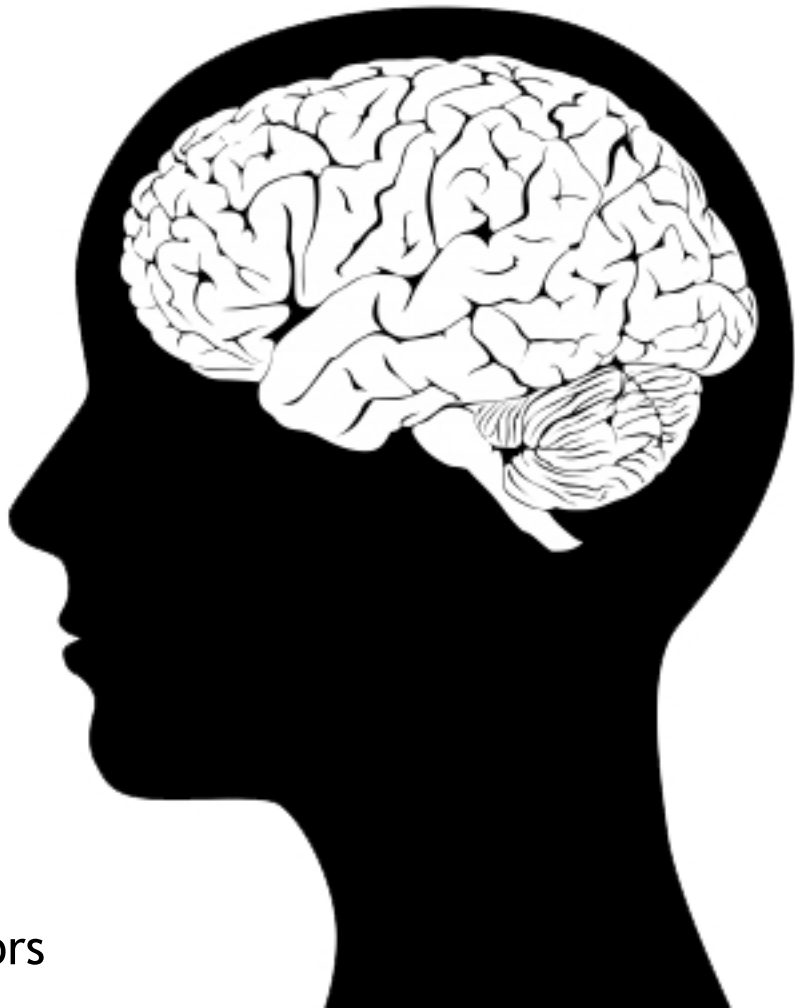
Feminism | Sexuality | Neuroethics

Emerging Undergraduate Scholarship



Cyd Cipolla and Kristina Gupta, Editors

Feminism, Sexuality, and Neuroethics: Emerging Undergraduate Scholarship

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Foreword

Dear Reader,

It is with great pleasure and pride that we share this sampling of undergraduate scholarship in neuroethics from Emory University. The collection of essays that follows was produced by students registered in the course *Feminism, Sexuality and Neuroethics* in the spring of 2012. The course was proposed, designed, and taught by graduate students Cyd Cipolla and Kristina Gupta as part of the Neuroethics Scholars Program. Their project – to develop and teach a one semester course on Feminism, Sexuality and Neuroethics – was selected as one of the two proposals to receive funding in the inaugural year of the Neuroethics Scholars Program. Cyd and Kristina, both talented doctoral candidates in the Women's, Gender, and Sexuality Studies program at Emory, received the competitive fellowship to develop and teach the course they envisioned as an interdisciplinary exercise in collaborative pedagogy.

Born out of the tremendous desire to create a space for discourse and reflection on the ethical impact of rapidly advancing neuroscientific endeavors, the Neuroethics Program at Emory University was formally established by the Center for Ethics in July 2011. In its short existence, the Emory Neuroethics Program has already gained a strong reputation both locally and internationally as a resource in social, legal, ethical and policy implications of neuroscience.

The Neuroethics Scholars Program Fellowship, sponsored by the Center for Ethics and funded by the Emory Neuroscience initiative, selects one to two graduate projects in neuroethics annually. The fellowship program was established to create and encourage an atmosphere that is receptive to the growing interest in topics at the intersection of neuroscience, ethics and society. Unfortunately, graduate students passionate about neuroethics have been generally unable to find resources to support the development of their interests. The Neuroethics Scholars Program is Emory's effort to address that challenge. The purpose of the fellowship is to facilitate the engagement of graduate students in the Emory community and beyond with neuroethics. The projects of our fellows span different foci of interest, including original empirically based neuroethics research projects, curriculum development and teaching of neuroethics content, and creation of new media to increase public awareness of neuroethical issues.

The essays you are about to read represent more than a year's effort for the graduate student teacher-scholars, a semester's cumulative effort for the student-authors and in many ways mirror the diversity of the field of Neuroethics, which itself enjoys contributions and influences from scholars with diverse academic backgrounds including, but not limited to neuroscience, law, philosophy, social science, and engineering.

Congratulations to Cyd and Kristina, who employed an interdisciplinary approach to foster ethically thoughtful and responsible scholarship by undergraduates on neuroethics. As graduate students teaching undergraduates, this small seminar setting provided successful near-peer mentorship that allowed their students to demonstrate cultivation of neuroethical considerations for understanding and dealing with our constantly evolving interpretations of the human condition and spirit.

While we can't begin to convey the exciting deliberations, thoughtful responses, and impact of this course on both students and instructors, it is our hope that this collection of student essays will showcase some of the sophistication and creativity expressed by students given the opportunity to engage on these topics in a formal setting.

We expect that as the Neuroethics Scholars Program continues to grow and evolve, the legacy created by Cyd Cipolla, Kristina Gupta and their students, so apparent in this publication, will be recognized and adopted by scholars and educators in the humanities and the sciences as evidence of the impact of a novel and successful approach to integrating disciplines over a common theme.

Sincerely,

Gillian Hue, PhD
Neuroethics Program Associate

Karen S. Rommelfanger, PhD
Neuroethics Program Director

Paul Root Wolpe, PhD
Center for Ethics Director

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Introduction

In the Fall of 2011, we were selected through a competitive process to be the inaugural Neuroethics Scholars Program Fellows with the Neuroethics Program at the Emory Center for Ethics. As humanities scholars who engage with scientific information on a regular basis, we were interested in teaching a course that would bring science and humanities students into the same conversation. Unfortunately, students in the sciences and in the humanities are too often isolated in their disciplines. We believe a truly interdisciplinary education provides students a well-rounded academic experience as well as an opportunity to contribute to society as informed public intellectuals. Neuroethics, an emerging field that examines the interactions between neuroscience, society and ethics, offers an opportunity to create spaces for rich interdisciplinary engagement and for thoughtful analyses of the issues surrounding neuroscientific research on gender and sexuality. With support from this fellowship we were able to develop and teach an undergraduate course at Emory titled "Feminism, Sexuality, and Neuroethics" in the Spring of 2012. This popular, interdisciplinary course was housed in the departments of Women's, Gender, and Sexuality Studies (WGSS) and Neuroscience and Behavioral Biology (NBB) and drew an equal number of talented and enthusiastic students from each department.

We designed the course to serve as an introduction to the vibrant field of Neuroethics through critically examining historical and contemporary scientific research on sexuality and the brain. Through this fellowship we had an opportunity to create a unique course model that combined the theoretical concepts from feminist science studies with those from Neuroethics. Students were able to engage in active, spirited dialogue and critique while exploring how neuroscientific research is shaped by cultural assumptions about gender and sexuality. By the end of the course, students acquired the skills to analyze the ethical, social, political, and legal implications of this area of neuroscience research.

We were able to draw on our expertise as interdisciplinary scholars in Women's, Gender, and Sexuality Studies while designing and teaching the course. We both examine issues related to scientific research and sexuality. Cyd studies psychiatric and scientific representations of sex offenders as part of her broader scholarship on sex crimes and sexual identity. She has always been interested in science, and came to her current project largely out of a fascination with the way scientific knowledge can become distorted when translated between disciplines, when under criticism, or when being broadcast to wider audiences. This is particularly true with studies of criminal and sexual behavior. Kristina explores medical and scientific understandings of sexual desire and sexual desire disorders as part of her broader research on compulsory sexuality and asexuality. She has a particular interest in the ethics involved in medicalizing aspects of sexuality. Although her work has always engaged with scientific knowledge of sexuality in one way or another, she has made "neuroliteracy" a particular focus of her academic training at Emory, pursuing a Graduate Certificate in Mind, Brain, and Culture.

Our distinct academic training gave us the ability to translate the scientific research in the course in a manner that was accessible and interesting to students in both the sciences and the humanities. In addition, the fact that we taught the course together not only gave our students the opportunity to benefit from the insights we each brought to the course from our particular areas of expertise but also allowed our students to witness academic collaboration in action. Teaching the course was also enormously beneficial for us. As humanities scholars, we were not "experts" on neuroscience technologies or the procedures involved in working in a laboratory setting, but we were able to rely on some of the neuroscience students in the class to serve as resident experts

for us. Thus, we increased our own knowledge about the scientific material not only in researching materials to build our course, but also while interacting with students as fellow resources of expertise in a truly collaborative learning process.

Our primary objective was to give our students the skills and knowledge necessary to become responsible consumers and/or producers of neuroscientific knowledge. We wanted students from the humanities to be able to understand and engage with the scientific studies and we wanted students from the sciences to be able to understand and engage with theoretical scholarship from Women's Studies and Neuroethics, thus we devoted the beginning weeks of the course to introducing concepts from neuroscience, feminist science studies, and Neuroethics. Students in our course also worked to develop the skills required to analyze the assumptions informing neuroscience research and the ethical implications of neuroscience research, and to develop an understanding of how neuroscientific research is conveyed to the public through a variety of mediums. Throughout the course, we were impressed by the level of fruitful engagement among the students and the respectful interactions between students from different disciplines. The WGSS students were able to apply some of the theoretical tools they had developed in other courses to very specific cases. The NBB students had the opportunity to ask questions about the assumptions informing research and the social implications of research, an opportunity that is not always available in their science courses. In their evaluations of the course, both WGSS and NBB students mentioned that the course gave them the opportunity to think about issues in a way they had not before, which we consider to be one mark of a successful learning experience.

The class itself was divided into units, each focusing on a different area within the field of scientific research on sexuality and the brain. Students read the relevant scientific study or studies on the topic alongside reports about the study in mainstream news media outlets, and then followed this by reading analyses and critiques of the work from both inside and outside the scientific community. Topics included: sex addiction, gender differences in sexuality, sexual orientation, sexual offenders, and monogamy, among others (see Appendix, p. A1). For the midterm project, we asked students to complete an experience-based-learning group project. Each group of students was given a description of the methods and results of a study investigating some aspect of sexuality and the brain. As a group, they were responsible for "writing up" their study in the style of a scientific article and presenting their study to the class. In addition, each group was responsible for writing two popular press articles based on the presentations given by the other groups, one in the style of Cosmo and one in the style of NPR. This project allowed students to consider issues such as: how do scientists make meaning out of scientific data? What ethical responsibilities do scientists have in communicating their results to the media? What constraints do members of the media face in communicating scientific findings to specific segments of the general public?

At the end of the course, the students were asked to develop an idea from the class discussions into a research paper, an argumentative paper, or a research proposal. This final project gave students the opportunity to undertake a more sustained investigation of a topic of interest to them. We have selected the most outstanding essays among the final projects submitted and present them in this booklet. It is our hope that seeing examples of the type of neuroethics work undergraduates can produce will encourage more instructors to develop courses like this in the future.

Dohyun Ahn is a rising junior, majoring in Women's, Gender, and Sexuality Studies and Classics. His paper, *Queerneuroethics: What Neuroscience Can Learn from Queer and Feminist Theory*, uses themes from queer and feminist theory to examine the ethics around neuroscientific

studies of human sexuality. He argues that any study of human subjects which ultimately parses humankind into discrete groups must proceed with caution, and uses the concept of "intelligibility" to suggest a framework for queer forms of neuroethics.

The second paper was written by Eliza McDuffie, who is a rising senior majoring in Women's, Gender, and Sexuality Studies and Italian. Titled *Disenchanted by the "Love Drug": The Negative Potentiality of a Monogamy Drug*, this paper examines the ethical implications of developing drugs which use neurochemical research to target the brain systems involved in love and attachment.

The third paper, written by rising junior and Neuroscience and Behavioral Biology major Stepheni Uh, is a research proposal for a project studying the biological linkage of the mirror neuron system and psychopathic behaviors in adolescent males. In the proposal, Stepheni also undertakes a substantive analysis of some of the ethical implications of her proposed study. While the existence of the mirror neuron system is disputed, designing a proposal to investigate this system allowed Stepheni to both think about the elements that must be incorporated in designing a research study while also reflecting on the ethical questions involved in proposing controversial research.

Emily White is a rising senior majoring in Interdisciplinary Studies, with a focus in Bioethics. Her paper, *Impulse Control Disorders and Criminal Responsibility: A Neuroscientific Insanity Defense*, examines recent developments in the field of neurolaw and neuroscientific studies of impulse control. She argues that these new advances require a re-examination of the guidelines governing the use of the "not guilty by reason of insanity" defense in the United States, ultimately arguing that defendants who have a neurological impulse control disorder should qualify for such a not-guilty plea.

Although a small sample of the fantastic work we saw in our class, these papers demonstrate the depth and breadth of academic engagement undergraduates of differing disciplinary backgrounds bring to the field of Neuroethics. We strongly encourage other educators whose work falls at the intersection of neuroscience, society, and ethics to explore creating neuroethics coursework. We invite current and future educators to utilize this course as a model to design courses that bridge the sciences and the humanities.

