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LETTER FROM THE EDITOR

On behalf of the entire editing staff, I am pleased to present to you the twelfth volume of *Lucerna*. This volume truly represents *Lucerna's* interdisciplinary mission. As you read these impressive works of undergraduate scholarship, you will learn about compelling topics in diverse fields of study, including mathematics, communications, psychology, and many more. By compiling research from such a wide variety of fields, our staff hopes this volume will highlight the academic accomplishments of students from across the University of Missouri-Kansas City's undergraduate community. The publication of this journal would not be possible without the work of our diligent editing staff. Our student editors contribute many hours of their busy schedules (including dozens of summer hours) to guarantee the success of this publication, and I am truly grateful for their dedication.

The research presented in this volume could not have been conducted without the support of committed faculty mentors. Therefore, I would like to express my sincere thanks to Dr. Robert Cohon, Dr. Steven Melling, Professor Haley Mickelson, Dr. Henrietta Rix Wood, Professor Ben Moats, Dr. Richard Delaware, Dr. Diane Fillion, William G. Murphy, Professor Alison Coupland, Dr. Deborah Smith, and Dr. Jason Martin. I am continually inspired by the contributions of UMKC's faculty mentors and the efforts they make to foster undergraduate research. Without their support, the publication of this journal would not be possible.

Furthermore, I am grateful for the unending support of the UMKC Honors College faculty and staff. Not only has the UMKC Honors College provided steadfast guidance and advice to our editors, but its faculty and staff also encourage the academic curiosity that our journal celebrates. Special thanks are due to *Lucerna's* 2016-2017 faculty advisor, Dr. Stephen Christ, and *Lucerna's* 2017-2018 faculty advisor, Dr. Henrietta Rix Wood. Both Dr. Christ and Dr. Wood were always available to listen to our staff's questions and concerns, and they showed the utmost

commitment to the journal's continued success. I also would like to thank Dr. Gayle Levy and Dean James McKusick for their steadfast support of *Lucerna's* goals, as well as Brenda Dingley for her guidance on copyright. Moreover, my thanks to Professor Paul Tosh and the talented Fine Arts students in the Egghead Student Design Agency for their design of *Lucerna* Volume 12. Thank you to Sasha Bingaman and Austin Crockett, who designed the Volume 12 cover and formatted the journal, respectively. During my time as Editor-in-Chief of *Lucerna*, I have been humbled by the selfless contributions of those who make it possible for undergraduate research to thrive at our university. Not only have I had the privilege of working with a talented editing staff and group of authors, but I have also experienced the incredible support of UMKC's faculty and staff. Thank you for all your work to make Volume 12 of *Lucerna* a success.

Finally, congratulations to the authors whose work is published in this volume, as well as those students recognized with honorable mentions. I wish you the best as you work towards future milestones and accomplishments, and I hope you will continue to pursue answers to even our most difficult questions.

Sincerely,
Anne Crawford
2016-2017
Editor-in-Chief

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EDITORIAL BOARD

Editor-in-Chief: Anne Crawford

Anne Crawford is a third-year student at UMKC majoring in English with minors in history and women's, gender, & sexuality studies. She chose to attend UMKC for its dedication to student success and for its location within a vibrant urban community. Anne first became involved in *Lucerna* during her freshman year when she was elected to be Managing Editor, and she appreciates the opportunity to edit a research journal as an undergraduate. In 2016-2017, Anne organized the symposium for *Lucerna* Volume 11, an experience which helped her develop valuable leadership skills. She is an active member of the UMKC Honors College and enjoys contributing to the unique honors experience. In Spring 2017, she was a member of the Honors College Student Executive Board, and she has also served as an Honors College discussion group co-leader. In her free time, Anne likes to travel, eat at Kansas City's amazing restaurants, and spend time with her two collies. After graduation, she plans to continue her studies in graduate school or law school.

Managing Editor: Anthony Gilyard

Anthony Gilyard is in his third year at UMKC majoring in business administration with an emphasis in management. He chose to attend UMKC for its diversity and unique educational opportunities. Anthony is currently in his second year with *Lucerna*, and he has assisted in planning the symposium for *Lucerna* Volume 11, led the symposium-planning process for *Lucerna* Volume 12, and was a published author in *Lucerna* Volume 11. He formerly served as the student assistant of the Honors College, and he now looks forward to further serving the Honors College through his work as Editor-in-Chief for *Lucerna* Volume 13. Always looking for diverse and unique opportunities, Anthony will be an intern at Truman Medical Center next summer, where he expects to work directly under the Chief Financial Officer. Upon graduation from UMKC, he hopes to become a business analyst/consultant, helping organizations big and small to grow and improve. Outside of his studies, Anthony enjoys baking, reading, a good video game, and exploring Kansas City.

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Nathan Otten

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Micah Patrick Prior

Pornography Culture
Rebekah Youmans

THE LION'S SHARE: A FORMAL ANALYSIS OF PROPORTION AND DIVISION IN A ROMAN SARCOPHAGAL RELIEF

BY CAROLYN NORDENGREN

Two lions, formed as a pair, were carved in relief on both ends of an ancient Roman sarcophagus. They turned inwards towards the center of the sarcophagus, confronting any viewer who dared approach it. Perhaps they sent a message about the character of the deceased, or maybe they were meant to act as a kind of guard for this person who was now departed from their living family and friends. The lions' dramatized ferociousness and high relief must have been quite imposing when the sarcophagus was whole. Now, separated by an unknown physical distance with little to connect them other than a pair of black and white photographs from the 1930s, these two lions represent a shift in artistic style that occurred in the mid-third century CE.

The mirroring of two lions on either end of a sarcophagus was a common style in the mid-third century CE. The Kansas City Lion,¹ (see figure 1), and its counterpart are one such example. Titles of ancient artworks are often assigned by scholars in the modern era based on objective information, such as the subject and current location. Accordingly, the Kansas City Lion was named to distinguish it from other lion reliefs. The Nelson-Atkins Museum of Art acquired the Kansas City Lion in 1948 and dates the carving to the late Roman Imperial Period, roughly 225 to 250 CE



Figure 1: The Kansas City Lion, The Nelson Atkins Museum of Art.

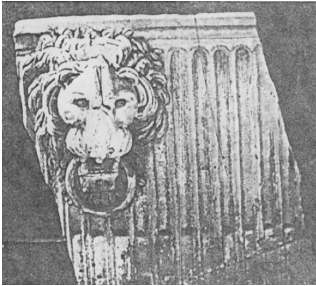


Figure 2: The Kansas City Lion as photographed by the DAI-Rome in 1936, DAI-Rome Negative 1936.194

(Department of Ancient Art). At the end of this paper, an argument will be made for a dating at the tail end of this range, and possibly slightly later.

The first record of the Kansas City Lion is from 1936 when it was photographed by the Deutsches Archäologisches Institut-Rome, DAI-Rome² (see figure 2 1936.194). When it was photographed there was a large expanse of the sarcophagus's central marble still connected to the right side of the lion. This section of marble was lost between 1936 and 1948, when the Nelson-Atkins Museum of Art acquired it.

The other lion carved with the Kansas City Lion was also photographed by the DAI-Rome, a year later in 1937 (see figure 3 1937.1086). Written on the back of this photograph was the German word *Privatbesitz*, meaning private collection, referring to its state of ownership. The *Privatbesitz* Lion was, and presumably still is, a part of a private collection. Also written on the back of the original photograph of the *Privatbesitz* Lion is the name v. Bergen. This refers to Carl-Ludwig Diego von Bergen, the German Ambassador to the Holy See from 1920 to 1943 (Harrigan 462). From the presence of his name on the back of the



Figure 3: The Privatbesitz Lion as photographed by the DAI-Rome in 1937, DAI-Rome Negative 1937.1086

photograph, one can safely conclude that von Bergen owned the Lion at the time it was photographed. In 1937, the same year his lion was photographed by the DAI-Rome, Diego von Bergen was nearing retirement. Beginning June 2 of that year, von Bergen was absent from Rome, ostensibly on vacation ("Rift"). Von Bergen returned to Rome a few weeks later on June 29, 1937 ("Reich"). Any piece of art owned by von Bergen, including the *Privatbesitz* Lion, would have spent the majority, if not all, of 1937 in Rome with him. This allowed plenty of time for the DAI-Rome to photograph the *Privatbesitz* Lion, creating the last known record of it. From this point on there is no further record of the *Privatbesitz* Lion. Jutta Stroszeck, an archaeologist at the DAI-Rome in the 1990s, believed that the *Privatbesitz* Lion was passed from von Bergen's collection to two other collectors, DAI-Rome assistant director Siefried Fuchs, then Herbert Wollmann, a member of the German envoy to the Holy See and a collector of Roman terracotta lamps. However, this series of transactions is unlikely due to the fact that Wollmann and Fuchs were never in Rome at the same time (Cohon). The photographs taken by the DAI-Rome in the 1930s are the last known connection between the two lions. It is unclear whether the DAI-Rome realized that these two lions were once a part of the same work. Though the current location of the *Privatbesitz* Lion is unknown, careful study of its counterpart, the Kansas City Lion, provides valuable information about the ways artistic styles transition from one movement to the next.

The study of the Kansas City Lion undertaken in this paper would not be possible if the Lion were not in such good condition. When the section of background marble was broken off of the right side, the mane remained intact. There is also a small amount of background marble between the edge of the mane and where the break occurred. The fact that the mane remained intact and that there was a small amount of marble between it and the edge is evidence that this break was intentional. The circumstances surrounding this break are unknown. The marble may have been removed because it drew attention away from the Lion or to simply make the Lion easier to transport. The forelocks originally over the

center of the Lion's forehead have broken off as well. This was most likely accidental as they were an integral part of the composition of the Lion; otherwise, the mane remains intact. There is a long, thin crack running down the Lion's face from the middle of the left muscle cord in the forehead through the center of the bridge of the nose to the right corner of the nose. Another crack is on the right cheek, originating just below the center of the eye and continuing diagonally downwards to the outer corner of the cheek. A larger crack is present along the top left side of the background marble, which continues through the upper mane and stops just shy of the center of the upper mane. There is another small crack on the Lion's face just below the lock of hair immediately in front of the Lion's right ear.

The condition of the Kansas City Lion allows for careful study of the formal qualities of the work. The entire carving, surrounding marble included, measures 50.8 cm long by 40.6 cm wide. The head of the Lion itself is slightly smaller. From the bottom of the ring to the top of the forelocks the Lion's head is 41.8 cm long and the maximum width of the mane is 33.1 cm. The maximum height of the relief, from the relief ground to the highest point of the Lion's face, the center of the bridge of the nose, is 14.8 centimeters. This number is significant as it is exactly half of a Roman foot when converted into the metric system of measurement. It would have been far easier for the artist to make the face about half a Roman foot, which would have achieved a similar effect. This extra effort put into precise measurement is evidence that the artist was deeply interested in precise proportions. The artist's dedication and attention to measurement did not end with the relief depth; evidence of careful measure and proportion is evident throughout the carving.

The Lion has a sophisticated system of ratios that dictate the proportions of the carving. These proportions serve to balance the Lion, ensuring that no one section of the Lion overpowers the others. In effect, the head is divided into three sections, each comprising one-third of the total length. The first third is from the top of the forelocks to the drill runnel shaped like an upside-

down Y between the eyes. The second portion stretches from the aforementioned drill runnel to the bottom tip of the nose. The third is from the tip of the nose to the bottom edge of the ring. The ratio of the length of the head (the tip of the nose to the top of the forelocks), when compared to the distance from the top of the hair to the bottom of the ring, is two to three. It is also important to note that the exact center of the Lion's face, from the top of the forelocks to the tip of the nose, is exactly at the center branch of the drill runnel between the eyebrows, aligning with the division between the first and second thirds of the face.

There is an equally sophisticated system of proportion along the horizontal axis of the Lion's face. The maximum width of the face is half that of the maximum width of the mane. Not only that, but the exact center of the Lion's face horizontally lies at an equally prominent position to that of the vertical center. The horizontal center of the Lion's face falls in the shallow drill runnel that runs the length of the Lion's face from the bottom of where the forelocks would have been to the top of the Lion's nose. The face of the Lion divides into four equal horizontal sections, each measuring roughly eight centimeters across. These horizontal sections are the two sides of the mane on either side of the Lion's face and the two halves of the face itself, divided by the aforementioned shallow drill runnel.

The ratios that dictate other proportions of the carving are more complex. The ratio of the maximum width of the face to the height of the face is seven to ten. The ratio of the maximum width of the mane to the total length of the lion, from the bottom of the ring to the top of the mane, is eight to ten. While neither the typical ancient nor modern viewer would have measured the Lion to discover the exact nature of these proportions, their resulting effect is still a major feature of the relief. These proportions as well as those discussed above keep the carving balanced without any one aspect overpowering the others.

This obvious interest in exact measurement and proportion is a hallmark of the Classical Greek style, dominated by the establishment of ideal proportions and naturalism (Prag 137). The

Romans became infatuated with all things Greek following the fourth century BCE after Roman generals ventured to mainland Greece as part of an expansionist campaign (Department of Greek and Roman Art). When these generals returned, they brought with them countless Greek cultural artifacts as evidence of their victory (Department of Greek and Roman Art). The most admired examples of Greek art were among these spoils, the majority of it sculpture. The Roman elite began commissioning sculpture based on the Greek style as a status symbol to show a connection to their high culture (Department of Greek and Roman Art). Eventually, Roman sculpture as a whole showed evidence of this Greek influence as lower classes adopted the practices of the elite (Department of Greek and Roman Art). During the Imperial period, 31 BCE – 235 CE, Roman art exhibited a combination of both Classical Greek and a later Greek Hellenistic influence (Henig 183). During the late Imperial Period, Hellenistic influence on Roman art grew (Henig 202). This transition will be discussed in greater detail later.

The precision evident in the creation of the proportions of the Kansas City Lion is equally apparent in the mane, though in this case resulting in an entirely different stylistic outcome. The artist divided the mane into four major sections, identified by the author, each with its own subsections. Each section mirrors across the Lion, and the resulting left and right sections have slight variations due to the turn of the Lion's head to the right, the center of the sarcophagus. This turning of the head compacts the right side of the mane.

Section I is composed of the upper portion of the mane behind the ears and the forelocks, which is the only portion of the mane that makes contact with the top rim of the sarcophagus. This section has four subsections. Subsections A are the left and right forelocks, while subsections B are behind the forelocks (see figure 4).

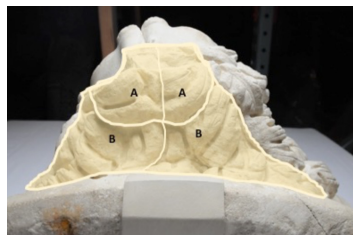


Figure 4: Kansas City Lion Mane Section I

Section II also divides into a left and right portion; in this case the left and right portions are on opposite sides of the Lion's face. Left Section II originates at the outer corner of the left forelock and curves downwards to frame the outer edge of the face in a sickle shape. It ends at the opening of the mouth. The outer edge of Left Section II is marked by a deep drill tunnel originating at the outer edge of the ear continuing downwards following the sickle shape of Section II (see figure 5). Left and Right Sections II divide into three sections, from top down: A, B, and C. Right Section II has the same overall shape and placement as Left Section II, originating at the outer corner of the right forelock, in front of the ear, continuing downwards framing the face, this time stopping just above the opening of the mouth. The drill tunnel that defines the outermost edge of this section is not as prevalent on the right side. This is one of the variations caused by the turn of the head. The right drill tunnel begins immediately at the outer edge of the ear. It follows Right Section II's sickle shape and curves around the bottom of the section (see figure 6).

Section III is immediately outside of Section II on the other side of the aforementioned drill tunnel. Left Section III begins immediately below Section I at the outer edge of the ear. This portion of the mane makes contact with the background along the outer edge of the mane. Section III ends just below the end



Figure 5: Kansas City Lion Mane Left Section II



Figure 6: Kansas City Lion Mane Right Section II

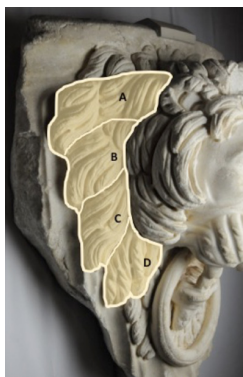


Figure 7: Kansas City Lion Mane Left Section III

of Section II, where the major drill runnel dividing the two sections curves outwards. Left section III subdivides into four sections, A, B, C, and D, from the top down (see figure 7). Right Section III begins at the outer edge of Section I, at the peak of the curve of the right ear, immediately behind and to the outside of Right Section II. Right Section III curves inwards at the bottom and cups the bottom of Right Section II. In a deviation from its counterpart on the left, Right Section III subdivides into only three sections, another variation due to the turn of the Lion's head. From the top down these sections are A, B, and C (see figure 8).

The final major section is Section IV. This section is the lowest portion of the mane directly behind and around the ring in the Lion's mouth. Left Section IV begins in the branch created by the drill runnel which divides Left Sections II and III. Left Section IV continues down to the bottom of the mane and across through the opening of the ring. Left Section IV subdivides into three sections: A, which is attached to the lower jaw; B, just below A still inside the ring; and C, the portion of Section IV outside of the ring. Right Section IV begins just below right Section II. Left and Right Sections IV connect at the center of the opening of the ring below the lower jaw. Right Section IV subdivides into three sections: A, which grows from the lower jaw; B, just below A still inside the ring, and C, the portion of Section IV outside of the ring (see figure 9).



Figure 8: Kansas City Lion Mane Right Section III

The divisions of the mane of the Kansas City Lion serve to frame and accentuate the Lion's face as well as integrate the head back into the background marble. Left and Right Sections II curve around the face with subsections B and C ending at the Lion's cheeks and lips so as to bring attention to them. Left and Right Sections III, as well as Left and Right Sections I serve as a transition between the main focus of the carving and the background of runnels. This section is in relatively low relief when compared to the height of the face. The low relief of these sections prevent the transition between the face and the background from being too abrupt, easing the eye from the highest to the lowest points in the sculpture.

When comparing the Kansas City Lion to a real lion, there are many marked differences. The most obvious difference is the exaggeration of form that has taken place to create a high level of drama. This is evident in the folds of the skin, a result of the open mouth which causes the skin of the face to fold around the nose and cheeks. These folds, when combined with the forehead's central muscle cords and the heavy eyebrows, direct the viewer's attention to the eyes. The eyes are surrounded by distinct runnels which serve to emphasize them by creating a sudden, drastic change in the depth of the relief. Real lions' manes do not divide into anything resembling the sections and subsections of the Kansas City Lion's mane. The Kansas City Lion's mane curls both in and away from the Lion's face, while real lions' manes are straight and flow outwards in every direction from the face.

The dramatic exaggeration present in both the mane and face of the Kansas City Lion is evidence of a Hellenistic artistic influence. The art of Hellenistic Greece was another influence on Roman art in the late Imperial Period, roughly 193 – 235 CE (Henig 199). The major hallmarks of Hellenistic art were drama, intense

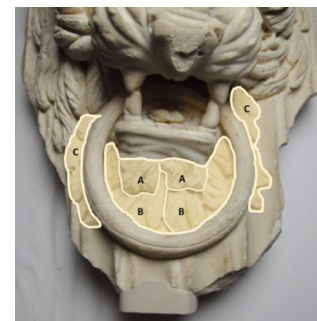


Figure 9: Kansas City Lion Mane Section IV

emotion and facial expressions, movement especially present in hair or drapery, and deep drill runnels (Thompkins 151). All these elements were at one time or another incorporated into Roman art. The levels of inclusion of these elements fluctuated between periods. Major periods of Hellenistic influence in Roman art were the Antonine period as well as the Gallienic period (Henig 202). During these times, the Romans embraced the major elements of Hellenistic art: motion, emotion, and intensity (Henig 202).

Beginning in the year 253 CE, the Hellenistic style enjoyed a brief resurgence under the rule of Roman Emperor Gallienus (253 – 268 CE) (Henig 202). Aside from the inclusion of careful proportion, a hallmark of the Classical style, and a slight degree of naturalism, Gallienic era art was extremely influenced by Hellenistic art. Art of this period was dominated by deeply drilled curling hair, eyes that gaze into the distance with sharply outlined pupils, and high relief (Henig 202). The artist's obvious interest in proportion and exact measurements are clear signs of an allegiance to a Classical style. The elaborate system of division present in the mane, however, coupled with the deep drill runnels used throughout and the motion in the mane, show the artist was interested in a Hellenistic style of carving. In fact, these aspects of this work take precedence over the Classical ones. While the measurements and proportions of the Lion are important elements, they are not as easily and immediately sensed as the curling and division in the mane, the deep drill runnels, or the exaggeration of the Lion's face. While the Classical elements provide the foundation for the work and ensure that it appears balanced, it is the Hellenistic elements that dictate the style of this relief.

It is for these reasons that the carving of the Kansas City Lion can be identified as carved at the beginning of the Hellenistic resurgence. The approximate range of date of the Kansas City Lion, from 225 CE to 250 CE, can therefore be understood to be slightly early (Department of Ancient Art). The artist is still relying on classical aesthetics while also applying the baroque style that was coming into vogue. The artist at work felt the influence of the Gallienic Imperial Court and had adjusted his style accordingly.

The Kansas City Lion can therefore be dated to the beginning of Emperor Gallienus' rule, 253 CE, or slightly later.

