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FORWARD

Letter From the Editor

Dear Readers,

I am pleased to introduce you to our latest issue of *The Owl*. I am honored to have served as Editor-in-Chief of Florida State's prestigious undergraduate research journal. I am truly grateful for my editors, Bryanna Major and Camila Aponte, who worked tirelessly to help deliver an outstanding collection of research. Our team is proud to present a diverse range of exceptional research showcasing the dedication and commitment of Florida State's undergraduate researchers. I hope you will find their research as inspiring and thought-provoking as I have.

I would like to thank Eli Mckown-Dawson, Maria Aleman-Martinez, and Lydia Fertil for their unwavering support throughout my time with SCURC. A special thanks to SCURC Advisor David Advent for his invaluable guidance for my team and me.

Lastly, I would like to thank you, our readers, for your interest in our research journal. We take immense pride in presenting you with this year's edition of *The Owl* and invite you to join us in celebrating our student researchers. Stay tuned for our upcoming editions!

Sincerely,

Arthi Solayappan

ARTICLES

*The French and English Evolution of
Anatomical Dissections and Their
Implementation in Legal Medicine in the
Eighteenth Century*

By Emma Reed



Emma Reed is a Class of 2023 graduate with a History degree and a Political Science minor. She is interested in researching crime patterns in urban areas and how specific criminal behavior relates to increased or decreased criminal activity. She is currently working on her Master's degree in Forensic Psychology with the intention to join the Federal Bureau of Investigation as a criminal profiler.

I.

Introduction

“Darkness had no effect upon my fancy, and a churchyard was to me merely the receptacle of bodies deprived of life.”¹ Mary Wollstonecraft Shelley’s book, *Frankenstein*, exemplifies the taboo nature of early eighteenth century studies of human anatomy, or the study of the human organ systems. . Prior to Wollstonecraft’s esteemed novel, in ancient times, different cultures performed various forms and techniques when dissecting the dead. In Egypt, organs from the torso would be removed from the body and put into jars in a tomb and the brain would be extracted from the skull via a passage in the nose. In Babylon, early surgeons would dissect animals to discern how human organs functioned. Greek surgeons and medical philosophers would dissect bodies to find a source for the human soul². For many of these early anatomists, the intent behind these dissections was to determine how the body functioned under certain circumstances, such as fighting off an illness or understanding how the human body could exist under extreme climactic conditions. While anatomical dissections had been performed for centuries, many religions, such as Islam and Christianity, forbade dissection, believing that dissections desecrated the body, and that the soul would not be able to rest in peace.

With the rise of monotheistic religions in Europe, predominantly Christianity, early doctors, called human anatomists, would resort to grave robbing to access cadavers necessary for their studies. Despite beginning with grave robberies and operating on the outskirts of the law, anatomical dissections became a foundational cornerstone in early forensic pathology and was

¹ Shelley, Mary Wollstonecraft. *Frankenstein; or, The Modern Prometheus*. London, Printed for Lackington, Hughes, Harding, Mavor, & Jones, 1818. Pdf. <https://www.loc.gov/item/53051218/>.

² “Anatomy: Art and Science.” Science Museum, July 10, 2019.

<https://www.sciencemuseum.org.uk/objects-and-stories/medicine/anatomy-art-and-science>.

key in the medico-legal field. Dissections had been performed on royals and nobles in England as early as the 1500s, under the Tudor Dynasty, where they were used to determine if a nobleman had been poisoned or assassinated in some manner. Anatomical dissections and the overall field of pathology in the eighteenth century had great advancements not seen in the previous centuries of its practice and implementation. In the following centuries, anatomical dissections—or later be referred to as autopsies—would become more efficient and vital in the arena of legal medicine, especially in cases of violent crimes or death caused vis-à-vis suspicious methods.

II.

Early Evolution of French Human Anatomy

The evolution of French forensic pathology is closely tied with legal changes and religion during the years between the 17th and 18th centuriesth and 18th centuries. In the fourteenth century, Pope Boniface VIII passed a papal bull, or a holy order, stating that the dissection of cadavers was strictly forbidden by the Catholic Church. As the Catholic Church controlled all of Europe by being the head of Christianity, anatomical dissections were not allowed, halting investigations into suspicious deaths and preventing scientific and medical advancements and knowledge. In the 14th century, Henri de Mondeville of France performed the first anatomical dissection since the implementation of the papal bull.³ Following his dissection, other French chemists and surgeons began performing their own dissections. However, despite de Mondeville's pioneering act against the Church, by the 1600s, the Catholic Church still did not permit anatomical dissections.

³ SK;, Ghosh. "Human Cadaveric Dissection: A Historical Account from Ancient Greece to the Modern Era."

Despite the setbacks created by the Catholic Church, France was one of the leading countries in studying human anatomy and anatomical dissections, primarily in two fields: morbid anatomy and rape.

Morbid anatomy is the study of tumors and other aggravated forms of diseased organs and tissues⁴, and at the time, both morbid anatomy and anatomical dissections were in their early stages of understanding in France. Oftentimes the diseased organs would become the cause of death or contributing factor; those who died in this manner would be examined by human anatomists and surgeons in their studies. Because of the rapid expansion in the study of morbid anatomy and its close relation with the slowly growing field of anatomy, there was a drastic increase of medical school access in France, leading to a greater understanding of the complexities of human anatomy, the interaction between healthy organs and diseased ones, and how these diseased organs would present themselves in both a living human and in a deceased one; this rapid development made France one of the most prominent countries to learn about anatomical dissection.

Anatomical dissections also became particularly important for rape cases. Rape was deemed a truly heinous act under the *ancien regime*, and in some cases the names of rapists would be printed in pamphlets and passed around the city as a sort of sex offenders list. Along with the public humiliation from the pamphlets, the sentences during the *ancien regime* varied for rape, with wide ranging prison times, torture via “the iron collar, the whip, branding, cutting off the hand, hanging, the stake, and the wheel”, as well as fines, and banishment.⁵ As child rape

⁴ de Saint-Maur, Paul P. “The Birth of the Clinicopathological Method in France: The Rise of Morbid Anatomy in France during the First Half of the Nineteenth Century.” *Virchows Archiv* 460, no. 1 (2011): 109–17. <https://doi.org/10.1007/s00428-011-1162-2>.

⁵ Vigarello, Georges, and Jean Birrell. “Violence Like Any Other?” Essay. In *A History of Rape: Sexual Violence in France from the 16th to the 20th Century*, 9–23. Cambridge: Polity, 2001.

and rape-murder cases became more common after the fall of the *ancien regime*, legal medicine, and the need for anatomical dissections where necessary, becoming more prominent in cases where rape was claimed on behalf of the family.

A new understanding of the hymen—a thin membrane in the vaginal cavity that many doctors and surgeons used to determine if a young woman was a virgin, as it would tear during intercourse — and its location, provided prudent information when investigating young women as victims of rape. For example, if the hymen and surrounding tissue was severely damaged and torn, rape is a plausible cause. A case in 1760, where a young girl named Sabine Petit was raped, the surgeons noted in the report that “the hymen membrane was totally destroyed by reason of which we believe there has been intromission [penetration].”⁶ During an autopsy where the deceased’s family claimed the victim was raped, surgeons would search for the torn hymen, any vaginal tearing and corresponding bruising around the pelvic area; they would then examine the torso for any indication of the deceased being held down or struck during the assault. This form of examination became a common practice for surgeons and human anatomists when performing anatomical dissection on a woman or girl. This more investigative and thorough examination provided more confidence to the families that the deceased had been raped prior to their death.

III.

The Evolution of the French Model of Law

French law, prior to the Revolutionary Period, was tumultuous: there were intense fluctuations in government leadership, monarchical power, and the legal system. Under the Old Regime in France, the penal system was very specific in its definitions of homicide; additional

⁶ Vigarello, Georges, and Jean Birrell. “The Emergence of Child Rape” Essay. In *A History of Rape: Sexual Violence in France from the 16th to the 20th Century*.

laws would be passed that clarified under what circumstances a victim of homicide could be dissected. There were five forms of homicide under the penal system: 1.) accidental-involuntary, where there is no presence of negligent behavior and homicide is not foreseen; 2.) accidental homicide by means of negligent behavior; 3.) necessary-legitimate, such as in cases of self-defense where the accused was attacked unprovoked; 4.) voluntary or willful but without premeditation or intent to kill, which can be seen in cases of blind rage; and lastly 5.) premeditated and deliberate.⁷ Voluntary or willful homicide and premeditated homicide both received the death penalty.⁸ Under these definitions, the penal system limited the ability to perform anatomical dissections, crucial for determining a cause of death. The French penal system before the French Revolution set strict definitions of homicides that were common in French society. Victims of homicide by negligent behavior and victims of voluntary or willful homicide were most often dissected in order to determine and prove, via forensic evidence, that the murder was committed with intent and not accidentally.

One of the few laws that directly referenced anatomical dissections and homicide was the Criminal Ordinance of 1670. The Ordinance, regarding dissection procedure, set clear guidelines for the methodology and expectations for a surgeon's reports. Furthermore, the Ordinance, "in jurisdictions where court-appointed surgeons existed, [the surgeons] must always witness any medico-legal examinations and reports."⁹ Despite the lack of open education regarding dissections at this time in France, anatomical dissections had a distinct presence in the medico-legal world. Regardless of the drastic socio-political regime change in the mid-to-late 1780s,

⁷ Andrews. "Murder." Essay. In *Law, Magistracy, and Crime in Old Regime Paris, 1735-1789*, 548–89. Cambridge: Cambridge university press, 1994.

⁸ Andrews. "Murder." Essay. In *Law, Magistracy, and Crime in Old Regime Paris*.

⁹ McClive, Cathy. "'Witnessing of the Hands' and Eyes: Surgeons as Medico-Legal Experts in the Claudine Rouge Affair, Lyon, 1767." *Journal for Eighteenth-Century Studies* 35, no. 4 (2012): 489–503. <https://doi.org/10.1111/j.1754-0208.2012.00535.x>.

some aspects of the Criminal Ordinance of 1670 would remain relevant in the legal proceedings in the quickly modernizing field of pathology.

During the French Revolution and the years after it ended, access to medical schools and medical practices became available to those who could afford to learn. Prior to the French Revolution, the Age of Enlightenment, and the Napoleonic Era, medical schools were open to primarily the upper class and did not regularly teach classes or programs focused on anatomical dissection. Under early Napoleonic rule and deriving inspiration from the Age of Enlightenment, more medical schools openly and legally taught anatomical dissection practices, with techniques emerging in Montpellier, Strasbourg, and Paris, primarily by the insistence of surgeon and chemist Antoine Francois de Fourcroy¹¹, who studied under human anatomists at the Paris Faculty of Medicine and, later, joined the Société Royale de Médecine.¹² Another notable surgeon, Pierre-Jean-Georges Cabanis, who though not well known for the study of anatomy, implemented new experiments and techniques, and applied philosophy to the field of pathology. Both medical professionals gained experience in a new eighteenth century subfield of medicine called morbid anatomy, which acted as a combination between surgical medicine, performed in hospitals, and in anatomical dissections. Furthermore, with the increased access to female cadavers and surgeon's increased expertise with obstetrics, some human anatomists were able to examine cases of sexual assault and rape in a more detailed capacity.

