who had died of AIDS, which may suggest that HIV played a role in creating the differences in INAH sizes. LeVay has not done any further testing to determine if HIV was the actual cause of the size differences between the brains. However, Byne (1995) found that HIV has no effect on the size of INAH3 or the other cell

groups nearby. Since HIV has no effect on the size of INAH3, then the expression of a homosexual phenotype may have a biological component that ultimately stems from a genetic basis.

Methods

Participants and Procedures

Participants in this study were a combination of students and members of the general public. Student participants were collected at a large mid-Atlantic University through basic communication courses (38.6%), and received extra credit for their participation. Members of the general public were also used in this study. Members of the general public were solicited using a variety of Internet sites and news groups catering to gay, lesbian, and bisexual individuals. This method yielded 331 (61.4%) participants. All participants filled out the questionnaire online. Additionally, using the Internet for data collection was found to be a reliable and valid method for achieving participation from the general public (Dillman, 2000; Wrench & Booth-Butterfield, 2001). The overall sample consisted of 539 participants, 316 (59%) males, 208 (39%) females, and 15 (3%) who did not respond. The mean age for the two collection methods were 34.45 (general public) and 19.79 (students). The mean age for the overall sample was 28.79.

Since this study was examining the impact that an individual's sexual orientation has on verbal and physical aggression, accurately assessing someone's sexual orientation became a key issue. This study used two different measurement techniques. First, a revised version of Kinsey, Pomeroy, and Martin's (1948) scale for measuring sexual orientation, the Kinsey Scale, employed by Hammer, Hu, Magnuson, Hu, and Pattatucci (1993) was used in this study to achieve a global rating for sexual orientation. These scores were then compared to a nominal measure that asked participants to indicate whether they were heterosexual, homosexual, or bisexual.[1] Using this method, it was found that there were 230 (42.7%) gay/lesbian participants, 38 (7.1%) bisexual participants, and 238 (44.2%) heterosexual participants, with 33 (6.1%) not responding to the question. Further break down by sex, indicated that there were 159 gay men and 68 lesbian women, 12 bisexual men and 26 bisexual women, and 130 straight men and 106 straight women.

Measures

Verbal Aggressiveness Scale. The Verbal Aggressiveness Scale was created by Infante and Wigley (1986) as a way to measure trait verbal

aggression. The Verbal Aggressiveness Scale contains twenty, five-point Likert-type scale items ranging from "almost never true" to "almost always true." The Verbal Aggressiveness Scale had an alpha reliability of .87 (M = 47.10 , SD = 11.16), which is consistent with previous results.

Physical Aggression Scale. The Physical Aggression Scale (PAS) is a scale that was created by the author of this study to measure an individual's tendency to use anti-social and physical aggressiveness as a means to intimidate and possibly inflict harm on other people during communicative interactions (Richmond, Wrench, & Gorham, 2001). Gurrero, Andersen, Jorgensen, Spitzberg, and Eloy (1995) created a three-item scale to measure violent communication/threats. After examining the Jorgensen et al.'s (1995) and Infante and Wigley's (1986) scale for verbal aggressiveness, the similarities were consistent enough that a more thorough construct designed to measure physical aggressiveness based on Infante and Wigley's scale was warranted. Initially, participants were given twenty, Likert-type items ranging from "strongly disagree" to "strongly agree." At the conclusion of the study, the items were factor analyzed using a maximum likelihood extraction method. A Kaiser-Meyer-Olkin Measure of Sampling Adequacy demon-strated that the data set was useful for performing factor analytic techniques, MSA = .93. While one strong factor was noted, two secondary factors were also noted through a Scree plot analysis. A chi-square analysis demonstrated the goodness-of-fit of the three factor model, X^2 (df = 133) = 472.89 , $p < .0001$. For this reason, a forced Varimax rotation was conducted and three factors were noted: object violence, physical confrontation, and control/task aggression (loadings and eigenvalues can be seen in Table 1).