The Kansas City Lion represents a transition between ancient Rome's Classical carving style and the Hellenistic style that was becoming popular. While many aspects of the Lion are similar to the appearance of a real lion, evidence of exaggeration is easy to find. The extreme folds of the skin, the heavy muscle cords, the roundness of the cheeks, and the multiple divisions of the mane all deviate from the way real lions look. Furthermore, all of these features serve to create a high level of drama. However, these lions are not exaggerated to the extremes that the later, definitively Hellenistic lion carvings are. This places the Kansas City Lion in a stylistic transition period between Classical and Hellenistic influence. Careful study and examination of the Kansas City Lion lends valuable insight into not only the ancient Romans' interpretation of Greek styles of carving, but also the ways in which styles transition from one to the next.

Notes

¹*Lion Head, fragment of a sarcophagus*, Roman, 225-250 C.E. Marble, 20 x 16 x 10 ½ inches (50.8 x 40.6 x 26.7 cm). The Nelson-Atkins Museum of Art, Kansas City, Missouri. Purchase: William Rockhill Nelson Trust, 48-50.

² Images of Figures 2 and 3 courtesy of Deutsches Archäologisches Institut-Rome.

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UNPACKING THE TINDER LEXICON: VISUAL RHETORIC AND POWER

BY CHELSEA BIHLMAYER

Overview

Over the course of the last several years, online media platforms have changed romantic communication norms. In its increasing popularity, online dating is a new form of romantic communication that deserves academic study. According to the 2016 Pew Research study, 59% American adults think online dating is a good way to meet people, and the percentage of 18-to-24-year-olds who online date nearly tripled from 2013 to 2016 (Smith & Anderson, 2016). With its increased use, computer mediated romantic communication media are introducing new communication norms and semiotics that have not yet been defined.

This paper will review the process of online dating, with a specific focus on "Location Based Real Time Dating" (David & Cambre, 2016, p. 2). This kind of media utilizes a swiping interface to mediate dating rituals. Because of this swiping interface, users develop specific decision making processes, or "filtering strategies" to inform impression management techniques. Based on Joseph Walther's Social Information Processing Theory, I propose these filtering and self-presentation decisions online are made through (often subconscious) analysis and use of symbolic messages in profile images—hereafter referred to as *depictive rhetoric*.

In this paper, I first define power based on Michel Foucault's definition in his *History of Sexuality*. I then seek to understand what is considered desirable by reviewing and outlining specific filtering standards. Next, using Barthes' discussion of depictive rhetoric, I explore how desirable traits are expressed in online dating discourse. After understanding what is desirable and how it is

expressed, I am able to construct a theoretical structure for reading emerging themes of power in online dating. In accomplishing this goal, I briefly discuss two examples of visual self-presentation strategies in online dating (the duck face and selfies), and suggest an emerging fifth narrative to Foucault's discourses on sex.

Defining Power

In *The History of Sexuality: Volume I*, Michel Foucault proposes a definition of power. The Foucaultian definition posits power as relations of force that are in a continuous process of communicative tensions and interchanges that negotiate meaning; in turn, these tensions and interchanges either strengthen or weaken the force relations (1990). And so, power is constantly being formed and rearranged through and by communication—this is the first component in Foucault's concept of power.

Furthermore, he explains a concept of how power is perpetuated. As he writes, "Strategies in which they [power relations] take effect are embodied in state apparatus and various social hegemonies" (Foucault, 1990, p. 92). Power is not a state of having and not having—it is a force that is done and acted in everyday systems. I argue that this force is acted through semiotics that permeate culture, specifically online dating media. The idea that power can be read in communication acts as seemingly trivial as dating apps is supported by Foucault's theory of "double conditioning." This Foucaultian rule of power relations posits that smaller acts of power support larger themes of social hegemony (1990). This rule is central to my argument: the smaller acts of visual rhetoric in online dating media support and maintain power at more general levels of society. This paper will discuss the social hegemonies of online dating culture, acted through visual rhetoric.

Foucault found four specific dominant narratives that guided the discourse on sex: "hysterization of women's bodies" (the promiscuous daughter, the saintly mother), "pedagogization of children's sex" (the war against onanism), a "socialization of procreative behavior" (valorized marital sex accompanied by the invention of capitalism) and "psychiatrization of perverse

pleasure" (the psychiatric homosexual) (1990, p.104-105). After compiling and reviewing the dominant depictive elements used in online dating rhetoric today, I propose a fifth narrative that is emerging as a response to a digital era.

Online Dating—A Review of the New Romantic Communication

There are dating websites for nearly every niche, but they can be split into two main subgroups: Personality Compatibility Based Dating (PCBD—my definition), like eHarmony.com and match.com; and "Location Based Real Time Dating (LBRTD)" (David & Cambre, 2016, p. 2), like Tinder, Grindr, and Bumble. LBRTD sites are distinguished by their "protocols [which] require pre-setting a limited geographical perimeter, age frame, choosing images, and device geolocalization for possible matches to appear" (David & Cambre, 2016, p. 3). Personality Compatibility Based Dating, by contrast, have these protocols, but also limit the dating pool that users have access to on the basis of personality tests and compatibility algorithms.

This paper will focus on LBRTD sites, with specific emphasis on Tinder—one of the most popular LBRTD media with 1.4 billion swipes per day and over 10 billion total matches ("About Tinder," 2016). This specific dating media has a more "lived experience" inherent to its interface; Tinder and similar LBRTD interfaces intentionally simulate the filtering strategies one would employ in a "real life" dating situation: image based social cues. LBRTD applications allow for pictures and a short biography (in the case of Tinder 500 words or less). Furthermore, these applications are aware of this "real life" simulation and urge daters to interact accordingly. Bumble's official blog outlines the dating community it creates: "The rules that apply in real life interactions will apply to Bumble . . . Imagine Bumble being at a restaurant where you can introduce yourself to people who pique your interest. How would you dress, act, and conduct yourself?" ("No More Mirror Selfies," 2016). Bumble creates a near-to-life experience by moderating the photos that users are allowed to post: nudity, partial nudity, "selfies," and photos of one's children are banned from the site ("No More

Mirror Selfies,” 2016). While these restrictions do not automatically create a replicate experience of face-to-face (F2F) communication, they set a standard for users to present similar cues as those that moderate F2F communication. Though modern dating practices have evolved to include new communication spaces, online dating platforms simulate, as much as they can, processes that are familiar in F2F social interaction.

Modern dating practices have not only moved online, but the modern daters have taken on a more research-centric role in their love lives. In various studies, online dating is referred to using a shopping metaphor; especially in LBRTD media, users have access to a wider circle of potential dates than offline. In this way, daters can be more selective; users “shop” for a mate whose traits best fit their needs (Best & Delmege, 2012; Jin & Martin, 2015). Because daters are given a wide variety of choices in a new mediated environment, they are presented with new challenges of how to decide and pick out their best fit. This decision-making process is facilitated by the analysis of social cues. The dominant theory in Computer Mediated Communication (CMC) research has been a “cues filtered out” theory, which suggests that the lack of cues in CMC is detrimental to impression formation (Reicher, Spears, & Postmes, 1995; Tanis & Postmes, 2003). In a media like LBRTD, the user cannot rely on cues like posture and tone of voice. Even the certainty of appearance is not guaranteed in CMC as self-presentation can be fabricated online. Many studies discuss deception online,¹ but this paper will operate under the assumption that users make their profiles in earnest and are motivated to form impressions. This approach aligns with Walther’s Social Information Processing Theory.

Social Information Processing Theory: A Picture is Worth a Thousand Words

When making an online dating profile, just like going on a first date, a person will present an image that is most desirable to the person he or she wants to attract. Sources agree that impression management online is created with intent (Best & Delmege, 2012; Jin & Martin, 2015; Tommasi, 2004). Because a person makes a

profile with intent, he or she will assume others do the same. When making a dating profile, users leave hints and create cues for others to read and decide if they are desirable or not. To describe this cue-reading and decision-making process, Walther proposed a Social Information Processing Theory (SIPT). SIPT acknowledges that there are fewer nonverbal social cues in CMC compared to F2F communications. Walther does not agree, however, that this is a detriment to impression formation; he proposes that users will compensate, or translate cues that are expressed nonverbally F2F into verbal or visual cues that are specific to online spaces (Baxter & Braithewaite, 2008). Unlike a cues filtered-out approach, this suggests that impression formation is possible online, but the cues given (the symbols presented in a profile) and cue reading is adapted to the online environment. Self-presentation online is a highly symbolic process of selective impression management. When codes are unlike “real life” semiology, users develop filtering strategies to read the social cues uniquely available to this computer-mediated dating environment.

In Personality Compatibility Based Dating, sites submit users to personality assessments upon sign-up and have search-engine filtering components that allow users to search for other users based on desired qualities, for example, height, religious views, or cleanliness. Frost et. al (2008), corroborated by Best and Delmege (2012) argue that digital filters limit partner criteria to what can be searched for—income, religion, etc. And the problem with this is that these criteria can be quickly assessed verbally by asking a person’s occupation or religion. The nature of online dating is that daters must adopt their cues used to express intangible criteria like humor, dominance, and distaste—these are “social functions” (Baxter & Braithewaite, 2008, p. 394). SIPT argues that “a distinction between the functions and the symbols used to achieve those functions” is the key to successful computer mediated communications (Baxter & Braithewaite, 2008, p. 394). For example, humor can be expressed F2F with an open body posture and ready laughter; in online dating messaging, this social function could be expressed through different symbols, like a sarcastic

biography or ironic profile pictures. LBRTD applications force their users to develop “analog” filtering strategies, i.e., the ability to read visual social cues, because there are no personality algorithms attached to these profiles. Users are exposed to every profile that is active in their location and age range, similar to going to a bar or restaurant, as Bumble’s official blog describes (“No More Mirror Selfies,” 2016). And so, daters cannot rely on digital filters to dictate which functions are categorized under what symbols, as is the case with PCBD media. This is where LBRTD media have surpassed their counterparts in their ability to simulate “real life” experience.

In contrast to F2F interactions, a CMC impression is mediated by the “phenomenon of context collapse” (Jin & Martin, 2015, p. 321); online daters are in such an environment that requires them to project an image of themselves in their entirety under the constraints of five images and a 500-word allotment. So, the key question is: how does one choose what to present? One respondent from Best and Delmege’s qualitative study said, “I looked at the other men’s profiles to see what is it all about, what do women expect to see, what do men display? I was very interested in finding out all about it” (2012, p. 251). Users want to present themselves in the most desirable way possible. In order to accomplish this goal, they have developed the ability to read the unique social cues of the online dating environment and adopt them for their own impression formation. These online-specific social cues are called *filtering strategies* and the process behind their creation is outlined in the following section.

Filtering Strategies: What is Desirable

After understanding the differences in F2F and CMC dating spaces, it is apparent that they are alike in that daters in both environments try to present themselves as desirable subjects. Next, it is important to understand what is desirable. Pulling from various qualitative studies of online dating practices, I compile a list of desirable social cues in the online dating world.

Natalia Tommasi (2004) found that people present themselves according to gender role desirability. Two schools of thought

on this trend are evolution and social theories. According to the former, desirable qualities are based on biological indicators to bear and provide for offspring. According to the latter, “People develop expectations for their own and others’ behaviors based on their beliefs about gender-appropriate behavior and attributes” (Tommasi, 2004, p. 8). A gendered bias in impression formation is echoed in other studies (Best & Delmege, 2012; Jin & Martin, 2015; Tomassi, 2004) and a review of specific desirable social cues and filtering strategies is as follows.

After studying 300 heterosexual male and 300 heterosexual female online daters’ profiles, Tommasi states that females presented themselves significantly different than males in the following categories: physical appearance, marital status/children, personality traits, and other/miscellaneous characteristics (2004). She also states that of various desired qualities, females specified age, economic resources, education/occupation, personality traits, other/miscellaneous characteristics more than males (Tommasi, 2004). Tomassi argues that this is a case of gender-biased presentation of self, but I argue that her data should be read differently; looking at Table 1 from Tomassi’s study, females present all cues more frequently across the data set, suggesting that women simply include more information on their profiles.

Tomassi’s findings demonstrate user norms for desirable presentation created online. Out of Tomassi’s nine traits, both male and female profiles most frequently cited physical appearance, hobbies/interests/habits, personality traits, and other/miscellaneous as desired qualities (highlighted in Table 1 below). Moreover, from the same nine traits, the top four traits most frequently self-presented were the same for both males and females: physical appearance, hobbies/interests/habits, personality traits, and education/occupation (also highlighted in Table 1 below).

I have highlighted the four most desired traits and most presented traits in men (blue) and women (pink) from Tomassi’s original table. In this version of the table, it is clear to see that contrary to Tomassi’s findings, females do not present significantly

different to men, other than the fact that they present nearly *all cues* more often. It is clear that men and women align on three out of the top four traits most desired and self-presented. This observation suggests not only that daters present themselves according to what they think is desired, but that they also learn what trends are desirable on other profiles and mimic these trends to manage self-presentation. Other research written on online dating profiles concur with and expand on the desirable qualities that Tommasi cites. There are reoccurring themes on what is desirable in online dating platforms. First, *physical attraction* is cited as “one of the most important factors in online dating”

Table 1

Category	Presentation of Self			Qualities Desired		
	Men	Women	χ^2	Men	Women	χ^2
Age	46	48	.050	9	20	4.377*
Physical Appearance	87	136	17.107**	123	102	3.131
Economic Resources	24	32	1.258	10	44	23.485**
Education/Occupation	113	119	.253	18	60	25.951**
Religion/Spirituality	20	24	.392	22	28	.784
Hobbies/Interests/Habits	190	185	.177	139	127	.971
Marital status/Children	63	103	4.896*	17	28	2.902
Personality Traits	190	239	19.605**	224	261	14.702**
Other/Miscellaneous	75	113	11.167**	49	145	70.088**

NOTE: * indicates $p \leq .05$, ** indicates $p \leq .01$

Tommasi, N. (2004). Differences between heterosexual males and females in presentation of self and qualities desired in a partner in online dating services. My highlights added to original table: blue for male and pink for female on top four traits presented and desired for each sex.

(Jin & Martin, 2015 echoed in Tomassi 2004). The second trait is *honesty*; CMC is innately ambiguous, and so users assign high importance to honesty. The lack of a profile picture or an

unclear picture indicate dishonesty, as do discrepancies between photographs and written descriptions (Best & Delmege, 2012). *Age* is the third filtering standard; in Best and Delmege’s 2012 interview study, one online dater commented that it is important for women to “[be] on the right side of 40” (Best & Delmege, p. 247; also in Jin & Martin, 2015; Tomassi 2004). Online daters look at *economic resources*, as well as *education/occupation* (Best & Delmege, 2012; Tomassi, 2004); and finally, *personality traits* (Tomassi, 2004). These traits are presented in dating profiles through modes of depictive rhetoric specific to the online dating lexicon. My line of inquiry into the online dating lexicon starts with filtering strategies: what desired quality is fulfilled in the image. The second point of inquiry is to break these images down into elements of depictive rhetoric, or, to ask how are these desired qualities expressed?

Reading Visual Rhetoric

In this section, I will outline theoretical groundwork used to read visual rhetoric. Roland Barthe’s discussion of visual rhetoric, “Rhetoric of the Image,” outlines how to read an image. Visual rhetoric has three messages: the written, the denoted, and connoted (Barthes, 1977). The first message, the written, is useful in stating directly what an image is; these are the words in dating profiles, including the user’s name and age. More relevant to dating-profile analysis, a written message can direct, leading a reader to a more flattering signified (Barthes, 1977). Images can be read in multiple ways, and so directional messages are important in the case of dating profiles where the intention is to create a desirable impression. When successful, a written message (or lack thereof) can persuade a reader to see an image in a way that conforms to one of the desirable social cues listed above.

The second reading of a message is the denoted message. This is an image without any cultural knowledge of semiotics attached to it; it is an image without a symbol, the signifiers sans knowledge of signification (Barthes, 1977). For example, in a picture of a human man, the literal man would be a denoted image, not any of the culturally assigned meanings that accompany his framing,

clothes, race, age, the lighting, his posture, and countless other symbols that are attached to his image. This reading only exists in theory, as every image carries with it a set of symbols. As Barthes points out, even a camera image versus a drawn picture has a set of connotations. For example, a “selfie” is often just a photo of a person, but the fact that this kind of photo is taken by the subject of the photo has given rise to its infamy in the online lexicon.

Along these lines, Barthes argues that pictures differ from video in that the former are non-projective; that is, they give a sense of “having been there,” whereas the latter relies on creating a magic of “being there” (Barthes, 1977, p. 159). I disagree with this understanding of photographs in the case of online dating profiles. The very essence of their appeal is the ability to elicit that projective “magic” in the viewer, which in turn allows the viewer to imagine themselves in the photo as a potential partner. In order to do this effectively, the user must successfully present cues of desirability, which are the essence of the third reading: the connoted image.

The final message, which will be the focus of rhetorical analysis, is the connoted image, or symbolic message. This is the signified message associated with the signifier, or denoted image. Barthes states that there is a “floating chain” of signifieds that can be read with any image (1977, p.154); because each person brings with them carried and specific knowledge, there are multiple levels of signifiers attached to each image. Foucault’s rule of tactical polyvalence explains why some signifieds are considered desirable while others are not. Assuming desirability is power, discourse is a mode through which power is conducted (Foucault, 1990). Therefore, signifiers take on meaning from negotiated power tensions online.

Because the denoted image only exists in theory, I use the term *connoted image*, from Barthes, and *depictive rhetoric* from Edwards and Winkler interchangeably. Both terms refer to this symbolic message, defined by Michael Osborn as “strategic pictures, verbal/non-verbal visualizations that linger in the collective memory of audiences as representative of their subjects” (1986, p. 79). One example of this concept is how the filtering standards of physical

appearance and economic status can be expressed through one element in an image; subjects can present well-fitted, name-brand clothes to express their good taste and physique. On the other hand, these expensive clothes could have a stronger, underlying connotation of the wealth used to acquire them. The subjects of the photo assume that their audience has a collective memory or knowledge of the brand they are wearing and can recognize its status.

As stated previously, online impression management is intentional—daters present the most desirable impression via the various social cues outlined above. These social cues are expressed through connoted images, which can be broken down into elements of depictive rhetoric: ideographs, representative characters, and culture types. Understanding how depictive rhetoric is defined and read sets up a structure to apply to analyzing online dating profiles. I will apply this reading in an analysis of one example of impression management in the following section.

The first element is “culture types”: images that are “culturally specific and ‘authorize arguments and social practices’” (Edwards & Winkler, 1997, p. 292). Since dating is inherently social, it is dependent on exchanging and understanding social cues, which are sometimes presented as culture types. This process of exchanging and understanding social cues can be understood through Foucault’s rule of “continual variation”; this rule states that power relations are a continuous changing of relationships and tensions that form force relations (1990). For example, a culture type that symbolized social status in the 1930s might not be the same culture type today, or it might symbolize different cues. Determining dominant culture types speaks to the dominant power relations of society; the narratives shown through culture types are the parallels of generalized power relations. In the example used above, the name brand of the clothes could be considered a culture type. The subject relies on the audience’s knowledge of the brand and their endorsement of a capitalist culture that encourages material wealth accumulation.

The second element Edwards and Winkler identify is

“representative characters.” They define “representative characters” as “a person [who is] abstracted and elevated to the status of cultural figure... embodying cultural ideals” (1997, p. 296). When a person sees a representative character, they immediately understand the values and community that surround the character. Representative characters are similar to culture types because they are culturally specific; however, they are unique because representative characters are persons whose images are embodied and used to define cultural values. In the case of LBRTD, there is limited space to craft an image, so representative characters are used frequently because they are effective; they succinctly represent a host of desirable social cues that might not be expressed otherwise. Furthermore, showing knowledge of a representative character may symbolize more social cues than the character itself symbolizes. Going back to the expensive clothes example, a person could dress in a way that simulates a well-dressed character or person. For example, consider a woman wearing a pantsuit like Hillary Clinton during her iconic 2016 campaign. The pantsuit and representative character “Hillary Clinton” could represent a left-leaning political worldview. But more than that, people who decide to use this as a representative character would be suggesting that they are politically active and have a certain amount of social capital.

The third element is Michael McGee’s conceptualization of the “ideograph.” The “ideograph” is defined as “a word or group of words, such as ‘liberty’ or ‘patriotism,’ that serve to rhetorically create communities according to ideological constraints and beliefs” (Edwards & Winkler, 1997, p. 297). They are words and images that are vague and symbolic enough to create a rallying force either for or against them. An ideograph is different from a representative character because the ideograph itself embodies a concept, rather than a person embodying several concepts. Edwards and Winkler point out that McGee did not consider images to be ideographs, but, with advances in technology, it is more and more common that images can construct symbols (1997). Barthes purported that “the more technology develops the diffusion of information (and notably of images), the more it provides the means of masking the

constructed meaning under the appearance of the given meaning” (1977, p.159). One notable example is the controversy of the selfie and its evolution as an ideograph, which will be discussed later in this essay. Ideographs are not only created in the space of online dating, but are especially useful for self-presentation. Like culture types, ideographs succinctly provide visual social cues.

Ideographs influence the way cultural meaning is created and power is communicated. Whereas Foucault has described how power is a communication act, McGee’s ideograph supports the ways in which power is created through communication. This process of power creation is better understood in McGee’s four characteristics of an ideograph. First, an ideograph is an ordinary language term found in political discourse (used in elite and non-elite conversations) (McGee, 1980). Because ideographs cross class boundaries, they have the ability to change or define behavior and attitudes at large. Ideographs support power narratives in this way: social hegemonies can be carried out through this universal, socially defining language element.