¹¹ de Saint-Maur, Paul P. "The Birth of the Clinicopathological Method in France: The Rise of Morbid Anatomy in France during the First Half of the Nineteenth Century." *Virchows Archiv* 460, no. 1 (2011): 109–17. <https://doi.org/10.1007/s00428-011-1162-2>.

¹² "Antoine François De Fourcroy." Encyclopedia.com. Encyclopedia.com, December 7, 2022. <https://www.encyclopedia.com/science/dictionaries-thesauruses-pictures-and-press-releases/fourcroy-antoine-francois-de>.

IV.

Early Evolution of English Human Anatomy

Anatomical dissections have been used as early as the Middle Ages in England, primarily used to discern whether or not a nobleman had been killed by poison or by natural means. Early anatomists called the problematic nature of detecting poisons as *pharmakon*, meaning both remedy and poison²⁵ as many of the plants and their chemical composition could be used to help sick people or, conversely, be used as a poison to kill them. In the mid-eighteenth century, England did not have dissection schools, even though anatomical dissections had been implemented as far back as the fourteenth century in legal cases at English royal courts. During this time, most of the dissection education was taught outside of university education; dissection training was still performed by guilds founded back in the Middle Ages; one of the most notable guilds was the Company of Barber Surgeons, which dissolved as more anatomy schools opened.²⁶

Despite the lack of development of pathology or anatomical dissections in England, as opposed to the rapid development of the field in France, printed books about anatomy that had been circulating around Europe since the late seventeenth century, arrived in England by the early eighteenth century. Some hospitals that offered services to poor and impoverished families, offering full medical services and giving the corpse of those who died in these hospitals to

²⁵ Renzi, Silvia De, Marco Bresadola, Maria Conforti, and Maria Conforti. "Visible Signs, Invisible Process: Explaining Poison in the Late Seventeenth Century." Essay. In *Pathology in Practice: Diseases and Dissections in Early Modern Europe*, 116–34. London: Routledge Taylor & Francis Group, 2019.

²⁶ Taylor, Clive R. "From Anatomy to Surgery to Pathology: Eighteenth Century London and the Hunterian Schools." *Virchows Archiv* 457, no. 4 (2010): 405–14. <https://doi.org/10.1007/s00428-010-0935-3>.

independent anatomy schools²⁷ where medical students and anatomists would dissect the bodies. This cooperation allowed medical students to learn more about the human body and determine the cause of death of different patients.

An excavation of one of these hospitals in 1996 yielded a large amount of evidence relating to anatomical dissections. The hospital in question Newcastle, founded in 1751, treated people from Tyne, Northumberland, and Durham; the cemetery gravesite held around 210 fully articulated skeletons and roughly 400 disarticulated individuals.²⁸ These skeletons showed evidence of several procedures; post-dissection skeletal evidence showed “sixty-one craniotomies, transected clavicles and ribs from thoracotomy procedures, and transecting of the spine in the sagittal plane.”²⁹ More of these hospitals, mainly funded by philanthropists, aided the popularization of anatomical dissections and how they could be potentially useful in the future.

V.

Hunterian Schools

As the study of anatomy became more common, more surgeons began setting up private anatomy programs. Two brothers—William and John Hunter—streamlined the field of pathology in London, pioneering pathology and the “art of dissection”³⁰. William Hunter opened

²⁷ Mitchell, Piers D, Ceridwen Boston, Simon Chaplin, Vin Chauhan, Jonathan Evans, Louise Fowler, Natasha Powers, Don Walker, Helen Webb, and Annsofie Witkin. “The Study of Anatomy in England from 1700 to the Early 20th Century.” *Journal of Anatomy*. U.S. National Library of Medicine, August 2011. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3162231/>.

²⁸ Mitchell, Piers D, et al.. “The Study of Anatomy in England from 1700 to the Early 20th Century.” *Journal of Anatomy*. U.S. National Library of Medicine, August 2011.

²⁹ Mitchell, Piers D, et al.. “The Study of Anatomy in England from 1700 to the Early 20th Century.” *Journal of Anatomy*. U.S. National Library of Medicine, August 2011.

³⁰ Taylor, Clive R. “From Anatomy to Surgery to Pathology: Eighteenth Century London and the Hunterian Schools.”

his own anatomy school for students in September of 1746 while his brother, John, took after him— first, by studying at William’s anatomy school at the Covent Garden Anatomy School. However, John eventually began to perform his own dissections, opening his own anatomy school in 1764, and a few years later, was indoctrinated in the Royal Society, and later was appointed Surgeon-Extraordinaire to King George III in 1776.³¹

John Hunter’s schools established practices and methods that would become standard form in pathology. These schools of anatomy, which were known as Hunterian schools, established practices and experiments that greatly improved the knowledge of the human body;

they also created and implemented new tools and techniques for

extracting viscera and blood from small vessels in the body. Sketches of body organs, such as the sketches of the heart and vessels in *Figure 2*³², were also a commonly mandated practice. A foundational standard was created and the field of pathology in England caught up with other, equally notable schools in France and Switzerland. With Hunterian education and England’s philanthropic hospitals, such as the Newcastle Infirmary, the field of pathology in England expanded rapidly. Within half a century, London had caught up with the French standards for anatomical dissections.

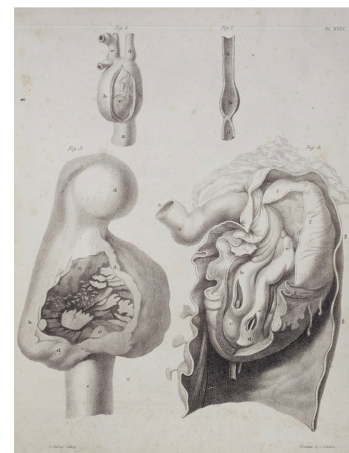


Fig. 2 Hunterian diagrams of the heart and aortic valves

³¹ Taylor, Clive R. “From Anatomy to Surgery to Pathology: Eighteenth Century London and the Hunterian Schools.”

³² Typically detailed dissections of crural and carotid arteries from Palmer’s ‘Works of John Hunter’ (Pl.XXIV; Palmer JF. Ed. Longman, London, 1837) Credit: Wellcome Library, London.

VI.

The Evolution of the English Model of Law

English common law greatly differed from French law. Unlike in France, where the French Revolution allowed a greater freedom for learning about the practice of anatomical dissections, the English Parliament passed a series of laws in the seventeenth century restricting a surgeon's access to bodies they could dissect while also passing laws that permitted certain criminals to be hanged and allowing their corpses to be given to anatomists and surgeons for their practices. The Dissection of Convicts Bill of 1786, introduced by William Wilberforce, was intended to increase surgeons' access to bodies to fulfill the lack of cadavers in medical schools necessary for students to learn about the human body; it was also intended to increase the number of cadavers accessible to anatomists so they could perform dissections in diverse and specific field of study.³³ Despite the extent of these laws, these attempts at medical reform were unsuccessful. In fact, as a response to the drastic increase of violent and nonviolent crime in the mid-eighteenth century, Parliament increased the "sentence of dissection" to over 200 different offenses.³⁴ Unfortunately, despite the attempt to cut back on the crime with the threat of dissection after the convict's hanging, and despite the medical community's emphatic approval of this decision--a decision that would give them access to more cadavers--Parliament only sentenced a select few of these cases as examples of the new legislation. This legislation, though designed to increase access to cadavers, was ineffective at the time. By the end of the 1780s,

³³ Ward, Richard. "The Criminal Corpse, Anatomists, and the Criminal Law: Parliamentary Attempts to Extend the Dissection of Offenders in Late Eighteenth-Century England." *Journal of British Studies* 54, no. 1 (2015): 63–87. <https://doi.org/10.1017/jbr.2014.167>.

³⁴ Mitchell, Piers D, Ceridwen Boston, Simon Chaplin, Vin Chauhan, Jonathan Evans, Louise Fowler, Natasha Powers, Don Walker, Helen Webb, and Annsophie Witkin. "The Study of Anatomy in England from 1700 to the Early 20th Century." *Journal of Anatomy*. U.S. National Library of Medicine, August 2011. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3162231/>.

around 90% of criminals sentenced to hanging and dissection had their sentence reduced, often reduced to not include dissection as a part of their sentence.

For a surgeon to perform an autopsy in a case in England, they would have to either be a witness to the crime, or they have to be requested by the prosecution. In the latter case, dissections would be instrumental to determine the cause of death. In a similar manner to the French Model, the English Model follows a process of electing a surgeon to perform an autopsy in a criminal case. In the English Model, a prosecutor will elect a trusted surgeon to perform an autopsy and then testify his results. However, the performance of the autopsy would oftentimes be performed publicly and their autopsy reports would have been published in local papers and journals. By the end of the 1700s, the study of anatomical dissection was integral to all medical training and judicial processes; dissection even became necessary during the Napoleonic Wars as an aspect of military medicine.³⁵ By 1828, according to a report by the Select Committee on Anatomy, there were an average of 800 medical students in London, with roughly 500 of those students studying or actively practicing anatomical dissections.³⁶

³⁵ Mitchell, Piers D, Ceridwen Boston, Simon Chaplin, Vin Chauhan, Jonathan Evans, Louise Fowler, Natasha Powers, Don Walker, Helen Webb, and Annsophie Witkin. "The Study of Anatomy in England from 1700 to the Early 20th Century." *Journal of Anatomy*. U.S. National Library of Medicine, August 2011. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3162231/>.

³⁶ Mitchell, Piers D, et al.. "The Study of Anatomy in England from 1700 to the Early 20th Century." *Journal of Anatomy*. U.S. National Library of Medicine, August 2011.

VII.