Object violence is the tendency for an individual to use physical aggression towards inanimate objects. While this may not directly harm an individual, this is considered physical aggression because it is still a method for invoking fear in another person. This factor consists of five items that had an alpha reliability level of .87 (M = 9.8 , SD = 4.75). The physical confrontation factor is the factor that most people think of when they consider physical aggression. This is the tendency for an individual to get into physical confrontations with other individuals. This factor consists of five items that had an alpha reliability level of .83 (M = 10.96, SD = 4.65). The final factor in the physical aggression scale is the control/task aggression factor. Control/task aggression is the tendency for one person to resort to physical aggressiveness as a way to win arguments, gain compliance, or accomplish specific goals. This factor consists of five items that had an alpha reliability level of .85 (M = 7.31 , SD = 3.07). The overall Physical Aggression Scale consists of fifteen Likert-Type items and has an alpha reliability of .91 when treated as a uni-dimensional scale (M = 29.15 , SD = 10.39).

Table 1

Factor Analysis of the Physical Aggression Scale

Item	Object Violence	Physical Confrontation	Control/ Task
1. I am extremely careful to avoid physically attacking another individual.	.17	.30	**.51**
2. When I get upset, I have a tendency to throw objects.	**.63***	.25	.21
3. I have physically confronted someone that I disagreed with.	.25	**.69**	.26
4. When I get angry, I tend to hit inanimate objects.	**.89**	.18	.14
5. I have been known to physically "fly off the handle."	.55	.41	.25
6. I try not to hit people even if I don't like them.	.01	.13	.35
7. I would never use physical violence to solve a problem.	.24	**.57**	.42
8. When I get mad, I tend to hit things.	**.83**	.23	.30
9. I have physically confronted someone.	.23	**.75**	.25
10. I use physical violence as a way to control others.	.27	.31	**.77**
11. I avoid physical violence at all costs.	.12	.50	.29
12. I get respect by physically intimidating others.	.18	.27	**.59**
13. I would never be involved in a physical confrontation.	.17	**.67**	.20
14. I have broken inanimate objects during a fit of rage.	**.58**	.35	.11
15. I tend to flee from physical confrontations.	.20	**.60**	.16
16. I always slam doors as a sign of anger.	.45	.01	.17
17. When losing an argument, I always resort to physical violence.	.31	.21	**.67**
18. Physical violence is never necessary.	.20	.44	.21
19. I hit walls as a means of dealing with my anger.	**.77**	.21	.23
20. Physically hurting others helps me accomplish my goals.	.23	.21	**.82**

*Bolded items were retained to represent the three factors. Five items were retained on each factor.

Temperament Measures. Eysenck, Eysenck's, and Barret's (1985) twelve-item measure of psychoticism (M = 27.09, SD = 5.49) was embedded within a general questionnaire consisting of Eysenck's (1998) ten-item measures of extraversion (M = 34.59, SD = 6.29) and neuroticism (M = 28.70 SD = 7.13). The means and standard deviations found in this study are similar to previous studies conducted using this measure (Beatty, Valencic, Rudd, & Dobos, 2000). Alpha reliabilities were conducted for the three measures: extraversion .78, neuroticism .83, and psychoticism .62. While these reliabilities are low, these measures have been consistently shown to have predictive validity of biological phenomena (Eysenck, 1998).

Results

The first hypothesis proposed that there would be significant relationships of neuroticism and psychoticism with both verbal and physical aggression. Significant Pearson product-moment correlations between neuroticism scores and aggression scores supported this part of the hypothesis: verbal aggression ($r = .23$, $p < .0001$) and physical aggression ($r = .22$, $p < .0001$). Additionally, neuroticism was associated with all three factors of physical aggression: object ($r = .30$, $p < .0001$), confrontational ($r = .12$, $p < .0001$), and task/control ($r = .13$, $p < .004$). The second half of this hypothesis predicted that psychoticism and aggression would be significantly related. A significant Pearson product-moment correlation between psychoticism scores and aggression scores supported this part of the hypothesis: verbal aggression ($r = .30$, $p < .0001$) and physical aggression ($r = .32$, $p < .0001$). Additionally, psychoticism was associated with all three factors of physical aggression: object ($r = .29$, $p < .0001$), confrontational ($r = .26$, $p < .0001$), and task/control ($r = .26$, $p < .0001$).