Second, they are a “high order abstraction representing collective commitment to a particular but equivocal and ill-defined normative goal” (McGee, 1980, in Edwards & Winkler, 1997, p. 298). In online dating, this “ill-defined normative goal” encompasses various desirable traits. Ideographs’ success can be explained by Barthes’s concept of floating chains: there are many layers of an image that can be read, and so an ideograph can be adapted and manipulated by the reader for their subjective needs (1977).

McGee’s third characteristic for an ideograph is that it “warrants the use of power, excuses the behavior and belief that might otherwise be perceived as eccentric or antisocial, and guides behavior and belief into channels easily recognized by a community as acceptable and laudable” (McGee, 1980, in Edwards & Winkler, 1997, p. 300). This is another way that ideographs change or define behavior or attitudes and support social hegemonies.

Finally, ideographs are “culture bound . . . [they] define and exclude groupings of the public” (Edwards & Winkler, 1997, p. 302). Ideographs are excellent modes in resolving power narratives. Like

other elements of depictive rhetoric, they establish and maintain a social hegemony through the social cues they represent. For example, a man could wear earrings to present cues of gender fluidity. Yet, ideographs establish in- and out-groups through cultural knowledge (or lack of knowledge) of the elements themselves. Using the same example of the man with earrings, that same element could be misread by an out-group as a cue of homosexuality.

The last element of depictive rhetoric is *icons*. These, according to Edwards and Winkler “represent what is already linguistically manifested” (1997, p. 304). Icons are nearly the same as ideographs—symbolic messages that support abstract structures of social hegemonies—but, unlike ideographs, icons do not *create* a symbolic message, they only *represent* it. Daters use all four of these elements in self-presentation strategies online.

Application: Reviewing Symbolic Images Online

It is not only important to understand what traits are desirable and how those traits are expressed online, it is also important to apply this knowledge to scholarly research as well as our daily lives. Analyzing specific examples of visual rhetoric on online dating websites can reveal their relevance in larger power structures. Because normative online dating behavior is so rapidly changing in post-modern society, it is important to continuously evaluate codes and how they are practiced. The cost of not doing so is to not understand dating norms and further perpetuate and participate in hegemonic power structures. One trend in online dating visual discourse is the theme of a disingenuous self. Sarcasm is continuously becoming more nuanced and complicated in negotiations of power. Neil Korobov argues that “adolescent boys (ages 12-15) use irony to construct and resist heteronormative forms of masculinity in social interaction” (2005, p. 225). It is necessary to further study the use of sarcasm and irony in online spaces, but this study was limited by time and scope. Two examples of disingenuous self-presentation can be found in ideographs like the selfie and the duckface.

In Qiu et. al.’s study of online self-presentation, they discuss the selfie, a photo of a person taken by that person. They say “Selfies contain unique cues that are not available in other types of photos” (Qiu et. al, 2015, p. 443). Although selfies contain cues indicating physical attraction, a selfie is contrived image formation (unlike a portrait). Qiu et. al. state that “compared to other types of photos, selfies give individuals more freedom of controlling their face visibility, emotional expression, and camera position” (2015, p. 444). People can make themselves look more attractive than in a candid photograph. This is one possible reason for the selfie’s infamy in the online dating lexicon; because honesty and physical attraction are held to such a high regard online, a selfie can portray cues that are inaccurate. Dating media have gone so far as to ban the selfie “because [they’re] over online spaces having different rules than other social spaces” (“No More Mirror Selfies,” 2016). These “different rules” could mean that selfies are found to be so deceptive that they no longer simulate the real world experience that sites, like Bumble, strive to create. Selfies are ideographs because their connotations, like deceptiveness, were associated after the image was already created.

Qiu et. al. describe another image that has become an ideograph in the online social media lexicon: the duckface. Duckface is “a facial expression made by pushing lips outward and upward to give the appearance of large and pouty lips” (Qiu et. al., 2015, p. 443). This cue is mostly seen in selfies because of their self-modulated nature, or the way that the subject has more control over their presentation than in other photos. Like the selfie, it was first an image used in online social media, and (mostly unfavorable) connotations developed from it. After studying the association of the Big Five traits associated with elements of online presentation, Qiu et. al. found that “neuroticism was related to duckface”; people who are neurotic tend to make a duckface in their pictures more frequently (2015, p. 445). Although a duckface is made to present cues of physical attractiveness through the appearance of large lips, the negative association with neuroticism has made the duckface associated with undesirable personality cues.

The duckface and the selfie, while ostensibly used to present cues of physical attraction, violate standards of honesty. But, used in other ways, sarcasm and irony are a form of currency in online profiles. Returning to McGee's discussion of the characteristics of the ideograph, he argues that ideographs create in- and out- groups (McGee in Edwards & Winkler, 1997). Sarcasm and disingenuous identities are effective ways to do this. While it has not been studied in dating profiles, Adriana Manago found ironic uses of femininity on a male participant's social networking profile. The participant writes that his motto is "99% angel," and he reports that this motto was "funny," and Manago observes that it "constructs his masculine sexuality as intractable" (Manago, 2013, p. 485). Sarcasm is a tool that can help users filter who is in and out of the cultural knowledge. Foucault had discussed four narratives on the discourse of sex. Sex was discussed in the context of the sexualization (or desexualization) of women's bodies, the masturbating child, the economic necessity of a procreative marriage, and the perversion of homosexuality. As mediated dating platforms have increased in popularity, they have opened a new narrative through which negotiations of self take place: disingenuous constructions of identity and self presentation.

Conclusion

Computer-mediated communication has created new spaces for romantic communication. The nonverbal symbols that express social functions (like attraction, sarcasm, or disinterest) are not available in computer-mediated communications, so users in digital space compensate with other cues. I found that physical attraction, honesty, age, economic resources, education/occupation, and personality traits are the most desired qualities in online dating platforms. Users express these traits through various elements of depictive rhetoric like the ideograph. LBRTD media users depict desirable qualities through symbols that are either not present in real life dating or are highly simplified. The selfie, a representation of "attractiveness," is not a symbol that is used in F2F communications. But more importantly, the selfie does

not simply signify "attractiveness," but over time has taken on meanings of dishonesty and neuroticism (Qiu et. al., 2015).

Continuing this study, an expanded review of symbolic images online will provide a better representation of how desirability is expressed through depictive rhetoric in LBRTD media. By collecting a large pool of profile images and user biographies as data from Tinder, I will be able to analyze reoccurring image-types using a cluster criticism method. With this method, I will reveal overarching symbolic themes that parallel dominant power narratives in society. Foucault revealed four narratives in *The History of Sexuality*; I propose that one more narrative is emerging in the post-modern world, guided by digital communications. This fifth narrative is a kind of disingenuous identity, especially in modern masculinity. Evidence of this fifth narrative is seen in the selfie, duckface, and other symbols used in online dating that have duplicitous connotations. Continued studies will define the emerging trends in romantic online semiotics and reveal developments in societal power structures.

Note

'Studies include: "Putting Your Best Face Forward: The Accuracy of Online Dating Photographs," Jeffrey T. Hancock; Catalina L. Toma; "Dating deception: Gender, online dating, and exaggerated self-presentation," Rosanna E. Guadagno, Bradley M. Okdie, & Sara A. Kruse; "Looks and Lies: The Role of Physical Attractiveness in Online Dating Self-Presentation and Deception," Catalina L. Toma, & Jeffrey T. Hancock.

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ENVISIONING RESTORATIVE JUSTICE WITHIN THE MISSOURI DEPARTMENT OF CORRECTIONS

BY CASEY MCDONALD

Introduction

Society generally thinks of prisons as places where offenders are punished for the crimes they committed. Some offenders will stay there forever, and others will eventually be released into a world they are unprepared to return to. Numerous individuals in different fields, however, are attempting to change our preconceived ideas about prison. Society views incarceration more and more as a problem, not a solution. Those who advocate for rehabilitation recognize that imprisonment can be more beneficial than it has been in the past. Offenders who are incarcerated generally have the ability to still do well in their lives, yet they often feel like victims of a criminal justice system that sent them to prison without addressing any of the issues that contributed to them being there. It is these issues that offenders struggle with when they are released. One of the approaches that seeks to solve this problem is restorative justice.

Restorative justice looks at crime, punishment, and justice in an entirely different way than criminal justice has traditionally. It does not just consider the crime, it looks at the offender, the victim, and the community as well. Howard Zehr (2015), perhaps the best-known advocate for restorative justice, describes it as:

An inherently positive value system, a vision of how we can live together in a life-giving way. It is based on the assumption—a reminder for those of us living in an individualistic world—that we are interconnected. It reminds us that we live in relationship, that our actions

impact others, that when those actions are harmful we have responsibilities. (p. 79)

Restorative justice is a more beneficial response to criminal justice, and it has many practical applications within the Missouri prison system. In this paper, I will review previous research and findings on the subject of restorative justice in prisons. I will also examine it within Missouri prisons, specifically its advancement within the state prison system, and what offenders gain from this approach to criminal justice.

Literature Review

Restorative justice is still an emerging practice, yet there has been a lot of research done on this topic covering many different factors. One of the main research questions is how well restorative justice actually works for offenders. Researchers answer this question by studying the recidivism rates of offenders who have participated in such a program. A study of a restorative justice program called Bridges to Life in Texas found that offenders who completed the program only had a recidivism rate of 12.4%, compared to 31.4% for offenders in general (Armour et al., 2005, p. 834). The Bridges to Life program is a three-month in-prison program that brings victim volunteers together with offenders to facilitate groups focused on healing and forgiveness. This approach allows offenders to adapt their thinking patterns through a change in empathy that comes through active listening and participation in the program, which is designed to reduce reoffending before offenders are released.

A majority of past research on restorative justice has looked at offenders. This includes their perceptions of restorative justice programs, changes in thinking patterns, and what they got out of their experience. The Bridges to Life study found that offenders wanted longer sessions and longer programs to be offered in order to build closer relationships that would result in more opportunities over time (Armour, et al., 2005, p. 840). Offenders also believed that the program should be offered elsewhere because “it increases understanding of impact, does good, and prevents future harm”

(Armour et al., 2005, p. 841). Listening to the feedback of offenders is important because it allows us to see how they experienced the program and what they believe could help others in the future.

Several studies have highlighted the change in offenders who participate in restorative justice programs. Armour (2016) studied the mechanisms behind their experience and found a significant change in offenders' empathy, vengefulness, forgiveness, and relationships (p. 2). She states that in order for this to occur, "Individuals must alter their view of self and find ways to act in consistent ways with the new self" (Armour, 2016, p. 16). This change was attributed to involvement in a restorative justice program where offenders were encouraged to open up and learn how their crime affected others, not just themselves.

Without looking at recidivism, research has also assessed the outcomes for the offenders who participate in restorative justice programs. A study of restorative justice programs in Belgian prisons found that 59% of offenders involved believed "that such work would make them feel good and useful" (Stamatakis, 2013, p. 98). A more in-depth prison study came away with similar results. Cheryl Swanson studied the impact of restorative justice in an Alabama prison. In the honor dorm of the prison, a faith-based approach was utilized that reflected many values of restorative justice. The daily activities of these offenders focused on respect, accountability, and discipline in a caring community. Offenders participated in peacemaking circles, educational opportunities, and mentoring with other inmates that was geared towards building positive relationships. Interviewing one of the offenders involved, she stated that he believed "restorative justice has given men an entirely different outlook on life" (Swanson, 2009, p. 38). These statements reflect on the "restorative" nature of restorative justice. Even for offenders who will not be released, these experiences can benefit how they perceive themselves and their imprisonment. It allows them to look beyond themselves to the victim and the community that is affected by their crime.

It is also important to look at how restorative justice programs in prisons are developed and what makes them successful. Similar

to the Bridges to Life program, Partners in Healing focused more on helping offenders face the effects of their offenses and subsequent imprisonment. It was funded for three years and conducted by an outside agency that visited the prisons and administered committee meetings in the form of circles, which allowed open communication between members. Reviewing the Partners in Healing program in three Canadian prisons, researchers concluded that the program succeeded because a staff member overcame administrative barriers, a person oversaw the program in each prison, and flexible programs were implemented (Crocker, 2015, p. 58). The participation of offenders was not documented in any way, meaning that offenders who did participate did so without any hopes of it helping them with parole or any other benefits (Crocker, 2015, p. 58). These criteria were important in helping offenders not only learn about restorative justice, but how to use it in their daily lives and apply it to situations not only in the past, but in the future as well.

To be successful, programs must be supported by officials and policy. Research has looked at the difficulty in establishing widespread programs across numerous prisons. According to Dhami (2009), "Restorative justice can only be sustained if prison officials are committed to it and resources are made available for it" (p. 445). Public support also influences this factor, which makes it difficult to argue for implementing it on a larger scale. There are already complications when it comes to funding prisons and programs designed to help prisoners are generally frowned upon. Recognizing this as an issue, Dhami (2009) also suggests that "restorative justice be used to improve prisoners' experiences of imprisonment which may result in an increase in prisons' utility in terms of their efforts to reduce crime via these alternative strategies" (p. 434). It can be difficult to change the mindset of prison officials who are not familiar with these methods. However, building a larger database of research may assist in showing that restorative justice is something that should be used more often in prisons and outside communities.

Researchers have also studied victim responses in order

to gauge the effectiveness of restorative justice in relation to victim involvement and satisfaction. The Bridges to Life study, which involved victim participation, showed that victims “could understand offenders’ thoughts, feelings and motivations for past actions and behaviors, that offenders are also victims, and how circumstances might drive people to do things that are not always right” (Armour, et al., 2005, p. 839). These perceptions evolved from victims witnessing change in offenders and noting how their presence and feedback made a difference.

Valuing Restorative Justice

At the beginning of 2016, 32,330 offenders were held by the Missouri Department of Corrections in prisons all over the state, and our state spent over \$291,000,000 on adult institutions that year (Missouri Department of Corrections, 2015). In an attempt to keep these numbers from growing, the department has recently taken an interest in restorative justice. One of the values of the department is to “work with offenders to repair harms done, and restore the communities to which many will return” (Missouri Department of Corrections, 2017). This statement ties in with some of the core values of restorative justice, which is to repair the harm that crime causes with the collaboration of all parties working towards a mutual goal. In an interview with George Lombardi, the director of the department, he stated that “one of the things we have emphasized in our department is restorative justice; that’s a major focus in our department” (Arthur, 2013). As we can see, the department has recognized the benefit and need of restorative justice programs. In doing so, the department has implemented several programs that reflect restorative principles and practices. Perhaps the most significant reflection of this is a program called Impact of Crime on Victims Classes, which is utilized in every prison run by the department within the state. This forty-hour course defines one of the key principles of restorative justice: holding offenders accountable for their crimes by learning how they affect the victim and community. In this class, offenders “develop a sensitivity toward victims and help prevent further

victimization” (Missouri Department of Corrections, n.d). This course helps offenders recognize the impact of their crime and further their understanding of how the victim feels. This results in greater empathy and respect for not only their victim, but people in general.

Another program utilized within the department is called Circles of Transformation. Harold Johnson, a minister who has facilitated and trained others to run this program, believes it is a wonderful opportunity for offenders. This six-week voluntary program focuses more on the offender and promotes change from within. Discussing how the program impacts offenders, he states that it “helps offenders be accountable but at the same time reconcile and restore their lives to help them be more productive citizens when released” (H. Johnson, personal communication, November 29, 2016). By helping offenders accomplish this goal, the department is taking proactive steps to assure that offenders are offered the guidance needed in order to appropriately transition back into society. Furthermore, this personal change in offenders promotes an opportunity for reduced rates of reoffending upon release as they have these skills and principles to utilize in their daily lives.

Several years ago, the department implemented a pilot program for victim-offender dialogues to be conducted throughout the state. Although this program was discontinued for various reasons, offenders are still allowed to write an apology letter to their victim. In writing these letters, the offender is expected to talk about how their crime impacted the victim and not about themselves. This helps offenders accept responsibility for what they have done, attempt to make amends with a victim, and possibly repair some of the harm they have caused. Kimberly Evans, the coordinator of victim services within the department, states that she “received very positive feedback from offenders who participated in writing letters to their victim” (K. Evans, personal communication, November 29, 2016). Although this may not make victims feel whole again, it is an important step for both the offender and the victim to move past the crime and to make sense of it in a new manner.

Finally, prisons within the department are very involved in community service. In 2014, nearly 180 tons of fresh produce grown within the prisons were donated to food pantries, shelters, churches, and nursing homes throughout the state. In speaking of the offenders who participated in making this happen, the director of the department stated that they “learn about compassion and altruistic behavior, which is something that many of them lack” (Herndon, 2014). Furthermore, offenders make handcrafted items while incarcerated, which can be donated to those in need. This opportunity presented itself in 2013 when a tornado hit Moore, Oklahoma. Thousands of handcrafted items were sent to those in need of relief after the destruction of the tornado. The restorative justice coordinator for the department at the time stated that “this is just one example of the many activities that offenders do on a regular basis that give back to those that are in need” (Missouri Department of Corrections, 2013). Community service allows offenders a chance to give back to the community. Also, it shows the public that offenders can contribute to society even while they are incarcerated, and that they have the initiative to do so.

The Struggle for Restorative Justice

Even though many researchers have proven the therapeutic effects of restorative justice within prisons, and numerous agencies have incorporated and advocated for it, there are many barriers faced in implementing restorative justice to a greater degree within prisons. This is due to a variety of reasons, including critics of the philosophy and public perception. This paper will examine issues within Missouri through discussion with those involved in restorative justice, although these issues may also relate to the national struggle for restorative justice.

One of the first issues relates to budgets and resources. When asked what barriers are faced within the department, Kimberly Evans responded that due to the budget in general and forthcoming budget cuts, “We are never going to have the ability for a program to meet the general needs for an issue like this” (K. Evans, personal communication, November 29, 2016). Prisons across the nation

are experiencing difficulties with budgets and paying for the imprisonment and treatment of offenders, and this issue affects our state’s ability to hire additional people to implement more programs that involve restorative justice. In turn, restorative justice programs in Missouri rely heavily on volunteers, however, volunteers are generally difficult to recruit in prisons. Allowing offenders to handle more of these programs would benefit our prison population by giving them the opportunity to participate in more programs that are restorative in nature. Furthermore, this would permit prisons to overcome the barrier of seeking out volunteers by enabling more offenders to develop and administer these programs. Long-term offenders who exhibit good behavior and are trusted among the staff would be ideal for this role. These offenders will be positive role models for new offenders who are still acclimating to the prison lifestyle.

Another obstacle encountered is with offenders themselves. When offenders are incarcerated, many believe that they are there as punishment for their crimes. In some cases, this makes it difficult to encourage them to participate in anything that is not mandatory. Harold Johnson remembers offenders who “didn’t have the willingness or motivation to participate” (H. Johnson, personal communication, November 29, 2016). This may be partly due to what offenders are asked to do in restorative programs, such as opening up and talking about their crime. Others may feel like they will receive nothing from it. Researching the limits of restorative justice within prisons, Albrecht (2011) states that the offender “might feel that he or she is already taking responsibility for the crime by serving a sentence” (p. 328). Since restorative justice is completely voluntary, offenders cannot be forced or coerced into participating. The only way around this issue is to have other offenders who have participated share their experiences in hopes that they may make them rethink their participation. Also, learning about restorative justice could influence some offenders.

Lastly, according to Harold Johnson, the struggle for restorative justice within Missouri prisons is largely due to a lingering punitive and retributive system. In his words, “A major part of how

they handle offenders is still based on punishment” (H. Johnson, personal communication, November 29, 2016). He mentioned how when offenders misbehave or violate prison rules, they are thrown in administrative segregation without any chance to reconcile their actions or examine the behavior that contributed to it. Furthermore, correctional officers are not trained in restorative justice and most do not respond well to offenders when problems arise. The structure of the department is still focused on punishing offenders and making sure they are paying for their crime. Yes, there are restorative programs and principles in effect, but they are fighting against traditional criminal justice practices, and prisons are the main embodiment of such practices.

How Does Restorative Justice Benefit Those Who Are Incarcerated?

Although there are many barriers with respect to restorative justice in our prisons, individual offenders benefit a great deal from it. They learn new things and are able to analyze their lives in a new way that helps them make the best of their situation. Referring to the apology letters that offenders can write to their victims, Kimberly Evans said that “they were able to show empathy and understand how their crime hurt others” (K. Evans, personal communication, November 29, 2016). Even a simple practice such as this allows offenders to process their actions, recognize the issues with them, and attempt to seek out ways to mend the harm they have caused.

A further benefit comes through the process of helping offenders so that they can, in turn, help others. Harold Johnson spoke about how he has trained dozens of offenders to facilitate circles within the prison. He said that many offenders he worked with were intelligent and “realized that they can be proactive and help themselves while incarcerated” (H. Johnson, personal communication, November 29, 2016). These are offenders who may be institutionalized and are treated poorly while incarcerated, and this allows them to reshape how they think about their situation. Instead of thinking of the past, they are looking towards the future

and asking themselves what they can do to benefit themselves and have an impact on others.

The change witnessed in offenders is instrumental in transforming how we look at and respond to offenders, especially those who are incarcerated. In an article on prison reform in relation to restorative justice, Goulding (2008) and his colleagues stated that “restorative justice could be successfully adapted for use within the prison setting, thus moving the brutalizing and punitive characteristics of current prison regimes, as previously outlined, towards a more reparative and healing approach” (p. 223). It is this mindset that will allow those working with offenders, and offenders themselves, to bring positive change within our prisons. Valuing restorative justice and attempting to further the implementation of it will greatly benefit Missouri prisons and the offenders who are being released from them back into our communities.