Sincerely,

Cyd Cipolla
Kristina Gupta

Doctoral Candidates, Department of Women's, Gender, and Sexuality Studies
Neuroethics Fellows, Neuroethics Program, Emory Center for Ethics
Emory University
July 2012

QueerNeuroethics:
What Neuroscience Can Learn from Queer and Feminist Theory

Dohyun Ahn, Women's, Gender, and Sexuality Studies and Classics, Emory University

Neuroscience research on gender and sexuality has implications for society that may be detrimental. Historically, scientific studies have been used to reinforce social inequalities. Though this may not happen anymore, modern research on the complex subjects of human sexualities and genders must be careful. Queer and feminist theories and social justice movements can provide guidelines and considerations for neuroscientists working in that field. Foucault's theory on human sciences and Butler's theory of gendered intelligibility provide a basis for my critique of scientific studies of genders and sexualities. I analyze and critique historical and modern studies, as well as the widely used language and assumptions within these fields. Incorporating the feminist and queer critiques of Alice Dreger and Peggy DesAutels, I also analyze the impact of this scientific research on society. Finally, I suggest how we all can strive to make the world more just, not just as scientists but also as readers and interpreters.

Self-knowledge is often seen as the ultimate goal of learning and wisdom. To achieve that goal, many scientists research humans as their primary object of study. Human sciences attempt to create and name categories of people, and fit people into those categories. Studies of humans as objects of knowledge should be carefully analyzed. These studies can objectify people, reducing them to categories rather than respecting their lived experiences. Science can divide and limit our very conception of humanness. It can even limit the intelligibility of people through the creation of scientific truth. Some people may become unintelligible because of a newly established scientific norm that they do not perfectly fit.

In this paper, I argue that contemporary neuroscience research on human sexuality and gender has significant power to render some people unintelligible. Using insights from queer theory, I argue that neuroscience studies of sexuality and gender can establish norms, dichotomies and boundaries around these very complex human experiences. In turn, the norms established by neuroscience can become the lens through which people understand themselves and others. I argue that, by critiquing and challenging neuroscience to be more ethical and to fully consider its impact on the lived experiences of real people, queer theory can push neuroscience to operate more justly.

I begin by briefly explaining work within queer theory that is relevant to understanding contemporary neuroscience research on sexuality and gender, specifically Michel Foucault's theory of the human sciences and Judith Butler's theory of gendered intelligibility. Within this section, I examine how neuroscience fits the mold of the Foucauldian human sciences, and how it limits intelligibility. Then, I use the theoretical tools offered by Foucault and Butler to analyze and critique studies within the biological sciences, beginning with two historical examples and turning to contemporary neuroscience research on sexual orientation, to show how biological sciences, and particularly neuroscience, have created a "natural truth," which expels all those who do not fit from the realm of the intelligible. I conclude by suggesting how neuroscience research can adapt in order to contribute to the creation of a more just and humane society.

The Human:
What We Understand About It

Neuroscience has recently become the dominant human science, surpassing psychology. In his book *The Order of Things*, Foucault (1973) lays out the history and foundations of what he calls "the human sciences." These sciences include

the overarching fields of biology, economics, and philology. According to Foucault, the study of humans as an object of knowledge "did not inherit a certain domain" (p. 344). In fact, he argues, "man did not exist (any more than life, or language, or labour)" (p. 344). Humans did not exist as a coherent concept before the development of these human sciences. People simply lived and did not theorize and study themselves as beings to be known. Rather, scientific study of humans only arose in the 19th century:

> Occasioned by a problem, a requirement, an obstacle of a theoretical or practical order: the new norms imposed by industrial society upon individuals were certainly necessary before psychology, slowly, in the course of the nineteenth century, could constitute itself as a science. (p. 345)

Foucault goes on to argue that "the 'human sciences' are dangerous intermediaries in the space of knowledge. The truth of the matter is, however, that this very posture dooms them to an essential instability" (p. 348). The human sciences can never have the universality they claim. Objectivity can never be fully achieved. They see themselves as they wish to be, not as they "truly" are. They create divergent categories that often marginalize. I argue that human sciences cannot achieve their goals continuing in the way they are.

Foucault distinguishes three different categories of human sciences: biology, economics, and philology. He argues that psychology is the paradigm of the human sciences, but I argue that, in our current time, neuroscience is the primary human science. Neuroscience belongs under biology. Biological human science is "the 'psychological region' [that] has found its locus in that place where the living being, in the extension of its functions, in its neuro-motor blueprints [...] opens itself to the possibility of representation" (p. 355). The human is, in its biological function, conceived in its parts, understood both by individual parts and by their relations. Neuroscience does this with the brain and neural connections, delineating parts, studying how different parts affect each other, and how these connections affect the whole. It treats the human as an object controlled by connecting neurons firing in the brain. I admit that not all neuroscientists see the human this way, but I argue that media and society interprets research in such a way. Results by themselves are merely numbers and letters. But when they are interpreted and reinterpreted by popular media, they can change the very way people perceive themselves. Even the popular perception of neuroscience affects how people think of themselves.

Of biological science, Foucault (1973) goes on to write:

> It is upon the projected surface of biology that man appears as a being possessing *functions* – receiving stimuli (physiological ones, but also social, interhuman, and cultural ones), reacting to them, adapting himself, evolving, submitting to the demands of an environment, coming to terms with the modifications it imposes, seeking to erase imbalances, acting in accordance with regularities, having, in short, conditions of existence and the possibility of finding average *norms* of adjustment which permit him to perform his functions. (p. 357 – author's emphasis)

Neuroscience determines the functions of the structures it delineates in the brain, studying how the brain receives information from both the outside world and the body, how it processes such stimuli, how neurons behave in response, and finally, how those neurons affect the body. In observing many brains with these functions, neuroscience creates a statistical norm, which becomes accepted as "natural." In this way, neuroscience creates, with an almost frightening efficiency, norms of human existence.

By creating norms and dichotomous categories of the human experience, neuroscience bounds intelligibility. An ancient philosophical concept about what the mind can comprehend, intelligibility is examined by Judith Butler (2006) in her article "Doing Justice to Someone." Butler argues that people must have an intelligible gender to be comprehended as a human and receive the dignity and love all deserve. The social impact of neuroscience can create this gendered intelligibility. Closely tied to the Foucauldian biological human sciences and its objectifying effects, neuroscience and its popular understanding can often create limits on human intelligibility by creating narrow lenses through which to understand ourselves. Science makes lenses through which we conceive the world. Especially with the status given to science by the

public as an infallible source of knowledge, theories often become natural truths. People are forced to fit these truths, or otherwise risk unintelligibility. On this power to create truth even on the body itself, Butler argues:

> This body becomes a point of reference for a narrative that is not about this body but seizes on the body, as it were, to inaugurate a narrative that interrogates the limits of the conceivably human. What is inconceivable is conceived again and again, through narrative means, but something remains outside the narrative, a resistant moment that signals a persisting inconceivability. (p. 187)

The interpretation and dissemination of such research on the human body and material-based explanations of human experience create narratives on bodies or brains that, while trying to conceive the inconceivable, still leave some crucial parts inconceivable. In this way, bodies become narratives to be constructed by research and its interpretation. A person without the corresponding brain type becomes unintelligible due to the disconnect between experience and science. Research marks these bodies because the results and interpretation excludes them from the created category. However, scientific categories have the power to make people more intelligible. Science must work to expand the limits of intelligibility rather than marginalize more people.

Anatomy of Sexuality

There are many examples in the history of biological science of how this science can create norms and limit intelligibility. We can learn much from the mistakes of our ancestors, and strive to never repeat them. In the past, the results of biological sciences have often been interpreted and presented in a way that creates an arbitrary category of "natural." These presentations very often reinforce social inequalities. One example is the creation of the female skeleton. Londa Schiebinger (1991) examines the history and social effects of the scientific obsession with the female skeleton in her work "More Than Skin Deep." Anatomists strove to discover the "true" biological difference between men and women. Many anatomists declared their version of the female skeleton to be scientifically objective and true. All their renditions of the female skeleton, however, reflected and reinforced their beliefs about the physical and intellectual weakness of women. Not only were these skeletons used to reinforce sexism, but also racism. The anatomists reasoned that African women's pelvises were smaller because Africans' infant skulls were smaller due to a lack of intelligence compared to the Europeans. These scientists did not see how their own understandings of sex and race were influencing their research. They also did not consider the role of socialization in producing bodily differences. Socialization influences bodily differences just as much as the hard-wiring of the brain affects social behavior. Scientists and anyone interpreting scientific results should always keep this knowledge in mind when attempting to claim any sort of cause and effect relation between anatomy and experience.

Besides reinforcing social inequalities through presenting certain data as objectively factual, biological sciences also establish a general sense that anatomy is the truth and destiny for people. One striking example can be found in the representation of intersex people in biology in the late 19th and early 20th centuries. Alice Dreger (1997) discusses this subject in depth in her article "Hermaphrodites in Love." Dreger traces the history of intersex people, stating that some intersex people who did not have equal parts of both male and female gonads were considered "pseudohermaphrodites" in the late 19th and early 20th centuries. Doctors, in the name of the natural and normal, forced those people to live as their "true" gender, although they themselves had lived much of their lives as, and felt themselves to be, a different gender. The doctors based their scientific truths in anatomy, in the body, in gonads. The scientists ignored the intersex people's lived experiences.

Dreger's work also demonstrates that, historically, homosexuality was constructed as a type of hermaphroditism, a psychological inversion of genders. In this insidious and stubborn gender inversion model of homosexuality, masculine gay men and feminine lesbian women become unintelligible. Much of the biological human sciences researching sexuality assume the gender inversion model of homosexuality. This model leads to an understanding by the public, even by those who are gay or lesbian,

that being gay involves having some sort of femininity in men or that being lesbian, some sort of masculinity in women. This assumption is deeply rooted in the hetero-normative hegemony that femininity means desiring men and masculinity means desiring women. Then, "cis-gendered" homosexuals have no place in the heteronormatively gendered system of intelligibility. Neuroscience has a vast power to create the "true" precisely because it works with the brain, which is seen as the ultimate source of our behaviors and experiences. In researching the functioning of the brain, neuroscience makes the category of the "true" truer than before. If it continues studying the complex issue of human sexuality without considering its implications, it could drive more people into the realm of the unintelligible.

Inverted Brains

One of the most treacherous fields of research that some neuroscientists, both gay and straight, have focused on is the elusive "gay brain." Much of the search began with Simon LeVay's (1991) discovery of the sexually-dimorphic INAH 3. It continues to this day, exemplified by Ivanka Savic and Per Lindström's (2008) study of the sex and sexually-dimorphic asymmetry of the brain's hemispheres and different parts, especially the amygdala. Both of these studies assumed a gender inversion model of homosexuality. In his classic study, LeVay examined postmortem brains of women, presumed heterosexual men, and confirmed homosexual men. In their more recent study, Savic and Lindström examined the asymmetries of hemispheres in heterosexual and homosexual men and women. LeVay (1991) found a smaller INAH3 for homosexual men and women compared to heterosexual men. This result directly supports the gender inversion assumption, but, as other scholars have pointed out, LeVay went into the study believing in the gender inversion assumption and thus his findings may be the result of confirmation bias (Stein, 2001). Savic and Lindström (2008) conclude that heterosexual men and homosexual women had larger right hemispheres while "homosexual subjects also showed sex-atypical amygdala connections" (p. 1). By using the term "sex-atypical," they reinforce the more than century-old idea that homosexuality is about sex or gender "a-typicality." Such hetero-normative expectations are reinforced without any consideration that this assumption might cause harm. Very few researchers admit the kinds of assumptions they make that are based in the social hegemony, and even fewer fully consider the implications their research will have in the public. Both studies attempt to create the gay brain, and to fit gay people into these molds. The neuroscience research of human sexualities that primarily examines humans as objects of knowledge, especially the creation of the gay brain, categorizes humans, limiting the intelligibility of full, complex human sexualities. There has been some realistic pushback to the discovery of the gay brain. As groundbreaking as his study was, LeVay's (1991) research has not been well replicated. Of course, as demonstrated by Savic and Lindström (2008), scientists have not stopped trying to make the gay brain, and this trend most likely will not stop anytime soon.

Even beyond the gay brain, any research attempting to "find" some bodily differences between queer and straight people have problems and unquestioned assumptions. Edward Stein (2001) summarizes them:

> Studies in the emerging scientific program embrace – explicitly or implicitly – a problematic account of what sexual orientation is; have problems finding an appropriate subject pool to study; accept unjustified assumptions about the base rate of homosexuality; and make a variety of implicit, widely varied, and unjustified assumptions about homosexuality. No study in the emerging research program avoids all these problems, and many of them have additional problems (for example, few of them have been replicated). (p. 226)

Yet Stein also says these assumptions and problems stand unquestioned by the researchers and by many of those who read and interpret the results because they are "culturally salient" (p. 213). They reinforce what is stereotypically thought to be true. It is ultimately a tautological nightmare: people assume these things are true because they are reinforced by science, and scientists continue to assume them because people think they are true. These stereotypes and assumptions are created and perpetuated by research and its influence on society's thought. Historically, scientists create categories and

"identify" characteristics of those categories. As people are fitted into these categories, they assume these characteristics, even if they do not phenomenologically align. Then, scientists often create anatomical destinies for these assumed differences.

While homosexuality is probably biological, such differences are not so anatomically obvious and clear-cut. We must remember that sexuality is not only very complex, but also contextual. Stein (2001) argues, "Everything psychological is in a sense biologically based and sexual orientations are psychological. Sexual orientations may, however, be among those psychological properties that emerge in certain cultures and during certain time periods" (p. 227). The modern understanding of sexual orientation only arose in the 19th century in Western Europe (Foucault, 1973). Thus, trying to find a deterministic anatomical basis for something so arbitrary seems almost silly. While science is very necessary, we must always be careful when researching or interpreting results.