Comparison of the French and English Models: the Lerouge Affair and the Murder of Ann Ruddle

The Lerouge Affair

There is a French case from Lyon that shows the role of dissections in legal medicine and the limitations of early modern anatomical dissections. Claudine Rouge, a eighteen year old girl from Lyon, went missing on June 25, 1767, and her body was found five days later on the banks of the Rhône. Her body was discovered by a local surgeon, who noted her bloated body from being in the water, signs of strangulation around her throat, and signs of rape around her genitalia. The surgeon then sent for a priest, who approached and observed her body as it was found on the bank. As he did not know whether she was Protestant or Catholic, he was unable to perform funerary rites, and thus the body was buried in the sand as officials searched for its identity. After her uncle identified her, she was buried in St. Michel sous Condrieu and, on 5 July, was exhumed from the cemetery upon her father's request. On July 7, her father on 7 July openly denounced four individuals--Mme. Forobert, Antione and Jean Perra, Jeanne Bolmier, and Pierre Metra--as the criminals responsible for the rape and murder of his daughter. His denunciation called for a trial and autopsy of her body for evidence proving both rape and the cause of death. The court agreed and ordered two master surgeons--Claude Champeaux and Jean Fassiole--to perform the dissection and report their findings to the Lyon court officials. *Figure 1* illustrates the timetable of the body.

The Body TimeTable

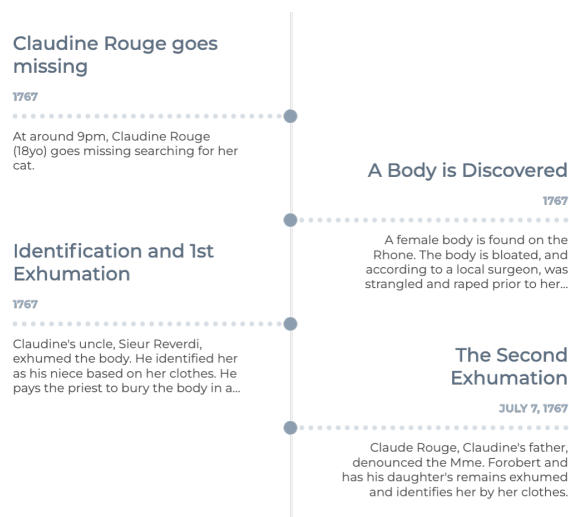


Fig. 1 Timeline of Mme. Rouge's body

The surgeon who was called to examine the body on the banks of the Rhône, François Giraud, who witnessed the body being hauled from the river, was able to discern that the body had been strangled prior to her death, attesting that, “[A]round her neck several bruises and an effusion of blood between the flesh and the tegument which makes us presume that this girl was strangled before she was thrown into the Rhône.”³⁷ Two graduate master surgeons from Lyon, Faissole and Champeaux, who attended to the exhumation of the body in Condrieu and performed the anatomical dissection on Mme. Rouge’s body, noted the body’s disfiguration in their official report, stating:

“[W]e found the head without tegument, the skull exposed and unfractured, the face, neck, and upper extremities nibbled by worms, the chest and stomach had not yet been opened by these insects...the decomposition of the natural parts under the [pubic] hair,

³⁷ ADR 2B189 Condrieu Discovery of the Body at Condrieu 1767

and the labia..and the external orifice of the vagina also eaten by worms, and the lower extremities were extremely bloated and without epidermis or skin.”³⁸

The surgeons note that because of the severe condition of the body when they examined it, they were not able to determine a definitive cause of death. Additionally, the report describes the water in her lungs, or the lack thereof. The report said her lungs were “sunken and without any water inside.”³⁹ This observation led the surgeons to believe that she had not drowned, ruling out drowning as a potential cause of death. The trauma around her neck indicated strangulation as the likely cause of death, but due to the decomposition of the body, Champeaux and Faissolle could not be definitive in their findings. In their report, they asserted that, despite lacking a definitive cause of death, the evidence seemed to indicate violent strangulation as Claudine Rouge’s cause of death. Unfortunately, due to the decomposition of the corpse, they were unable to identify any evidence of rape. Though the report, prepared and presented by the experienced surgeons and accepted by the presiding judge, there were serious discrepancies that greatly hindered the accuracy of the dissection, discrepancies which were brought to light by the defendants’ counsel and other anatomists fascinated by this case.

Several factors went against the prosecution and the attending surgeons responsible for the autopsy. Firstly, even in death, the body went through a physically traumatizing ordeal. The body was left to the elements, exposed to wildlife, submerged in water, sand, and soil; and the soft tissue surrounding the vaginal cavity and in the face had been eaten away by the river’s animal life, making identification of the victim difficult and rape near impossible to definitively prove. Furthermore, the body was exposed to the sun on the bank, buried three times and exhumed

³⁸ ADR 2B189 Extract from Records of the jurisdiction of Condrieu 10 July 1767

³⁹ McClive, Cathy. “‘Witnessing of the Hands’ and Eyes: Surgeons as Medico-Legal Experts in the Claudine Rouge Affair, Lyon, 1767.” *Journal for Eighteenth-Century Studies* 35, no. 4 (2012): 489–503. <https://doi.org/10.1111/j.1754-0208.2012.00535.x>.

twice for the trial and dissection, then finally laid to rest. The body's extreme exposure to the elements made it impossible to prove the existence of rape and determine if strangulation was a definite cause of death. Regarding Claude Rouge's claim that his daughter was raped, the surgeons could not find any evidence of a torn hymen, tearing, or bruising in or around the vaginal cavity; much of the tissue surrounding these areas are soft tissue and had been eaten away by wildlife. Without the forensic evidence supporting M. Rouge's claims, the prosecution had a difficult time maintaining a case against the accused. One of the defense attorneys assigned to the Rouge case commented that, "they opened the corpse and they did not recognize that she had been strangled, they did not recognize that she had been raped, how can one talk of rape and murder when there is no proof, no trace?"⁴⁰

The case of Claudine Rouge, or the Lerouge Affair as it would later be called, came with many problems, from handling the body prior to its dissection, and the debates on experiments performed to determine the potential cause of death. At the beginning of the affair, there were a series of legal, procedural setbacks that inhibited an examination and dissection by the Lyon surgeons.⁴¹ Because of these setbacks, Mme. Rouge's body wasted away, allowing much of the forensic evidence of her rape and murder to erode and decompose. This forced the prosecution to rely on the witness statements of the Condrieu surgeon, Giraud, who first-handedly saw the strangulation marks on her neck. The procedural flaws and lack of forensic evidence severely weakened the prosecution's argument and the experiments performed by the Lyon surgeons were called into question by other surgeons.

⁴⁰ ADR 2B189 Mémoire pour Antoine et Jean Perra 12 December 1767

⁴¹ McClive, Cathy. "Witnessing of the Hands' and Eyes: Surgeons as Medico-Legal Experts in the Claudine Rouge Affair, Lyon, 1767." *Journal for Eighteenth-Century Studies* 35, no. 4 (2012): 489–503. <https://doi.org/10.1111/j.1754-0208.2012.00535.x>.

A primary takeaway from the dissection, used as evidence during the prosecution was the lack of water in the body's lungs. This, as the surgeons wrote in their report, showed that Claudine Rouge had been killed before her body had been thrown in the water. Unfortunately, the experiments in support of this idea yielded questionable results, as one surgeon stated, "With regards to the water which can remain in the lungs of those who drown, they observe that when a living animal is plunged into water, it tries to breathe and that the fluid must enter and exit the chest in a quantity proportional to the dilation of the lungs. But the movement of exhalation being always the last it necessarily chases out part of the water."⁴² This surgeon noted that in similar experiments, which mimicked the drowning of Mme. Rouge, as part of an animal's last breath, it forces water out of the lungs. The surgeon logically concludes that it is entirely possible for Rouge to have been alive when she was thrown in the water, which would then have the cause of death listed as drowning. The Lerouge affair caught the attention of many other surgeons who either agreed or disagreed with Faissole and Champeaux's conclusion regarding the lack of water in the lungs; despite the debate, no surgeon was able to accurately state whether or not drowning was the cause of death. In summary, the legal flaws, and the debatable results from Faissole and Champeaux's experiments caused a domino effect, which resulted in insufficient evidence and reasonable doubt, thereby forcing the prosecution to rely on witness testimony.⁴³ All of these factors exemplify how the early practices of pathology, and the implementation of anatomical dissections could backfire, as many of the laws and procedures had not caught up to the greatly advancing field. While modern pathology could indicate whether

⁴²ADR 2B189 Extracts from printed pamphlet literature about the medical evidence and the role of the surgeon and physicians involved.

⁴³ McClive, Cathy. "Witnessing of the Hands' and Eyes: Surgeons as Medico-Legal Experts in the Claudine Rouge Affair, Lyon, 1767." *Journal for Eighteenth-Century Studies* 35, no. 4 (2012): 489–503. <https://doi.org/10.1111/j.1754-0208.2012.00535.x>.

or not the cause of death was drowning or strangulation, early modern pathology and dissections did not have the forensic knowledge or technology to finalize an official cause of death.

The Murder of Ann Ruddle

On January 9th, 1793, John Ruddle was indicted for assaulting his wife, Anne Ruddle in England. According to the Old Bailey proceedings, Mr. Ruddle was accused of “feloniously, wilfully, and of malice...[assaulted] with both his hands and feet to and against the ground on the head, stomach, back, breast, belly and sides did strike...”⁴⁴ that resulted in her death. He testified that he had gone out to a pub and drink with some friends and the late Mrs. Ann Ruddle was in attendance. At around midnight, Mr. and Mrs. Ruddle left the pub and continued to drink with their neighbor, Mrs. Ann Baker. When Mrs. Baker retired for the evening, the couple, intoxicated from all the drinking, continued to their home, where they had a disagreement. Mr. Ruddle’s claimed in his testimony that Mrs. Ruddle attacked him with a fire poker, and that he reacted by striking her multiple times with his fists and feet. In the trial proceedings, based on witness and expert testimony from the surgeon assigned to the trial, on February 20th, Mr. Ruddle was charged with manslaughter, fined, and imprisoned for a year.

The surgeon, Mr. John Makinder, testified that he conducted both an initial examination of Mrs. Ruddle’s body at the Ruddle residence, which entailed a general overview of the body. Upon this general overview, he noted that despite Mr. Ruddle testifying to defending himself from his wife by beating her with his hands and feet in various parts of the body, the coroner did not find any discernable marks or any indication of violence except around the neck, where he saw “under the chin there was a little bit of skin grazed off.”⁴⁵ Upon inquiry, Mr. Makinder

⁴⁴ Old Bailey Proceedings Online (www.oldbaileyonline.org, version 8.0, 24 October 2022), February 1793, trial of JOHN RUDDLE (t17930220-37). (Hereafter OBP. John Ruddle)

⁴⁵ OBP. John Ruddle.

learned from Mr. Ruddle that the mark under the chin had been there for a few days and was not the result of the fight between the husband and wife that led to her immediate death. He notes that after performing an anatomical dissection, he searched for a potential cause of death. When opening the body, he noted the only sign of violence was around the neck, with swelling and an “extravasation of blood” surrounding the cerebrum and the cerebellum; he also noted that the swelling and bruising suggested the injury was sustained close to her time of death, so close in fact that he testified that manual strangulation was the cause of death for Mrs. Ruddle .