Conclusion

Restorative justice is a difficult concept to put into action due to a variety of variables that affect its implementation. However, we can see the positive effect it has on offenders who are incarcerated. Recognizing this can allow prisons to focus on adhering to programs that involve offenders in restorative practices. Furthermore, institutions should evaluate the barriers to becoming more restorative and attempt to combat them. In prisons, the sole purpose should be to help offenders and assist them in ways that benefit them while incarcerated and will help prepare them for a better outcome upon release. Missouri has issues shared with states that practice restorative justice, but the offenders still benefit from the programs that are available. Further research should focus on ways to allow offenders to be more involved in programs such as these. This would help overcome some of the obstacles such as budgeting and staff. Departments should also recognize the importance of allowing offenders to participate in and be a part of these programs.

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ONE SIZE DOESN'T FIT ALL: CHANGING THE PEDAGOGY IN PUBLIC URBAN SCHOOL SYSTEMS

BY MORGAN ROBERTSON

John Dewey, educational philosopher and major educational reformer, says, “I believe that education . . . is a process of living and not a preparation for future living” (“My Pedagogic Creed” 78). Dewey recognizes that our educational system should be as individualized as our individual lives. One might argue that since there is a standardized test that claims to accurately measure students’ progress towards a set of standards, then there must be a standardized way to teach those standards. Well, not exactly; in the world of education, one size does not fit all. Standardized testing, though once a prized idea, has created a somewhat ideological trap in which teachers can often fall. The curriculum that educators use for students should be as different as the students’ personalities, thoughts, and ideas.

At one point, the United States accepted and welcomed standardized testing as a method of evaluating educators and allowing all students to receive the same quality of education. This was the ultimate goal of the No Child Left Behind Act of 2001. Unfortunately, in our efforts to accommodate everyone, we have unintentionally created a standardized school system that is not at all student-centered. Taxpayers and educators alike should be informed about this important aspect of the American education system. We can solve the problem of high dropout rates, low test scores, and low college preparedness caused by standardized teaching through the solution of student-centered pedagogy, which can be implemented through practical and planned lesson plans.

Definitions and Necessary Information

Before discussing my research, I consider it necessary to establish a few definitions of some words that would otherwise be considered abstract. The following definitions are in my own words, are based upon a summation of my research, and reflect current research on the topics. The term “student-centered pedagogy” is generally agreed by researchers and educators to mean an approach to education in which the student guides a teacher-prepared lesson plan. This allows students to apply meaningful context to the subject matter. This term will often be contrasted with “standardized teaching” (also called “teacher-centered”), or an approach to education in which the educator teaches their respective state standards without considering the needs or diversity of the students they teach. Some examples of this include teaching from a textbook, lecturing, and reading off of prepared PowerPoint slides.

In addition to defining terms, I would also like to utilize this section to lay out some important emphases that I have placed on my research. The problems that will be discussed in the next section are based solely upon the public urban school districts of Kansas City and St. Louis City, Missouri. Because of the location of the University of Missouri-Kansas City, and the subject matter of this research, Public Urban Education, I felt it necessary to include applicable and relatable schools to address these issues.

The Problem: ACT Scores and Dropout Rates

There are many problems with the United States public urban education system. Specifically in Missouri, our Department of Elementary and Secondary Education (DESE) critiques and praises each Missouri school district through what they call District Report Cards. All of the data in this section is from the Kansas City and St. Louis City school districts’ report cards.

In order to explain the lack of college preparedness in Kansas City and St. Louis schools, the first problem that I will address is the low ACT scores among public urban high schools in Missouri. The ACT “is the leading US college admissions test measuring what

you learn in high school to determine your academic readiness for college” (“The ACT Test for Students”). In 2015, the average composite ACT score for the Kansas City, Missouri school district was 16.2, which is 5.4 points lower than the overall Missouri average (“Guided Inquiry”). In the same year, the students in the St. Louis City school district scored an average of 16.7 composite on the ACT (“Guided Inquiry”). For a frame of reference, according to 2016 admissions records, the lowest ACT score that UMKC will accept for automatic admission is a 17, and that is only if a student is in the top 6% of his or her graduating class (“Freshmen Admission Requirements”).

The second problem that is worth noting is the high and ever rising dropout rate within public urban schools. The dropout rate is a percentage that represents the number of students who decide to leave high school that year divided by the number of students who were enrolled in that school during that year. From 2010 to 2015, the Kansas City, Missouri public school district’s dropout rate had not sunk below 8% (“Guided Inquiry”). In 2011, that rate doubled to 16.6% of students who dropped out before graduating (“Guided Inquiry”). In the St. Louis City public school district, the dropout rate has not fallen below 9% since 2010 (“Guided Inquiry”). In 2011, that rate was at a shocking 19.8% (“Guided Inquiry”). Ben Curran and Neil Wetherbee, educators and co-authors of the book *Engaged, Connected, Empowered: Teaching and Learning in the 21st Century*, write, “Whether you teach history, math, science, literature, or elementary school, when you stand in front of an entire class and talk, you’re running the risk of losing the attention of a large percentage of them” (Curran and Wetherbee 88). There is a cause behind these astonishing dropout rates and ACT scores; they do not happen on their own, nor do they occur overnight.

The Cause: Standardized Teaching

As previously mentioned, the beginning of standardization within public schools was when the No Child Left Behind Act of 2001 was implemented. This act required each state to establish academic standards and a standardized testing system (NCLB Act

2001). In Missouri, the standards are titled the Show-Me Standards and our testing system is the Missouri Assessment Program (MAP). The subjects tested on the MAP include math, reading, language arts, and science. These areas make up the core curriculum that all students are required to learn according to the Missouri state standards.

I want to emphasize that I am not dismissing the state standards, nor do I argue that they are not important. I do believe that these standards have a purpose. The Missouri Department of Elementary and Secondary Education (DESE) states that, “[T]he standards serve as a blueprint from which local school districts may write challenging curriculum to help all students achieve” (“Show-Me Standards”). Andy Davies, educator and administrator, says, “As we thought about how to revise our curriculum, and took the time to really read the Common Core standards, we determined that these standards were, in fact, less restrictive and prescriptive than portrayed in the media” (Davies 52). The original purpose behind the standards was not to overtake or control the teacher. As these sources explain, it was to provide a “blueprint” or an outline for schools to create a more challenging curriculum. DESE even states, “These standards for students are not a curriculum” (“Show-Me Standards”). It seems as though high school administrations are placing a large amount of importance and emphasis on high test scores, and consequently teachers are pressured into producing those results.

That pressure is causing teachers to standardize their instruction. Curran and Wetherbee write, “The pressure to perform and to boost students’ achievement on [standardized] tests, of course, is enormous. We feel it every day in our own classrooms. However, . . . teachers forget that their students are anything but ‘common’ in their interests, learning styles, temperaments, personalities, and so many other ways” (89). These two authors explain how they have seen several teachers standardize their teaching strategies as a result of these tests. To encourage change, they offer advice to teachers that adjust their curricula according to state testing standards: “Just because the tests are standardized

and the core is ‘common,’ your teaching does not have to be either of these things” (Curran and Wetherbee 89). In addition, George DeBoer writes, “Prescribed knowledge is often meaningless to [students]” and continues by stating, “Since students already possess a wealth of knowledge from their personal experience with the world and with each other, their insights should be an indispensable part of the educational process” (DeBoer 406).

Standardized teaching does not allow students to use the wealth of knowledge and insight they bring to the table. When a teacher standardizes his or her teaching, it typically only allows students to think or understand in a particular way, which limits the students who might learn in a different way. These students, who may think in a more artistic manner, will struggle to understand the material that is taught from a textbook. Struggling often leads to boredom or lack of interest, which then might lead to dropping out of school or lower test scores, as I previously discussed. Boredom also hinders exploration and discovery. Students who might otherwise be interested in a subject if they had the freedom to explore it could tire of it due to the rigidity of the lesson.

It is evident that standardized teaching is not a solution, but rather a cause of the problem of dropout rates and college unpreparedness. Teachers have adopted the standards as a curriculum, thus creating a standardized lesson plan. This can often consist of lecturing from a textbook, PowerPoint, or handing out practice quizzes. There are several different ways that teachers are turning the focus off the student and on to producing results. We live in a society that values diversity and difference, so why does our education system expect every student to be the same? Curran and Wetherbee accurately describe these schools as “factories” and students as “product[s] created on an assembly line, as if producing children who excel at test taking is the equivalent to achieving and learning” (89). Knowing that excelling at test taking is not equivalent to achieving and learning, we look for a solution to this seemingly difficult problem.

The Solution: Student-Centered Pedagogy

That solution is found in the concept of student-centered pedagogy. As I had mentioned earlier, student-centered pedagogy is an approach to education in which the students guide the well-planned lesson and apply it individually. Curran and Wetherbee say, “Students learn in so many different ways. And they deserve opportunities to demonstrate their creativity and intellectual abilities. They deserve to be the central focus of the educational process” (91). It only makes sense that students—without whom there would be no need for education—would be the focus of education.

The concept of allowing students to have the ability to make choices about their own education has been around since well-known educational psychologist Jean Piaget, who is summarized in DeBoer’s article, says, “students develop personal meaning regarding the physical world through direct experience and dialogue with others about those experiences” (DeBoer 406). Basically, Piaget proposes that the most common and effective method of learning is through personal experiences. We do this every day, for example, through cooking dinner. You can read a recipe, you can understand what the recipe is asking for, and you can even imagine what the outcome will be; but, until you actually start to put the ingredients together, stir, mix, *do*, you won’t truly understand how to cook. Dewey also places heavy emphasis on the students’ experiences and the contributions that those experiences have on education when shared and explored (Dewey).

Student-centered learning is not a new topic, nor is it rocket science. Several schools have implemented this pedagogy and have seen some amazing results. A study was conducted on four urban schools in California that have switched from a standardized pedagogy to a more student-centered approach. These four schools included City Arts and Technology High School in San Francisco, Dozier-Libbey Medical High School in Antioch, Life Academy of Health and Bioscience in Oakland, and Impact Academy of Arts and Technology in Hayward (Friedlaender 8). According to the research brief, the schools in this study are not selective in

admissions and serve predominantly low-income students of color (Friedlaender 1). As part of the study, each of these schools embodies the characteristic of “curriculum, instruction, and assessments [that] are designed to help students engage in the learning process and develop analytical, collaboration, and communication skills” (Friedlaender 2). There were several positive results from this study. For example, students of these four schools “exhibited greater gains in achievement on the California Star Test” (Friedlaender 3). In addition, the graduation rates far exceeded the district, or even state, averages (Friedlaender 3). Lastly, these schools are closing the college preparedness gap between low-income minority students and majority students (Friedlaender 3). To summarize, the problems that Missouri urban public schools are facing include lower graduation rates and low performance on standardized assessments. We know what the solution is and we have seen it effectively in action, so how do we implement this student-centered pedagogy into the Missouri public urban classroom?

The Implementation: How do I do that?

The student-centered classroom can be broken down into four main areas of focused change. These four areas include: 1) choice, 2) planning, 3) exploration and discovery, and 4) individualization. These four categories, though not a complete list, are derived primarily from Curran and Wetherbee’s book, *Engaged, Connected, Empowered: Teaching and Learning in the 21st Century*. These two experienced educators have discovered the effectiveness of student-centered pedagogy and offer several abstract implementations. To help understand those abstract ideas, I will explain several practical methods of application.

The first area of focused change was choice. Curran and Wetherbee encourage teachers to allow students to make choices within the context of the class as well as their daily work, including choices about what they learn and how they learn it (93). Practically, this could look like giving a homework assignment in which students express what they have learned in class, in any method

they choose, through song, dance, picture, movie, the sky is the limit.

The second area of focused change is planning. I find this area to be extremely important and may possibly be the very reason many teachers prefer a different pedagogy, as it does take a lot of extra thinking and work on the teacher’s part. Curran and Wetherbee suggest that teachers start with their learning outcomes in mind, then develop the lessons around those outcomes (94-95). Teachers can develop specific and attainable learning outcomes or have all the lesson plans scheduled at the start, with several back-up lessons, just in case. Planning does not require teachers to stick to their plans no matter what, but it is helpful to have a general guideline the teacher can follow. This provides the students with a structured lesson without having to sacrifice flexibility and student guidance.

The third area is exploration and discovery. Helping students is great, but a teacher needs to establish right off the bat when he or she will leave discovery and exploration to the students. I find that this area is a sub-area of planning, but it is often overlooked and warrants a greater focus. Curran and Wetherbee suggest the practical method of asking specific questions about the assignment like “Who will be in charge of finding the resources, you or the students?” and “Will students complete research using search engines, or will you provide the links directly?” (95).

The fourth area of focus is individualization. Curran and Wetherbee write, “We live in a world of common standards, so it may seem that the idea of individualized learning plans is completely far-fetched”; however, incorporating the students’ interests, they continue, “is a powerful way to engage them in meaningful learning” (102). This goes back to Piaget and Dewey’s ideas about learning through doing and its importance in student-centered pedagogy. One practical way to develop an individualized approach to teaching is to individually meet with students and discuss student-friendly goals, or goals which are attainable and realistic for each student. Another would be project-based or inquiry-based learning; these student-centered methods are often

well-planned, thought-out, and impactful to students.

How to Manage a Student-Centered Classroom

One argument against student-centered teaching is the difficulty of managing a classroom that is student-centered. Some people rightfully question, “How does a teacher stay in control over a classroom that is centered on students?” This is a valid inquiry and ought to be addressed. Although it may be more difficult to maintain authority in a classroom that is supposed to be open and free for students to explore, I do not think it is a reason enough to eliminate the method altogether. According to Tracey Garrett’s article from *Journal of Classroom Interaction*, person-centered management “features shared leadership, community building, and a balance between the needs of teachers and students” (34).

In order to implement this person-centered management, we have to distinguish it from the traditional teacher-centered management. The main areas of difference include the role of leadership, discipline, and consequences. When using teacher-centered management, the teacher acts as the sole leader of the classroom, thus giving the management a feel of oversight as opposed to the person-centered model in which the students and teachers share the leadership roles and the management is similar to guidance (Garrett 35). Secondly, teacher-centered management consists of teachers implementing pre-made rules and disciplining those who break the rules; this is contrasted with the scenario in which students create the rules with the teacher, which allows discipline to come from self (Garrett 35). Lastly, teacher-centered classrooms implement standard consequences for all students rather than consequences that are unique to each student and situation (Garret 35).

Although it takes more effort and thought to institute person- or student-centered, management within a classroom, it is the best way to implement student-centered instruction while maintaining authority and control. An out-of-control classroom is not conducive to learning. One does not have to sacrifice an orderly classroom for a student-centered classroom.

Conclusion

Dewey wrote in his book *Experience and Education*, “As I have emphasized more than once, the road of the new education is not an easier one to follow than the old road but a more strenuous and difficult one” (114-115). The necessary changes discussed in this essay cannot happen overnight, but they do need to happen. It takes effort, support, and courage to make these changes, but it is worth it. There is a problem of low tests scores and high dropout rates within public urban schools that is caused by standardized teaching. I have provided a solution in student-centered pedagogy and offered implementation strategies and examples of successful student-centered methods. Curran and Wetherbee conclude their thoughts on student-centered learning with the following statement: “Every time we have put students at the forefront of their learning experiences, we are amazed at how they respond. Creativity, passion, inquiry, and exploration become the norm and boredom and passivity become things of the past” (118). Let us make a difference in the lives of the next generation of learners, workers, and leaders, through student-centered pedagogy.

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MISREPRESENTATION OF CULTURES IN LITERARY PERFORMANCE: A PERFORMANCE STUDIES ANALYSIS OF *HEART OF DARKNESS*

BY SAMUEL Z. LIM

From dance, to theater, to song, performance has always been used as a strong tool to spread a message and inspire and incite social movements. Performance can provoke awareness and change in social thought. In Joseph Conrad's acclaimed 1899 novella, *Heart of Darkness*, he attempts to expose many of the horrors the Congolese people faced during the African slave trade. Although this is a non-theatrical, fictional literary work, the interdisciplinary field of Performance Studies, a field created by theater critic and scholar Richard Schechner at New York University in the late 1970's, considers literature a "relevant social performance" (Schechner). By definition, we are therefore able to critique the effectiveness of such a performance in *Heart of Darkness*. As a literary performance exploring a specific culture, *Heart of Darkness* should have properly depicted the society it takes place in without bias. Conrad's attempt to accurately depict this society was not well executed and showed only a negative, stereotypical view of the Congolese people. His depiction lacks cultural references that we can intellectually grasp and critique. These deficiencies in Conrad's novella harm the image of the Congo and misinform a major population of readers. Through the lens of critical performance studies, Joseph Conrad's acclaimed novella *Heart of Darkness* was not an effective literary performance and did not achieve its intended purpose.

In an article from *Harvard Magazine* about the concept of writing as a performance, American literary critic, theorist, scholar, and Pulitzer Prize-winning author Stephen Greenblatt explains that

the key to a successful writing performance is “understanding the nature of the occasion” (Greenblatt). In Joseph Conrad’s case, it was to write an entertaining fictional work while at the same time describing the foreign struggles of the Congolese people to the western world. Greenblatt argues that for fiction writers, one of his or her goals must be to entertain, or else no one will pick up their work to read. While attempting to educate his audience about the Congolese people, Conrad describes scenes of gun battle, murder, forced labor, and primitive practices to entertain his western readers:

Six black men advanced in a file, toiling up the path. They walked erect and slow, balancing small baskets full of earth on their heads, and the clink kept time with their footsteps. Black rags were wound round their loins, and the short ends behind wagged to and fro like tails. I could see every rib, the joints of their limbs were like knots in a rope; each had an iron collar on his neck, and all were connected together with a chain whose bights swung between them, rhythmically clinking . . . All their meagre breasts panted together, the violently dilated nostrils quivered, the eyes stared stonily uphill. They passed me within six inches, without a glance, with that complete, deathlike indifference of unhappy savages. (23)

Early after Marlow’s arrival in the Congo, the narrator describes the chained slaves, referring to them as savages. In this case, however, and like many instances throughout the novella, this travesty is only casually mentioned. Conrad inserts details but quickly continues on to the storyline of Marlow and his struggles throughout the novella. Directly following the word “savages,” Conrad immediately draws his attention away from the Congolese people, and begins to describe the military men running the work area (23). Conrad offers no real reaction or opposition to the state of the slaves aside from a simple description of their condition. By doing so, he weakens the shock factor to his readers and therefore undermines the power of his performance.

One could also argue that there is a double standard when

defining acts of morality in *Heart of Darkness*. This is most clearly seen in Marlow’s discovery of heads on spears around Mr. Kurtz’s hut:

Curious, this feeling that came over me that such details would be more intolerable than those heads drying on the stakes under Mr. Kurtz’s windows. After all, that was only a savage sight, while I seemed at one bound to have been transported into some lightless region of subtle horrors, where pure, uncomplicated savagery was a positive relief, being something that had a right to exist—obviously—in the sunshine. The young man looked at me with surprise. I suppose it did not occur to him that Mr. Kurtz was no idol of mine. (Conrad 27)

Marlow has a negative reaction, but in some ways this is simply a non-aggressive minor opposition. We must recognize that Marlow’s feelings are only in disappointment to his “idol” Mr. Kurtz. He feels that this barbaric violence is wrong only because he believed that Mr. Kurtz, a white male, was morally above savage behavior and would not allow it. He did not question the violence when black individuals were committing it, as he viewed them as savage and barbaric in nature. This quote also reveals Conrad’s tendency to depict Africans solely as a weak people. This aspect of his writing is most clearly seen when Marlow is near the work site and climbs the hillside as the “unhappy savages” pass him (Conrad 23). He immediately sees the slaves at work and reflects on their situation.

They were dying slowly—it was very clear. They were not enemies, they were not criminals, they were nothing earthly now—nothing but black shadows of disease and starvation, lying confusedly in the greenish gloom. (Conrad 25)

When Marlow sees sick and dying Africans, he described them in this state. But there is never a description of a hard working, powerful, or healthy Africans that draws the reader’s attention. We can contrast this lack of a powerful African figures to the depictions of Africans in Chinua Achebe’s historic work, *Things Fall*

Apart. Although Achebe shows the “primitive” side of his society, including violence and the brutality against women, he also outlines the rituals and cultural aspects that one could find beauty and value in. The society Achebe describes has order, tradition, and is not characterized as savage; Conrad fails to address this aspect of Congolese society in *Heart of Darkness*. Slavery was not the only important aspect of Congolese society, and one could argue that Conrad’s argument would have been more powerful if he had discussed the cultures and cultural values that were lost because of the slave trade. In *Things Fall Apart*, we are introduced to the religious structure, the hard work of farmers and their agricultural achievements, and the intricate family dynamic within tribes. Okonkwo is clearly not a slave, but a masculine, hard-working member of his society. By comparison, Conrad’s portrayal of naked gun battles and chained men fails to communicate the same level of humanity in the Congolese people.