Biological Determinism Begets Biological Eradication

This search for the anatomical cause of homosexuality shows a frightening prospect for queer people. If the gay brain is indeed established and accepted by society, it can be used irresponsibly; one worst-case scenario is a eugenics program to completely prevent and eradicate homosexuality. At the same time, by asserting the truth status of the gay gene or the gay brain, a kind of "gay enough" threshold is created, marginalizing other queer people, creating a simple dichotomy between gay and straight. Alice Dreger (1997) gives a vision of a world with an established and accepted gay brain:

> We seem to return continually to the idea that it is anatomy, however unsuspected, however invisible, that determines all else and constitutes the 'truth.' With the advent of genetic research into the 'roots' of sexuality, will a homosexually active man lacking a supposed 'gay gene' become now a 'pseudo-homosexual'? Will a hetero-sexually active woman with a 'lesbian gene' become a 'pseudo-heterosexual'? (p. 62)

When truth is based in anatomy, what one feels and believes becomes illegitimate and often dismissed as delusional. People can say that someone who feels gay is actually straight if his brain is not gay, which alienates him from both the gay and straight communities. Someone like this may become unintelligible because of the conflict between their own truth of who they are and what society believes they are. They also become unintelligible to themselves because they lack the language and the lens through which to comprehend the self. We understand ourselves and the world through what has been given to us by established language. Without that, intelligibility falls apart. The creation of the gay brain could make many more people unintelligible. "Queer" as it stands now – a category resistant to restraining categories – would no longer be legitimate.

Media Representations of Science

While science should be critiqued for its methods and unquestioned assumptions, how research influences society is not entirely the fault of scientists. More often than not, the popular media and the interpretations of the research results can determine the use of the science in the public. The limiting effects of scientific research on human sexualities are evident in the public reception of such studies. News media is the primary way the general public learns about new research. Even if the media skews or misinterprets, it still becomes socially accepted science. Science reporters generally are not scientists, and they often give the wrong impression of a study. For example, Alice Park (2008) wrote a popular press article for *Time* on Savic and Lindström's (2008) study. Park oversimplifies the study, conflating many concepts that are unrelated to the original research, as well as reinforcing many of the problematic assumptions that plague sexuality research. Park never quotes the study nor even mentions the original researchers' names, but rather quotes another a geneticist in America. On the one hand, Park's reporting reinforces the gender-inversion model of homosexuality. The geneticist claims that this study can prove that "there are regions of the brain not directly involved in sexuality that seem to be feminized in gay males." Feminized is a problematic term. It not only implies the gender inversion model of homosexuality, the heteronormative model of mas-

culinity and femininity, and ignores homosexual women and all other kinds of queerness; but also makes masculine gay men less intelligible – although it may provide, probably unintentionally, some legitimacy to effeminate gay men and trans* people.

On the other hand, Park reinforces stereotypes about both heterosexual men and gay men, and about masculinity, by arguing that both groups share the following characteristics of "masculinity": they prefer younger partners, have casual sex more than women, and are aroused by visual stimuli. Park continues to quote the geneticist, "So I expect that some regions of the brain will remain masculine even in gay men," as if it was expected that gay men actually had a completely female brain in the body of a cisman. Ultimately, in Park's article, gay men are represented as having a combination of a "feminine" and a "masculine" brain. Popular media, without enough knowledge of science to make such connections, informs the public. People then understand this article to be the scientific fact because of the status of privileged discourse that science is given. It is no one particular party's fault that dissemination of knowledge about neuroscience happens in this way; rather, we all must take responsibility for critically understanding knowledge. Scientists must ensure that their research is understood by the media the way they want it to be understood, media must be more informed, and the public must question what they read more.

Conclusion

We, as a society, must move beyond seeing bodies and humans as objects of study. Social justice movements, like feminism and queer justice, can greatly inform the ethics of science. Peggy DesAutels (2010) in her work "Sex Differences and Neuroethics" lays out specific ways neuroscience can be more ethical with feminism in mind. DesAutels (2010) lays out clear steps that neuroscience can take to improve:

> (1) critically examining ways that sex-based neuroscientific research is embedded within and contributes to gender-based social biases and injustices; (2) providing guidance for whether or not, and under what conditions, sex-based neuroscientific re-search should be conducted and disseminated; (3) emphasizing that brain plasticity and variations are to be expected and 'normal'; and (4) developing theories of ''moral brains'' that are informed both by neuroscientific findings (including findings of sex-based differences) and ethical theories (including feminist theories). (p. 109)

Furthermore, we must also remember that the categories of the sexes, genders, and sexualities are arbitrary. Scientific research into genders and sexualities partly create these categories and their divisions. Scientists, popular media writers, and anyone who reads about science must be careful to not propagate wrongful assumptions and marginalize people. Everyone has a role in improving this world, in expanding intelligibility, in keeping the human sciences ethical.

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Disenchanted by the "Love Drug": The Negative Potentiality of a Monogamy Drug

Eliza McDuffie, Women's, Gender, and Sexuality Studies and Italian, Emory University

Increasing understanding of the human brain due to neuroscientific research suggests that we might soon be able to manipulate love and attachment (Young, 2009). That is, a pharmaceutical drug that would maintain relationships by inducing monogamy is not impossible. While many might see this as a positive innovation, the possible development of such a drug necessitates a comprehensive discussion about its ethical implications. A monogamy drug could potentially have negative consequences for society as a whole: by promoting one ideal relationship, it could reinforce problematic dichotomies and marginalize a significant portion of the population. We must examine the drug's essentialist assumptions about human monogamy. While considering these issues, this paper seeks to examine the potential significance of the creation and usage of a monogamy drug.

In the weeks leading up to Valentine's Day it is virtually impossible to avoid images of a baby boy with an arrow: Cupid, Roman mythology's god of love. While most of the other ancient mythological characters have faded from popular discourse, Cupid remains because the idea that his arrow can induce passionate, lifelong love is culturally attractive. Cupid is a persistent reminder of our society's interest in true love and monogamy. Western society continues to view and promote monogamy as the ideal and, really, only acceptable sexual relationship. Cupid's arrow represents an ideal relationship, one that endures the test of time because two people are madly in love with each other, despite the fact that most people know that this is rarely the reality. Couples fight, cheat, and grow apart. Ultimately, most relationships will end. But what if we could control our love and ensure monogamy? What if we had access to our own arrow?

This idea might not be as farfetched as it seems. In fact, Dr. Larry J. Young (2009) believes that "drugs that manipulate brain systems at whim to enhance…our love for another may not be far away" (p. 148). Yet the invention of such a drug would have serious ethical implications. While a drug that could increase monogamy in human sexual relationships might seem to promise a better society full of happily married couples, such a drug could also reinforce problematic dichotomies and prolong unhealthy, dangerous relationships. Some of the support for this drug promotes the assumption that human beings are naturally intended to be monogamous. However, that assumption can be, and has been, refuted. Even though a monogamy drug could have some positive implications, both the depth and range of its negative potentiality far outweigh any possible benefit.

This paper seeks to discuss these ethical implications. First, it considers the existing and possible arguments in favor of a monogamy drug. Next, it outlines the drug's negative implications, primarily focusing on its promotion of "mononormativity." And, finally, it provides evidence that human beings are not necessarily biologically predisposed to be monogamous. For the purposes of this paper, monogamy will be defined as it is in Young's (2009) scientific research as "long-term pair bonding" (p. 148). This definition does not inherently exclude sexual infidelity, as the relevant research is based upon prairie voles that engage in extra-pair copulation (Ledford, 2008). Any monogamy drug developed from this research would promote this type of monogamy.

Evaluating Arguments for a Monogamy Drug

As stated in the introduction, recent scientific research into monogamy indicates it would be possible to develop a drug that could strengthen

love for a sexual partner and thus maintain monogamy. According to Young (2009), neuroscience could help us get there, as "biologists may soon be able to reduce certain mental states associated with love to a biochemical chain of events" (p. 148). Young explains how through studying prairie voles, one of the only other monogamous mammals, scientists have been able to identify hormones released in the brain that stimulate pair bonding.

In females, this hormone is oxytocin, which is also released during childbirth. In males, this hormone is vasopressin, whose regulatory receptor gene is *AVPR1A*. Whichever variant of *AVPR1A* a man has can influence the degree to which he bonds with his sexual partner:

> Men with a particular *AVPR1A* variant are twice as likely as men without it to remain unmarried, or when married, twice as likely to report a recent crisis in their marriage. [Additionally,] spouses of men with the variant also express more dissatisfaction in their relationships than do those of men lacking it. (p. 148)

However, if prairie voles are truly representative of human sexual behavior, men with that particular *AVPR1A* variant are not necessarily unable to change. Salvuescu (2010) stress that the "infusion of oxytocin into the brains of female prairie voles and vasopressin in male prairie voles facilitated pair bonding even in the absence of mating" (p. 412). These findings suggest that, with more research, scientists may soon be able to isolate the specific brain systems active in human pair bonding. They would subsequently create a drug that could manipulate these systems in order to increase love for one's partner, thereby helping its users maintain monogamous relationships.

Some argue that such a monogamy drug could promote the physical health of its users. Julian Savulescu and Anders Sandberg (2008) argue in their article "Neuro-enhancement of Love and Marriage: The Chemicals Between Us," that love is physically healthy. The strong social support system that comes with partner love can increase one's overall happiness by lowering rates of depression and stress and attendant harmful physical symptoms, such as high blood pressure and a weaker immune system. Additionally, in the same way that love can increase physical health, Savulescu and Sandberg (2008) argue that loss of love can decrease physical health. Grief over a failed relationship can often lead to overall unhappiness and self-imposed seclusion, resulting in higher rates of stress and depression.

Yet the contention that a monogamy drug would promote human health and happiness is ultimately questionable. While breakups may cause unhappiness and a resulting decline in physical health, it is also important to acknowledge that relationships often end because they are not making both parties happy. While a breakup might induce short-term depression and stress, separation may make both parties happier in the long-term and, consequently, better off physically. A monogamy drug used to enhance and protect an otherwise failing relationship would prevent its users from finding greater happiness in the future by dissuading them from searching for alternatives that might prove healthier than the relationship in which they are choosing to remain. A couple whose relationship is fraught with domestic violence might, for example, agree to take the monogamy drug (or one partner might coerce the other into taking it – another fundamental problem), thus prolonging the cycle of abuse by remaining in that unhealthy relationship (Savulescu & Sandberg, 2008).

While a monogamy drug might improve a relationship's longevity, the knowledge that the maintenance of the relationship is contingent upon pharmaceutical stimulants could end up decreasing the couple's happiness, especially if only one partner felt the need to use the drug. There are certain scenarios in which it might make sense to use a monogamy drug anyway, such as relationships where one or more partners feel that it would be severely harmful to leave the relationship for reasons such as finances or children. Still, arguments favoring the drug as a means to human happiness are fundamentally dubious, as they operate under the assumption that human happiness can be measured and defined. Happiness is an abstract emotional concept and is virtually impossible to explain or describe accurately. Arguments which link monogamy to happiness do not offer new definitions of happiness, but only result in equating

human happiness with monogamy and promoting mononormativity.

It is vital to acknowledge that our mononormative society awards monogamous relationships, particularly those institutionalized through marriage, with a variety of social, monetary and legal benefits. Married couples can obtain joint social security and insurance, receive various tax exemptions, file for joint adoption, and have visitation rights in hospitals or jail. It is possible that the correlation of monogamy with human happiness is a result of these advantages and not of the relationships themselves.

Another argument in favor of a monogamy drug is that it could be seen as a tool for greater human freedom. There are multiple preexisting obstacles that prevent some human beings from being able to experience the three stages of love – lust, attraction and attachment – and thus from being able to maintain long-term partner relationships (Savulescu, 2010). Men with a particular *AVPR1A* variation exemplify these barriers. Savulescu and Sandberg (2008) argue that evolution can be blamed for impeding enduring love "through conferring different goals on men and women, through evolving relationship structures that promote inclusive fitness rather than happiness, and by way of a mismatch between current possibilities (e.g. lifespan) and evolved adaptations" (p. 33). These predetermined factors can limit how certain people can love and exist in relationships. If the people affected wish for the ability to maintain a monogamous relationship, it can be argued that their bodies are preventing them from freely acting and from attaining their rationally desired ideal (Savulescu, 2010). In these cases, a monogamy drug could potentially be employed to combat physical limitations on love by affording the patient the hormones and brain activity necessary to uphold a lasting relationship. Savulescu argues that the invention of a monogamy drug for this purpose is imperative, because biological and physical factors not only restrict love, but also human freedom.

In order to determine if the invention of a monogamy drug as a means to human freedom is truly ethical, it is crucial to question *why* people would see it as a source of liberation. It is likely many individuals desire the ability to be monogamous because society values monogamous relationships as the ideal and, thus, they have become the widespread norm. So, ultimately, those who seek the ability to be monogamous are actually looking to conform to the expected societal norms. A monogamy drug would only be a source of liberation if we consider the "freedom to conform" a desirable freedom.

A third possible argument in support of a monogamy drug is that it could have positive implications for society as a whole. As Joseph Henrich, Robert Boyd and Peter J. Richardson (2012) report in their article "The Puzzle of Monogamous Marriage," "data from Mormon communities between 1830 and 1890 show that intra-sexual competition declined dramatically as governmental forces suppressed polygynous marriage" (p. 660). This data suggests that in communities that practice normative monogamous marriage, as opposed to polygynous marriage in which men take many wives, there is more equality amongst male citizens. Since having multiple wives is not a symbol of status and power, men are not competing against each other to attain the most women. According to Henrich, Boyd and Richardson (2012), since monogamy depletes the amount of low-status unmarried men, decreased intra-sexual competition can lead to reduced crime rates, as unmarried men are more likely to engage in risky and criminal behaviors, especially those which victimize women.