He further itestifies in court that based on the type of injuries Mrs. Ruddle sustained from the altercation with her husband, that she was a victim of domestic abuse, and her husband ended her life.

The Ruddle's case of anatomical dissection greatly differed from the Rouge case in the timeline of events between the murder and the dissection; regardless of the *modus operandi* of the murders, Claudine Rouge's body was examined 12-15 days after she had been killed⁴⁶ whereas Ann Ruddle's body was examined immediately and then, a few days later, was properly dissected. The primary reason for the delay in the Rouge case had to do with procedural challenges which inhibited the body's examination by the Lyonnais surgeons. On the other hand, the examination of Ann Ruddle's body faced no delay and moreover, the first individual to be called to the scene was the surgeon who performed the dissection, Mr. Makinder. This fact allowed the surgeon to contribute both witness and medical testimony in the trial regarding the body's condition and the cause of death. While a Condrieu surgeon on the Rouge case witnessed the body on the banks on the Rhône and saw the lividity of the strangulation marks, he was not

⁴⁶ McClive, Cathy. ““Witnessing of the Hands’ and Eyes: Surgeons as Medico-Legal Experts in the Claudine Rouge Affair, Lyon, 1767.” *Journal for Eighteenth-Century Studies* 35, no. 4 (2012): 489–503. <https://doi.org/10.1111/j.1754-0208.2012.00535.x>.

able to offer professional testimony or provide a cause of death; he was legally only able to testify as to the lividity of the marks and nothing more.

VIII.

Conclusion

The English Model and the French Model of using autopsies and their role in legal medicine, while they bear similarities to each other-- primarily in regards to the performance of the autopsy and testifying in trials, they greatly differed in their evolution and education. Following the French Revolution and during the Age of Enlightenment, French medical schools increased their acceptance of new students and allowed more experimentation and development of new instruments and techniques for anatomical dissections. In several urban cities, Paris most notably, medical schools became more diverse in their teachings, with several of them focusing on aspects beyond educating young medical students on the human body, by also imparting knowledge in legal medicine as a method of bringing forth forensic evidence in criminal trials, as seen in the case of Mme. Claudine Rouge.

However, in England, religious superstition and legislations restricted many anatomists' accesses to cadavers, which resulted in a dramatic spike in grave-robbings. The mid-eighteenth century legislation aided in providing more access to bodies-- bodies of hanged burglars and other petty offense criminals. Despite the use of anatomical dissections having been used in cases of questionable causes of death since the time of Henry VIII and Elizabeth I, urban England fell behind other European cities in advancing the field of forensic pathology. Through William and John Hunter's education and advancements, anatomy schools emerged, along with

updated experiments, tests, and proper education into the practice of anatomical dissection. In a few short years, London became a top ranking city to study pathology, and its use of forensic pathology was equally useful in determining cause of death and providing more concrete physical evidence, especially in cases of hearsay, such as the case of Mrs. Ann Ruddle.

The eighteenth century saw a rapid advancement and implementation of anatomical dissections in these two countries, thanks to the domestic political, legal, and even philosophical approaches to the field. Because of the vast developments during this time period, forensic pathology became a necessary aspect of trials and court cases; by presenting hard facts in case where dissections were prudent, justice could be rightly dealt to those responsible.

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*The External Versus the Internal in
Aphra Behn's Oroonoko: The
Antagonism of Sentimentality to Physical
Exceptionalism*

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Daniel Siegel is a third-year undergraduate student at Florida State University majoring in English Literature with a minor in Communication. He has researched peer review in social science journals through the UROP program, but his main passion is humanities research. After graduating, he hopes to enroll in an English Literature graduate program in order to continue studying and writing about literature. He has a passion for ecology and sustainability and hopes to explore the relationship between the environment and literature in his future studies. Daniel is also interested in science communication and exploring the most effective ways to relate environmental topics to the general public.

Aphra Behn's *Oroonoko* tells the story of an enslaved Coramantien prince—the titular Oroonoko. This novel is narrated from the perspective of a white European woman who encounters Oroonoko during his enslavement in Surinam, a narrator who quickly notices that Oroonoko does not fit the standard archetype of an enslaved person. He is exceptional in many ways, not least of which is his position as a prince. This position of status and power is uncommon for an enslaved person. This realization of his exceptionalism is reflected and emphasized in the narration of this work. Aphra Behn exceptionalizes Oroonoko in many ways, the most obvious of which relate to his physical qualities. Behn describes Oroonoko as incredibly beautiful, powerful, and in control of his physical body. Oroonoko is also exceptionalized through his connections to sensibility. Oroonoko is strongly impacted by his feelings and passions throughout Behn's novel, often having visceral physical reactions to his experiences. Behn uses this sensibility to exceptionalize Oroonoko by attributing to him the positive characteristics associated with sensible characters. Oroonoko's sensibility also contrasts and competes with his physical strength. While Oroonoko's physical qualities seem to be his most essential characteristics, the strength of his sensibility defines his character, overwhelming his physical power and control. To Aphra Behn, the internal qualities associated with sensibility are most important, not the external qualities which she initially appears to value.

Oroonoko's physical qualities are Behn's main descriptive focus at the beginning of *Oroonoko*. Behn spends a great deal of time describing Oroonoko's physical characteristics, which exceptionalize him, placing him above other African people. He possesses “a native beauty, so transcending all those of his gloomy race” (Behn, 2003, p. 13). His beauty goes above and beyond what Behn considers the standard for an African person. Behn is more specific in describing why she finds Oroonoko physically superior to other Coramantiens: his skin color is

“perfect ebony, or polished jet” rather than “rusty black,” and his nose is “rising and Roman, instead of African and flat” (p 15). Behn also mentions the shape of Oroonoko’s mouth as different from the shape “natural to the rest of the negroes” (p. 15). Oroonoko’s best features are those which distance him from other African and enslaved people—his “Roman” nose and his non-standard mouth, both features associated with Europeans. His beauty is so great that it creates “Surprize and Wonder” in those who see him (Behn, p. 13). The reaction that others have to Oroonoko’s physical features provs that he is exceptionalized. Seeing Oroonoko creates a feeling of surprise because his beauty is so unexpected and great. Oroonoko’s characteristics are almost supernatural: his beauty transcends what Behn believes is natural or expected for a Coramantien and produces a strong reaction in those who observe him. Behn describes how Oroonoko’s physical characteristics make him appear in battle “like some Divine Power descended to save his Country from Destruction” (p. 33). Here, Oroonoko’s physical appearance is again crafted as almost supernatural. He is “divine” and godlike, once again placed above other African people. Oroonoko is not fighting alongside his countrymen. He is instead placed above them, descending from a position of divinity and greatness to become a savior. The language Aphra Behn uses to describe Oroonoko’s physical appearance makes it clear that Oroonoko is not only different but better than other black people. His features are European and thus conform with the standards of beauty of Behn and other European observers. Even Oroonoko’s non-European features, such as his dark skin, are still different and better than other black people. His skin is a “perfect ebony” or “jet” rather than the “rusty” and, therefore, imperfect shade of the other enslaved people Behn encounters. Behn exceptionalizes Oroonoko’s physical qualities through more than just descriptions of his beauty. He can do “such Things as will not be believed that human Strength could perform” (Behn, p. 33). Oroonoko’s strength, like

his beauty, is supernatural: it goes beyond the normal. He is a divine figure not just because of his appearance but also his physical strength which provides him exceptional skill in battle. He is referred to as a “Wonder of all that World” when he becomes “one of the most expert Captains, and bravest Soldiers that ever saw the Field of *Mars*” at the age of just seventeen (Behn, p. 13). Once again, Oroonoko fulfills and outdoes not just the lesser standards which were often expected of an African but also the greater standards of a European. Behn uses the term “the Field of *Mars*,” creating a connection to Rome (as she did when describing Oroonoko’s nose). Oroonoko’s later nickname of Caesar emphasizes this connection to Rome, making Behn’s point even more apparent: this is a hero on par with the classical heroes of Rome (heroes who were very much admired by European society). Oroonoko’s fighting ability is so great that he is a wonder of the whole world, not just of Coramantien. Oroonoko is painted as an exceptional figure because of his physical beauty, strength, and capabilities in battle.

Oroonoko’s physical strength is not just mentioned in his descriptions at the beginning of the novel—it is expanded upon and seems to grow as he faces more significant challenges. Oroonoko has a “mix of strength, speed, intellect, and might” which is made evident in his encounter with “a huge tiger” (Bressler, 2018, p. 23). Oroonoko fights off this “monstrous Beast of mighty Size” and later another, even more infamous one (Behn, 2003, p. 51). His aim with a bow and arrow is good enough to take down a tiger who has been shot many times before without dying. European colonists have shot the tiger with guns—Oroonoko’s ability to take down this beast with a bow and arrow is evidence of his exceptionalism. Even without the advantage of a gun, Oroonoko’s physical abilities are enough to defeat this beast. This and other conquests in Surinam are proof of Oroonoko’s physical strength and abilities. Still, the most impressive display of his physical control is when he maintains his “demeanor during [a]

moment of great physical pain” (Bressler, 2018, p. 41). When Oroonoko acts against colonial powers by leading an exodus of enslaved people, he is brutally whipped “in a most deplorable and inhuman Manner, rending the very Flesh from [his] Bones” (Behn, p. 64). During this painful experience, Oroonoko “was not perceived to make any moan, or to alter his face” (Behn, p. 64). He is able to maintain physical composure despite the great pain of his punishment because he has an incredible degree of control over his physical body. A similar circumstance occurs at the end of the novel when Oroonoko is killed. While he is dismembered, Oroonoko smokes a pipe of tobacco. When his “ears and his nose” are cut off and burned, “he still smok’d on, as if nothing had touch’d him” (Behn, p. 73). Even as Oroonoko dies, he does so “without a groan or reproach” (Behn, p. 73). Despite the terrible pain and punishment he is enduring, Oroonoko maintains control of his body and physical reactions. Continuing to smoke during this experience is proof of this discipline: “the pipe is used as a sign of composure” as Oroonoko continues to smoke throughout this brutal physical punishment (Kunin, 2009, p. 91). Behn represents Oroonoko as a figure of great physical control and strength, a warrior-prince whose physical abilities and appearance set him above other African people (and even above the Europeans he meets and interacts with).