Given that the depiction of African society is an important issue to Achebe, he has come forward publicly to criticize *Heart of Darkness*. During an interview with NPR’s Robert Siegel, host of the radio show *All Things Considered*, Chinua Achebe stated that *Heart of Darkness* is a gross misrepresentation of African society. “The language of description of the people in *Heart of Darkness* is inappropriate,” said Achebe. “I realized how terribly terribly wrong [*Heart of Darkness*] was to portray my people — any people — from that attitude” (Siegal). This one-sided view of culture can have a negative effect on a literary performance. Johannes Fabian, Professor of Anthropology at the University of Amsterdam, has written extensively on the intersections of performance, theater, and anthropology. He feels that any performance that discusses cultures foreign to its audiences has an effect on intercultural relations. Scholars in his area have noted that the role of any theatrical or performance work is to help society gain knowledge of culture. A piece that undermines the image of African cultures inevitably weakens relations between Africa and the western world. Fabian warns against the bias shown in *Heart of Darkness*, “Still, [when publishing a work of performance] there is a danger that

must be avoided, which is to instrumentalize theatricality” (Fabian 179). Presenting negativity in an overdramatic fashion for the sake of entertainment underplays the significance of culture. Death, lack of education, danger, and violence may help draw in audiences, but if overdone, it becomes impossible to provide a legitimate picture of the peoples described. Readers need substance. One could say that for purposes of pure entertainment, substance is not needed, and shock factor is most valued. This concept connects us back to the intent of Conrad’s work, which was to expose the western world to the Congolese culture. By only showing horrors, he provides a flawed and incomplete vision of Congolese society to his readers.

Performance artists have critiqued the importance and process of measuring the effectivity of art. Writer, activist, and performance artist Guillermo Gómez-Peña argues that effectivity is based on the amount of discussion a work receives. “Once the performance is over and people walk away, our hope is that a process of reflection gets triggered in their perplexed psyches. If the performance is effective (I didn’t say ‘good,’ but effective), this process can last for several weeks, even months” (Gómez-Peña). Although he makes the argument that discussion is an indicator of effectivity, a factor that many scholars have argued is important since the publication of *Heart of Darkness*, he ignores the idea that if the discussion is based upon false, one-sided ideals, it is counteractive to its intended message. Any such discussion fosters a false, misunderstood perception of a society. Considering this in conjunction with *Heart of Darkness*, Conrad’s work has done a disservice to its readers and the public sphere of western culture. One of the clearest examples of this disservice is Conrad’s discussion of cannibalism. When Marlow describes his time on the ship in the Congo to his friends, he states that his crewmen were cannibals:

I don’t pretend to say that steamboat floated all the time. More than once she had to wade for a bit, with twenty cannibals splashing around and pushing. We had enlisted some of these chaps on the way for a crew. Fine fellows—cannibals—in their place. They were men one could work with, and I am grateful to them. And, after all, they did not

eat each other before my face: they had brought along a provision of hippo-meat which went rotten, and made the mystery of the wilderness stink in my nostrils. (Conrad 56)

Some scholars argue that this description of the Congo is completely false. Candice Bradley, an Associate Professor of Anthropology at Lawrence University, has written on *Heart of Darkness*, the history of the Congolese people, and cannibalism. She claims that “though they did not have a written history, the people of the Congo were not primitives, cannibals or savages” (Bradley).

Dr. Frances B. Singh, Professor of English at Hostos College and scholar of colonial and post-colonial literature, recognizes the past existence of cannibalism in the Congo, but disagrees with Conrad’s depiction of it. On the subject, Singh writes: “He never completely grants [cannibals] human status: at best they are a species of superior hyena . . .” (273). She also argues that Marlow’s view of the Congo is so limited that he believes cannibals eat human flesh out of “greed” and “lust,” not as a ritual with great cultural significance. As Singh explains:

... a society in which cannibalism has ritual significance cannot possibly be a symbol for a lawless and bestial one. All primitive ritual, no matter how shocking it may appear to an outsider, is, in the words of Johan Huizinga, “sacred play . . . fecund of cosmic insight and social development.” (274)

Although it is clear that scholars have differing viewpoints on the subject of cannibalism in the Congo, they largely disagree with Conrad’s depiction of cannibalism in *Heart of Darkness*. Authors can encourage readers to discuss the culture of the Congolese people, but if the information they base their discussion on is inaccurate, then they have not actually added any new information to their readers’ worldview. As a result, the mindsets of those who read *Heart of Darkness* are left unchanged. Some would argue that readers are left in a worse position, as they were given false ideals. This outcome is ultimately the opposite of Conrad’s original intentions.

In addition to misrepresentation, bias is also a critical issue in cultural exploration. Fabian expands upon the idea that western

writers often critique and give a one-sided view of African societies. Such authors only convey a sense of doom, which is a part of Fabian’s warning of overusing theatricality. “If ‘to be or not to be’ is the question, then ‘to be and not to be’—to me the most succinct concept of performance—might be the answer,” (Fabian). Fabian suggests that giving a broad, complete image of a society or culture in performance is the most effective and accurate option. By only discussing the instability of a society, we ignore the culture of the society. There is no discussion or analysis of agricultural achievements and religious philosophy within *Heart of Darkness*, which are actively present in many African cultures.

Even today, readers and critics alike discuss the significance and impact of *Heart of Darkness*. The British popular newspaper *The Telegraph* published an article in 2009 discussing public reaction to Conrad’s *Heart of Darkness*:

Like some deeply bruised cloud hovering thunderously above a summer picnic, Joseph Conrad’s *Heart of Darkness* threatens us still, more than a century since its publication . . . Few works have entertained, excited and troubled minds as much. It has inspired music—including a forthcoming opera by Tarik O’Regan—and spawned numerous radio, theatre, film and television adaptations, the most famous being *Apocalypse Now* (Miller).

Although we continue to recognize *Heart of Darkness* as a great literary work, it is clear that its depiction of tribal African society is inaccurate. Scholars have argued that it has harmed intercultural relations, and it is clear that the novella fails to present the complex characteristics and positive aspects of Congolese culture and African society as a whole. Moreover, Conrad fails to draw strong attention to the many hardships faced by the African people. *Heart of Darkness* sheds no light on the great culture damaged by the slave experience. Although Conrad intended to communicate the slave experience of the Congolese people, his literary performance is ultimately ineffective.

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SO ABSTRUSE A DOCTRINE: A *TREATISE OF FLUXIONS* BY COLIN MACLAURIN

BY EILENE M. TOPPIN ORDING

In the preface to his monumental work of 1742, *A Treatise of Fluxions*, the Scottish mathematician Colin Maclaurin (1742) referred to the Method of Infinitesimals as an abstruse science. "Method of Infinitesimals" and "fluxions" are terms for what is called calculus in modern mathematics. Maclaurin set out to refute objections to the then-unexplained form of Sir Isaac Newton's calculus and ended by presenting calculus through classical geometry. While some have criticized his approach as slowing the development of calculus (Ball, 1968), this work is not entirely based on classical geometry (Grabiner, 1997). Only the elementary elements were necessarily explained this way to show the validity of the method in a familiar, classical way.

In 1734, a treatise entitled *The Analyst* by Bishop George Berkeley was published. It was a criticism of Sir Isaac Newton's *De Analysi* and contemporary papers that were the foundational works on Newtonian calculus. Berkeley protested that the assumption that certain quantities could be neglected due to their infinitesimal magnitude caused errors and was not sufficiently proven. He compared the Analyst (meaning Newton) to religious leaders calling on others to take leaps of logic upon faith alone.

Maclaurin was qualified to make a refutation of Berkeley's paper by his background in mathematics and his acquaintance with Newton's fluxions. Maclaurin was born in Kilmodan, Scotland in 1698. Because his father died when he was a baby and his mother passed away in 1707, his youth was supervised by his father's

brother who diligently oversaw his education. He was educated in Scotland, learning all the subjects that a clergyman's son would be expected to know: Latin, logic, moral philosophy, natural philosophy (science), and mathematics (O'Connor & Robertson, 1999).

At this time, Scotland was embarking on a renaissance of its own; four universities in Scotland were flourishing, interacting with scholars in France and the Lowland Countries across the English Channel and making great strides in medicine, engineering, and the sciences. This was no academic hinterland; Scotland was the center of technological growth in multiple areas. Maclaurin was in the heart of this growth, and Scottish mathematical training was highly sought after. He attended university in Glasgow beginning in 1709 at age 11. This early entry into university seems unusual to us, but in that era, universities were competing for talent, so it was not unheard of for youngsters to enter university in their early adolescence. He attained the degree of Master of Arts at age 14 in 1712 by defending a thesis titled *On the Power of Gravity* in which he used Newton's theories, which would have been known to only a select body of experts at that time (O'Connor & Robertson, 1999).

Due to Newton's reluctance to publish and be exposed to unkind criticism, there were not many people who thoroughly read, understood, and used his fluxions. One of the few people who did was David Gregory, a nephew of James Gregory the astronomer and brother of the James Gregory that Maclaurin was later hired to assist at Edinburgh. Maclaurin was one of this small group of mathematicians completely familiar with the method of fluxions (O'Connor & Robertson, 1999). By 1717, Maclaurin was appointed to a professorship in Aberdeen at the young age of 19. In order to gain the appointment, he had to compete with the other candidates by taking a test that lasted ten days. While at Aberdeen, he published two papers, one in 1718 and one in 1719 (O'Connor & Robertson, 1999).

Maclaurin journeyed to London in 1719. While he was there, he was invited to join The Royal Society of London for Improving Natural Knowledge. The Royal Society was an important body

of scientists and mathematicians from a variety of fields. They shared information by lecture and through a journal, *Philosophical Transactions*, and election as a fellow was a great honor. Of course, Sir Isaac Newton was the president of the Royal Society at that time, and it seems likely that Maclaurin met him here for the first time, though some Newton biographers disagree about this point (O'Connor & Robertson, 1999).

In 1722, Maclaurin was asked to accompany a young man on a Grand Tour of the European continent, and he did. During his sojourn in Paris, he probably met some of the great philosophers, scientists, and mathematicians that were resident at that time. The young man in Maclaurin's charge became ill and died in 1725, however, so Maclaurin returned to Aberdeen, where he had been shirking his responsibility as a lecturer (Turnbull, 2007). In 1725, James Gregory held the mathematics chair at the University of Edinburgh, but he was ill and the decision was made to find a co-chair while he was recovering. Newton wrote a recommendation for Maclaurin to be given the position. He even offered to privately fund that position. There is no evidence that the university took Newton up on his offer, but in November of 1725, Maclaurin took up the appointment (O'Connor & Robertson, 1999). In the years following his appointment to Edinburgh, Maclaurin was busy lecturing, finding and marrying his spouse, Anne Stewart, and publishing at least two articles on fluxions in *Philosophical Transactions*. Maclaurin was a contemporary of numerous eminent Scottish scientists. He belonged to the Rankenian Club of Edinburgh where he met with other scholars from the university to discuss such topics as Berkeley's essay (O'Connor & Robertson, 1999).

In 1734, Bishop George Berkeley (1685-1753) wrote his widely-read attack on calculus, or the study of "fluxions" as Newton referred to the technique. Berkeley questioned the methods and validity of the whole technique, and Maclaurin was moved to write a reply. The reply turned into his two volume masterwork on calculus titled *A Treatise of Fluxions* published in Edinburgh in 1742.

Maclaurin's (1742) *Treatise* began as a reply to Berkeley's claim that Newton's form of calculus was founded on no better evidence

than that of religion, but it developed into something much more important: a spotlight on Newton's work. He could have written a paper or a pamphlet to refute Berkeley. When he sat down to do that he must have been inspired by how much more there was to say about the subject, especially since Newton himself had died without publishing a paper on it. Newton's papers on fluxions in the 1670s were rejected for publication by both the Royal Society and the Cambridge University Press. *De Analysisi* and another work on the subject were distributed privately to like-minded mathematicians. Newton, who disliked controversy, put most of his effort into physics from that point rather than persevere in mathematics. The works were published forty years later, thus Berkeley's pamphlet was published seven years after Newton's death and the answer to the pamphlet was written by someone else (Smith, 2007).

In the preface to his *Treatise*, Maclaurin said he wrote the first four chapters of the first volume and the first chapter of the second before showing them to others for their comments and opinions. Maclaurin (1742) says in his introduction to the first volume:

For we may be apt to rest in an obscure and imperfect knowledge of so abstruse a doctrine, as better suited to its nature, instead of seeking for that clear and full view which we ought to have of geometrical truth; and to this we may ascribe the inclination which has appeared of late for introducing mysteries into a science wherein there ought to be none (p. 2).

Maclaurin (1742) agreed in part with Berkeley that so important a method must be proved. Defining the terms fully and explaining how and when the dismissal of small quantities is appropriate was an important step in the acceptance and application of fluxions. It appears from Maclaurin's introduction that he knew some practitioners had begun dismissing small terms and making unwise, or at least hasty, assumptions. Apparently, he was not alone in this observation. The people to whom he showed the first parts of his *Treatise* were so enthusiastic that they encouraged him to do more (Maclaurin, 1742).

Before we examine Proposition XXII from his *Treatise of Fluxions*,

it would be wise to discuss Newtonian calculus terminology. A *fluxion* would be defined today as a derivative (rate of change) with respect to time of a "fluent," or a "quantity that flows." Today a fluent is called a function. The Newtonian definition of a function given by Maclaurin (1742) is as follows: "The velocity with which a quantity flows, at any term of time while it is supposed to be generated, is called its *Fluxion*, which is therefore always measured by the increment or decrement that would be generated in a given time by this motion" (p. 57). We see, as Maclaurin (1742) explained early in the *Treatise*, the use of a horizontal line or base of a figure to represent the time during which a point, figure, or body is moving. The path the body takes during that time sweeps out an area in the time of motion. The ordinates are the values of the height of the curve at the instant of measurement, values of y or $f(t)$ as we commonly refer to them. So, the fluxion is the derivative (rate of change) at the instant of measurement. Of course, if the velocity also varies with time, the second derivative measures the acceleration (rate of change of the velocity) at the given time. Maclaurin used Newton's notation to indicate fluxions of various degrees. The first fluxion was represented by a letter with one dot, \dot{y} . A second fluxion was indicated by a second dot, \ddot{y} , and the third fluxion was indicated by a third dot and so on.

When Maclaurin declares that the fluxion of a base is "given," we understand that the first derivative or velocity along that straight line is constant [$\frac{dx}{dt} = \text{constant}$]. With constant velocity, the position of a body will vary in constant proportion with the time. Therefore, as Maclaurin creates a graph plotting the ordinate against the base, we can treat the base as if it were representative of increments of time. The fluxion of the ordinate, is $\frac{dy}{dt}$ and the fluxion of the curve

$$\text{is then } \frac{dy}{dx} = \frac{\left(\frac{dy}{dt}\right)}{\left(\frac{dx}{dt}\right)} .$$

Proposition XXII from Chapter IX defines the so-called points of inflection of the graphs of continuous functions and explains how to identify them using the first and second fluxions. We call these the first and second derivative tests in modern mathematics.

Maclaurin (1742) wrote that Fermat proposed a geometric method on maxima and minima around 1638, and he set out to show how the method of fluxions was more expeditious (p. 214). My comments are in [square brackets].

Before we examine Proposition XXII, we must consider Lemma VII from Article 184 and its converse.

Lemma VII states (Maclaurin, 1742):

The base being supposed to flow uniformly, the ordinate increases with a motion that is continually accelerated, and decreases with a motion that is continually retarded, when the arch is convex [concave up] towards the base. But when the arch is concave towards the base [concave down], the ordinate increases with a retarded motion, and decreases with an accelerated motion.

[To understand this, we look at two cases with two subcases each.

Case 1: Assume the curve is concave up.

Case 1a: (Figure 47 simplified) The ordinate is increasing and the motion is continually accelerated. In modern terms: y increases, $\frac{dy}{dt} > 0$, motion accelerated, $\frac{d^2y}{dt^2} > 0$. The curve is increasing and concave up.

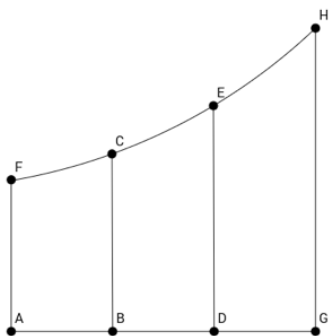


Figure 47 simplified

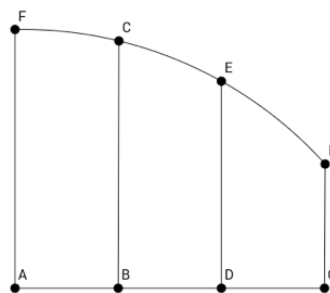


Figure 50 simplified

Case 1b: (Figure 50 simplified) The ordinate is decreasing and the motion is continually retarded. In modern terms: y decreases, $\frac{dy}{dt} < 0$, motion retarded, $\frac{d^2y}{dt^2} < 0$. The curve is decreasing and concave down. Maclaurin (1742) says this curve is convex towards the base (concave up). But just as the second derivative less than zero tells us the curve is concave down, the figure shows that the curve is concave down. We cannot explain the contradiction without more research.

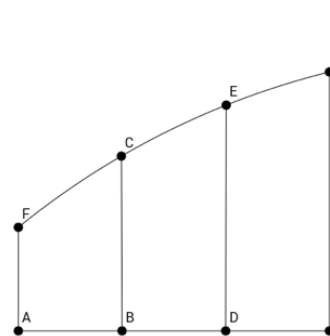


Figure 50 simplified

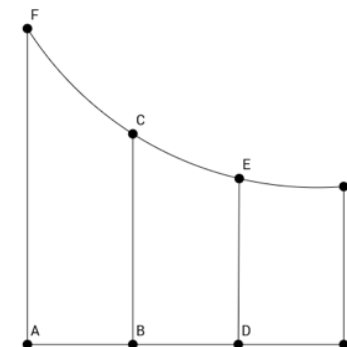


Figure 47 simplified

Case 2: Assume the curve is concave down.

Case 2a: (Figure 50 simplified) The ordinate is increasing and the motion is continually retarded. In modern terms: y increases, $\frac{dy}{dt} > 0$, motion retarded, $\frac{d^2y}{dt^2} < 0$. The curve is increasing and concave down.

Case 2b: (Figure 47 modified) The ordinate is decreasing and the motion is continually accelerated. By this we state in modern terms: y decreases, $\frac{dy}{dt} < 0$, motion accelerated, $\frac{d^2y}{dt^2} > 0$. The curve is decreasing and concave up. Maclaurin (1742) says the curve is concave towards the base (concave down), but as Figure 47 simplified

shows, this curve is concave up; again, there is a contradiction.

We are led to conclude that the statements of case 1b and case 2b have been reversed. Since Maclaurin only provided drawings 47 and 50 for cases 1a and 2a, it is otherwise difficult to explain these seeming contradictions.

To rephrase and correct Lemma VII in modern terms: If the curve is convex with the base (concave up) then the curve is being accelerated (second derivative is greater than zero) whether y is increasing or decreasing. If a curve is concave with the base (concave down), then the curve is being retarded (second derivative is less than zero) whether y is increasing or decreasing.

Maclaurin (1742) states in article 264 (without proof) that the converse of the (corrected) lemma is also true: If a curve where y is increasing or decreasing has its motion being accelerated (second derivative is greater than zero), then the curve is convex towards the base (concave up). If a curve where y is increasing or decreasing has its motion being retarded (second derivative is less than zero), then the curve is concave towards the base (concave down).]

[End of Lemma VII (Maclaurin, 1742).]

Now we may begin Proposition XXII (Maclaurin, 1742).

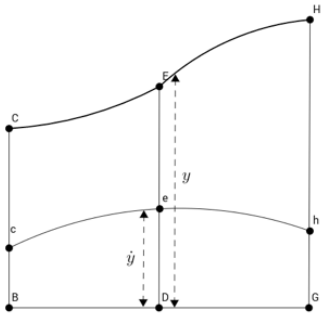
Proposition XXII

263. *The ordinate meets the curve in a point of contrary flexure [inflection] when its fluxion [first derivative with respect to time] is a maximum or minimum, the fluxion of the base being given, and the curve being continued on both sides of the ordinate.*

[The graph of a continuous function $y = f(t)$ has a point of inflection when the first derivative, \dot{y} , attains a local maximum or minimum.]

[Proof I:]

Resuming the construction of the 249th and 251st articles, it follows from what was demonstrated there [by geometry], that, when the ordinates [y-values]



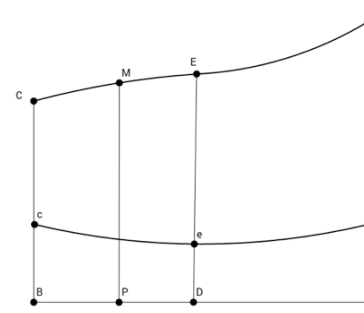
Modified figure 95

of the arch ce [the curve representing the first derivative \dot{y} of the upper curve, CE] increase from Bc to De, the arch CE is convex towards the base [concave up with respect to base BD], and that when the ordinates from De to Gh decrease, the arch EH is concave towards the base [concave down with respect to base DG]; that is, when De is a *maximum*, and the arches ce, eh are on different sides of De, the point E [on the upper curve CH] is a point of contrary flexure [point of inflection].

[Modified figure 95 shows a simultaneous graph of two curves, the upper curve a representation of the ordinates or y -values as a function of time, the lower curve plotting the first derivative (fluxion or \dot{y}) as a function of time. The upper curve has a point of inflection where DE is the ordinate and the lower curve has a maximum at that point represented by ordinate De. Thus, Maclaurin (1742) claims that points of inflection will occur where there is a maximum in the graph of the first derivative as a function of time.]

But De represents the fluxion of the ordinate DE, the fluxion [here, \dot{x}] of the base being represented by the given right line [straight line] DG. Therefore, when the fluxion of the ordinate [the first derivative \dot{y} of the curve y at the point D] is a *maximum*, and the curve is continued from the ordinate on both sides, it [the ordinate, $DE = y$] meets the curve in a point of contrary flexure [point of inflection].