While these points all certainly support a monogamy drug as a means to promote a safer, more productive society, they are ultimately debatable. Much of this discussion relies on evidence that monogamy has positive effects on low-status men. A monogamy drug might actually increase intra-sexual competition, particularly in terms of class. Due to pharmaceutical patent laws, the drug would most likely be an expensive product and thus only attainable by higher-status individuals. If a monogamy drug were to be widely used and favored in relationships, lower-status individuals would not be able to afford it and it would consequently be more difficult for them to find long-term mates. The resulting discrepancy in the drug's attainability could alienate those of lower financial status, and, by Henrich, Boyd and Richardson's (2012) logic, lead to *increased* crime rates.

Finally, it is crucial to acknowledge that almost all of the previously discussed arguments

in favor of a monogamy drug are fundamentally heteronormative, as all of the cited data is based on heterosexual couples. Because they ignore any other sexual identities, these arguments are not necessarily applicable to a large portion of the population who do not consider themselves heterosexual.

Medicalizing Monogamy

A monogamy drug would incite discrimination by promoting normative standards. The entire reason this drug could be invented and seen as beneficial is that our society is extremely mononormative – i.e. our society values monogamy as the moral and ideal standard upon which to judge a relationship. This mononormativity is so prevalent and influential that non-monogamy is often seen as immoral behavior indicative of an individual's capabilities and judgment beyond the realm of relationships. A monogamy drug would essentially be an endorsement of this ideal by making monogamy widely accessible. Providing a drug to encourage monogamy effectively medicalizes attachment, and by prioritizing a certain type of relationship, suggests that anyone who is non-monogamous has something fundamentally wrong with them that needs to be corrected through medical intervention.

The ideal of monogamy does not exist in isolation. It rests on a variety of other ideals that together have come to define our society's most valued type of relationship: a married, white, upper-middle class, heterosexual couple with children. The closer a relationship is to this ideal, the more accepted and less stigmatized it is. Because a monogamy drug would make monogamy ostensibly universally achievable, monogamy would not only be expected, but enforceable. This would reinforce problematic dichoomies, further marginalizing many already alienated individuals and communities.

Within the queer community, a monogamy drug could add to the already overwhelming pressure to conform to the heterosexual standard of relationships. For example, the opinion of some queer individuals is that the agenda to legalize gay marriage "fractures our communities, pits us against natural allies, [and] supports unequal power structures" (Queer Kids of Queer Parents Against Gay Marriage, 2009). Queer people who argue against legalizing gay marriage point out that it would create a division between the married "good gays" and the unmarried "bad queers." A monogamy drug would create a division between the monogamous "good gays" who opt to take the drug and assist their own normalization and non-monogamous "bad queers." As our society has a pre-existing stigma against homosexuals, the stigma against non-monogamous individuals would inevitably be amplified for gay individuals and couples. Additionally, since there is already a stereotype of homosexuals as more promiscuous than heterosexuals, gay individuals or couples who choose a non-monogamous lifestyle after the invention of a monogamy drug would be even more scrutinized than straight individuals making the same decision.

A monogamy drug would also negatively affect the Black community by reinforcing negative stereotypes about Black sexuality, for both men and women. According to Martin and Woodward (2005), Black women are often characterized as "sexual siren[s]" who "care for nothing but [their] own sexual satisfaction" (p. 272). Further, as Huchinson (1996) notes, "the myth of rapacious black male sexuality is still one of America's most durable and deadly stereotypes" (p. 70). Racist stereotypes within our society often identify Black sexuality as an almost beastly force that is dangerous and insatiable. Black individuals choosing a non-monogamous lifestyle despite the existence of a monogamy drug would be even further subjected to these stereotypes, for their decision not to be monogamous could be seen as evidence for these negative racialized assumptions.

Monogamous relationships often represent more than two people's love for one another. Our society holds the involved parties to certain centuries-old expectations of a monogamous lifestyle. These expectations are amplified for serious, long-term monogamous relationships that often involve coupled living. These relationships would inevitably become more prevalent with the invention of a monogamy drug, as it would allow more relationships to progress as monogamous. While this monogamous lifestyle is not a single formula for existence, it does carry certain valued implications, particularly those of masculinity and femininity. Entering into a heterosexual monogamous relationship means

becoming the embodiment of the respective idealized roles of the hard working, breadwinning male or the domestic, financially dependent female. A monogamy drug would ultimately encourage individuals and couples to conform to the constructed gender roles while simultaneously endorsing discrimination against those who choose not to inhabit these roles. A monogamy drug could also reinforce patriarchy by endorsing these traditionally constructed and gendered roles of the monogamous lifestyle that idealize a strong masculinity and a passive femininity.

Monogamy as Natural

While not all of those in favor of a monogamy drug argue that monogamy is "natural," some support for the drug would certainly be based on the fact that some people assume monogamy is both "natural" and right for human beings (Savulescu, 2010; Savulescu & Sandberg, 2008). This assumption is problematic because it equates the dichotomy of "natural/unnatural" with "good/bad". Not only are the definitions of "good" and "bad" fundamentally personal and ambiguous, but also associating "natural" with "good" only serves to provide a stronger basis upon which to stigmatize those whose actions do not fall into that category. If created under the assumption that monogamy is "natural", the drug would marginalize any individuals who chose not to take the drug because it would define them as both unnatural and unwilling to conform to the correct, i.e. "natural," human state.

In point of fact, there is much evidence that human beings are not biologically predisposed to monogamy, or even to loving, long-term relationships in general, and that monogamy is a socially constructed phenomenon. This evidence includes the consistent, species-wide traits of sexual dimorphism and sexual bimaturism. Sexual dimorphism is a term to describe the inherent size difference between male and female human bodies. According to Barash and Lipton (2001), the most probable reason for any sexual dimorphism where one sex is larger than the other is "the payoffs associated with success in competing with other same-sex members…namely, a harem consisting of more than one female" (p. 141). That is, sexual dimorphism both promotes and is caused by non-monogamous sexual pairing. Barash and Lipton also argue that sexual bimaturism reflects the "naturalness" of non-monogamy. Sexual bimaturism refers to the fact that human females mature a few years ahead of human males, and, similar to sexual dimorphism, the most likely explanation is that "males delay their maturation until they are somewhat older, stronger, tougher, and presumably a bit more savvy than their more callow counterparts" in order to compete for and keep a harem of multiple women (p. 142).

There is little evidence of monogamy among pre-historic human societies. In fact, the consensus among paleontologists today is that monogamous marriage and the nuclear family did not exist in ancient communities, and that, actually, they would have made survival impossible (Coontz, 2005). However, monogamy did develop, and there are many theories as to why. Friedrich Engels (1902) speculates that monogamy came about with the evolution of private property as a means to determine the passing down of assets to one's descendants. Another more common theory is that monogamy developed as a way to increase paternity certainty in exchange for fatherhood and to decrease inequality and competition amongst men by only allowing them to take one wife (Barash & Lipton, 2001). Additionally, according to Coontz (2005), the idea of love within a monogamous relationship only fully developed as a widely accepted norm at the end of the 18th century as a result of increased financial independence and new political and philosophical ideas, such as individual rights. Monogamy is fundamentally a recently-created social norm to which people are expected to adhere in order to be fully accepted in society. The ethics of a drug meant to enhance obedience to a social norm are questionable at best.

Conclusion

As neuroscientific research indicates that it might be possible to create a monogamy drug, it is imperative to question whether such a development would be beneficial. While some argue that a monogamy drug would promote health, happiness, freedom and a better, safer society overall, these arguments are fundamentally flawed. They assume that the best way for every person to live is within a monogamous relation-

ship, and thus fail to consider individual situations, such as sexuality, class or even the specific nuances of different relationships. By ignoring the diversity of human experience, these arguments are essentially advocating widespread conformation to mono-normative standards.

It is these mononormative standards that make the drug ethically questionable. By medicalizing monogamy, the invention of such a drug would render monogamy, and the adherence to mononormative standards, not only more attainable, but also more expected. Essentially, a monogamy drug could become the medicine of cultural normalization – the cure for all socially condemned behavior. Therefore, because their life choices would deny assimilation, non-monogamous individuals and couples would become marginalized, particularly those whose communities are already subject to social stigmas. In fact, a monogamy drug could likely *enhance* many of these stigmas, such as racism, homophobia and sexism. Pre-existing stereotypes about threatening or promiscuous sexuality could become amplified for non-monogamous Black and queer individuals. By encouraging a vision of the ideal relationship entrenched in patriarchal norms, a monogamy drug would promote strict adherence to traditional gender roles that restrict female agency.

The central ethical issue with the development of a monogamy drug lies in the fact that monogamy itself is ultimately a socially constructed norm. As much scientific evidence illustrates, human beings are not biologically predetermined to be monogamous. Rather, monogamy originated in reaction to social change, and eventually became a normative, expected practice. While a monogamy drug may be marketed as the key to personal happiness, it would essentially be geared towards society as a whole – to fit every person and every relationship into the norm of monogamy. Although a monogamy drug might have personal appeal to some, it is crucial to look beyond simply the short-term individual results, and consider how it would influence those of certain identities and fundamentally alter our current conceptions of love and relationships. Upon closer investigation, it becomes clear that such a drug could permanently render our society more segregated and discriminating.

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Research Proposal: The Biological Linkage of the Mirror Neuron System and Psychopathic Behaviors in Adolescent Males

Stepheni Uh, Neuroscience and Behavioral Biology, Emory University

Psychopathy is a complex personality disorder that is prevalent throughout the human population. The causes of psychopathy remain elusive, but many studies have been conducted to identify possible factors contributing to the onset of the disorder including genetic, biological, environmental and social influences. Explanations for the onset of psychopathy often incorporate the composition of the human brain, particularly abnormalities within the empathy circuit of the brain. Recently, a new area of interest for psychopathic studies involves the mirror neuron system (MNS), which will be the focus of this proposed study. The MNS is thought to play a role in autonomic responses to observed behaviors and emotions. The prevalence and role of the MNS in humans is still debated, though an increasing amount of current research is advocating its existence in humans. In order to help expand the knowledge concerning the human MNS, this study will attempt to investigate the relationship between the MNS and psychopathic behaviors in adolescent males.

The social stigmatization associated with the label "psychopath" is significant. In extreme cases, psychopaths are characterized as intraspecies predators who lack conscience or feelings for others and "cold-bloodedly" do whatever they desire without guilt or remorse (Hare, 1998). It is common to denote psychopaths as "evil," which seems to be a word that does not have a concrete definition. Baron-Cohen (2011) recently established his goal to replace the term "evil" with "empathy" by drawing upon the idea that those who are evil lack empathy and reduce other humans to objects. With this notion, Baron-Cohen (2011) describes psychopaths as individuals who essentially dehumanize other humans and commit violent actions without any feelings towards their victims. Yet, there is also the subgroup of psychopaths who are deemed "successful psychopaths" due to their abilities to avoid serious antisocial behaviors and thus conceal their psychopathic natures and escape incrimination (Hall & Benning, 2006; Hare, 1998). Psychopathy, therefore, is a complex and often disturbing personality disorder. Although various studies that target the cause, onset, and progression of psychopathy have been done, it is still unclear exactly when and how psychopathy evolves in human development.

An intriguing question surrounding psychopathy revolves around the time of the disease onset. Some studies have shown that psychopathy can be detected at an early age through observation of a child's social behaviors (Cruise, 2000). However, other researchers argue that personalities may easily change over time and thus adolescent behaviors are not necessarily good indicators for potential psychopathic behavior (Cruise, 2000). Adolescent behaviors, nevertheless, pose several interesting notions concerning the transient – or perhaps not so transient – nature of human personalities. One pertinent question, for example, involves the possible influences one's physiological brain might have upon one's personality and behaviors: whether there are external aspects, such as social experiences, that affect the development of the brain or if the composition of an individual's brain serves as a mediator for an individual's future perceptions of the world and thus his or her personality.

A specific area of interest is a recently discovered brain system known as the mirror neuron system (MNS), which has been postulated to affect a person's tendency for psychopathic conduct due to its observed roles in social behaviors including empathy and imitation (Iacoboni et al., 2005). Some researchers have proposed that the

MNS may play a role in understanding the intentions of other individuals, commonly referred to as "action recognition" (Iacoboni et al., 2005). Due to its recent discovery in macaque monkeys, however, there is a lack of information concerning the structure and function of the MNS within human beings. Nevertheless, recent fMRI studies have concluded that the MNS appears to extend throughout the inferior parietal lobe, ventral premotor cortex, and the caudal part of the inferior frontal gyrus within the human brain (Sale & Fraceschini, 2012; Baron-Cohen, 2011). It is important to note that some researchers dispute the existence of the MNS in humans and that there is still a great deal of speculation about its function (Hickok, 2009).[1]

The overall goal of this proposed study is to observe the mechanism as well as the composition of the mirror neuron systems in individuals suffering from personality disorders. In addition, this study will investigate whether or not dysfunctional mirror neuron systems in adolescent males correspond to psychopathic behavior, particularly neither understanding nor recognizing the emotions of others. Comparisons between adolescent males exhibiting psychopathic behaviors and adolescent males and females without psychopathic behaviors will be made through analyzing MRI scans and questionnaires.