While Aphra Behn connects Oroonoko to physical beauty, strength, and military prowess, she also depicts him as a man of sensibility with the corresponding strength of feeling and emotional depth. Behn’s depictions of Oroonoko’s sensibility become far more important than his physical characteristics in this novel. In the eighteenth century, a sensible person was capable of intense passionate feelings and of having these feelings impact their physical body. Sensibility was also tied to “heightened faculties or unusual intelligence” (Mullan, 1990, p. 145). Even when it became connected to greater medical issues and nervous disorders, these became “fashionable

and even, in some cases, enviable” (Mullan, 1990, p. 142). This is not surprising as a “heightened sensibility” had become evidence “of learning, intelligence, and sensitivity” (Mullan, 1990, p. 170). In displaying Oroonoko as a sensible character, Behn implies that Oroonoko possesses these positive qualities. Only those with these qualities could be so highly sensible, “for only those peculiarly privileged are liable to so ‘suffer’” from sensibility (Mullan, 1990, p. 145). Sensibility is tied to the privilege of learning and intelligence, something Behn attributes to Oroonoko when she states that he has “all the civility of a well-bred Great Man” (Behn, 2003, p. 14). Oroonoko, possessing the civility of a “well-bred” and therefore privileged man, is tied to the learning, intelligence, and sensitivity of a man with this status. Oroonoko’s “civility” is vital: despite being from Africa, which was considered “uncivilized” by European colonial powers, Oroonoko has the civility of someone who is European and highly educated. Behn’s exceptionalization of Oroonoko in this way makes his sensibility possible. Behn explicitly states Oroonoko’s connection to sensibility. She explains that he and Imoinda are “greatly born, so sensible,” once again connecting his sensibility to his status as she did when she connects him to well-bred men (p. 14). Oroonoko is “as sensible of Power, as any Prince civiliz’d” (Behn, p. 15). The implication is that sensibility is more common among Europeans (who were seen as more “civiliz’d” than Africans) and that it is connected to class: Behn compares Oroonoko’s sensibility to a “Prince,” a person of a high class who would have had access to a quality education. Behn continues to depict Oroonoko as sensible throughout her novel through continued use of the word “sensible” itself and in describing his external, physical reactions to his internal feelings and emotions.

Behn describes Oroonoko’s physical responses to emotions in several moments throughout her text. These descriptions connect this text to medical theories of the eighteenth century. The

theory of sensibility emphasized the interconnectedness of the human nervous system. Doctors such as Robert Whytt, an eighteenth-century nervous disease expert, believed “that the nerves are endued with feeling, and that there is a general sympathy which prevails through the whole system” (Whytt, 1797, pp. v–vi). Because of this interconnectedness, and the fact that “involuntary, as well as voluntary motion, depends on some power or influence of the nerves,” it was generally understood that impulses affecting one part of the body could cause physical reactions to the whole system (Whytt, p. 5). Equally important in this time period was the idea that “the nerves link the internal to the external” (Mullan, 1990, p. 166). In the eighteenth century, it was a scientific fact that powerful emotions could cause intense physical reactions—someone’s internal feelings can be seen in their external responses to stimuli. It was agreed that “nothing makes more sudden, or surprising changes in the body, than the several passions of the mind” (Whytt, p. 60). Visible, physical reactions to emotion became a sign of great feeling and sensibility (and of the civility and intelligence associated with sensibility). In many places throughout *Oroonoko*, the titular character displays these types of physical reactions. Aphra Behn uses this to tie her character to these ideas of greatness and of the “learning, intelligence, and sensitivity” which were linked to “heightened sensibility” (Mullan, p. 170). There are many circumstances where Oroonoko’s external reactions to his passions prove the strength of his sensibility.

An essential display of Oroonoko’s sensibility comes when his beloved Imoinda is taken into the clutches of his grandfather, the king of Coramantien. When Oroonoko hears that “she had received the royal veil” (a sign that she is to become the property of the king), he is reduced to “madness” and must be prevented from “laying violent hands on himself” (Behn, 2003, p. 19). He has a powerful emotional reaction to the loss of his lover. This reaction becomes physical

when Oroonoko finally sees Imoinda and “was ready to sink in the place where he stood; and had certainly done so but for the support of Aboan...which, with his change of countenance, had betrayed him, had the king chanced to look that way” (Behn, p. 22). This reaction is that of a man of refined sensibility: Oroonoko is unable to support himself because of his emotional response to seeing Imoinda. Oroonoko’s “change of countenance” (which openly displays his emotions) is of blushing and turning pale: “’tis certain that both these changes were evident” in Oroonoko at this moment (Behn, p. 22). These intense physical reactions clearly display sensibility: the internal (Oroonoko’s passion for Imoinda) has affected the external (Oroonoko’s facial expression). A noteworthy aspect of sensibility is that it “allows internal disorder to become observable” (Mullan, 1990, p. 163). In making Oroonoko’s emotional reaction visible, Behn furthers his connections to sensibility and its associated qualities. The strength of Oroonoko’s “highest Passions of Love” and how they impact him is emphasized in several other places (Behn, p. 14). Oroonoko is “as capable of love as ‘twas possible...in saying that, I have named the highest degree of love: for sure great souls are most capable of that passion” (Behn, p. 15). If great souls are capable of greater love than others, and Oroonoko is capable of the greatest love possible, then Oroonoko must be a truly exceptional soul. Oroonoko’s great soul creates a great passion: his is the “most passionate Heart that ever lov’d” (Behn, p. 22). The strength of Oroonoko’s love allows for the strength of his physical reactions. This is a man “who never heard the name of love without a sigh” (Behn, p. 43). Oroonoko is unable to think about love without the physical reaction of sighing. His going limp and blushing in the Otan directly represents the strength of this passion and thus the degree to which he is “great.” If just thinking of love is enough to make Oroonoko sigh, then seeing Imoinda in the clutches of his grandfather is likely to create a much stronger reaction, and indeed it does. Oroonoko is so distraught at

seeing the bed the king has prepared for himself and Imoinda that “rage” and “wild frenzies seized his heart” (Behn, p. 22). Behn doesn’t mention the heart idly: this moment corresponds with medical theories surrounding the nervous system. According to Whytt, “the great consent between the brain and heart appears from the sudden and remarkable effects of the passions on the latter” (Whytt, 1797, p. 16). Simply seeing this scene which causes Oroonoko emotional distress can impact his brain—and therefore his body, since “certain ideas or affections excited in the mind, are always accompanied with corresponding motions or feelings in the body” (Whytt, p. 61). Behn displays these physical consequences: Oroonoko “was forced to retire to vent his groans, where he fell down on a carpet, and lay struggling a long time, and only breathing now and then” (Behn, p. 22). This is a moment clearly connected to reactions of sensibility, often characterized by “violent tremors, palpitations, faintings and convulsive fits” brought on by “fear, grief, surprise, or other passions” (Whytt, p. 102). Oroonoko is so affected by seeing his wife under the control of the king that he has this struggling fit. Behn uses the sensible reaction of “fainting and general convulsions,” one of the most common symptoms of sensibility, to represent the strength of Oroonoko’s passion (Whytt, p. 11). Whereas in some people, “the feelings, perceptions, and passions, are naturally dull, slow, and difficult to be roused; in others, they are very quick and easily excited, on account of a great delicacy and sensibility of the brain and nerves” (Whytt, p. 114). The strength and immediacy of Oroonoko’s reaction in the Otan leaves no question that he has this “great delicacy and sensibility.” Because “external”, physical reactions and “involuntary motion” were seen as evidence of the strength of one’s “internal” feelings, they are also evidence of “refinement and ‘sensibility’” (Mullan, p. 146). By depicting Oroonoko as highly sensible and susceptible to “feelings, perceptions, and passions,” Behn connects him to this refinement. Aphra Behn uses Oroonoko’s physical reactions to emotional

stimuli to paint him as a man of great sensibility, thus exceptionalizing him due to the associations between sensibility and learned intelligence. Oroonoko's great sensibility is also proof that his internal self has some control over his external self.

The degree to which Oroonoko exists as a sensible being and thus as a person who can be physically impacted by his passions eventually comes to threaten this status as a character of physical strength. Oroonoko's "passion for Imoinda embroils him in a sentimental and peculiarly modern moral dilemma which...threatens Oroonoko's honor as a noble-blooded military commander" (Doyle, 1995, p. 173). Oroonoko's sentimentality makes it difficult for him to maintain his status as a warrior, a position defined by physical power and strength. Oroonoko's sensibility actually inhibits his ability to exist as a character defined by physical strength. Behn, in imbuing Oroonoko with sensibility, makes it impossible for his physical characteristics to be his most valuable because his physical power is lessened by his sensibility. "Oroonoko's capacity for love...depletes his interest in the glories of war and honor" and thus detracts from the exceptionalism created by his physical prowess and high position in the military (Doyle, p. 174). The primary reason that Oroonoko's strength of sensibility cannot coexist with his physical strength is that while sensibility is "evidence of refinement and 'sensibility,'" this kind of reaction can also be "debilitating" (Mullan, 1990, p. 146). At the time Aphra Behn was writing *Oroonoko*, sensibility was thought of as existing in parallel with medical conditions. Patients who exhibited the "special and desirable" characteristics of sensibility also often faced "melancholy, delirium and defeat" (Mullan, p. 141). These characteristics lead to inaction: those who experience melancholy lose their desire and ability to engage in physical action. Behn represents this inaction within her novel. Oroonoko, after losing his wife Imoinda, decides to give up on being a warrior, falling into what Behn describes as a "Disease of Melancholy" (p. 34). He is determined

never to “lift a weapon, or draw a bow, but abandon the small remains of his life to sighs and tears” (Behn, p. 32). The power which stems from Oroonoko’s ability to fight and use these weapons is outweighed by his melancholy, a disease of sensibility. The very thing which encourages Oroonoko’s physical displays of inner feelings and grief (“sighs and tears”) also leads him to give up fighting. Oroonoko’s sensibility counteracts his physical control elsewhere in the text as well. When Oroonoko reunites with Imoinda in Surinam, he is surprised to see her there (having thought she was dead). He has an intense reaction to “left his body destitute of almost life: it stood without motion, and for a minute knew not that it had a being (Behn, pp. 44–45). Oroonoko is struck completely immobile because of his intense emotions. A complete inability to move was a symptom of sensibility: “some of the more violent passions have...occasioned a kind of tetanus, or catalepsy; so that the person has appeared liker a statue than anything alive” (Whytt, 1797, p. 214). Oroonoko’s immobility is a sign of incredible sensibility and proof that this sensibility is more powerful than his physical control. The strength of his reaction to seeing Imoinda overcomes the control of his body, something that even the intense pain of physical torture has been unable to do. This isn’t the only scene where Oroonoko is rendered immobile. Later in the text, Oroonoko decides to kill his wife, Imoinda. After doing so, he is so distraught at having lost her that he is unable to move and “never rose from the Ground where he had made her sad Sacrifice” (Behn, 2003, p. 70). Even as he decides to stand up, “he found his Strength so decay’d...that he was forced to lie down again” (Behn, p. 70). Behn mentions that “he had not eat in two Days, which was one Occasion of his Feebleness, but Excess of Grief was the greatest” (p. 70). Behn acknowledges that something physical (lack of food) can affect Oroonoko’s physical control, but his emotional response to losing his wife primarily prevents him from standing up. Later in this scene, Oroonoko “rip’d up his own Belly,