In like manner [revised figure 96], when the ordinates from the arch ce decrease, and those from eh increase (that is, when De is a *minimum*), the arch CE is concave [down towards BD] and the arch EH is convex towards the base [concave up with respect to DG], by what was shown in the 249th and 251st articles. Therefore, when the fluxion of the ordinate



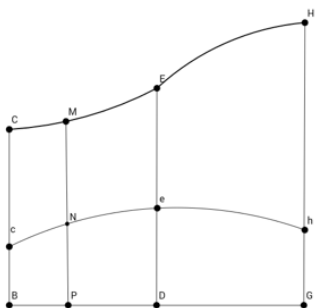
Revised figure 96

[graph of first derivative \dot{y}] is a *minimum*, the fluxion of the base being given, and the curve being continued from the ordinate on both sides, the ordinate meets the curve in a point of contrary flexure [point of inflection].

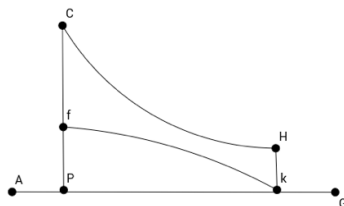
[End of Proof 1]

[Proof 2:] 264. The proposition appears also from the converse of the [corrected] 7th lemma, art. 184. [As stated above, the converse of the Lemma: If a curve where y is increasing or decreasing has its motion being accelerated (second derivative is greater than zero), then the curve is convex towards the base (concave up). If a curve where y is increasing or decreasing has its motion being retarded (second derivative is less than zero), then the curve is concave towards the base (concave down).

It follows for our purposes here that when the first derivative is increasing with respect to time, the curve is concave up and when the first derivative is decreasing with respect to time the curve is concave down.]



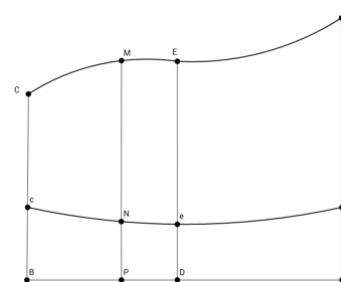
Revised figure 95



Revised figure 44, note 1

For, if we suppose the fluxion of the ordinate DE to be a *maximum* [that is, in revised figure 95 De is a maximum on the lower curve], the fluxion of the ordinate PM [the ordinate of the lower curve PN] must increase while M describes [moves along the upper curve] CE , and decrease

while [the point] M describes [moves along the curve] EH . Therefore, by the converse of the 7th lemma, [in revised figure 95] if PM increases while M describes CEH , the arch CE must be convex [concave up with respect to the base BD] and EH concave [down] towards the base $[DG]$; so that E must be a point of contrary flexure [point of inflection].



Revised figure 96

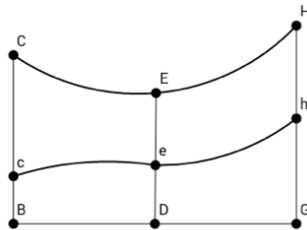
If PM decrease while M describes CEH , the arch CE must be concave [down toward base BD] and the arch EH convex [concave up] towards the base $[DG]$, and E a point of contrary flexure [point of inflection at D]. In the same manner, when the fluxion $[De]$ of DE is a minimum, it appears that E is a point of the same kind [point of inflection]. We do not comprehend [include] under the [terms] *maxima* or *minima* quantities that vanish [where the first fluxion equals zero], or such as are supposed to exceed all assignable magnitude [For this argument, he excludes the case where the first derivative equals zero and the case where the first derivative approaches infinity.]

[End of Proof 2.]

265. Cor. I [Corollary I]. As there are various kinds of maxima and minima [global, local or endpoint], so there are various kinds of points of contrary flexure [points of inflection].

[In the introduction to Chapter IX, Maclaurin (1742) said that the first kind of inflection point is found on a curve where that curve is continued immediately on both sides of the ordinate. The second kind of inflection point we would call a point of reflection, and it is found when the curve is reflected through a line intersecting that ordinate and both the branches of the curve are on the same side of the ordinate. He concedes that in the second case, some writers exclude these because “those branches (or at least the adjoining parts of each) are over the same base.” We would exclude these today because the graph would no longer represent the graph of a function, since each point on the base would correspond to two points on the curve.]

As in the most common cases, the ordinate is a maximum or minimum when its fluxion vanishes [the first derivative is zero], the fluxion of the base being given; so, when the second fluxion of the ordinate vanishes [second derivative is zero], the ordinate most commonly passes through a point of contrary flexure [point of inflection].



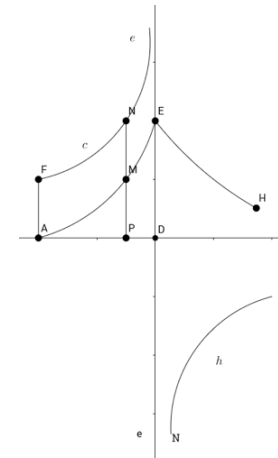
Revised figure 97

But this is not universally true, though the curve be continued on both sides of that ordinate. For when [in revised figure 97] the tangent of the curve *ceh* at *e* becomes parallel to the base, the second fluxion [\ddot{y} , the second derivative] of *DE* or the first fluxion of *De*, vanishes [equals 0], the fluxion of the base being given; but in this case, *e* may be a point of contrary flexure [of the graph of

the first fluxion] (art. 260 [where this argument is made geometrically]), and, *De* (which measures the fluxion of *DE*) not being a maximum or minimum, then *E* is not a point of contrary flexure, but the whole arch *CEH* has its concavity turned the same way.

[If both the first derivative and the second derivative are zero at a given point, and the first derivative does not attain a maximum or minimum at that point, then the graph of the original function will not have a point of inflection there.]

266. Cor. II. [Omitted]



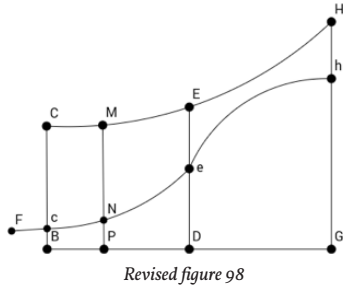
Revised figure 92

267. When *De* or the fluxion of the ordinate *DE* is such a maximum or minimum as was described in the 245th and 262d articles [In revised figure 92, the fluxion of the curve, $\frac{dy}{dx}$, equals the fluxion of the ordinate, $\frac{dy}{dt}$, and $\frac{dx}{dt} = 0$], *E* is [a cusp and] a point of contrary flexure, and, the tangent at *e* being perpendicular to the base [meaning vertical], the

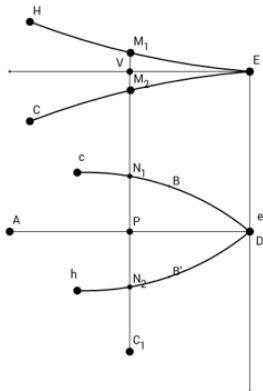
right line that measures the fluxion of the base vanishes [equals zero] in this case when that [right line] which measures the fluxion of De , or the second fluxion of DE

is given [Meaning the fluxion of the curve $\frac{dy}{dx} = \frac{\left(\frac{dy}{dt}\right)}{\left(\frac{dx}{dt}\right)}$ is infinite when the fluxion of the base $\frac{dx}{dt} = 0$ and the second derivative $\frac{d^2y}{dt^2}$ is constant (given)].

But it does not follow, conversely, that when this happens, E is always a point of contrary flexure, although the curve be continued on both sides of the ordinate DE .



Revised figure 98

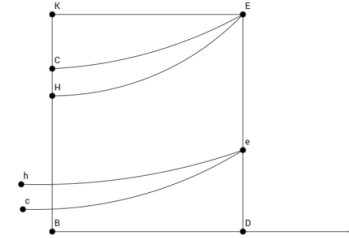


Revised figure 99, Note 1.

For if e itself be a point of contrary flexure in the [fluxion] curve FN (Fig. 98 [see Revised figure 98]), then, though the tangent at e be perpendicular to the base, De is not a *maximum* or *minimum*, and E in the curve CEH is not a point of contrary flexure; but the whole arch CH has its convexity or concavity towards the base, according as the ordinates of the arch ch continually increase or decrease from Bc to Gh .

268. Hitherto we have supposed the two arches CE and EH to be on different [left and right] sides of DE . When these arches are on the same side of DE , and have a tangent at E different from DE , then E is a point of reflexion [sic], or cuspis [Revised figure 99, Note 1. Line VE is a line of reflection. Note: Since from our point of view these are no longer the graphs of functions, we would

have to imagine the figures rotated 90° counterclockwise so that DE becomes horizontal.]. The celebrated author of the *Analyse de infiniment petits* [L'Hospital, 1696] distinguishes those points of two kinds; the point E is a cuspis of the first kind when the arches EC , EH have their convexity towards each other [Revised figure 101], but of the second kind, when the convexity of the one is towards the concavity of the other [EC, EH Revised figure 99, note 1].



Revised figure 101

In general, when E is a cuspis of the first kind, and the tangent [KE in Revised figure 101] at E is parallel to the base, the fluxions of DE of any number of successive orders may vanish, the fluxion of the base being given; but the fluxion of the next order to those that vanish cannot be to the fluxion of the base in any assignable ratio, and is said (according to the usual language on the subject) to become infinitely great [If $y^n(t) = 0$, then $y^{n+1}(t)$ is undefined.], in the same sense as the ordinate of a curve is commonly said to become infinite when it is supposed to coincide with any asymptote.

[End of Proposition XXII (Maclaurin, 1742).]

Maclaurin (1742) stated in his introduction that this treatise was written to be easy for beginners. Almost everyone was a beginner in calculus at the time, and a firm foundation was needed for everyone to speak about fluxions using clear definitions

and concrete postulates and theorems. To make the terms and statements clear for traditionalists, it was necessary at first to use geometric arguments that people with a classical education in mathematics could understand. Despite the importance of Maclaurin's work, some were impatient with the use of traditional geometry to explain fluxions. The assumption seems to have been that geometry would always be required to justify new work in the field. In his book, *A Short History of Mathematics*, W. W. Rouse Ball (1968) wrote of Maclaurin:

Maclaurin was one of the most able mathematicians of the eighteenth century, but his influence on the progress of British mathematics was on the whole unfortunate. By himself abandoning the use both of analysis and of the infinitesimal calculus, he induced Newton's countrymen to confine themselves to Newton's methods, and it was not until about 1820, when the differential calculus was introduced into the Cambridge curriculum, that English mathematicians made any general use of the more powerful methods of modern analysis.

However, it seems that Ball had not taken into account that Maclaurin died four years after *A Treatise of Fluxions* was published, and perhaps Ball had not sufficiently considered the second volume of the work. Maclaurin could scarcely have intended that his countrymen would confine themselves to Newton's methods. He himself read Euler and Leibniz and included a mention of Euler's work in his preface (Maclaurin, 1742). Near the end of his life, and shortly after *A Treatise of Fluxions* was published in 1742, Maclaurin was busy coping with violent war between Scottish rebels and the English government. He died in 1746 as a result of poor health following a harrowing escape from Edinburgh in which he fell from a horse (O'Connor & Robertson, 1999). There is no predicting where he would have gone with his research after the war, but we may presume that he would have continued to correspond with his contacts on the continent. Further, it seems harsh to blame Maclaurin for a wave of nationalism brought on by the just pride Newton's countrymen took in Newton's prowess and the bitter

fight over who discovered calculus first, Newton or Leibniz. It is safe to say this nationalistic pride delayed English acceptance of the Continental version of calculus.

Judith V. Grabiner (1997) has written a strong defense of Maclaurin by indicating the influence which *A Treatise of Fluxions* had on Continental calculus. For example, she traces the use of inequalities in arguments by Lagrange and Cauchy back to Maclaurin's work. Another key instance of this is the well-known proof by Maclaurin of a special case of the Fundamental Theorem of Calculus. Using an inequality and a double reductio argument he proved that if the area under a curve equals x^n , then the

function equals $\frac{1}{n+1}x^{n+1}$. This proof is found in Volume II of *A Treatise of Fluxions* (Maclaurin, 1742). Grabiner (1997) also argues that Maclaurin's rigorous methods in defining maxima, minima, and points of inflection served not just to refute Berkeley, but to enlighten Maclaurin's students and support his own research on curves which "cross over themselves, loop around and are tangent to themselves" (Grabiner, 1997).

While Maclaurin did indeed use classical techniques in *A Treatise of Fluxions*, it is clear from a general reading of the text that he also used every tool in his calculus toolkit. He explained and demonstrated the usefulness of calculus in general and of fluxions specifically using infinite series and underlying principles of analysis as well as geometry. It is impossible to know if he would have used Continental methods and notation had he lived longer, but it is unfair to assume his masterwork was responsible for an entire nation's reluctance to accept those tools which have become the standard in calculus worldwide.

Whatever Maclaurin's intentions at the start may have been, his treatise put many fundamental definitions, postulates, and theorems in rigorous form with proofs that traditionalists could understand and validate. His familiarity with Newton's work made him an excellent candidate to explain fluxions and the Method of Infinitesimals. His connections with other mathematicians' work helped him to bring to the *Treatise* the most recent available research.

He introduced many scholars to a new branch of mathematics through this work. Without calculus, some complex scientific work would have been difficult or even impossible. Maclaurin provided a sound foundation upon which to base further mathematical research and for the application of the method to other sciences.

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Endnotes

1. I acknowledge the use of the Geogebra web application for the construction of the figures in this paper. See Geogebra.org for more information.
2. Figures in the paper are numbered as Maclaurin (1742) numbered them. I have drawn my own revised or modified versions, but kept the original figure numbers for convenience.



THE EFFECT OF TARGET STIMULUS MODALITY ON PREPULSE INHIBITION

BY JESSICA GETTLEMAN

Introduction

Prepulse inhibition (PPI) is a psychophysiological measure believed to index the ability to filter distracting stimuli. Specifically, a weak, non-startling stimulus (prepulse) is presented immediately before a startling stimulus, causing a reduction in the strength of the measured startle eyeblink response to the startling stimulus (Graham, 1975). In order to explain why this attenuated eyeblink response occurs, the “protection of processing hypothesis” (Graham, 1975) suggests that detection of a new stimulus in the environment triggers a momentary filtering process that allows for the processing of the prepulse stimulus to continue without interruption from other stimuli. Therefore, the amount of inhibition of the startle eyeblink response is believed to be proportional to the salience, or importance, of the prepulse, which in turn is related to the attentional processing necessary to evaluate its significance.

Current research has examined a variety of attentional factors that modulate PPI. One of these factors, directed attention, has been operationalized as the discrimination between attended (salient) and non-attended prepulses in the same modality (e.g. both attended and non-attended prepulses are acoustic). Enhanced PPI (i.e. smaller eyeblink responses to the startle stimulus when a prepulse was presented first) has been observed when participants are instructed to attend to a given prepulse, compared to a lesser reduction when a prepulse is to be ignored (Dawson, Hazlett,

Filion, Nuechterlein, & Schell, 1993; Filion, Dawson, & Schell, 1993; McDowd, Filion, Harris, & Braff, 1993). Few studies, however, have included prepulses of more than one modality. Of those that have, some have shown that PPI is modulated by the modality of the prepulse. In their ontogenetic study of Long-Evans hooded rats where auditory, visual, and tactile prepulses were employed, Moran, Hord, Booze, Harrod, and Mactutus (2016) found that the strength and timing of the rats’ eyeblinks were modulated by the prepulses. Further, Aubert, Reiss, and Ouagazzal (2006) observed differences in the temporal patterns of auditory and visual PPI in BALB/cByJ mice. When comparing this strain of mice with 129S2 mice, they found that the latter strain exhibited greater levels of acoustic PPI as well as poorer levels of visual PPI, showing a modality-specific difference in PPI between strains.

No study, however, has presented the same subject with prepulses of different modalities simultaneously and directed the subject’s attention to one prepulse or the other. In other words, in the context of PPI, directed attention has not yet been examined across prepulse modalities. The present study attempts to fill this gap in the literature by presenting participants with prepulses in both visual and acoustic modalities. It was hypothesized that PPI would differ for target (attended-to) and non-target prepulses. Furthermore, we hypothesized that participants who were instructed to pay attention to a visual prepulse while ignoring an acoustic prepulse presented simultaneously would show a different pattern of eyeblink responses than participants who were exposed to the same stimulus pairing but were instructed to attend to the acoustic prepulse. Addressing this subject is important because it can help psychologists determine if distracting information is filtered differently across modalities. Moreover, further research in this area can help us understand if, in a human population, filtering ability is enhanced depending on the modality to which attention is directed.

Method

Participants

Participants (N = 50) were healthy University of Missouri-Kansas City (UMKC) students. Participants were predominantly female with a mean age of 22.83 years and a standard deviation of 5.70. These students were recruited via an online recruiting and scheduling system (PsychPool). All participation was voluntary, and a signed copy of informed consent was filed separately from all other participant data and materials.

Psychophysiological Assessment

After informed consent was given, participants completed a set of self-report measures and were prepared for electromyography (EMG) electrode placement. The muscles under the participant's left eye (orbicularis oculi) and the participant's left temple were cleaned before electrode gel and electrodes were placed on these areas according to established practices (Blumenthal et al., 2005).

Participants were then seated in a sound-attenuated chamber. Headphones were placed on participants' ears and participants were instructed to face a computer screen for a PPI assessment. In this assessment, participants were presented with visual stimuli (circles and squares) via the computer screen and acoustic stimuli (low tones and high tones) via the headphones. 50 visual/acoustic stimulus pairs were presented for 500ms each with the inter-trial intervals (ITI) between them varying between 5000ms and 10,000ms. Circles were always paired with low tones and squares were always paired with high tones. Startle stimuli, 105 dB white noise bursts of 50ms duration, were presented via the headphones 120ms after stimulus onset during 12 randomly selected circle/low tone trials and 12 randomly selected square/high tone trials. Startle stimuli were also presented alone during 12 randomly selected ITIs in order to assess each participant's baseline startle eyeblink response (i.e. startle eyeblink response to the startle stimulus alone with no prepulse). Approximately half of participants (n = 25) were instructed to press the space bar as quickly as possible in response to the onset of each circle and to not

let the sounds affect this response. The remaining participants (n = 25) were instructed to press the space bar as quickly as possible in response to the onset of each low tone and to not let the shapes (or startle sounds) affect this response. Therefore, the circles and low tones were target stimuli while the squares and high tones were non-targets, and the modality of the stimuli to which participants were directing their attention was manipulated. After completing the assessment, the participants were disconnected from the electrode recording equipment, debriefed, and thanked for their participation.

During the assessment, eyeblink EMG data were collected for all participants via Biopac MP150, filtered and rectified online. Eyeblink responses were scored for amplitude, the maximum amount of muscle activity during the eyeblink response, measured in microvolts (μV). They were also scored for peak latency, the time between the onset of the startle stimulus and the point at which the maximum amplitude of the startle eyeblink response was reached, measured in milliseconds (ms).

Results

For the trials including prepulses, PPI was calculated as a percentage change from baseline trials (trials with startle stimulus only). These scores were then averaged, giving each participant a measure of PPI for baseline trials, target stimulus trials, and non-target stimulus trials. A 2 (attended modality) X 2 (Target/Non-target) Repeated Measures ANOVA showed that PPI was significantly greater for trials involving the target stimulus: $F(1,45) = 38.84, p < .001$ (see Figure 1). PPI did not significantly differ based on the modality of the target stimulus, nor was there a significant interaction (all $ps > .05$).

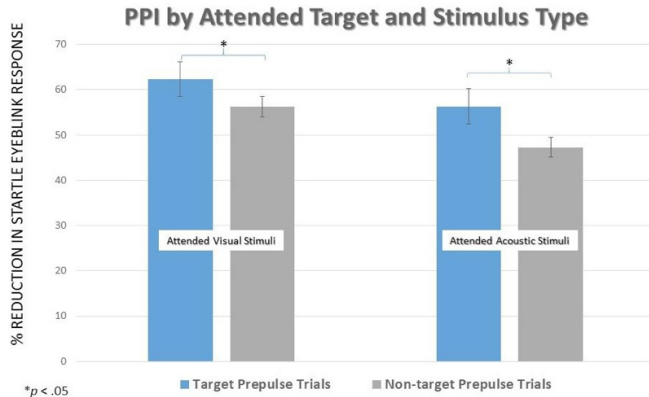


Figure 1

Latency scores (i.e. the latency between the onset of the startle stimulus and the maximum, or peak, amplitude of the eyeblink response) were averaged for all prepulse trials as well as for the baseline conditions. For the visual stimulus condition, the change in latency between trials with and without prepulses was significant, for both targets [$t(23) = -3.186, p = .004$] and non-targets [$t(23) = -4.72, p < .001$]. However, for the acoustic stimulus condition, latencies did not significantly differ (see Figure 2).