Literature Review

Psychopathy is a personality disorder that is characterized by interpersonal aspects, such as "cold-heartedness" and egocentricity, and affective features including lack of empathy, anxiety, and remorse (Lynam, 1996). According to numerous studies (Hare, 1998; Cale & Lilienfeld, 2001; Baron-Cohen, 2011), the majority of psychopathic individuals are males. The reasons behind this gender imbalance are unclear due to the limited amount of research done concerning possible correlations between sex differences and psychopathy (Cale & Lilienfeld, 2001). A recent suggestion of why males are overrepresented within the psychopathic population is that differences in sex hormones and in brain regions of the empathy circuit place males at a higher risk for developing psychopathy (Baron-Cohen, 2011).[2] Nevertheless, more research is necessary since there may be multiple reasons (i.e. environmental, social, cognitive, etc.) for the higher percentage of male psychopaths.

Psychopaths exhibit high rates of recidivism and often engage in substance abuse, passive avoidance, and response modulation (Kosson, Cyterski, Neumann, Steuerwalkd, & Walker-Mathews, 2002). In addition to these interpersonal and affective "anomalies," many researchers associate psychopathy with antisocial behaviors. Many cases, for instance, show that psychopathic individuals are more likely to engage in crimes that may range from small thefts to violent outbreaks (Lynam, 1996). However, the interpersonal and affective variances found in psychopaths prove to represent the core or the basis of the adult syndrome and have not been extensively studied in adolescent subjects (Kosson et al. 2002).

A critical stepping-stone to the expansion of knowledge about psychopathy involves the exploration of whether or not one's risk for psychopathy as an adult can be predicted by observing one's behaviors during adolescence. Researchers have proposed that psychopathy includes a set of maladaptive personality traits and behaviors that stem from childhood (Kosson et al., 2002). In particular, hyperactivity and conduct disorders, such as crime and violent outbursts, have been observed to be childhood problems that appear similar to many of the symptoms of psychopathy including increased crime rates and antisocial behaviors (Lynam, 1996). Some scientists, therefore, investigate whether or not hyperactivity and conduct disorders serve as accurate predictors for future onset of psychopathy. Pelham et al. (1991), for instance, discovered that boys with both hyperac-

[1] Some researchers suggest that the MNS is not specific to only one general region of the brain and that there may be multiple mirror neuron systems. Hickok also disputes several theories of MNS including its proposed function of "action understanding" and overall existence in humans (Hickok, 2009).

[2] According to Baron-Cohen, males often have smaller orbito-frontal cortexes (OFC), which is a brain region that regulates certain emotions, especially aggression and moral conduct, in comparison to females. Males who show more extreme cases of antisocial behavior have been found to have even smaller OFCs.

tivity and conduct disorders exhibited higher aggressive responses to provocation but displayed less physiological arousal than boys who only exhibited hyperactivity (Lynam, 1996). These data are consistent with Arnett and colleagues, who observed that adult psychopathic individuals have lower autonomic arousal after punishment (Lynam, 1996). The childhood problems of hyperactivity and conduct disorders, therefore, may be possible indicators of adult psychopathy.

Several researchers have recently incorporated the MNS into their conceptualization of psychopathic personality disorder. Mirror neurons were first discovered in area F5 of the macaque monkey premotor cortex (Rizzolatti & Craighero, 2004). In Rizzolatti's study, mirror neurons were found to discharge when the monkeys performed a certain action and when they observed another monkey or human doing a similar action. Interestingly, this discharge was not seen if there was no interaction between a biological effector, such as a hand or mouth, and an object (Rizzolatti & Craighero, 2004). The most effective actions instigating their motor responses proved to be grasping and manipulating objects. Gallese and Goldman (1998) describe mirror neurons in monkeys as forming a "cortical system that matches observation and execution of motor actions" (p. 495). Recognition, comprehension, and imitation of the actions of others then seemed to include direct ties to the MNS through the motor cortex. After this discovery, the MNS has also been suggested to exist in humans and is an emerging area of interest due to its proposed connection with empathy, which represents a core diagnostic feature of psychopathy (Fecteau et al., 2007). A key concept related to the MNS and empathy is the process of "mind-reading" in the sense that individuals perceive the mental states of others (Gallese & Goldman, 1998). In other words, those who empathize with others have the ability to recognize and comprehend the emotional or mental conditions of others. Empathy has various definitions, but it is commonly defined as Fecteau, Pascual-Leone, & Theoret (2007) define it: the "capacity to understand other's actions, sensations, and emotions" (p. 138). This empathy component in most psychopathic individuals, however, seems to be dysfunctional due to their impaired autonomic responses to recognition of emotions in others, especially to sad or painful expressions (Fecteau et al., 2007).

Fecteau et al. undertook a study that examined the potential correlations between activity within the sensorimotor MNS for pain and psychopathic personality traits (2007). They recruited eighteen non-psychiatric male college students who viewed video clips – needle penetrating the skin of a human hand, Q-tip touching the skin, and needle penetrating an apple – while transcranial magnetic stimulation-induced motor evoked potentials were recorded. At the beginning of these videos, excitability in the motor cortex increased, suggesting that simply watching an action with some relation to human activity stimulates the motor cortex. After the subjects viewed the clips, they were administered the Psychopathic Personality Inventory (PPI) in order to evaluate their personality traits and possible psychopathic traits. Feceteau et al. found that the motor cortex excitability was selectively reduced when the subjects watched the needle penetrating the human hand compared to when they watched the other videos. An interesting and questionable result, however, was that those who scored high on the coldheartedness scale of the PPI exhibited the greatest modulation of cortical excitability. This discovery seems to contradict the popular notion that psychopathic individuals lack the ability to recognize painful stimuli because of malfunctioning or reduced cortical activity. Feceteau and colleagues mention, however, that the sensorimotor cortex is related to sensory empathy rather than emotional empathy. Hence, psychopathic individuals may lack concern as well as emotion about the effects painful endeavors may have on others, rather than possess the inability to recognize other people's perspectives.

To date, more scientists and researchers are advocating the existence of the MNS within the human brain through various forms of neuroimaging research (fMRI, EEG, TMS, etc.) focused upon action observation and mimicry (Cattaneo & Rizzolatti, 2009; Sale & Franceschini, 2012). Baron-Cohen (2011) asserts that the MNS is primarily involved in mirroring actions of others automatically or without consciously thinking about the other person's feelings. In this sense, mirror neurons may serve as "building blocks"

of empathy rather than represent empathy as a whole by themselves (Baron-Cohen, 2011). This idea, however, is subjective in that there are many different ways to define empathy. Baron-Cohen specifically defines empathy as the "ability to identify what someone else is thinking or feeling and to respond to their thoughts and feelings with an appropriate emotion" (p 16). In this case, mirror neurons may play a role in the autonomic process of mimicking another's actions and also interact with other conscious neural processes involved in the emotional aspects of the empathy circuit. From Baron-Cohen's definition of empathy, an interesting suggestion regarding the function of the MNS arises: the idea that empathy occurs in two stages. First, the autonomic process of picking up on another person's emotion through their actions must occur. Then one must perceive and understand the feelings associated with that particular emotion. These ideas, however, are tentative and require more research. Additionally, due to the limited amount of research done on the MNS within humans, the issue of determining what role(s) the MNS plays in a human's empathetic capabilities still remains.

Hypotheses

Interest in the MNS is growing, but a deficit of concrete information regarding the specific functions as well as the existence of mirror neurons in humans still remains. In addition, there have not been many studies observing the possible correlation between physiological discrepancies either within or in close proximity to the MNS and an individual's behavior. The aim of this study is to focus on the MNS and contemplate whether or not a significant correlation between the activities and physiological composition of the MNS and certain psychopathic behaviors exists. In this study, we will use brain-imaging technology to compare the responses to emotional stimuli in the MNS between adolescent males with psychopathy and adolescent males and females without psychopathy. We will examine the following hypotheses:

1) Psychopathic adolescent males show less brain activity in response to emotional stimuli within the brain regions thought to contain the mirror neuron system in comparison to the adolescent males and females without psychopathy. In addition, major brain regions involved in emotional and empathy regulations such as the orbito-frontal cortex (OFC), amygdala, and medial prefrontal cortex (Baron-Cohen, 2011) will be observed in all subjects to investigate whether these regions show increased or decreased activity along with the regions comprising the MNS.
2) Differences in MNS response may be related to differences in personal history and social and familial backgrounds.
3) The mirror neuron system of the female control group will show greater activation than the male control group as well as the experimental group. This difference may be correlated with variances in hormonal states. Since there are many studies that have shown the effects of hormones such as oxytocin and dopamine in regulating one's brain and behavior towards others in a social setting as well as differences in baseline levels of hormones across genders, it is likely that the female control group will show a greater level of these hormones, which may enhance their responses to the emotional stimuli.

Methods

Subjects/Design: We will recruit 30 adolescent males (15-18 years old) who exhibit psychopathic behaviors based on the Psychopathy Checklist: Youth Version (PCL-YV), and 20 adolescent males and 20 adolescent females who do not show psychopathic behaviors. All of the control adolescent males and females will be recruited through IRB-approved flyers posted throughout the area while the psychopathic adolescent males will be recruited by contacting psychiatrists and psychologists or juvenile detention centers within the community.

Each control subject will fill out a demographic questionnaire as well as a Beck Depression Inventory (BDI) to check levels of depression – primarily to ensure that the control subject pool does not have any notable emotional instability that may affect their reactions to the screenings. A survey created by professional family counselors will also be distributed to each control subject and their guardians in order to assess the nature of familial relationships as well as social stability within and outside their homes. Close examinations of certain cases of

psychopathy have shown that many psychopaths were raised in unstable backgrounds (Baron-Cohen, 2011). These unstable backgrounds include being isolated or bullied by others at a young age, parental rejection, lack of strong relationships with others, and conduct disorders (Baron-Cohen, 2011). In order to investigate this notion, we potentially want a portion of the control subjects to have grown up in stable environments (i.e. no significant family conflicts, no abusive relationships, annual income within the median range, no conduct disorders, and proper education) and the rest of the control group to have grown up in unstable environments. This way, we will be able to examine the significance of one's background on one's risk for psychopathy.

The experimental subjects will be assessed through interviews regarding their emotional and mental states as well as their upbringing and environments. Psychiatrists who are specialized in adolescent disorders will interview each experimental subject privately though their conversations will be recorded for future reference while analyzing our results. This interview procedure will allow us to consider the significance of the environments surrounding each individual. The guardians of the experimental group will also fill out the same surveys as those given to the control group and their guardians. Their responses will be compared to their children's responses given during the interviews in order to examine possible inconsistencies in perceptions of their lifestyles. The experimental subjects will also complete the PCL-YV to attempt to control for the levels of psychopathy in the experimental pool. The PCL-YV will measure the 20 behavioral dispositions of the PCL-R with the option of scoring each condition with a 0 (consistently absent), 1 (inconsistent), or 2 (consistently present). The PCL-YV used will reflect the one modified specifically for adolescents by Kosson et al. (2002).

All subjects will undergo fMRI scans and blood draws 20 minutes before and after each scan, which will be centrifuged for their endocrine assays to check hormone levels. Each scan will consist of 60-seconds long videos of adolescent males and females either happily, sadly, or angrily playing with a ball as well as an image of the ball alone. After the scan, there will be another questionnaire given specifically about the videos, asking what the subjects noticed about each video (i.e. descriptions of the facial expressions of the adolescent male or female in each video) and how they felt after watching each video throughout the scan. Potentially, longitudinal studies will be done on the subjects by keeping in contact with the psychiatrists as well as the subjects and their families for the next 5 years to see if their behaviors are in fact transient and if the MNS serves as a plausible indicator for full-onset of adult psychopaths.

Creation of stimuli: Adolescent males and females will be recruited to record films for the happy, sad, and angry videos. They will be required to have no relation to any of the subjects and also be within the same adolescent age range of 15-18 years old. For the happy video, we would expect the subjects to play with the ball in a happy manner, i.e. throwing it up and down or tossing it around with happy expressions including laughter. The sad video, on the other hand, would probably involve the individual not playing with the ball at all or sadly tossing the ball with sad facial expressions. The angry video will consist of the individual exhibiting angry behaviors such as fiercely throwing the ball or attempting to destroy the ball. A neutral image of the ball alone will be used to see if the mirror neuron system reacts to still-life images, which will indicate whether or not the MNS is only related to action recognition mechanisms.

Scanning procedure: The scanning procedures used within this study will follow the methods presented in Buckner and colleagues' study concerning cortical activation during cognitive tasks (Buckner et al., 1996). A 1.5-Tesla General Electric scanner with echo planar imaging (EPI) will be utilized for the scans. In order to reduce movement and noise, the head coil will consist of padding that will surround the subjects' heads. 20 minutes before scanning, each subject will undergo a blood draw using an I.V. catheter. After each subject is positioned within the scanner, he or she will undergo a structural MRI scan (5 minutes), a functional MRI scan as he or she watches the videos and the image of the ball alone (6.12 minutes), and then will be removed from the scanner (5 minutes). After the scan the subjects will rest for about 20 minutes to wait

for hormonal response and then undergo another blood draw. The plasma from the two blood draws will later be assayed primarily for oxytocin and dopamine due to their observed roles in emotional responses including empathy, pleasure, and nurturance using standard protocols for blood assays.

The functional scans will use an EPI sequence with 2 sets in a "block-trial" procedure (Buckner et al., 1996). One set will include the following: (1) male adolescent happily playing with the ball, (2) sadly playing with the ball, (3) angrily playing with the ball, (4) the image of the ball itself. The second set will include the following: (1) the female adolescent happily, (2) sadly, (3) angrily playing with the ball and then (4) the image of the ball itself once again. Each video set will be followed by fixation for 2500 ms. The order in which the subjects view the two sets will be randomized.