and took his Bowels and pull'd 'em out" but is still able to fight off an Englishman and then stab a great warrior named Tuscan (Behn, p. 71). Disembowelment, combined with his lack of strength due to malnourishment, is not enough to inhibit his ability to fight, but the sensible reaction Oroonoko has from grief prevents him from even standing. In this scene, Behn sets up the contrast between physical and emotional pain. Emotional pain and sensibility end up victorious: they are the more impactful influence on Oroonoko's body. Oroonoko's "disease of Melancholy and Languishment" caused by his grief at losing Imoinda loss is so debilitating that it doesn't only threaten Oroonoko's life as a warrior but his life itself (Behn, p. 34). Oroonoko's soldiers cannot "raise him from the carpet" he lays down on and are unable to get him to engage in the "action and resolutions of life" (Behn, p. 34). If it wasn't for Oroonoko's being drawn into action by the threat of an incoming army, his disease "had certainly kill'd him" (Behn, p. 34). Earlier in the text, Oroonoko "believed he could not live, if he were forced away" before he sees Imoinda (Behn, p. 25). The sadness he feels without seeing his wife has such an impact that it impacts his physical well-being. This is the most extreme symptom or reaction of sensibility: "excessive fear, grief, joy and shame have sometimes been followed by sudden death" (Whytt, p. 214). Behn contrasts Oroonoko's physical strength with the debilitating impacts of his sensibility, emphasizing his passion and strength of feeling as the true defining aspects of his character. Behn accentuates Oroonoko's physical strength and control not because they are the most important aspects of his character, but rather to emphasize the power of his sensibility. Oroonoko can withstand disembowelment without a groan, but he is rendered completely immobile by passion—Behn represents the internal as more important than the external.

Oroonoko's sensibility doesn't only endanger him because his grief threatens his physical health. In the Otan, when Oroonoko has a visible reaction to seeing Imoinda, there are dangerous

consequences if the king notices his emotional display. Oroonoko's physical reaction "had betrayed him, had the king chanced to look that way" (Behn, 2003, p. 22). At this moment, Oroonoko attempts to convince the king that "he was no longer a lover of Imoinda" (Behn, p. 22). If his blushing and "betraying" of emotion were noticed, Oroonoko would be in danger of violating the king's will and facing punishment for such a violation, as occurs later when Imoinda is sold into slavery. In Behn's work, "betrayal means showing on the face what should be kept hidden in the heart. Betrayal means violating a code of privacy, exposing the internal, making it vulnerable to penetration or possession by others" (Kunin, 2009, p. 88). There is a danger associated with betrayal in that it displays the internal to the world: Oroonoko's feelings becoming visible can place him in a dangerous situation. Despite this danger and vulnerability, Oroonoko fails to control his physical reaction. Oroonoko's sensibility is so strong that it overcomes even his physical control, which is represented as almost superhuman elsewhere. This isn't the only moment in which Oroonoko displays his emotions outwardly. In this scene, his "blush is utterly characteristic of his failure to maintain facial composure against violent assaults from within" (Kunin, p. 88). The blush is "characteristic" because Oroonoko has sensible reactions often: they become a key aspect of his character. Additionally, it is significant that his blush is a "failure" to maintain composure. Oroonoko lacks the capability to control his reactions of sensibility, proving their strength. This is another moment of exceptionalization. The intense physical reactions to Oroonoko's passions and feelings only happen to those with "an uncommon delicacy of their nervous system" (Whytt, 1797, p. 102). Oroonoko's "delicacy" isn't only shown through his physical reactions to passions and feelings. Behn uses the term directly when describing his "delicate Sense" (p. 40). The term delicate, at this time, "had a proliferation of meanings that speak both to the sensibility of a subject and to the beauty of an object" (Bressler,

2018, p. 32). Behn describes Oroonoko as “delicate” in a physical sense when discussing his tattoos which were “delicately cut,” describing the beauty of Oroonoko’s body as an object (p. 46). More importantly, she expresses his *sense* as being delicate—Oroonoko, as a subject, possesses sensibility. Those with a “greater delicacy and sensibility of the brain and nerves” were more likely to have their “feelings, perceptions, and passions” excited (Whytt, p. 114). By describing Oroonoko as delicate, Aphra Behn ties him to sensibility, once again diminishing the importance of his physical strength. Oroonoko is not described as delicate because he lacks strength, but because his sensibility (which can inhibit his physical power) is itself a form of delicacy. Oroonoko is defined not by his physical characteristics, but by his sensibility, which outweighs his remarkable physical control.

In Aphra Behn’s *Oroonoko*, the titular character is represented as having many positive physical attributes. Behn emphasizes Oroonoko’s beauty, attributing European attributes which place him above other Coramantien people. His strength is also exceptionalized and described as greater than human. This great strength allows Oroonoko to be a great warrior as well, able to singlehandedly turn the tide of a great battle. Oroonoko’s physical strength continues to be emphasized as he engages in great hunts in Surinam and is able to maintain composure during moments of great physical pain. Despite the degree to which Behn emphasizes his physical characteristics, Oroonoko’s connection to sensibility truly defines his character. Behn connects Oroonoko to sensibility through her choices of language, using the term “sensible” as well as other related words such as “delicate” or describing Oroonoko’s disease of “melancholy.” Oroonoko is also connected to medical theories of sensibility through his physical reactions to emotion—he blushes, sighs, has fainting spells and fits, is rendered immobile, and is weakened almost to the point of death because of the strength of his passion. Oroonoko’s connection to

sensibility is more important to the plot of Behn's novel than his physical characteristics. His sensibility also diminishes these characteristics, preventing his being defined as a character of physical power and control. Oroonoko's fighting ability is unimportant when he is rendered immobile by sensibility, and his physical control (which stands up to incredible physical pain) cannot withstand the power of his passion and sensible reactions. Aphra Behn's *Oroonoko* and the character for which the novel is named are defined by internal characteristics such as sensibility and passion, rather than external beauty and power.

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*Testing The Impact of Demographic
Factors on the Differences in State
Voting in the 2020 United States
Presidential Election*

By Sam Stella



Sam Stella is a second-year student majoring in Political Science and Statistics from Pittsburgh, PA. His research interests center on electoral politics, election science, and voting behavior. Sam has also done work on an unrelated UROP project and for a political campaign in the 2022 election cycle. Outside of research, he is a Knight of Columbus and competes on the FSU Quiz Bowl team. After graduating, he looks to work in campaign or electoral politics.

Abstract

A recent quip in electoral politics is the idea that “demographics is destiny”. This idea, which has seen a lot of ink spilled on both sides, is that the changing demographics of the United States will inevitably lead to different electoral outcomes, especially pertaining to the idea of dominance from one political party (in this case, usually the Democrats). These disputes usually invoke changing racial demographics, as well as changing religion and education demographics. However, there has been relatively little research or discussion about whether or to what extent demographics can predict voting behavior in the first place within the United States.

In this paper, I utilize demographic data from the 2020 presidential election to evaluate the extent to which the difference between states’ electoral outcomes can be attributed to racial, religious, and education demographics. This will include creating a model to project each states’ outcome based on the national demographic vote, and then examining what we can glean from the differences between the model and the real outcomes.

Introduction

In American politics, there are demographic differences in voting behavior in presidential elections. For example, over the last sixty years, Black voters have frequently voted by landslide margins for the candidate of the Democratic party (Hartig et al., 2021). Similarly, for at least the past six presidential elections, White Evangelical Protestants have voted by wide margins for the Republican party nominee (Hartig et al., 2021).

The extent to which these demographic differences are correlated with different states’ political outcomes, though, can be complicated. Many of the states with the highest concentrations of Black voters vote for the Republican candidate. Excluding the District of

Columbia, five of the top 10 states in terms of Black percentage voted Republican in each of the last six presidential elections (Mississippi, Louisiana, Alabama, South Carolina, and Tennessee) and two more voted Republican in five out of the last six presidential elections (Georgia and North Carolina) (Public Religion Research Institute, 2021) (U.S. Census Bureau, 2021b). Many of these states overlap with the states with the most White Evangelical Protestants. Five of these top 10 Black states are also in the top 10 for the most White Evangelical Protestants (Tennessee, Alabama, Mississippi, South Carolina, and North Carolina), and an additional three are above the national average: Georgia, Virginia, and Louisiana (Public Religion Research Institute, 2021)(U.S. Census Bureau, 2021b). Thus, it can be difficult to work out the cumulative demographic impact on each election.

This paper sets out to test the nationwide impact of demographics on the 2020 presidential election, and it also observes the extent to which voting differences between states can be attributed to demographics. For example, this paper will be evaluating the extent to which demographics can explain the difference in 2020 between a state that voted heavily for the Democratic nominee, like Maryland, and a state that voted heavily for the Republican nominee, like West Virginia.

Conveniently, major data on all three demographics that I wanted to test were available for the year of 2020 (with the Census and the PRRI Census of American Religion), making 2020 a very good election to consider these questions ~~on~~ relative to years like 2004, 2008, 2012, or 2016 in which there was no Census and many of which did not see major religious landscape studies.

My hypothesis is that demographic differences will have a statistically significant, but not absolute, relationship with the difference between state voting behavior in the 2020 presidential

election. In other words, I expect that demographic differences will be correlated with electoral differences, but that it will not be completely explanatory of the differences.

Methodology

In order to test the impact of demographic factors, I had to determine which factors to collect and test. Ultimately, in this paper, the three factors that are tested are race, religion, and education. A helpful tool to see why these were selected is the Pew Research Center's 2020 Validated Voter File Analysis, a survey that talked to validated voters to see how they voted (Hartig, Igielnik & Keeter, 2021). In the Pew analysis, White voters voted for Trump by 12 points (55%-43%) while Black voters voted for Biden by 84 (92%-8%) (Hartig et al., 2021). White Evangelical Protestants voted for Trump by 69, whereas Atheists voted for Biden by 76 (Hartig et al., 2021). Those with postgraduate degrees voted for Biden by 35, whereas those with high school or less voted for Trump by 15 (Hartig et al., 2021). All three of these factors, therefore, are associated with major differences in political support.

Meanwhile, some other factors associated with major differences in political support on the Pew analysis were excluded for various reasons. Both sex and age produced significant gaps, however, neither one differs by enough between states to produce a meaningful difference. According to the 2020 Census, the most male state was Alaska (52% male, 48% female), whereas the most female state was Mississippi (51.8% female, 48.2% male); not a significant difference (U.S. Census Bureau, 2021a).