To analyze this relationship farther, multiple regressions were conducted to evaluate the prediction of verbal and physical aggression from temperament (extraversion, neuroticism, and psychoticism). The linear combination of temperament was significantly related to the level of verbal aggression, F (3, 528) = 22.23, $p < .0001$. The sample multiple correlation coefficient was .34, which indicates that approximately 34% ^{2} of the variance in verbal aggression in the sample can be accounted for by the linear combination of neuroticism and psychoticism: neuroticism, t (531) = 4.96, $p < .0001$, and psychoticism, t (531) = 5.61 , $p < .0001$. Additionally, the linear combination of temperament was significantly related to the level of physical aggression, F (3, 526) = 29.15, $p < .0001$. The sample multiple correlation coefficient (r) was .38, which indicates that approximately 38% of the variance in physical aggression in the sample can be accounted for by

the linear combination of neuroticism and psychoticism: neuroticism, t (529) = 5.13, $p < .0001$, and psychoticism, t (529) = 7.41, $p < .0001$.

The second hypothesis predicted that there would be significant differences between heterosexual males and heterosexual females, gay men, lesbian women, bisexual men, and bisexual women in reference to verbal and physical aggression. To test this hypothesis, separate one-way Analyses of Variances (ANOVAs) were calculated for verbal and physical aggression. The Levene Test for homogeneity of variances was not significant for verbal aggression, which indicates that the variance differences in the cells would not affect Type One error. A significant difference was noted among the various populations, F (5, 495) = 13.18, $p < .0001$. Post Hoc analysis for this hypothesis can be seen in Table 2.

The second half of this hypothesis examined physical aggression. The Levene Test for homogeneity of variances was significant for physical aggression and all three sub factors. As a way to make sure that this variance difference would not yield higher levels of Type One error, a Kruskal-Wallis test was conducted on the sexual orientation categories and physical aggression and its three sub factors. The test, which corrected for tied ranks, was significant for the overall physical aggression construct, x^2 (5, N = 500) = 122.59 , $p < .0001$, and each of the three sub factors: object, x^2 (5, N = 500) = 74.90 , $p < .0001$; confrontation, x^2 (5, N = 500) = 105.61 , $p < .0001$; and task/control, x^2 (5, N = 500) = 95.173 , $p < .0001$. Overall, the Kruskal Wallis test in this case indicates that the varying number of participants in each cell does not produce an increased probability of Type I error. Further, using a traditional one-way ANOVA is still useful, but a more conservative Dunnett's C Post-Hoc test was

Table 2
Differences among Groups on Verbal Aggression

Sexual Orientation	Mean	SD	HM	HF	GM	LF	BM
Hetero Male	52.41	10.70					
Hetero Female	48.52	10.76	*				
Gay Male	44.90	10.10	*	—			
Lesbian Female	41.66	10.36	*	*	—		
Bi-Male	49.33	10.31	—	—	—	—	
Bi-Female	43.27	8.70	*	—	—	—	—

Note. An asterisk indicates a significant difference employing Dunnett's C.

employed to provide increased protection from Type One error. Significant differences were seen between the sexual orientation categories and physical aggression, F (5, 494) = 39.19 , p < .0001. Post Hoc analysis for this question can be seen in Table 3. Additionally, significant differences were seen between the sexual orientation categories and the physical aggression sub-factors: object, F (5, 494) = 19.34, p < .0001; confrontation, F (5, 494) = 30.27, p < .0001; and task/control, F (5, 494) = 27.90, p < .0001. The Post Hoc analyses for object (Table 4), confrontation (Table 5), and task/control (Table 6) provide further information on the significant differences noted in this study. Overall, the second hypothesis was supported.