Data Analysis and Interpretation

We will analyze the responses to each video of all subjects by processing and standardizing the fMRI scans, examining the questionnaires regarding each subject's interpretation of the videos, comparing hormone levels and correlating the results to the initial surveys, forms, and interviews. There will be three main comparisons: (1) between the control group and experimental group with similar backgrounds (2) between the control and experimental groups with different backgrounds and (3) between the female controls and male control and experimental groups. We expect to see greater activation within the regions suggested to contain the MNS as well as the empathy circuit areas in the control group than in the experimental group (though a more significant difference in levels of activation within the second comparison due to the influences of the contrasting environments). The questionnaires of the control groups are also expected to be more accurate and perceptive of the feelings of the individual in each video. The last comparison will most likely show that females are more emotionally responsive to the videos. The plasma assays will be studied in order to see if the differences in hormones before and after viewing the videos are statistically significant as well as whether or not hormone levels are correlated with differences in emotional response and response within the MNS.

Limitations

There are several limitations to this study, which may affect our data analysis and overall conclusions. For instance, there is the risk of false information being given in the self-reports and interviews. In order to minimize the risk we will closely investigate the interviews and questionnaires completed by the subjects and their guardians. For the experimental group, those who helped recruit the subjects (psychiatrists, juvenile facilities, etc.) will be asked to provide as much information as possible regarding the subjects' backgrounds.

The study will also not address the question of causality in relation to psychopathy. If we find a difference in the MNS between adolescents with psycopathy and those without, we will not be able to say whether those differences are the cause of psycopathy, the result of psychopathy, or if some unknown factor is the cause of both the differences in the MNS and psychopathy.

In addition, the study will not settle the question of causality in terms of hormonal differences and gender differences in MNS. If hormonal differences are found to be correlated with gender differences in MNS response, we will not be able to say whether the hormonal differences are the cause or the effect of the MNS differences or if some other factor (including gender socialization) is the cause of both the differences in hormonal levels and the differences in MNS response.

Significance of Research

Overall, this study may provide new insight pertaining to the functions of mirror neurons in human beings, which is important because this system is poorly understood in general. The study has practical significance because by seeking to understand the roles of the environment, the MNS system, hormones, and gender in psychopathy, this research may provide some suggestions on potential treatments for this condition. Specifically, if our hypotheses prove to be supported by the data we collect, these data will open several new innovations such as possible methods to treat psychopathy at the beginning or

prior to disease onset and begin therapy at an early age. Thus, we believe it is worth pursuing this research.

There are many ethical implications, however, of neuroscience research investigating the role the brain plays in our personality, behavior, perceptions, and beliefs. In order to address these ethical implications, the new and growing field of neuroethics challenges all individuals interested in the scientific world to question the legitimacy and humanity of brain studies and research from both scientific and nonscientific perspectives. This particular study raises ethical questions related to the role the brain plays in personality and behavior as well as the role of gender differences in psychopathy.

Role of Brain in Personality: There is clearly more than one factor, whether biological or external, that affects the development of a human being's persona and characteristics. In general, one must be careful in making direct causal ties between the brain and a behavior since there may be various external factors that also affect that specific behavior. In addition, it is difficult to say that the structuring and activity of one's brain (in this case the regions containing the MNS) in response to certain stimuli indicate future behaviors, personalities, and etc. Furthermore, by observing symptoms that reflect psychopathy but exist before the onset of the disorder – a period known as the "prodrome" – this study raises several ethical issues. Diagnosing psychopathy at an early stage, for example, may lead to various social problems including stigmatization, loss of privacy, and discrimination within the workforce as well as by insurance policies (Haroun et al., 2006). These potential issues are particularly problematic, ethically and personally, for the subjects who do not end up becoming full-fledged psychopaths as adults.

In addition, if the study shows that psychopathy is correlated with differences in the activations of certain neural pathways, some might interpret the results of the study as evidence that psychopaths are not legally responsible for their criminal actions. The question of whether neuroscientific evidence about the correlation between brain activity and criminal behavior should affect our legal system is controversial and has been examined in detail by other neuroethics scholars (Dressing, Sartorius, & Meyer-Lindenberg, 2008; Greene & Cohen, 2004).

Role of Gender in Psychopathy: Due to the history of gender differences and psychopathy, I decided to investigate the idea that differences in hormones and brain compositions are correlated with differences in personalities. The controversial notions that arise from studying gender and brain differences are extensive, and this research may potentially reinforce two problematic ideas: (1) that gender differences are hardwired into the brain and/or the result of hormone differences and (2) that in general, women are more empathetic than men. In order to address these possibilities, we will analyze and present the data with the mentality that we cannot prove direct causality between the brain and behaviors. Furthermore, we will ensure that we consider all of the possibilities that may cause certain differences in behaviors and responses that lie outside the parameters of this study. Individual, cultural, political, and other social variances, for example, may play significant roles in the shaping of one's personality and actions (DesAutels, 2010). Thus, we will refrain from making definitive claims based on our results concerning the possible roles gender differences may have on a person's risk for psychopathy.

Conclusions

The proposed study investigates both exciting and controversial notions that may provide a unique realm of research. The knowledge about the MNS in humans is limited and the path towards psychopathy also lacks concrete data. This study, therefore, may contribute more ideas to help expand these two areas of research. At the same time, as investigators, we must continue to consider the ethical and social implications of this study and of the field of neuroscience as a whole.

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Impulse Control Disorders and Criminal Responsibility: A Neuroscientific Insanity Defense

Emily K. White, Interdisciplinary Studies – Bioethics, Emory University

The insanity defense has undergone serious reformulations since the United States adopted the standard set by the M'Naghten case in 1843. One of the most significant resulted from the 1982 trial of John Hinckley. As a result of the trial the "irresistible impulse" test, or volitional component of the insanity defense, was permanently discarded leaving only the cognitive, or right vs. wrong standard. However, neuroscientific technologies have led to new discoveries, evidencing distinct sites of pathology in the brain that can impair an individual's impulse control to such a degree that many scientists and legal scholars believe they should not be held criminally liable for their behavior. This paper argues that based on the new neuroscientific evidence, the insanity defense in the United States should be re-expanded to include a volitional prong to ensure that individuals with impulse control disorders receive just treatment under the law.

There have always been deeply entrenched cultural stigmas surrounding mental illness and the use of the insanity defense in the United States. However, emerging neuroscience research raises new questions about the existence of free will and what it means to be criminally responsible. The tumultuous history of the insanity defense has had a limiting effect on current laws governing the plea of not guilty by reason of insanity, making current insanity jurisprudence ill-equipped to handle the discoveries of neuroscience. This paper argues that the courts should take a proactive stance in researching the implications of allowing these new technologies into the courtroom. Advances in neuroscience research have led to new discoveries about impulse control disorders providing the scientific evidence needed to expand our legal system's current cognitive standard for mental insanity to include a volitional or "irresistible impulse" standard. Not only do recent neuroscientific discoveries show that an impulse can be considered truly irresistible, but they also provide the courts with techniques for assessing a defendant's impairment in impulse control that are as reliable as the ones presently used to assess defendants' cognitive impairments (Redding, 2006).

I begin this paper by giving a brief history of the insanity defense in the U.S. I then explore recent neuroscientific findings about impulse control disorders. Finally, using articles from the modern field of neurolaw, I argue that given new neuroscientific evidence, which provides a comprehensive understanding of impulse control disorders and their effect on criminal behavior, the current insanity defense should be expanded to include a volitional prong. This would allow all individuals who suffer from impulse control disorders to assert a plea of not guilty by reason of insanity.

History of the Insanity Defense

In order to properly understand how the insanity defense currently operates in the United States, it is first necessary to explore the history of the defense and its foundation within English common law. This begins with the trial of Daniel M'Naghten in 1843. M'Naghten was an English citizen who, due to his schizophrenic delusions, shot Edward Drummond, the secretary to the Prime Minister of England. According to Bennett (2009), M'Naghten's lawyer argued that he "was the creature of delusion and uncontrollable impulse, which took away from him the character of a responsible being" (p. 290). After the jury acquitted M'Naghten, finding him not guilty "on the grounds of insanity," Lord Chief Justice Tindal published a report detailing the opinions of the House of Lords in regards to the jury's decision in order to regulate the future use of the insanity defense. Tindal's report said that in order to be found not guilty by reason of in-

sanity, a defendant's mental illness must have impacted his rational cognitive ability to such a degree that he was unaware that his action was wrong. Consequently, the defendant lacked the requisite *mens rea*, or criminal intent, to be held responsible. This test formed the basis of what is known today as the M'Naghten Rule or the "right vs. wrong test" (Hawkings-León, 1999).

The M'Naghten rule governed the insanity defense in the U.S. until the 1880s, when states began adopting another test under which individuals could be found not guilty by reason of insanity, known as the "irresistible impulse test." This test was first employed in *Parsons v. State* (1887), where the Alabama Supreme Court found the M'Naghten rule too narrow and outdated in light of recent scientific findings. By the 1880s, a majority of doctors in the U.S. and Britain agreed that mental insanity was a brain disease that could not be characterized solely by an inability to distinguish between right and wrong. Numerous doctors and researchers found that many patients with diagnosed mental illnesses did know the difference between right and wrong and that due to the complex pathology of mental disease, all cases of insanity could not be measured by one simple test. Torry and Billick (2010) describe the new irresistible impulse test as the "policeman-at-the-elbow-law," to wit, a person suffers from an "irresistible impulse" only if s/he would have committed the criminal act with a policeman at his/her elbow (p. 257). This test allowed for the treatment of a wider variety of mental illnesses because it permitted individuals to plead not guilty by reason of insanity if they knew the difference between right and wrong but nonetheless could not abstain from criminal action. While sixteen other states followed Alabama's lead and expanded their definition of legal insanity to incorporate this new irresistible impulse test, by 1944 the majority of states still retained the stricter M'Naghten test (Felthous, 2010).

In 1954, the D.C. Circuit Court of Appeals expanded the insanity defense in *Durham v. United States.* The Court found that even with the addition of the irresistible impulse test, the current standard was too stringent and inconsistent with current psychological research – specifically the discovery of the brain's biological influence on physical diseases, or psychosomatic disorders. It determined that both components were insufficient, even when combined, to cover the broad range of mental illnesses that defendants could assert in court. According to Hawkings-León (1999), the court found the M'Naghten rule wanting because it relied too heavily on a symptomatic definition of mental insanity that was not only beyond the capabilities of the court to determine, but also beyond the understanding of medical science. They found the irresistible impulse test deficient because it did not recognize "mental illness characterized by brooding and reflection" (p. 396) and created a new test, known as the "product test" or "Durham Rule." However, many states rejected the product test due to the incredibly wide range of disorders and illnesses that could potentially meet this new standard. Ultimately only two jurisdictions (Washington, D.C. and New Hampshire) actually adopted the test (Hawkings-León, 1999).

The next major change to insanity jurisprudence came in 1962 with the American Law Institute's Model Penal Code. The American Law Institute set out to develop a more uniform penal code and, in doing so, created a new set of criteria for pleading not guilty by reason of insanity. According to the Model Penal Code § 4.01, "A person is not responsible for criminal conduct if at the time of such conduct as a result of mental disease or mental defect he lacks substantial capacity either to appreciate the criminality [wrongfulness] of his conduct or to reform his conduct to the requirements of the law," and "the terms 'mental disease or defect' do not include an abnormality manifested only by repeated criminal or otherwise anti-social conduct." This reformulation of the insanity defense incorporates both the cognitive component of the M'Naghten rule, "substantial capacity to appreciate the criminality of his conduct," and the volitional component of the irresistible impulse test, "to reform his conduct to the requirements of the law." Thus, the Model Penal Code's incorporation of an inability to reform one's conduct allowed people under an 'irresistible impulse' and consequently unable to control or reform their conduct to mount an insanity defense.

Torry and Billick (2010) point out that in addition to excluding psychopathy and sociopa-

thy from the categories of mental disease and defect, the standard of the Model Penal Code mandated that mental diseases and defects be medically diagnosed. This consequently allowed medical and psychiatric practitioners to testify and present evidence regarding the defendant's mental state. That same year, in *McDonald v. United States* (1962) the D.C. Circuit rendered the first exclusively legal definition of mental disease or defect as "any abnormal condition of the mind which substantially affects mental or emotional processes and substantially impairs behavioral controls." The Second Circuit Court of Appeals adopted the insanity standard from the Model Penal Code in *United States v. Freeman* (1966). The D.C. Circuit followed suit in *United States v. Brawner* (1972), but initially recognized the *McDonald* definition, consequently disregarding the MPC's exclusion of psychopathic and sociopathic disorders. Unlike the product test, the MPC standard received substantial judicial recognition. By 1982, twenty-two states had adopted a version of the Model Penal Code, while twenty-six states still utilized some version of the M'Naghten Rule (Torry & Billick, 2010).

The Impact of *Hinckley*

Acceptance of the more liberal MPC standard didn't last long, in large part because of the highly publicized trial of John Hinckley Jr. in 1982. Hinckley attempted to assassinate President Ronald Reagan, shooting him and three other individuals while under the delusional belief that it would impress actress Jodie Foster. Hinckley offered a plea of not guilty by reason of insanity. At that time, if a defendant pled not guilty by reason of insanity, the District of Columbia imposed the burden on the government to prove, beyond a reasonable doubt, that the defendant was in fact sane at the time of the crime. This meant that if the prosecution was unable to prove Hinckley was sane during the commission of the crime, the jury would have to find in favor of Hinckley. During the trial, the judge admitted Hinckley's CT scans, which revealed abnormal brain atrophy (Aronson, 2010). The prosecution and defense proffered experts who agreed that Hinckley was psychologically disturbed, but presented contradictory testimony on the degree of Hinckley's mental illness and whether it was his prevailing mental state at the time of the crime. In the end, the jury found Hinckley not guilty by reason of insanity. Both the public and the government were incensed by the verdict, which they believed allowed sane, guilty offenders to be unjustly acquitted. This resulted in a number of negative outcomes for the insanity defense.