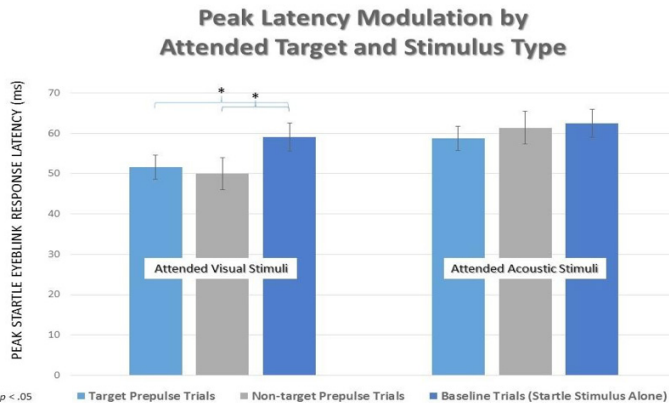


Figure 2

In order to assess whether any of these observed differences had an effect on the participants' responses to target stimuli, each participant's response probability, accuracy, and reaction times were compared between each of the attended modalities. Response probability was calculated by dividing the number of responses by the total number of trials of a given stimulus presentation, and accuracy was calculated by subtracting the response probability for non-target trials from the response probability for target trials. Finally, reaction times were measured by recording the time from stimulus pairing onset to the response, for both target and non-target trials. As expected, response probabilities were significantly greater for target than non-target stimuli, regardless of the presence of the startle sound (distractor). This difference was observed for both attended modalities. Accuracy was significantly greater for trials in which the stimulus pair was presented alone versus trials which also included the startle stimulus. This difference was also observed for both attended modalities. For trials containing the startle stimulus, reaction time to non-target stimuli (false alarms) was significantly faster than the reaction time to target stimuli (hits) for both attended modality groups. Since reaction times are known to capture response types ranging from impulsive to perseverative, the fact that non-target response times were faster indicates that perseverative responses to non-targets were correctly judged, and therefore, no responses were given to these stimuli. Moreover, reaction times to hits were significantly reduced (i.e. "faster") for participants attending to the visual target, compared to those attending to the acoustic target. These differences were observed whether the stimulus pair was presented alone: [$t(37) = -2.77, p = .009$]; presented with the startle stimulus: [$t(37) = -2.40, p = .02$]; and for all target trials: [$t(37) = -2.73, p = .01$] (see Table 1).

PARTICIPANT RESPONSES TO STIMULI BETWEEN MODALITIES					
BTWN GROUP DIFF.	MEASURE	TARGET STIMULI	W/I GROUP DIFF.	NON-TARGET STIMULI	ACCURACY
		(HITS)		(FAKE ALARMS)	(TARGET – NON-TARGET RESPONSE PROBABILITY)
		[MEAN (SD)]		[MEAN (SD)]	[MEAN (SD)]
VISUAL TARGET (n = 25)	RESPONSE PROBABILITY: STIMULUS PAIR PRESENTED ALONE (13 TRIALS)	.984 (.055)	*	.036 (.059)	.947 (.106)
	RESPONSE PROBABILITY: STIMULUS PAIR PRESENTED W/ STARTLE SOUND (12 TRIALS)	.978 (.038)	*	.105 (.067)	.873 (.070)
	RESPONSE PROBABILITY: ALL TRIALS OF STIMULUS PAIR (25 TRIALS)	.981 (.034)	*	.042 (.060)	.939 (.078)
	1* REACTION TIME (ms): STIMULUS PAIR PRESENTED ALONE (13 TRIALS)	474.63 (75.13)		509.57 (186.66) <small>57% of participants</small>	
	2* REACTION TIME (ms): STIMULUS PAIR PRESENTED WITH STARTLE SOUND (12 TRIALS)	436.42 (83.15)	*	379.76 (133.43) <small>58% of participants</small>	
	3* REACTION TIME (ms): ALL TRIALS OF STIMULUS PAIR (25 TRIALS)	455.53 (77.22)	*	417.62 (160.04)	
	ACCU				
	ACCU				
	ACCU				
ACOUSTIC TARGET (n = 25)	RESPONSE PROBABILITY: STIMULUS PAIR PRESENTED ALONE (13 TRIALS)	.969 (.063)	*	.042 (.079)	.927 (.098)
	RESPONSE PROBABILITY: STIMULUS PAIR PRESENTED W/ STARTLE SOUND (12 TRIALS)	.883 (.219)	*	.092 (.081)	.792 (.220)
	RESPONSE PROBABILITY: ALL TRIALS OF STIMULUS PAIR (25 TRIALS)	.928 (.123)	*	.042 (.073)	.886 (.136)
	1* REACTION TIME (ms): STIMULUS PAIR PRESENTED ALONE (13 TRIALS)	567.81 (127.06)		628.72 (272.01) <small>53% of participants</small>	
	2* REACTION TIME (ms): STIMULUS PAIR PRESENTED WITH STARTLE SOUND (12 TRIALS)	535.21 (160.14)	*	445.73 (185.51) <small>57% of participants</small>	
	3* REACTION TIME (ms): ALL TRIALS OF STIMULUS PAIR (25 TRIALS)	551.51 (133.67)	*	500.63 (228.76)	
					[*all ps < .05]

Table 1

Discussion

Regardless of stimulus modality, PPI significantly differed between target and non-target stimulus conditions, suggesting that the salience of the prepulse modulates PPI, in line with Graham's (1975) "protection of processing hypothesis." Peak latencies of eyeblink responses did not significantly differ between salience conditions, yet they differed based on the modality of the target stimulus to which the participants were instructed to direct their attention. Therefore, modality influences the timing of PPI, indicating that there are timing differences involved in the eyeblink reflex of PPI.

Differences in the patterns of accuracy and response probability to target stimuli suggest that the introduction of a distracting stimulus (the startle sound) interferes with efficient processing of the prepulse stimulus. Additionally, differences in reaction times between attended modalities of the prepulse targets

suggest that prepulse processing may be specific to the modality of directed attention. This would lend support to the specific modality model of attention proposed by Navon and Gopher (1979) which states that attending to stimuli in the same modality (e.g. both acoustic stimuli) is more difficult than attending to stimuli in separate modalities (e.g. one acoustic stimulus and one visual stimulus) because stimuli in the same modality draw from the same pool of attentional resources.

Taken together, the above results show support for the given hypothesis in that PPI was greater for target prepulse stimuli and that this protective process was initiated more rapidly when the target and distractor stimuli were in different modalities. These results may indicate that different (or modality-specific) pathways are simultaneously involved in attentional filtering, rather than one single mechanism. This conclusion has important implications for applied psychology.


For instance, clinical psychologists who treat attentional deficits or sensory processing abnormalities in general or in conjunction with disorders such as attention deficit hyperactivity disorder (ADHD) or autism spectrum disorder (ASD) should consider testing their clients to determine the modality in which deficits are most pronounced. Further, school psychologists may encourage teachers to present material in the modality in which students learn most effectively. In terms of a different approach, efforts could be made to reduce the disparity between the stronger and weaker modalities by exposing clients to stimuli in the weaker modality on a consistent basis. This idea is similar to that on which exposure and response prevention (ERP) therapy, a subset of cognitive behavioral therapy (CBT), is based.

Given these applications, there are several directions this research could take that would expand the results of the current study and add to the PPI literature by discussing the significance of responses to prepulses in different modalities. First, the sample in this study included only healthy, college-aged students. Larger differences in the observed effects could be revealed by using participants of different ages or including a clinical sample of

individuals with attentional deficits. Second, only visual and acoustic prepulses were used. Including prepulses in other modalities, such as tactile prepulses, would allow any differences in PPI and reaction times across three or more different modalities to be detected and examined. Third, though prepulses were presented in both visual and acoustic modalities, all startle stimuli were presented in the acoustic modality. Adding a visual startle stimulus condition and counterbalancing participants across conditions (i.e., having participants attend to both visual and acoustic prepulses when acoustic startle stimuli are presented as well as when visual startle stimuli are presented) would clarify the relationship between the modality of the startle stimulus and the modality of its prepulse. Moreover, including acoustic and visual startle stimuli would allow for additional analysis of both the resources involved in attentional filtering and how these resources are allocated. Following these recommendations, future research could further disentangle the complex interaction between attention, stimulus salience, and any inhibitory processes that all interact during efficient stimulus filtering.

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LOCUS OF CONTROL, ANXIETY, AND THE EFFECTS OF SLEEP HYGIENE EDUCATION ON COLLEGE STUDENT SLEEP

BY J.W. GURERA

I. INTRODUCTION

Throughout their lives, up to 20% of the US population will experience sleep-related issues (Chambers & Keller, 1993). Insufficient sleep can lead to physical problems of fatigue and drowsiness as well as cognitive problems such as difficulty in concentration and awareness. Consistent circadian rhythms supported by an equally consistent sleep schedule are key for the mental recuperation required for adults who, according to the National Sleep Foundation, are advised to get between seven and nine hours of sleep per night (2015). Problems with sleep are especially prevalent in a university population; recent research suggests college students get an average of less than six hours of sleep per night. Commonly documented sleep-related afflictions for this demographic include frequent sleep disturbances, irregular sleep-wake patterns, chronic partial sleep deprivation, insufficient sleep syndrome, and delayed sleep phase disorder, with especially common issues of inconsistent sleep scheduling (Lund, 2010; Gellis, 2014; Thomas, 2015).

In an effort to help his or her clients with primary or comorbid symptoms of poor sleep, a clinician may employ a few different strategies. Clinical psychologists may use a form of cognitive behavioral therapy (CBT) to treat insomnia or related afflictions by addressing certain thoughts and ideations related to both unwanted and desired behavior. Another approach would be to implement an educational intervention designed to teach clients

not only the importance of sleep, but also the habits an individual can employ to optimize sleep patterns, otherwise known as sleep hygiene practices. Inconsistencies in the literature exist concerning the effectiveness of sleep hygiene education as a tool for clinicians to assist in a client's sleep-related issues (Irish, 2015); however, several studies in recent years have found evidence supporting the validity of sleep hygiene education to improve sleep. As an intervention, it has demonstrated similar effectiveness to CBT for improving self-reported sleep quantity and sleep efficiency. This technique has been further linked to improvements in knowledge and appreciation for the role of sleep, sleep duration, sleep scheduling, confidence in one's ability to apply sleep hygiene practices, and overall quality of life (Edinger, 2009; Peachey, 2012; Tamura, 2014; Thomas, 2015).

Despite this recent research supporting the effectiveness of sleep hygiene education, clinicians may still choose other interventions. This is partially due to the fact that the success of sleep hygiene education is largely dependent on factors that the clinician cannot oversee. The actual implementation of sleep hygiene practices takes place outside the confines of a clinical practice. As a result, the clients' self-efficacy and their desire or ability to apply learned techniques to their life are critical for sleep hygiene education to succeed.

A facet of self-efficacy that may influence a desire to apply recommended sleep hygiene practices to one's routine is an individual's locus of control (Rotter, 1966). Defined as a perception of one's ability to influence the result of an event or situation, locus of control is a measurable outcome with self-reported scores that range from an internal locus of control (a firm belief in one's ability to affect an outcome) to an external, or chance, locus of control (a perception of randomness to the outcome and one's lack of influence over a result). The locus of control scale is a popular tool in the field of experimental psychology due to its ease of implementation and practical application to a variety of situations. An adaptation of the instrument was developed specifically for the purpose of assessing a patient's perception of

control over his or her health-related outcomes before and after treatment. The Multidimensional Health Locus of Control Scale demonstrates the adaptability of Rotter's original measure and its potential (Wallston, 1978). Locus of control has more recently been applied to the perception of sleep-related outcomes. The Sleep Locus of Control (SLOC) Scale is scored from an internal sleep locus of control (ISLC), in which a person perceives the power to influence his or her sleep, to a chance sleep locus of control (CSLC), describing the impression of a person's lack of control over sleep (Vincent, 2004).

The SLOC Scale has been administered in clinical research to investigate the efficacies of different sleep interventions. The impact of a computerized version of CBT on primary and comorbid insomnia was found to be mediated by participants' SLOC scores, as those with an enhanced ISLC after treatment demonstrated a decrease in symptom severity (Vincent, 2010). The existing precedent connecting the effectiveness of CBT and sleep hygiene education suggests the SLOC Scale may show similar mediating effects on a client's sleep quantity and sleep efficiency after an education-based intervention.

In a study investigating job efficiency in hospital nurses, sleep hygiene has been found to mediate the relationship between trait anxiety (i.e. baseline preoccupation level) and insomnia severity (Chou, 2015). The apparent connection between trait anxiety and sleep hygiene practices is important to consider for research investigating sleep hygiene education treatments. Information from the National Sleep Foundation and other supporting research claim that high trait anxiety, frequently linked to low self-efficacy, affects an individual's ability to get satisfactory sleep as well as perform academically (Sleep Hygiene, 2015; Peachey, 2012; Tamura, 2014; Edinger, 2009). Anxiety in this context takes the form of restless cognitive activity while an individual attempts to fall asleep (Gellis, 2009). An increase in non-sleep hours documented in bed caused by worrisome thoughts and preoccupations may affect the measurement of sleep efficiency, a variable that is calculated by the percentage of time spent sleeping while in bed, which is routinely

assessed in sleep research as a method of operationally defining the ambiguous concept of "sleep quality" (Edinger, 2009). Clinical research exploring the utility of sleep interventions typically controls for a client's anxiety levels to prevent confounding results on outcome variables such as sleep efficiency.

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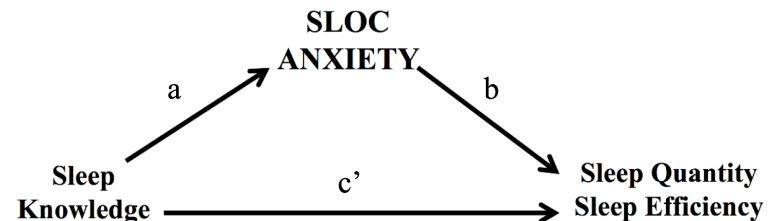


Figure 1. Hypothetical model depicting the relation between mediators SLOC and Anxiety with sleep hygiene education and sleep-related outcome variables.

Previous research has shown the effectiveness of a sleep intervention to improve sleep is mediated by SLOC. The diagram above (Figure 1) illustrates the hypothesized relationships between our variables. For the college sample in this study, it is hypothesized that an increase in sleep knowledge as a result of a sleep hygiene education intervention will be positively correlated with the outcome variables of sleep quantity and sleep efficiency through the mediating roles played by sleep locus of control and trait anxiety. The participants in our study with low-trait anxiety and internal sleep loci of control will benefit the most from a sleep hygiene education, with an increase in sleep quantity and sleep efficiency after the administration of the treatment compared to baseline measurements of the outcome variables. Inversely, participants with high-trait anxiety and chance sleep loci of control will benefit the least from the education intervention, with lower levels of sleep quantity and sleep efficiency after the treatment.

The hypothesized mediation model is tested using procedures designed by Baron and Kenny (1986). First an increase in sleep knowledge will be correlated with each of the sleep outcome variables (c'). Second, the correlations between improved sleep knowledge and the self-efficacy related variables (a) will be determined. Third, SLOC and trait anxiety will be correlated with sleep quantity and sleep efficiency (b). Once all the correlations of the mediation model have been found to be significant, a partial correlation will be conducted in order to determine whether the relationship between sleep knowledge and the sleep outcome variables (c') remains significant while controlling for the potentially mediating effects of the self-efficacy factors. If this relationship becomes insignificant after controlling for the self-efficacy factors, then SLOC and trait anxiety will be shown to mediate the relationship of c' .

2. METHODS

2.1. Sampling, Participants

University of Missouri-Kansas City students participated in this study after signing up online through the Department

of Psychology's PsychPool system, which awards participants with extra credit for associated psychology courses. Participants received four PsychPool credits and \$20 for the full completion of the study. A total of 21 students completed the entire procedure (16 female, 5 male; mean age = 22.95 years). To be eligible for this study, students had to be 18 years or older with reported normal or corrected hearing and vision in order to participate in all aspects of the research design, which consisted of three separate lab visits, each spaced apart by 2 two-week periods when sleep was assessed.

2.2. Experimental Design

Students who volunteered for this study scheduled a 30-minute orientation meeting in our laboratory (Visit 1). In that meeting, the student was given an overview of the study and asked to review and sign an informed consent document. Participants also completed a short demographics survey. Students then received a FitBit Charge activity monitor to assess the sleep-related outcomes of sleep quantity and sleep efficiency throughout the course of the experiment. Participants were also given a manual sleep log to record the approximate time that they fell asleep and woke up each day during the first two-week sleep phase (Period A). At this time, the participant completed two surveys: the State Trait Anxiety Inventory (STAI) TRAIT-version (Spielberger et al., 1983) to assess trait anxiety and the Anxiety and Preoccupation about Sleep Questionnaire (Harvey & Tang, 2013) to assess sleep-specific anxiety. Participants also completed a brief sleep hygiene quiz to determine the individual's initial knowledge of sleep hygiene.

When participants arrived at the lab for Visit 2 of the study, they completed a Sleep Hygiene Questionnaire (SHQ) to classify their individual level of sleep hygiene over Period A. Next, participants were presented the sleep hygiene education intervention, with information based on a common sleep education curriculum (Kloss et al., 2016), as well as details about issues college students frequently encounter with sleep. In addition, university counseling contact information was included in case a student wanted professional assistance. After the education intervention,

the participants completed three surveys: the SLOC Scale, the STAI-STATE version, and, in reference to Period A, the Pittsburgh Sleep Quality Index (PSQI). A sleep hygiene quiz covering the information presented during the experiment was given to assess whether or not the participant was engaged in the task and how much information was retained. Participants were given a second manual sleep log to record their sleep data for Period B.

At the conclusion of Period B, when participants arrived at the laboratory (Visit 3) to return their FitBit band, they were also asked to answer the PSQI, APSQ, and SLOC a second time, as well as to submit their second manual sleep log. At this time, the researcher compensated the participant for their full completion of the study.

2.3. Measures

The FitBit Charge activity monitor stores data on a website in a private account that is linked to the wristband. Participants were provided with this information and told that they could access the website to review data at any time during either of the two-week sleep assessment periods. Measures obtained from the FitBit monitor consist of time (in minutes) in bed, time asleep, and number of awakenings per night. The quality and patterns of sleep were also measured with the PSQI, a frequently used sleep self-report scale. It is composed of a total of 19 items, which are broken down into 7 domains of sleep quality for analysis, and a global score is calculated to indicate overall sleep quality. Manual sleep logs were also used to index sleep quantity as a companion source of information with the PSQI and the FitBit-based measures. The FitBit data were crosschecked with the sleep logs, which served to improve internal validity for the activity monitor.

A brief demographic survey was included, which requested the participant's age, gender, and ethnicity in order to control for the possible confounding effects of these variables. The survey inquired whether the students have ever been diagnosed with a sleep disorder as well as their use of medications that may alter sleep. Anxiety was assessed using the STAI and the APSQ. The STAI is a 40 item self-report questionnaire that is split into two

sections. The STATE section asks the participant to “indicate how they feel right now, at this moment.” The TRAIT section asks the participant to “indicate how they generally feel.” The APSQ is a short 10-item survey designed to index the intensity of worry related to poor sleep and insomnia. Perceptions of control were indicated by the SLOC Scale, which is an eight item self-report questionnaire. Participants' responses were scored as a weighted ratio of the instrument's subscales: ISLC/CSLC. The sleep hygiene questionnaire introduced before the education program is a 19-item self-report questionnaire that inquires the average number of days per week a participant practiced certain sleep hygiene-related behaviors. Total scores are categorized into quartiles, which are determined based on a range of scores from the program's existing data (Gellis, 2009).

3. RESULTS

3.1. Descriptive Statistics

In order to test the hypothesized mediating roles played by SLOC and trait anxiety on the relationship between sleep hygiene education and the sleep outcome variables of sleep quantity and sleep efficiency, correlational analyses were computed using IBM SPSS. Before testing our hypotheses, we examined descriptive statistics for our sample's sleep characteristics, self-reported SLOC, and sleep hygiene knowledge before and after the education intervention, which took place between sleep assessment Period A and Period B.

MEASURES	SUBCOMPONENTS	PERIOD A	PERIOD B
FitBit Sleep Data	Sleep Quantity (min)	469.31	476.67
	Sleep Efficiency (%)	93.22	92.92
Sleep Hygiene Quiz Scores	Average Quiz Score	55.03	91.84
	Perfect Scores/Total	1/21	14/21
	Failed Quizzes/Total	16/21	1/21
SLOC Scale	SLOC Ratio (log.)	0.26	0.28
	ISLC	20.81	20.19
	CSLC	11.82	11.19

Table 1. Descriptive statistics before and after the sleep hygiene education intervention.

Significant sleep quantity changes from Period A to Period B were not found. This is likely because all participants of the sample (N=21) exhibited uncommonly high levels of sleep efficiency and fell within the recommended range of sleep quantity from the onset of the experiment. The atypical nature of our college sample runs contrary to existing literature documenting poor sleep in college students. Despite this, our sample demonstrated low initial scores on the sleep hygiene quiz, which supports existing research that shows poor sleep hygiene in this demographic. Participants' sleep knowledge significantly improved following the sleep hygiene presentation. In Table 1, the average quiz score increased from a failing grade to above 90 percent. A chi-squared analysis showed this improvement to be statistically significant ($p < .05$), which serves as a sufficient manipulation check for the sleep hygiene education intervention's ability to increase the knowledge of sleep hygiene practices. In regard to the SLOC Scale, average scores were consistent before and after the education intervention. SLOC ratio scores and subscale responses indicated relative stability. The positively skewed ISLC/CSLC ratio scores required data to be log transformed to normalize the distribution.

To test the hypothesized mediation model, a correlation was

conducted between an improvement in sleep knowledge and the sleep outcome variables (c'). This correlation was shown to be nonsignificant. The small variance in our outcome variables of sleep quantity and sleep efficiency, as a result of an atypical sample of good college student sleepers, did not allow for a formal test of the mediation model. Instead, correlations were examined to investigate the relationship between the predicted mediating variables of SLOC and trait anxiety with sleep efficiency and sleep quantity, independent of the sleep knowledge variables.