Table 3
Differences among Groups on Physical Aggression

Sexual Orientation	Mean	SD	HM	HF	GM	LF	BM
Hetero Male	36.85	10.75					
Hetero Female	26.28	8.90	*				
Gay Male	23.09	8.07	*	*			
Lesbian Female	23.63	7.90	*	—	—		
Bi-Male	25.67	7.25	*	—	—	—	
Bi-Female	26.08	7.07	*	—	—	—	—

Note. An asterisk indicates a significant difference employing Dunnett's C.

Table 4
Differences among Groups on Object Aggression

Sexual Orientation	Mean	SD	HM	HF	GM	LF	BM
Hetero Male	12.83	5.19					
Hetero Female	8.78	3.99	*				
Gay Male	8.16	4.18	*	—			
Lesbian Female	8.46	1.92	*	—	—		
Bi-Male	6.33	1.78	—	—	—	—	
Bi-Female	6.23	6.23	*	—	—	—	—

Note. An asterisk indicates a significant difference employing Dunnett's C.

Table 5
Differences among Groups on Confrontational Aggression

Sexual Orientation	Mean	SD	HM	HF	GM	LF	BM
Hetero Male	14.38	4.73					
Hetero Female	10.51	4.35	*				
Gay Male	8.70	3.70	*	*			
Lesbian Female	9.07	3.50	*	—	—		
Bi-Male	10.17	3.97	*	—	—	—	
Bi-Female	10.15	3.81	*	—	—	—	—

Note. An asterisk indicates a significant difference employing Dunnett's C.

Table 6
Differences among Groups on Task/Control Aggression

Sexual Orientation	Mean	SD	HM	HF	GM	LF	BM
Hetero Male	9.65	3.81					
Hetero Female	6.99	2.47	*				
Gay Male	6.23	4.18	*	—			
Lesbian Female	6.09	1.92	*	—	—		
Bi-Male	6.33	1.77	*	—	—	—	
Bi-Female	6.23	2.32	*	—	—	—	—

Note. An asterisk indicates a significant difference employing Dunnett's C.

Discussion

The initial assumptions for this study stemmed out of research that had been conducted in areas beyond traditional communication research in the physical sciences. While a neurological, physiological, or genetic conceptualization of sexual orientation is not a new concept for researchers in gay, lesbian, and bisexual studies, examining human communication through this filter had yet to be completed. While the ethical nature of this line of research is widely debated, the overwhelming amount of scientific studies supporting the position of the origin of sexual orientation is mounting (Hammer & Copeland, 1994, 1998; Hammer et al, 1993; LeVay, 1991, 1993, 1996; LeVay & Hammer, 1994). The goal of this study was to examine the possibility of a biological basis for differences seen between gay men and heterosexual men in relation to verbal and

physical aggression stemming from the research on hypothalamic differences by Simon LeVay (1991).

This study stemmed from research conducted by LeVay (1991). He was the first researcher to notice neurophysiological differences in brain structures between heterosexual males and homosexual males in the interstitial nucleus of the anterior hypothalamus three (INAH3) region of the brain. This study hypothesized correctly that a significant difference would be found in reported physical and verbal aggression between straight males and straight females, gay men, lesbian women, bisexual males, and bisexual females. Except for the non-significant differences between heterosexual males and bisexual males on verbal aggression and object aggression, heterosexual males are clearly more verbally and physically aggressive. In LeVay's (1991) study, he examined post mortem cadavers that were clearly identified as heterosexual females and males and gays and lesbians, bisexuals were not part of his original study, so the hypotheses in this study predicted that bisexuals would resemble gay and lesbians more so than they would heterosexuals. It is possible that this lack of significance between heterosexual males and bisexual males could be the result of either biological makeup or cultural influence.

A second significant difference between heterosexual females and gay men on confrontational physical aggression was not expected. While the underpinnings of this problem could be biological in orientation, the similarity in hypothalamic structure seen between gay men and heterosexual females would lead one to think otherwise. Instead, this could definitely be a cultural function of confrontational physical aggression. Like Beatty, McCroskey, and Valencic (2001) hypothesized, behavior is impacted by culture and by biology. And while a great deal of confrontational physical aggression is accounted for by temperament, you cannot separate the temperament of an individual from her or his culture. For this reason, the slight variation on this one factor of physical aggression could be statistically possible. Further analysis of this phenomenon should be conducted.