Similarly, the oldest state (of those above 18), Florida, was within ten percentage points in every age category of the youngest state, Alaska, as well as every other state; this is also not a significant enough difference (U.S. Census Bureau, 2021a). Other factors on the Pew survey did not produce a large or consistent enough gap (income), did not qualify as demographic factors

(area type), or did not differ enough between states, especially if the three main factors were controlled (marital status, veteran status).

An additional consideration to make is that race, religion, and education can often confound with each other, meaning that measuring each separately would produce a risk of double-counting some demographic differences. For instance, White Evangelical Protestants are somewhat less likely to have higher educational attainments than White Mainline Protestants (Public Religion Research Institute, 2021). If religion and education are measured separately, then the education test will pick up some differences due to religion and the religion test will pick up some differences due to education. An example of a similar problem is that there is a significant difference in 2020 voting patterns between white college graduates and white non-college graduates, but very little difference in 2020 voting patterns between Black college graduates and Black non-college graduates (Hartig et al., 2021). If race and education are measured separately, then the education test could be highly skewed in heavily white or heavily non-white states. Therefore, in this test, each state will be split up into categories of all three variables (for example, non-college White Evangelical Protestants, or postgraduate White Catholics) to avoid these confounds and simplify the testing.

Once the factors were selected, the next step was to determine the extent to which each state consisted of each demographic group. Race and Religion data was collected from the 2020 Census of American Religion conducted by the Public Religion Research Institute. This data was from the same year as the election and already classified its data by race and religion, as opposed to just one or the other. It also only takes into account data from adults, meaning those eligible to vote. It was not published at the state level, but it was published at the county level along with the population size of each county. Because of this, the county data was collected

and then converted into statewide data based upon the population of each county via a weighted population average. This was done in order to fill the gap between county and nationwide data and to match the data with the statewide Census data and the statewide electoral results. This paper is about measuring the differences between states.

Educational attainment data was collected for each of the fifty states, plus the District of Columbia, from the 2020 US Census, which provided data on the educational attainment of those 18 and over (meaning those eligible to vote), matching the PRRI race and religion data. PRRI also helpfully provided data on the national rates of educational attainment for various religious groups. Thus, it was possible to create estimates of race, religion, and education crosstabs, meaning the percentages of the population that are of each race, religion, and/or education subgroup. It is easiest to explain this process through an example, so we will use Florida, White Evangelical Protestants (WEP), and high school or less educational attainment.

The PRRI data suggested that Florida is 15.86% WEP (Public Religion Research Institute, 2021). PRRI also suggests that for educational attainment, 40% of WEPs are high school or less, 33% have some college, 17% have a bachelor's degree, and 9% have a postgraduate degree (Public Religion Research Institute, 2021). So based off the national PRRI numbers, there is 6.35% high school or less WEP in Florida. When the high school or less subgroups are combined, these numbers promote a theoretical percentage of the state's population that is high school or less. Therefore, if the educational distributions of Florida's race and religion subgroups were the same as the national distributions in the PRRI, Florida would be 39.90% high school or less, but the Census says that it is 40.38% (U.S. Census Bureau 2021c). We want to match our data to the Census educational attainment data to account for this difference. Therefore, our 6.35% figure would be multiplied by $(.4038/.3990)$, becoming 6.42%.

This procedure means that all of our crosstabs will match the Census educational attainment ones. However, this can distort our race and religion data. So, we multiply by the ratio of our new WEP total (15.90% in this case) and the PRRI crosstab, meaning our 6.42% figure would be multiplied by $(.1586/.1590)$, becoming 6.41%. Then, repeat the Census educational attainment ratio and the PRRI race/religion ratio a second time to ensure that the final result is as close as possible to both. In this case, 6.41% was multiplied by $.04038/0.4033$, then the product was multiplied by $.1586/.1585$, producing a final estimate of Florida being 6.42% high school or less WEP.

In summary, the PRRI provided county-level race and religion subgroup data and county-level population data, and they provided national data on the educational attainment distributions of these subgroups. The US Census provided statewide data on educational attainment. The PRRI county-level data was converted into state-level data for race and religion subgroups via weighted population averages (weighted by population). This new PRRI state-level data was then compared with the PRRI national data on educational attainment distributions to create a preliminary race-religion-education crosstab. This preliminary race, religion, and education crosstab was then compared with the Census state-level educational attainment data to account for the fact that some states are more or less educated than the national average. This new data was then compared one more time with the PRRI state-level race and religion data, and it was then compared to the Census state-level education data to produce the final race-religion-education subgroup sizes for each state.

After producing the race-religion-education crosstabs for every state and checking that they're consistent with the national figures, via another weighted population average, the next step was to determine the rate at which each of these crosstabs voted nationally. This was done

with the race, religion, and education crosstabs from the 2020 Pew Validated Voter File (Hartig et al., 2021). At the national level, based upon my race-religion-education crosstab, there was a minor difference (less than one percentage points for each party) in predicted vote, and so each category was slightly tweaked such that the weighted population average of the national crosstab votes (the “inputs”) were consistent with the real 51.33%-46.89% margins of the election. This was done to ensure that this test would produce internally consistent data, and each tweak was well within the margin of error of a survey like the Pew survey. This was also done in consultation with the 2020 AP Voter Analysis and the 2020 Edison Exit Poll, meaning that any tweaks were done in the direction of the difference between the Pew survey and these two surveys (Cable News Network, 2020) (Fox News Network, 2020). The inputs used are shown below.

Figure 1. Estimates of Subgroup Political Support in the 2020 Presidential Election

Subgroup	US Pop. Share	Biden	Trump	Subgroup	US Pop. Share	Biden	Trump	Subgroup	US Pop. Share	Biden	Trump
White Evangelical Protestant (HS)	6.93%	10.00%	89.00%	Black Protestant (B)	1.32%	87.00%	12.00%	Muslim (HS)	0.33%	57.00%	41.00%
White Evangelical Protestant (SC)	5.67%	18.00%	81.00%	Black Protestant (P)	0.84%	89.00%	8.00%	Muslim (SC)	0.18%	63.00%	35.00%
White Evangelical Protestant (B)	3.30%	32.00%	67.00%	Hispanic Protestant (HS)	2.26%	36.00%	62.00%	Muslim (B)	0.16%	65.00%	33.00%
White Evangelical Protestant (P)	1.68%	39.00%	60.00%	Hispanic Protestant (SC)	0.95%	40.00%	58.00%	Muslim (P)	0.16%	72.00%	25.00%
White Mainline Protestant (HS)	4.62%	33.00%	66.00%	Hispanic Protestant (B)	0.41%	47.00%	51.00%	Buddhist (HS)	0.23%	65.00%	33.00%
White Mainline Protestant (SC)	4.56%	42.00%	56.00%	Hispanic Protestant (P)	0.25%	60.00%	36.00%	Buddhist (SC)	0.20%	67.00%	31.00%
White Mainline Protestant (B)	3.25%	48.00%	50.00%	Hispanic Catholic (HS)	5.15%	66.00%	32.00%	Buddhist (B)	0.12%	72.00%	26.00%
White Mainline Protestant (P)	1.80%	58.00%	41.00%	Hispanic Catholic (SC)	1.66%	68.00%	30.00%	Buddhist (P)	0.15%	75.00%	22.00%
White Catholic (HS)	3.52%	33.00%	66.00%	Hispanic Catholic (B)	0.85%	73.00%	25.00%	Hindu (HS)	0.11%	61.00%	38.00%
White Catholic (SC)	3.82%	40.00%	59.00%	Hispanic Catholic (P)	0.34%	78.00%	20.00%	Hindu (SC)	0.08%	65.00%	33.00%
White Catholic (B)	3.19%	46.00%	53.00%	Other Christian (HS)	2.47%	38.00%	59.00%	Hindu (B)	0.11%	67.00%	31.00%
White Catholic (P)	1.82%	59.00%	39.00%	Other Christian (SC)	1.96%	42.00%	56.00%	Hindu (P)	0.25%	72.00%	26.00%
Mormon (HS)	0.52%	15.00%	80.00%	Other Christian (B)	1.17%	47.00%	50.00%	Unaffiliated (HS)	8.45%	62.00%	36.00%
Mormon (SC)	0.48%	23.00%	72.00%	Other Christian (P)	0.66%	57.00%	40.00%	Unaffiliated (SC)	7.63%	67.00%	30.00%
Mormon (B)	0.38%	27.00%	68.00%	Jewish (HS)	0.31%	58.00%	40.00%	Unaffiliated (B)	5.35%	77.00%	21.00%
Mormon (P)	0.28%	37.00%	57.00%	Jewish (SC)	0.34%	66.00%	32.00%	Unaffiliated (P)	3.11%	84.00%	14.00%
Black Protestant (HS)	3.35%	91.00%	8.00%	Jewish (B)	0.39%	70.00%	28.00%	Totals	100.0%	51.33%	46.89%
Black Protestant (SC)	2.39%	90.00%	9.00%	Jewish (P)	0.49%	75.00%	22.00%				

HS=High School or Less, SC=Some College, B=Bachelor’s Degree, and P=Postgraduate Degree

Following this, those inputs were used with the crosstab population shares of each state. The predicted margins based upon these three variables were then compared with the real election margins in each state in a linear regression to determine how accurate the model was.

This regression was done without an intercept because an intercept would distort the model from its intercept at a 4.44% margin nationally.

Results

The predictions, real results, and the difference for each state is shown in Table 1. The regression results for the margins over the 50 states are displayed in Table 2.