After the Hinckley decision, the American Psychiatric Association and American Medical Association changed their official stances regarding insanity jurisprudence in the U.S., urging that the plea either be abolished or significantly restricted. A number of states did away with the plea of not guilty by reason of insanity all together, instead favoring a more simple *mens rea* defense or a new guilty but mentally ill verdict. After *Hinckley,* a majority of states also shifted the burden of proof from the state to the defendant, who would now have to prove that s/he was mentally insane at the time of the crime, or else the jury would have to find in favor of the prosecution.

Congress enacted the Insanity Defense Reform Act (IDRA) in 1984, the first federal legislative attempt at regulating the insanity defense (Torry & Billick, 2010). The IDRA (1984) requires that in order to be found not guilty by reason of insanity a defendant must prove that "as a result of a *severe* mental disease or defect, [he] was unable to appreciate the nature and quality of the wrongfulness of his acts [at the time they were committed]." This strict interpretation of the M'Naghten test excludes the volitional prong contained in the MPC and officially makes the federal plea of not guilty by reason of insanity an affirmative defense, with the standard of proof being clear and convincing evidence. The IDRA also restricts the admissibility of expert testimony, prohibiting expert witnesses from testifying whether the defendant actually had the requisite mental condition to commit the crime (Hawkings-León, 1999).

The IDRA still governs the defense of not guilty by reason of insanity in federal courts. In the majority of states that recognize the plea, the insanity defense closely resembles the M'Naghten Rule. Furthermore, in the recent case of *Clark v. Arizona*, the U.S. Supreme Court specifically upheld states' right to prohibit

irresistible impulse or "diminished capacity" defenses (Felthous, 2010).

Neuroscience Evidence and Impulse Control

Given the current, extremely restrictive state of the insanity defense, it is important to look at what the admission of neuroscience research could mean for criminally insane defendants, especially those suffering from impulse control disorders. While neuroscientific evidence is generally presented to illustrate brain abnormalities or defects that could potentially explain a person's deviant behavior, allowing this kind of evidence to be introduced in cases of not guilty by reason of insanity could have even greater implications, including absolving an individual of criminal responsibility (Aronson, 2010). Specifically, neuroscience evidence could play a major role in both the guilt and sentencing phases of trials where the defendant pleads not guilty by reason of insanity, both during the guilt phase, by allowing the jury to see physical evidence corroborating the testimony of expert witnesses (psychiatrists, psychologists, etc.) and during the sentencing phase, where it could convince the judge to reduce the sentence for defendants who are found guilty but mentally ill (Aronson, 2010).[1]

Unfortunately, Moriarty (2008) states that while a majority of courts have accepted the use of x-rays, MRIs, EEGs, and CT scans to identify "physiological structures, trauma, and certain illnesses," (p. 47) courts are much more reticent to allow neuroimages as proof of a defendant's inability to understand the wrongfulness of his act or conform his conduct to the requirements of the law due to frontal lobe damage. The notable exception is in the sentencing phase, where the federal death penalty statute provides that impaired capacity should be considered as a mitigating factor.

However, new neuroscience research is establishing an indisputable correlation between brain dysfunction and the inability to control one's behavior. Courts may no longer be able to ignore the important role of neuroscience in determining the cognitive capacities requisite to criminal culpability (Sasso, 2009). Thus, it is important to understand how the medical and legal communities view and define impulse control disorders.

According to the DSM-IV-TR (2000), "the essential feature of Impulse Control Disorders is the failure to resist an impulse, drive, or temptation to perform an act that is harmful to the person or to others" (p. 663). Impulse control disorders include intermittent explosive disorder, kleptomania, pyromania, pathological gambling, trichotillomania, and impulse-control disorders not otherwise specified.[2] In neuroscience and the law, this term is used more broadly to encompass any sort of significantly impaired control over one's impulses that is a direct result of a brain function disorder. Recent neuroscientific studies illustrate how damage or dysfunction in specific areas of the brain can result in reduced behavior control and how these behaviors are directly linked to criminal behavior.

A study by Magyar, Carr, Rosenfeld, and Rotter (2009), entitled "An Exploration of the Relationship Between Criminal Cognitions and Psychopathy in a Civil Psychiatric Sample," illustrates the link between disordered functioning, including impulse control disorders, and criminal activity. The authors researched the relationship between criminal cognitions and psychopathy in a sample of civil psychiatric patients, 29.5% of whom fell within the diagnostic range of psychopathy. They found that psychopathy is heavily intertwined with criminal think-

[1] The current standards governing the admissibility of expert testimony and evidence are based on the specific state's or federal rules of evidence, as well as the state's adoption of either the *Frye* standard (scientific evidence must be "general accepted" by the relevant scientific community) or the federal, *Daubert* standard (a judge must determine that the evidence is both scientifically reliable and relevant to the case at hand).

[2] The proposed changes for the DSM-V classify ICDs under Disruptive, Impulse Control, and Conduct Disorders, remove pyromania and kleptomania as distinct disorders (though they retain fire setting and compulsive stealing as symptoms of a conduct disorder or ICD respectively), and reclassify pathological gambling as gambling disorder under Addiction and Related Disorders, and trichotillomania as hair-pulling disorder under Obsessive Compulsive and Related Disorders.

ing and the criminal cognitions that produce it, implying that individuals with psychiatric conditions, a large percentage of whom display psychopathic traits, are much more likely to engage in antisocial and impulsive behaviors. Magyar et al. also determined that some factors associated with criminal thinking are better explained by "neurocognitive defects (e.g., attention problems), than [by] personality variables" (p. 874). This finding further supports the conclusion that individuals who suffer from impulse control disorders have an increased tendency to engage in criminal thinking and, consequently, behavior. Finally, the authors suggest that using the findings from this study, and others like it, patients can be treated using improved mental health practices aimed at correcting cognitive deficiencies.

Neurolaw and the Reformation of the Insanity Defense

Richard E. Redding's 2006 article, "The Brain Disordered Defendant: Neuroscience and Legal Insanity in the Twenty-First Century" presents some of the most compelling evidence supporting the existence of impulse control disorders and their effect on individuals' cognitive and behavioral functioning. Redding focuses on the relationship between impulsive criminal conduct and frontal lobe dysfunction, a brain disorder that is characterized by damage to the frontal lobes resulting in structural and/or functional abnormalities that can be the result of injury or illness. Redding posits that this association is not surprising given that the frontal lobes have been directly linked to "the executive brain functions of attention allocation, planning, decision making, judgment, behavioral monitoring and impulse control" (p. 67).

Redding concludes that damage to the ventromedial prefrontal cortex of the prefrontal lobe is most directly associated with impulsivity and aggression, while damage to the dorsolateral prefrontal cortex more commonly impairs judgment and ethical reasoning. The numerous scientific studies he presents evidence a clear correlation between the first type of frontal lobe disorder and the following behavioral characteristics: extremely poor judgment; inability to learn from prior experiences; risky decision making for short-term gains; insensitivity to long-term negative consequences; pseudo-psychopathy – differentiated by a tendency towards *impulsive* aggression; emotional reactivity, or episodic dyscontrol characterized by rage attacks; and repetitive, impulsive criminal behavior. Thus, these studies prove that individuals with frontal lobe disorders are prone to impulsive, sometimes criminal behaviors, as a direct result of their brain disorder and not because they have a personal will to commit these acts. Redding also notes that although the existence of frontal lobe disorder in and of itself does not necessarily result in any particular one of these characteristics, a mild dysfunction in the frontal lobe may result in impulsive or violent behavior if there is also a specific impulse control disorder diagnosis, a coexisting psychiatric disorder with paranoid features, or a history of abuse in childhood. In other words, patients with psychiatric disorders who have any frontal lobe disorder are much more likely to commit uncontrollable, aggressive, likely criminal, acts.

Redding's article establishes that individuals suffering from frontal lobe disorders have a biological disposition to aggressive criminal behavior that they cannot control. He notes that while people with these disorders may know that what they are doing is wrong, they are unable to stop themselves. Therefore, Redding's work demonstrates that the current cognitive standard of the insanity defense is insufficient because it fails to take into account those individuals who commit impulsive criminal acts as a result of frontal lobe disorders.

Maxwell Bennet's 2009 article, entitled "Criminal Law as it Pertains to 'Mentally Incompetent Defendants': A McNaughton Rule in the Light of Cognitive Neuroscience," illustrates a link between dysfunction in the pre-supplementary motor area of the brain and an apparent lack of self-control. Unlike Redding, who focuses on frontal lobe disorder, Bennett demonstrates how dysfunction in two other areas of the brain can result in uncontrollable, impulsive behavior. Bennett argues that damage to the pre-supplementary motor area results in an inability to act appropriately or refrain from one action and shift to another. He also provides evidence of a link between dysfunction in the orbitofrontal cortex of the brain and impulsivity and decreased delay aversion. Bennett asserts

both that lesions and/or degeneration in the orbitofrontal cortex make people uninhibited, leading to inappropriate, impulsive behavior, and that abnormal or decreased activity in the orbitofrontal cortex diminishes the ability to resist short-term rewards in favor of major long-term rewards.

The scientific evidence presented in both of these articles demonstrates that an individual's inability to control his or her impulses can be directly linked to specific sites of pathology in the brain. These neuroscientific findings also provide substantial proof that impulse control disorders can be accurately assessed and distinguished from a voluntary choice to resist an impulse. This research contradicts the leading arguments against expanding the current insanity jurisprudence: that any mental illness substantial enough to exculpate a crime will necessarily meet the cognitive standard and thus, a volitional test is unnecessary; that the brain cannot mandate behavior and thus, people should be held responsible for their behavior whether or not they have a brain abnormality; and that the field of neuroscience and the evidence produced by it are still too infantile to be used in a legal setting. Instead, considering brain-based proof of impulse control disorders actually supports the inclusion of a volitional or "irresistible impulse" test.

Conclusion: Return to Pre-*Hinckley*

Neuroscience research illustrates that an individual can be considered cognitively sane under the law yet be incapable of controlling his or her behavior to such an extent that she or he should not be held criminally liable. A cognitive test alone is too restrictive because it fails to include other types of mental insanity that should absolve an individual of criminal responsibility. In order to achieve true justice, the United States must consider a return to a pre-*Hinckley* insanity defense, one that includes both the current cognitive standard and a volitional, control standard.

Currently, individuals who have impulse control disorders, but retain their cognitive and reasoning abilities, cannot mount an insanity defense under the cognitive standard. The denial of this defense may violate due process of law. Simply claiming that a defendant is unable to control his behavior due to a mental disease or defect is not the same as saying that society should allow his actions because they are the product of mental disease or defect, but rather that this impairment renders him unable to conduct himself in accordance with the law and, therefore, he should not be punished or held liable under that law. Instead, as Magyar (2009) suggests, individuals suffering from impulse control disorders who are charged with criminal acts should be committed to a mental institution where they can receive help and treatment for their condition. It is not only potentially unconstitutional, but also immoral not to allow a defendant with an impulse control disorder to present a not guilty by reason of insanity defense, especially in light of the new neuroscientific findings. In conclusion, the current insanity jurisprudence in the U.S. must be expanded to incorporate a volitional or "irresistible impulse" standard in order to ensure justice for all.

References

American Law Institute. (1962). *Model Penal Code* § 4.01. Philadelphia, PA.

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.).

Aronson, J. D. (2010). The law's use of brain evidence. *Annual Review of Law and Social Science*, *6*, 93-108.

Bennett, M. (2009). Criminal law as it pertains to 'mentally incompetent defendants': A McNaughton rule in the light of cognitive neuroscience. *Australian and New Zealand Journal of Psychiatry*, *43*(4), 289-299.

Felthous, A. R. (2010). Psychopathic disorders and criminal responsibility in the USA. *European Archives of Psychiatry and Clinical Neuroscience, 260*, 137-141.

Hawkings-León, C. G. (1999). "Literature as law": The history of the insanity plea and a fictional application within the law & literature canon. *Temple Law Review*, *72*, 381-450.

Magyar, M., Carr, W.A., Rosenfeld, B., & Rotter, M. (2009). An exploration of the relationship between criminal cognitions and psychopathy in a civil psychiatric sample. *International Journal of Offender Therapy and Comparative Criminology, 54*(6), 865-877.

McDonald v. United States, 312 F. 2d 847, 851 (D.C. Cir. 1962).

Moriarty, J. C. (2008). Flickering admissibility: Neuroimaging evidence in the U.S. courts. *Behavioral Sciences & the Law, 26*(1), 29-49.

Redding, R. E. (2006). The brain-disordered defendant: Neuroscience and legal insanity in the twenty-first century. *American University Law Review*, *56*(1), 51-127.

Sasso, P. (2009). Criminal responsibility in the age of 'mind-reading'. *American Criminal Law Review*, *46*, 1191.

The Insanity Defense Reform Act of 1984, Pub. L. No. 99-646, § 17, 100 Stat. 3599 (1986).

Torry, Z. D., & Billick, S. B. (2010, April 6). Overlapping universe: Understanding legal insanity and psychosis. *Psychiatric Quarterly, 81,* 253-262.

Appendix A: Course Syllabus

Feminism, Sexuality, and Neuroethics
(WGS 385-005/NBB 370-001) Spring 2012

Co-Instructors:
Cyd Cipolla and Kristina Gupta

Course Description:
Neuroethics is an emerging field that considers the interaction between neuroscience, behavioral biology, society, and ethics. Major questions of concern within neuroethics include: How do scientific discoveries impact society? How can scientific researchers more fully understand the ethical implications of their work? The intersection of feminist science studies with the field of Neuroethics produces new ways to ask these questions, considering, for example, not only how science impacts society, but how scientific research is shaped by cultural assumptions. Ultimately, students in this class will combine the critical thinking skills from both of these fields to answer the question: How can we all be responsible consumers and/or producers of neuroscientific knowledge?