Overall, these minor differences on the various aspects of aggression do not take away from the overarching finding in this study. In this study, heterosexual males were clearly more verbally and physically aggressive than heterosexual females, gay men, lesbian women, bisexual males, and bisexual females. These findings are strong indicants of biological roots in some aspects of human communication. Also, both verbal and physical aggression were found to be positively related to Eysenck's (1998) and Eysenck, Eysenck, and Barrett's (1985) temperamental components of neuroticism and psychoticism, which is consistent with earlier findings related to temperament and verbal aggression (Valencic, Beatty, Rudd, & Heisel,

1998). Clearly, further research should be conducted on sexual dimorphism in human communication.

Conclusions

Overall, this article provides a new perspective for how communication scholars can use information gained from the natural sciences to understand a variety of facets of human communication. While this study has a clear biological basis for the variables examined, this article proposes that other communicative traits (e.g., nonverbal immediacy, communication competence, conflict management styles, etc...) may also be impacted by an individual's sexual orientation, which should be researched.

This article supplies more evidence of the innate genetic and biological foundations of sexual orientation and human communication. Additionally, this article demonstrates that while cultures are generally examined through learning theory models, many cultural attributes may have genetic bases. While many people will cry foul and attempt to use this research in ways that it is not intended to be used, the following guidelines should be used when analyzing this form of research. First and foremost, look at the results found in this study. Clearly, heterosexual men are the only aberrant group when examining both physical and verbal aggression. And while the biological link to aggression is fairly rooted in the physical sciences, accepting this knowledge has not been easy for researchers in the social sciences. As researchers we should not be trying to discard the work done in the physical sciences, but attempting to see how we can integrate our scientific efforts to get a more complete and holistic understand of human communication. Second, biological determinism is not an innately bad concept. We are all born with factors of our temperament and physical structure that we cannot control. As a society, we will not truly learn tolerance until we have the ability to go beyond our prejudices and examine what is and what is not reality. Lastly, scientists on both sides of the academic fence (social and physical) need to keep doing the research that matters to humans. Overall, the nature of human communication research is definitely seeing the paradigmatic shift that McCroskey and Beatty (1998) suggested would be coming.

Footnotes

1. To test this nominal measure of sexual orientation, a one-way ANOVA was conducted examining the scores generated on the Kinsey scale in relation to the nominal sexual orientation measure (gay, straight, and bi-sexual), $F = 1638$, $p < .0001$. While there were significant differences noted, the Levene Statistic demonstrated that there was a significant

difference between the variances. As a way to make sure that this variance difference will not yield higher levels of Type One error, a Kruskal-Wallis test was conducted to evaluate the three sexual-orientation dimensions on median change in the scores found on the Kinsey Scale. The test, which corrected for tied ranks, was significant x^2 (2, N = 499) = 402.44 , p < .0001. In essence, the variance difference noted by the Levene Statistic due to condition size differences will not lead to an increased possibility of Type One error in this study. Overall, this analysis demonstrated that individuals who indicate that they are homosexual have higher scores on the Kinsey Scale (0 being completely heterosexual and 6 being completely homosexual) than those people who label themselves as bisexual, who have higher scores on the Kinsey Scale than those people who label themselves as heterosexual.

2. It is important to recognize these simple and multiple correlations are the appropriate estimates of variance accounted for in this study – not the square of the correlations as is the case in most research reported in the communication discipline. The correlation coefficient is the appropriate estimate of shared variance when that correlation is due to a latent variable (Jenson, 1980; Ozer, 1985; Tryon, 1929). In the present study, both the temperamental super traits and the communication traits are presumed to be produced by the latent cause of neurological structures. As Ozer (1985) explains, "Most trait models suggest that some latent variable underlies scores on both measures; and that the latent variable is responsible for the covariance between the measured variables... This is not determination of one variable by another, but determination of measured variables by a latent variable" (p. 312).

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