Table 1. Demographic Projections vs. Real 2020 Presidential Election Results

State	Model Projection	Real Result	Difference	State	Model Projection	Real Result	Difference	State	Model Projection	Real Result	Difference
Alabama	-9.30%	-25.46%	-16.16%	Louisiana	3.06%	-18.61%	-21.67%	Ohio	-5.16%	-8.03%	-2.87%
Alaska	-4.88%	-10.06%	-5.18%	Maine	-6.92%	9.07%	15.99%	Oklahoma	-13.30%	-33.08%	-19.78%
Arizona	3.80%	0.30%	-3.50%	Maryland	20.07%	33.21%	13.14%	Oregon	1.22%	16.08%	14.86%
Arkansas	-17.14%	-27.62%	-10.48%	Massachusetts	11.44%	33.46%	22.02%	Pennsylvania	-1.06%	1.17%	2.23%
California	16.99%	29.16%	12.17%	Michigan	0.42%	2.78%	2.36%	Rhode Island	4.94%	20.78%	15.84%
Colorado	4.95%	13.50%	8.55%	Minnesota	-4.68%	7.12%	11.80%	South Carolina	-0.39%	-11.68%	-11.29%
Connecticut	10.01%	20.07%	10.06%	Mississippi	-1.80%	-16.54%	-14.74%	South Dakota	-19.71%	-26.16%	-6.45%
Delaware	9.23%	18.97%	9.74%	Missouri	-10.36%	-15.39%	-5.03%	Tennessee	-12.21%	-23.21%	-11.00%
DC	42.51%	86.75%	44.24%	Montana	-10.71%	-16.37%	-5.66%	Texas	7.14%	-5.58%	-12.72%
Florida	7.77%	-3.36%	-11.13%	Nebraska	-8.79%	-19.05%	-10.26%	Utah	-19.97%	-20.48%	-0.51%
Georgia	8.32%	0.23%	-8.09%	Nevada	8.44%	2.39%	-6.05%	Vermont	1.67%	35.42%	33.75%
Hawai'i	3.99%	29.46%	25.47%	New Hampshire	2.38%	7.35%	4.97%	Virginia	6.84%	10.11%	3.27%
Idaho	-14.43%	-30.77%	-16.34%	New Jersey	18.39%	15.93%	-2.46%	Washington	4.09%	19.20%	15.11%
Illinois	11.20%	16.99%	5.79%	New Mexico	4.34%	10.79%	6.45%	West Virginia	-25.98%	-38.93%	-12.95%
Indiana	-10.05%	-16.06%	-6.01%	New York	19.51%	23.11%	3.60%	Wisconsin	-6.61%	0.63%	7.24%
Iowa	-14.53%	-8.20%	6.33%	North Carolina	-0.28%	-1.34%	-1.06%	Wyoming	-14.97%	-43.39%	-28.42%
Kansas	-8.41%	-14.65%	-6.24%	North Dakota	-17.63%	-33.35%	-15.72%	Total	4.44%	4.44%	0.00%
Kentucky	-17.08%	-25.94%	-8.86%								

Table 2. Regression of the Demographic Projections vs. the Real 2020 Presidential Results

Slope	1.650721473	Total Sum of Squares	2.219341674
Standard Error (Slope)	0.1280801395	Standard Error (Y Estimate)	0.1155899499
Coefficient of Determination	0.7686315268	Degrees of Freedom	50
F Statistic	166.1055018	Residual Sum of Squares	0.6680518256

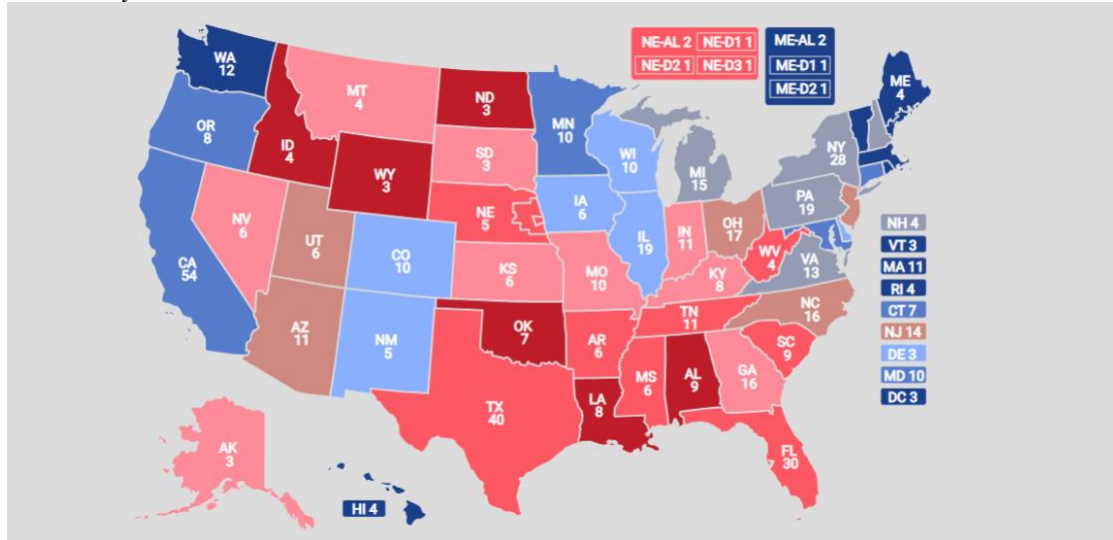
The slope of the regression is 1.65, which means that the model tends to understate the real margins. The slope being greater than 1 is well outside the 99% confidence interval. Based on the data displayed in Table 1, 38 out of 51 states saw a larger margin of the same party predicted to win by the model. The possible reasons for this will be discussed further in the discussion section of this paper.

The r^2 value is 0.769 when including the increase in margin discussed above, suggesting that demographics control for at most $\frac{2}{3}$ of election outcomes. This value is statistically significant (outside a 99% confidence interval) based on the standard error, suggesting that the demographics tested were associated with electoral voting behavior in the 2020 presidential election. Note that when you exclude the impact that the increased margins have, the model is a bit less than 0.769 explanative. An r^2 calculation without the slope effects produces an r^2 value of 0.649. That is still well outside a 99% confidence interval, but it is worth noting.

Table 3. States Ranked by Largest Difference Between Demographic Projections and 2020 Presidential Election Results

State	Difference	State	Difference	State	Difference
DC	-44.24%	Texas	12.72%	Kansas	6.24%
Vermont	-33.75%	California	-12.17%	Nevada	6.05%
Wyoming	28.42%	Minnesota	-11.80%	Indiana	6.01%
Hawai'i	-25.47%	South Carolina	11.29%	Illinois	-5.79%
Massachusetts	-22.02%	Florida	11.13%	Montana	5.66%
Louisiana	21.67%	Tennessee	11.00%	Alaska	5.18%
Oklahoma	19.78%	Arkansas	10.48%	Missouri	5.03%
Idaho	16.34%	Nebraska	10.26%	New Hampshire	-4.97%
Alabama	16.16%	Connecticut	-10.06%	New York	-3.60%
Maine	-15.99%	Delaware	-9.74%	Arizona	3.50%
Rhode Island	-15.84%	Kentucky	8.86%	Virginia	-3.27%
North Dakota	15.72%	Colorado	-8.55%	Ohio	2.87%
Washington	-15.11%	Georgia	8.09%	New Jersey	2.46%
Oregon	-14.86%	Wisconsin	-7.24%	Michigan	-2.36%
Mississippi	14.74%	South Dakota	6.45%	Pennsylvania	-2.23%
Maryland	-13.14%	New Mexico	-6.45%	North Carolina	1.06%
West Virginia	12.95%	Iowa	-6.33%	Utah	0.51%

Map 1. The Differences Between Demographic Projections and 2020 Presidential Election Results by State



Lightest Color=0-5%, Second=5-10%, Third=10-15%, Fourth=15%+; Maine & Nebraska are statewide, not broken out by Congressional District

Table 3 ranks the differences between the model projection and the real 2020 result by state and Map 1 displays it geographically, allowing us to see where the major differences occurred. Only two of the twenty largest states appear in the top quarter of differences, whereas six of the ten smallest appear (including DC). Meanwhile, five of the top ten largest states are in the top 10 smallest differences, and an additional three more of the top 10 smallest differences are in the top 15 largest states. This bolsters the model's credibility due to it being more predictive of larger population areas. It also suggests that smaller states are more likely to have conditions that are associated with large divergences from the demographic projections.

Discussion

These results did support my hypothesis that demographics would have a statistically significant, but not absolute, impact. Excluding the effect of the model generally undershooting margins, these demographics explain just under two-thirds of voting difference between states. That is fairly similar to what I expected, which is that demographic factors such as, race,

religion, and education explain a significant amount of the difference, but not all of the difference. In other words, factors other than demographic ones such as economic sectors, local culture, geography, ideological sorting, etc. also influence the difference in the voting behavior between states.

This both supports and harms various arguments surrounding the political effect of demographics in America. On one hand, it is clear that demographics have an impact on the difference in voting behavior between states, which supports many of the recent theories regarding changing demographics in politics. On the other hand, there are clearly other factors that also play a significant role in differences in electoral behavior that must be taken into consideration, which contradicts many of the recent analyses regarding changing demographics in politics (which are often univariate).

Turning to the issue of causation, an argument could be made from these results that demographics explain anywhere from three-fourths to well below two-thirds of differential electoral behavior. The first thing to discuss is the possible explanations for the model undershooting margins in most cases. A case could be made that demographics influence the broader state's culture, which impacts electoral results. For example, an area with more White Evangelical Protestants may experience people who would have called themselves Evangelical in a different region, instead call themselves Mainline due to identification being relative. This would mean that demographics would lead to much of that impact.

On the flip side, explanations such as ideological sorting, where people move to states that fit them politically, and differential turnout, where people don't vote because they don't think their candidate can win, would also explain the demographic model undershooting margins in both directions and don't have much to do with demographics. Further, a case could be made

that state culture and economy influence both demographics and political behavior. For example, a state's economy being more focused on specific sectors may impact the education of its population, and it also may affect the intra-group voting of the educational subgroups such as college graduates in fossil fuels versus college graduates at tech startups. Similarly, due to a majority of Americans living in their native states, states can maintain distinctive cultures, which could impact religiosity, and also voting behavior in other ways (Florida, 2019). So, it is possible that demographics explain somewhat less than 64.9% of the difference in presidential voting patterns.

Ultimately, this study cannot determine causation because it is not an experiment. This is a case study; it only analyzes the results of one recent election, and there are no factors controlled. There are several reasons for this, including the lining up of good data, and 2020 was the highest-turnout election in recent memory. It would likely be difficult to create an experiment that could control for many of these factors, due to a lack of available data, like on ideological sorting, or a difficulty of measurement in the first place, on something like a state's culture. Furthermore, presidential elections only happen once every four years, and the constant change in American politics means that it is difficult to draw from a large sample. With all that said, it is still a case study, and cannot prove causation.

Another limitation is the data utilized in this analysis. While it is true that there is more available data than there would be generally, there are still some limitations. For starters, the PRRI county-by-county data on religion appears to be unweighted. PRRI put weights onto their final national findings, but it appears that they released their county crosstabs unweighted, producing national results, if all counties are added together, that are somewhat different from their final findings; beyond what could be ascribed to rounding error. Similarly, due to the

granular nature of the demographic crosstabs in this study, there was not precise data on each one's national 2020 voting patterns, and these had to be estimated based upon the available data. Ultimately, these were used because they were determined to be the best ways to test this hypothesis, and this is much more data than would be available for any other presidential election since 2000. It is still imperfect, and it should be treated as such.

In conclusion, demographics had a statistically significant impact on the difference in state voting behavior in the 2020 election, but they were not completely explanatory. Other factors also played a substantial role.

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