Students in this class will learn the major topics and themes within the field of Neuroethics through critically examining historical and contemporary scientific research on sexuality and the brain. Each unit of the class focuses on a different area within the field of scientific research on sexuality and the brain. Students will read the significant scientific study or studies on the topic alongside reports about the study in mainstream news media outlets, and then follow this by reading critiques of the work from both inside and outside the scientific community.

This class is open to students in the sciences, social sciences, and humanities. No previous experience with neuroscience research or sexuality research is required.

Course Objectives:
1. To develop the skills required to critically read and understand scientific articles in the field of neuroscience
2. To develop the skills required to examine the cultural assumptions influencing scientific research on sexuality and the brain and to analyze the ethical and political implications of this research for society
3. To develop an understanding of how neuroscientific research is conveyed to the public through media

Texts: All course readings are articles. They will be available on e-reserves through the library and/or on the course Blackboard site.

Participation/Attendance: Students are expected to come to class each session having *actively* read the text(s) assigned for that date. Class participation consists of asking questions when material is unclear and engaging in productive, relevant, critical conversation during discussion periods. **(10%)**

Short Writing Assignments: For most weeks, students will write short writing assignments in response to the assigned reading (~250 words) designed to train them as critical and effective readers. On other weeks, students will have short writing assignments in preparation for the final paper/research proposal. Specific instructions will be given in class. **(30%)**

Midterm: In the eighth week of class, students will undertake a two part project wherein they will act as producers of neuroscientific knowledge in different ways. Each student will be assigned to a scientific research team and given the hypothesis and data from an experiment. The teams will have to write up conclusions based on those results as if preparing the discussion section of a journal article. They will present those findings to the rest of the class. Students in the audience will play the part of news media, and write up articles based on the research to be posted on the class blog. **(30%)**

Final: Students can choose to prepare **A)** A 12-15 page research or analytical paper on a topic related to class, or **B)** A 12-15 page research proposal describing a research project related to the class. Students will choose their path at midterm and will work with the instructors to design and complete the requirements for their chosen topic or question. **(30%)**

Course Schedule:

Introduction

Friday, Jan 20: Intro to Neuroethics

- Wolpe PR. 2004. "Ethics and Social Policy in Research on the Neuroscience of Human Sexuality." *Nature Neuroscience*. 7: 1031-1033.
- Farah MJ. 2005. "Neuroethics: the Practical and the Philosophical." *Trends Cogn Sci*. (1): 34-40.

Monday, Jan 23: Intro to Neuroethics

- Farah MJ, Wolpe PR. 2004. "Monitoring and Manipulating Brain Function: New Neuroscience Technologies and their Ethical Implications." *Hastings Cent Rep*. 4(3): 35-45.

Wednesday, Jan 25: Intro to Feminist Science Studies

- Fox Keller, Evelyn. 1982. "Feminism and Science." *Signs*. 7(3); 589-602.

Friday, Jan 27: Intro to Feminist Science Studies - **Reading Response 1 Due**

- Schiebinger, Londa. 1989. "More Than Skin Deep: The Scientific Search for Sexual Difference," from *The Mind Has No Sex? Women in the Origins of Modern Science*. Cambridge, MA: Harvard University Press, 189-213.

Monday, Jan 30: Brain Basics

- Kandel E, Schwartz J, Jessell T. 2000. "Chapter 1: The Brain and Behavior," from *Principles of Neural Science 4th Edition*. McGraw-Hill Medical, 5-18.

Wednesday, Feb 1: Imaging the Brain: Neuroscience Research Methods I

- Baars BJ, Gage NM. 2010. "Chapter 4: The Tools: Imaging the Living Brain," from *Cognition, Brain, and Consciousness, Second Edition: Introduction to Cognitive Neuroscience*. Academic Press, 95-126.

Friday, Feb 3: Imaging the Brain: Neuroscience Research Methods II

- Joyce, Kelly. 2005. "Appealing Images: Magnetic Resonance Imaging and the Production of Authoritative Knowledge." *Social Studies of Science*. 35(3): 437-462.
- **Reading Reponse 2 Due**

Topic: Brains, Past and Present, Part 1 - Historical Case Study

Monday, Feb 6

- Krafft-Ebing, Richard von. 1889 (trans. 1965). "General Pathology," from *Psychopathia Sexualis,* New York, NY: Arcade, 32-52.

Wednesday, Feb 8

- Oosterhaus, Harry. 2000. "Classifying and Explaining Perversion," from *Stepchildren of Nature: Krafft-Ebing, Psychiatry, and the Making of Sexual Identity.* Chicago, IL: University of Chicago Press, 43-55.

Friday, Feb 10 - **Reading Response 3 Due**

- Schultheiss, Dirk and Sidney Glina. 2010. "Highlights from the History of Sexual Medicine." *J Sex Med*;7:2031–2043.

Part 2 - Contemporary Understandings of the Brain and Sexual Desire

Monday, Feb 13

- Fisher HE, Aron A, Mashek D, Li H, Brown LL. 2002. "Defining the Brain Systems of Lust, Romantic Attraction, and Attachment." *Arch Sex Behav*. 31(5): 413-9.

Wednesday, Feb 15

- Toates F. 2009. "An Integrative Theoretical Framework for Understanding Sexual Motivation, Arousal, and Behavior." *J Sex Res*. 46(2-3): 168-93.

Friday, Feb 17 - **Reading Response 4 Due**

- Lorber, Judith. 1994. "How Many Opposites? Gendered Sexuality," from *Paradoxes of Gender*. New Haven, CT: Yale University Press, 55-79.

Topic: Gender Differences in Sexuality

Monday, Feb 20

- Hamann S, Herman RA, Nolan CL, Wallen K. 2004. "Men and Women Differ in Amygdala Response to Visual Sexual Stimuli." *Nat Neurosci*. 7(4): 411-6.
- Canli T, Gabrieli JD. 2004. "Imaging Gender Differences in Sexual Arousal." *Nat Neurosci*. 7(4): 325-6.

Wednesday, Feb 22

- DesAutels, Peggy. 2010. "Sex Differences and Neuroethics." *Philosophical Psychology*. 23(1): 95-111.

Friday, Feb 24 - **Reading Response 5 Due**

- Fausto-Sterling, Anne. 2000. "Chapter 5: Sexing the Brain: How Biologists Make A Difference." from *Sexing the Body: Gender Politics and the Construction of Sexuality*. New York, NY: Basic Books, 115-145.

Topic: The "Gay Brain" Part I

Monday, Feb 27

- LeVay S. 1991. "A Difference in Hypothalamic Structure between Heterosexual and Homosexual Men." *Science*. 253(5023): 1034-1037.

Wednesday, Feb 29

- Barinaga M. 1991. "Is Homosexuality Biological?" *Science*. 253(5023): 956-957.
- Suplee, Curt. "Brain May Determine Sexuality; Node Seen as Key To Gay Orientation." *The Washington Post*. Aug 30, 1991.

Friday, Mar 2

- Hegarty, Peter. 1997. "Materializing the Hypothalamus: A Performative Account of the 'Gay Brain.'" *Feminism and Psychology*. 7(3): 355-372.

Monday, March 5 – Friday, March 9 - **Midterm Project**

Monday, Mar 12 – Friday, March 16 - **Spring Break – No class**

Topic: The "Gay Brain" Part II

Monday, Mar 19

- Savic I, Lindstrom P. 2008. "PET and MRI Show Differences in Cerebral Asymmetry and Functional Connectivity between Homo- and Heterosexual Subjects." *PNAS*. 105(27): 9403-9408.
- Park, Alice. "What the Gay Brain Looks Like." *Time.* Tuesday, June 17, 2008.

Wednesday, March 21

- Stein, Ed. 1999. "Critique of the Emerging Research Program." from *The Mismeasure of Desire: The Science, Theory and Ethics of Sexual Orientation*. Oxford; New York: Oxford University Press, 190-228.

Friday, March 23

- Sedgwick, Eve Kosofsky. 1991. "How to Bring Your Kids up Gay." *Social Text*. 29: 18-27.
- **Reading Response 6 Due**
- **Students must meet with one of the instructors regarding their final paper/research proposal by this date**

Topic: Sex Addiction/Hypersexuality

Monday, March 26

- Miner MH, Raymond N, Mueller BA, Lloyd M, Lim KO. 2009. "Preliminary Investigation of the Impulsive and Neuroanatomical Characteristics of Compulsive Sexual Behavior." *Psychiatry Res*. 174(2): 146-51.
- Bostwick JM, Bucci JA. 2008. "Internet Sex Addiction Treated with Naltrexone." *Mayo Clin Proc*. 83(2): 226-30.

Wednesday, March 28

- Hyman, S.E. 2007. "The Neurobiology of Addiction: Implications for Voluntary Control of Behavior." *The American Journal of Bioethics*. 7(1): 8-11.

Friday, March 30 - **Question for Final Due**

- Irvine JM. 1995. "Reinventing Perversion: Sex Addiction and Cultural Anxieties." *Journal of the History of Sexuality*. 5(3): 429-450.

Topic: Sexual Desire Disorders

Monday, April 2

- Bianchi-Demicheli, F., Cojan, Y., Waber, L., Recordon, N., Vuilleumier, P. and Ortigue, S. 2011. "Neural Bases of Hypoactive Sexual Desire Disorder in Women: An Event-Related fMRI Study." *The Journal of Sexual Medicine*. 8(9): 2546–2559.

Wednesday, April 4

- Stahl SM. 2010. "Targeting Circuits of Sexual Desire as a Treatment Strategy for Hypoactive Sexual Desire Disorder." *J Clin Psychiatry*. 71(7): 821-2.

Friday, April 6 - **Reading Response 7 Due**

- Tiefer L. 2006. "Female Sexual Dysfunction: a Case Study of Disease Mongering and Activist Resistance. *PLoS Med*. 3(4): 178.

Topic: Sexual Offenders/Paraphilias

Monday, April 9

- Ponseti J, Granert O, Jansen O, Wolff S, Beier K, Neutze J, Deuschl G, Mehdorn H, Siebner H, Bosinski H. 2011."Assessment of Pedophilia Using Hemodynamic Brain Response to Sexual Stimuli."*Arch Gen Psychiatry*. Online First.

Wednesday, April 11

- Jordan K, Fromberger P, Stolpman G, Müller JL. 2011. "The Role of Testosterone in Sexuality and Paraphilia-A Neurobiological Approach. Part II: Testosterone and Paraphilia." *J Sex Med.* 8(11): 3008-29.

Friday, April 13 - **Annotated Bibliography or Literature Review for Final Due**

- Schiltz K, Witzel J, Northoff G, Zierhut K, Gubka U, Fellmann H, Kaufmann J, Tempelmann C, Wiebking C, Bogerts B. 2007. "Brain pathology in pedophilic offenders: evidence of volume reduction in the right amygdala and related diencephalic structures. *Arch Gen Psychiatry.* 64(6): 737-46.

Monday, April 16

- Healy, Melissa. "Diagnosing Pedophilia with a Brain Scan." *Los Angeles Times.* October 3, 2011.
- "To Catch a Predator… With a Brain Scanner?" http://neuroskeptic.blogspot.com/2011/10/to-catch-predator-with-brain-scanner.html

Wednesday, April 18

- Dressing H, Sartorius A, Meyer-Lindenberg A. 2008. "Implications of fMRI and Genetics for the Law and the Routine Practice of Forensic Psychiatry." *Neurocase*. 14(1): 7-14.

Friday, April 20 - **Reading Response 8 Due**

- Greene and Cohen. 2004. "For the Law, Neuroscience Changes Nothing and Everything" *Philos Trans R Soc Lond B Biol Sci*. 359(1451): 1775-85.

Topic: Monogamy

Monday, April 23

- Young LJ. 2009. "Being Human: Love: Neuroscience reveals all." *Nature*. 457(7226): 148
- Lim MM et al. 2004. "Enhanced Partner Preference in a Promiscuous Species by Manipulating the Expression of a Single Gene." *Nature*. 429: 754-757.
- Fink S, Excoffier L, and Heckel G. 2006. "Mammalian Monogamy is not Controlled by a Single Gene." *PNAS*. 103(29): 10956-10960.

Wednesday, April 25

- Savulescu, Julian, and Anders Sandberg. 2008. "Neuroenhancement of Love and Marriage: The Chemicals Between Us." *Neuroethics*. 1: 31-44.
- Wade, Nicholas. "DNA of Voles May Hint at Why Some Fathers Shirk Duties." *The New York Times*. June 10, 2005.

Friday, April 27 - **Final Outline (or Draft - optional) Due**

- Ritchie A and Barker M. 2006. "'There Aren't Words for What We Do or How We Feel So We Have To Make Them Up': Constructing Polyamorous Languages in a Culture of Compulsory Monogamy." *Sexualities*. 9(5): 584-601.

Monday, April 30 – Wrap-Up and Work-shopping Drafts

A collection of undergraduate student papers written by participants in "Feminism, Sexuality and Neuroethics," a course taught at Emory University in Spring 2012 by Cyd Cipolla and Kristina Gupta. Course administration provided by the departments of Neuroscience and Behavioral Biology and Women's, Gender, and Sexuality Studies of Emory University. Publication edited by Cyd Cipolla and Kristina Gupta. Cover design and content layout by Anjana Kallarackal. Published by the Neuroethics Program of the Center for Ethics at Emory University.

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