3.2. Sleep Locus of Control and Sleep Efficiency (SE)

After examining the descriptive statistics for the SLOC scores, we divided our sample into two equal groups for comparison: those participants whose SLOC ratio scores increased or remained constant from Period A to Period B (SLOC scores became more internal; $n=11$), and those participants whose SLOC ratio scores decreased from Period A to Period B (SLOC scores became more chance; $n=10$). Once participants were grouped according to their change in SLOC scores, correlations were calculated with the sleep-related outcome variables.

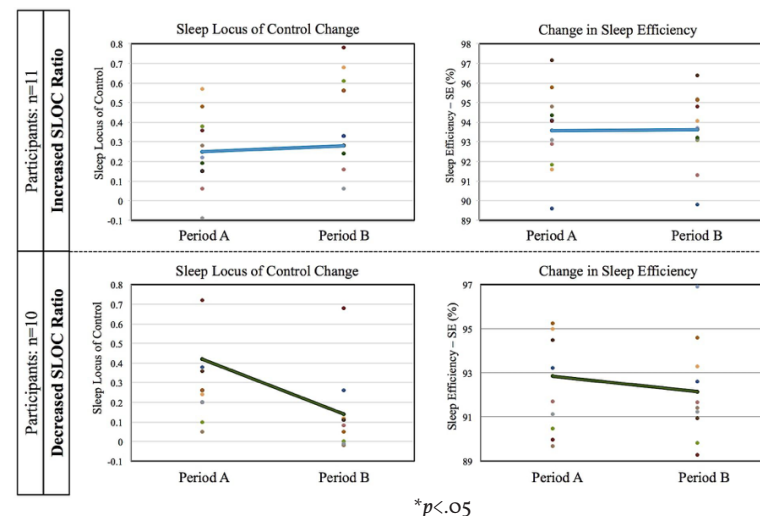


Figure 2. Increased SLOC Ratio (top), Decreased SLOC Ratio (bottom); SLOC and SE changes

As mentioned before, SLOC scores were assessed as a ratio of the subcomponents of internal and chance sleep loci (ISLC/CSLC). If a participant's ratio was above 1, he or she was determined to have an internal sleep locus. For ratios between 0 and 1, participants were scored as having a chance sleep locus (the skewed nature of scoring this ratio warranted the log transformation of the data presented in Figure 2). For our sample ($N=21$), 20 participants in Period A responded as ISLC and 19 participants possessed an ISLC in Period B. The overwhelming ISLC responses were unpredicted and atypical. Although the majority of students fell in the ISLC range, the strength of their score within that range changed from Period A to Period B. We investigated whether the size of the change was related to the sleep outcome variables. Correlations between the changes in SLOC and sleep efficiency from Period A to Period B were statistically significant ($p<.05$). For participants whose SLOC ratios increased or remained relatively stable from Period A to Period B, sleep efficiency was similarly constant over time. Intriguingly, sleep efficiency percentages decreased for the group of participants whose SLOC ratios decreased after the sleep hygiene education intervention, demonstrating a relationship between a participant's sleep locus becoming more chance (i.e., a decrease in the SLOC ratio) and adverse effects on sleep. The correlation between changes in perceptions of control over time and changes in sleep outcomes may suggest that longitudinal assessments of SLOC and sleep efficiency can tell a greater narrative for these two variables than has been reported in previous cross-sectional research.

3.3. Trait Anxiety and Sleep Quantity

Results in Figure 3 show a negative relationship between trait anxiety and the sleep-related outcome of sleep quantity, as predicted in the hypothesis. Trait anxiety scores from the STAI correlated with sleep quantity after the sleep hygiene education program ($r(20) = -.450$; $p<.05$). The APSQ, the second anxiety self-report used in this study, also showed statistically significant relationship with Period B sleep quantity. This second

questionnaire was administered on two occasions throughout the procedure: once during Visit 1, in which these scores were treated as trait measures, and once again at Visit 3, which were interpreted as state measures. Trait APSQ scores demonstrated nearly identical correlations to sleep quantity as the STAI – TRAIT ($r(20) = -.451$; $p<.05$), while a stronger correlation was found for state APSQ scores and Period B sleep quantity ($r(20) = -.571$; $p<.05$).

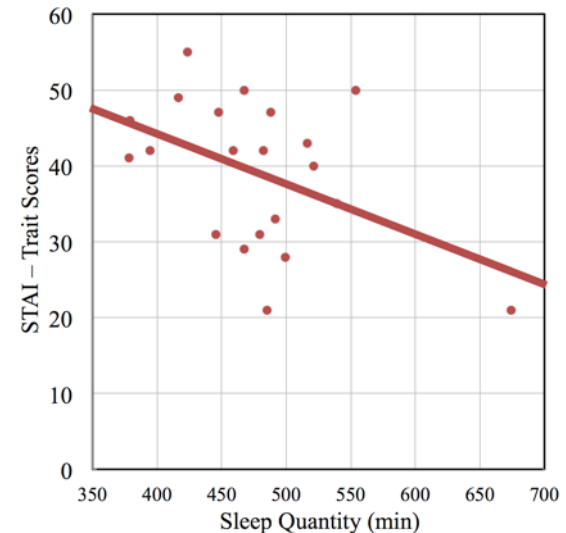


Figure 3. Trait Anxiety and Sleep Quantity Post-Sleep Hygiene Education (Period B)

4. DISCUSSION

4.1. Self-Efficacy and Sleep Hygiene Education

Sleep hygiene education has not been utilized extensively in populations with clinical issues of primary or comorbid insomnia. Inconsistencies in the literature show that it is difficult to predict for whom this form of sleep intervention will be successful. Merely presenting information to individuals does not guarantee the implementation of new sleep knowledge to one's routine. For our sample, a statistically significant increase in sleep hygiene

familiarity shown by improved quiz scores demonstrated that almost all participants learned new sleep habits that would potentially improve their sleep. However, in analyzing the descriptive characteristics of sleep-related outcomes before and after the education program, the sample as a whole showed no significant increase in either sleep quantity or sleep efficiency. At this stage, additional variables measured throughout the course of our four-week study were assessed to determine whether there were participants for whom the sleep hygiene education program was successful. It has been suggested that this form of sleep intervention has exhibited mixed results largely due to issues connected to self-efficacy. We predicted a mediating role for the self-efficacy related factors of sleep locus of control and trait anxiety. These variables were anticipated to help determine the characteristics of the college students for whom an education intervention requiring the application of learned information would work. Contrary to the literature documenting a high level of sleep deprivation in college students, our sample exhibited baseline sleep levels within the recommended range. This prevented a test of the hypothesized mediation model, as not enough variance was permitted in the outcome variables to demonstrate a mediated effect on a sleep hygiene education intervention for our college participants.

Despite the limitations caused by our sample's atypically good baseline sleep characteristics, the self-efficacy variables we identified as potential mediators were both found to be significantly related to the sleep-related outcomes. The education intervention was shown to be more beneficial for those participants who scored low on the trait anxiety measures of the STAI and APSQ, as these participants had higher levels of sleep quantity in the two week post-intervention sleep assessment (Period B). This finding is consistent with the literature relating high anxiety to poor sleep quantity and suggests sleep hygiene education could play a role in the amelioration of sleep-related anxiety. Sleep hygiene education was least beneficial for participants whose SLOC ratio went down after the intervention (i.e., sleep locus became more chance), as this

group's sleep efficiency decreased. Inconsistent with our findings, previous research has found an association between internal sleep loci and "less than favorable" sleep efficiency, although these data were collected from participants at a single point in time. The significant correlation between change in SLOC and change in sleep efficiency portrays the utility of longitudinal sleep studies in establishing a more detailed representation of these variables' relation that may not be seen in cross sectional research.

The fact that the two self-efficacy related variables we assessed both correlate with college sleep tells an important story. If the effectiveness of sleep hygiene education can be predicted by a college student's trait anxiety or locus of control, then self-efficacy indices may also predict an efficacious education intervention for a clinical population. This is especially intriguing since the college student sample of this study had high baseline levels of sleep quantity and sleep efficiency, as well as a majority internal sleep loci throughout the experiment. Despite a resultant small window of possible variance for these factors to change as a result of the sleep hygiene education program, the intervention still showed benefits to high self-efficacy participants. This suggests that for a clinical sample with high self-efficacy and room for improvement in sleep outcomes, sleep hygiene education should also exhibit significant efficiency.

4.2. Comments, Limitations, and Future Research

The inability to test the proposed mediation model was the most considerable limitation faced for this study. This college student sample demonstrated atypically high baseline sleep characteristics, which was unanticipated due to the breadth of existing literature consistently documenting sleep-related problems for this demographic. Continued data collection on this project will potentially capture poor college sleep habits that more closely align with what has been described in the literature to allow for a direct test of the mediation model.

Another limitation of this study was the lack of participants with chance sleep loci of control. Although changes in the ratio

were seen during the study, most participants' scores remained in the range of an internal sleep locus. It is possible that with a larger sample size, SLOC scores may show more variability. It is also possible that having an internal sleep locus may simply be a characteristic of this population. Having the perception of control over certain aspects of one's life, such as sleep, may be a function of a college student's above average education level. Thus, for a college student with an internal sleep locus who may be seeking to improve his or her sleep, learning sleep hygiene techniques from reputable sources (such as the National Sleep Foundation or university guidance counselors) could be beneficial.

Overall, the results of this study support the utility of wearable technology for investigating sleep habits. Self-reports of sleep used in this study, including the PSQI and manual sleep logs tracking estimated sleep and wake times, were used to cross reference the validity of FitBit sleep data. In general, these self-reports were not sufficient for the purposes of this study. Participants' ballpark estimates did not provide adequate means for calculating sleep quantity and sleep efficiency, whereas the sensitivity of the FitBit activity monitor allowed for detailed measurement of our outcome variables.

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AN EVALUATION OF GENERATIONAL DIFFERENCES IN WOMEN: THE WORKPLACE, STEM FIELDS, AND TECHNOLOGICAL COMPREHENSION

BY CHRISTIA STEIN

The famous fictional paleobotanist of *Jurassic Park*, Dr. Ellie Sattler, once responded to Ian Malcolm's comment, "God creates dinosaurs, God destroys dinosaurs, God creates Man, Man kills God, Man brings back dinosaurs" with the retort, "Dinosaurs eat Man, Woman inherits the Earth" (*Jurassic Park*). She does this in true feminine style and grace, and just an *eensy* bit of sarcasm. A sense of humor is practically required in this line of work: Ellie is a woman in STEM, a male dominant field, especially in the paleo world where the primary line of work is digging in dirt. Throughout the film, she partakes in "unfeminine" work, including digging her hands right into a pile of dinosaur feces in order to determine what was ailing a triceratops. *Jurassic Park* is set in the 1990s, a time when women were even less likely to be scientists than they are today. Though women are less likely to assume roles considered womanly, there are still many generational and gender differences for those in science and technology related fields. The generational gaps of Millennials, Generation X, and Baby Boomers demonstrate clear divides when it comes to STEM disciplines. Individuals from these three generations understand and use technology in different ways; there are even differences in the ways they are introduced to STEM careers. As technology and STEM outreach programs continue to grow, the number of women in science and technology will increase as well.

To first understand generational and career differences in women, personal interviews were conducted with three women:

Millennial, Vivian Corum (age 19); Generation X, Christine Franks (age 41); and Baby Boomer, Evelyn Smith (age 62). The names of these women have been changed to protect their privacy. The first question all three of the interviewees were asked was to describe their usual day. Vivian's answer demonstrates the usual hectic life of a 19-year-old college student, including supporting a thirteen-credit hour school week and a ten-hour work week. Her main focus is balancing her responsibilities and relaxation. With midterms coming up, this balance is threatened as she tries to support her friends, family, and religion while also working toward succeeding in her courses. Through observation in addition to her formal interview, she appears to be struggling with time management and always feels behind. This most likely due to her Netflix habit and the amount of time she spends commuting (about one and a half hours a day, roundtrip). Despite the time she feels she wastes in commuting or streaming her favorite shows or even spending time with friends, at the end of the day she still needs to take the time to be the college sophomore that she is (Corum).

Though Vivian is just starting out in life and trying to find her balance, Christine is right in the thick of it. When she described her daily life, it mostly included working. She is a middle-school math teacher and a secretary for a small family business, which means she hits the ground running at six o'clock every morning. She is on her feet working all day and does not stop until dinner time. Then she sits down with her family, watches a bit of television or plays on her iPad, gets the house ready for the next day, and goes to bed. Rinse and repeat. Her busy lifestyle combined with the stress of maintaining multiple jobs (including her two actual jobs and duties as a mother) leaves her dreaming of the beach and valuing every moment she can get with her family (Franks).

As far from the other two interviewees' lifestyles as possible, 62-year-old Evelyn spends most of her time just enjoying life. Her main responsibilities are maintaining her home, being a house cleaner, and babysitting her youngest granddaughter. Upon first observation, she is a small-town housewife who works because she likes keeping busy. One of the main characteristics of her lifestyle

is that she gets to choose when she works. Usually Mondays and Tuesdays are reserved for her granddaughter and two to three other days of the week she cleans houses for people in her area. She never works more than thirty-hours a week and her free time is spent with her family and fiancé. At this point in her life she values living in the now, always keeping busy while having a good time (Smith).

After discussing the interviewees' daily lives, their working lives were discussed. Using their responses, patterns were determined in reference to their age and whether or not their careers could be considered STEM. Vivian explained that she "had 3 different jobs total. [She's] a seasonal volleyball referee, a part-time sales associate, and an SI leader" (Corum). Alongside her current employment, Vivian is working toward an undergraduate degree in biology at the University of Missouri-Kansas City. From there she will go on to medical school and then hopefully a career as a dermatologist. She plans to complete all of her education at once with the ultimate payoff of getting to work in her desired STEM field for the rest of her life. While Vivian is completing all of her education at once and using it to pursue her ultimate career goals, Christine took a less direct route. She began working for her father at twelve years old in their family business and has been "on payroll since [she] was sixteen" (Franks). In addition, she has held multiple stereotypical teenage jobs at fast food restaurants and a grocery store and, for many years, she has worked formally as the secretary for her family business. She has finally settled down as a middle-school math teacher at a rural school, which is a majority STEM career (Franks). At the moment Christine is content, but who knows where she may go next, as she still plans to continue her education. As for Evelyn, she previously worked as a full-time secretary keeping the books for a small family business. At this point in her life, her main source of income is from cleaning houses and babysitting her granddaughter. Though it is not exactly mentally stimulating work, she is perfectly content. Here she rules her own life and is completely comfortable in her responsibilities, where she has little to no connection to STEM (Smith).

Based on the responses of the interviewees, there are three categories that the careers of said women can be separated into: fully STEM, partial STEM, and non-STEM. Fully STEM women have grown up during the STEM movement, which encourages women to exercise their minds and pursue their curiosities. They are also heavily encouraged to go on to post-secondary school in order to maintain competitiveness in the workplace. This Millennial generation is using their newfound education and rights to bring new skill sets and determination to the workplace which has never been seen before. Due to the high input of more educated workers, older generations are left to retroactively seek education that they did not initially need when entering their field. This is where partial STEM women come into play. These are women who most likely sought out some form of job in a feminine career when they came of age in order to support their families. Now that education is becoming a necessity, these women are retroactively seeking education in order to advance their careers or maintain their positions. Once they return to school, they discover a newfound sense of curiosity that was lying beneath the surface, and they put it to the test. A prime example can be seen in Christine. Her return to the classroom was originally meant to enhance her professional skill set so she could find a more stable job, but her curiosity drove her to try new things, which resulted in her joining a STEM field (Franks).

Despite Christine happily revisiting her education, many women are not eager to make the same choice. These women tend to have worked their way up into management positions in companies they have been with long-term and are now being driven out by increasingly younger people with more education. This situation is discussed in-depth in the article "Educational Credentialing of an Aging Workforce: Uneasy Conclusions." The primary argument in this article is that many people in the Baby Boomer generation and those at the later end of Generation X feel as though "nobody need question their qualification[s]," despite not technically being qualified for the position they hold. These tensions are being seen more and more in the workplace, especially in women (Isopahkala-

Bouret). According to Alison Brod, in an article from *The Wall Street Journal*, the educated Millennial females entering the workplace are seen as too casual, in the ways they talk and dress at work. In order to incorporate Millennials into the workplace, mentorships are formed between Baby Boomers and the newest hires. The Baby Boomers tend to seek “feminine input” from those they mentor, whether they are Millennials or Generation X individuals, while the Millennials get the benefit of learning professionalism (Zaslow). Interpersonal relationships between women in the workplace slowly lessen the generational divide.

The final category that distinguishes women in their careers is non-STEM women. These are women who have either never been driven by the questions of science, were never allowed to pursue science, or feel they are too old to begin/continue their education. Out of the three interviewees, this is the category Evelyn falls into. She has never nor will she ever move into a STEM field. Not only does she not have the education to do so, she does not have the desire or drive to perform in this field. Overall, most women fall somewhere in the spectrum around partially STEM, from technology becoming part of their everyday lives to an innate sense of curiosity that can readily be expressed. Time and the efforts of STEM outreach programs will be a major factor in determining if this shifts to more women being fully integrated into the world of STEM.

Due to the low number of women working in fields that are seen as fully STEM, there is a current outreach intended to encourage young women and children to act on their science-mindedness and curiosity. Those who advocate for this cause encourage women to not give up on their STEM aspirations just because some may see them as unfeminine. Scholarships, women’s programs, STEM clubs, and current media are all designed to take this concept and use it in a way that brings more and more women into science and technology-related fields every year. As an all-girls Catholic school student, Vivian grew up surrounded by women and men alike who encouraged her to follow her heart and mind, stand up for herself as an equal, and make decisions on her future based on her interests.

Due to the influence of others who encouraged her curiosity, she knew from a very young age she wanted to work in science. By the time she was in high school, she had completely embraced the idea that a woman can participate in any portion of society she wishes to, especially in STEM.

Vivian’s high school activities reveal her early ambition to enter the STEM field. During Vivian’s senior year, she became the Vice President of her STEM club and was active in building a working trebuchet. Aside from male maintenance workers teaching the female students how to use the power tools properly, the female students did all the work, including making the schematics, taking measurements, and physically assembling the trebuchet. Once the trebuchet was assembled, the STEM club collected pumpkins from the Art Club’s fall pumpkin painting competition to test out their machine. While simply talking with Vivian about this project, she became visibly excited about the accomplishment. The pride she takes in her projects, the amount of effort she puts into them, and her belief in her abilities as a woman who actively participates in the STEM field is remarkable (Corum). However, not everyone shares Vivian’s positive experience with science.

One theory as to why women young and old may not feel at home in STEM is in the way it is presented to women as opposed to men. In Margaret Brenston’s article “Worlds Apart: Women, Men and Technology” she comments, “There are machines and tools suitable” for men—saws, trucks, wrenches, guns and forklifts, for example—and those “suitable” for women—vacuum cleaners, typewriters and food processors” (Brenston). Heavy machinery, car maintenance, and construction are all associated with masculinity, while cooking, doing laundry, and being artistic are all seen as feminine. Even when using technology in the same manner that men do, a woman’s approach is often viewed as artistic while a man’s approach is viewed as analytical. Yet another problem women in STEM face is that men perceive themselves as the authority on technology. According to Brenston, “Men may explain a technological matter to women but they do not discuss it with them: that they do with other men” (Brenston). Men do not think of

women in technology as equals; they see them as just being there, and if women do make themselves heard, men will most likely assume they are wrong. Though more women are entering STEM, their ideas are still subjected to sexism. If women were treated in the same way as men in technology from the beginning, who knows where the world would be now.

Due to the stigma associated with women in science, one company creates awareness of the need for women in STEM through their advertising. In their ads, they show how parents' responses to their daughters doing "masculine" work affects their future. Verizon Wireless released a commercial in 2014 titled "Inspire Her Mind." The commercial was meant to show viewers what happens to girls who are taught to act the way society thinks girls should, and it encourages parents to support their daughters in all their interests. The commercial starts off by showing a little girl (Samantha) grinning and playing outside while her mom says to her, "Who's my pretty girl?" The rest of the commercial was spent redirecting Samantha from activities that were not girly: when she was jumping in a puddle, "you'll get your dress dirty"; when she was playing with found organisms on the beach, "you don't want to mess with that"; when she was constructing an elaborate solar system, "this project is getting out of hand." Since she was never supported in her scientific inquiries, instead of growing up to practice science and to explore the world around her, she simply exists as every other young woman who was encouraged to substitute curiosity for lip gloss. However, there is hope. Simply presenting this idea for the general public to see and understand is slowly helping to change people's ideas about what it means to be a girl and what it means to stereotype genders. More and more parents, teachers, and coaches are encouraging girls to participate in STEM, explore their surroundings, and question the world around them. This newfound understanding of how to empower young girls is thanks to advertisers like Verizon who have brought the meaning of words and attitudes to parents' attention ("Inspire Her Mind").

The current push for women in STEM is not only the result of early conversations about gender stereotyping, but also because

technology is a quickly expanding a field which must constantly be kept up with. The human need to expand on technology and integrate it into our lives has resulted in modern day cyborgism. There is a relationship between being able to take technology, view it, process it, interpret its meaning, and being able to say "it is this thing" from screen to brain. This relationship is discussed in detail in the *New York Times* article titled "Are We Becoming Cyborgs?" In this article, Maria Popova states, "The notion of a cyborg is essentially an enhanced human. And I think a large portion of the cyborgism of today is algorithms" (Richardson). The initial example of cyborgism that is mentioned in this article is a person who wears glasses. Glasses are a technology that humans developed in order to enhance their vision. Since this technology (glasses) becomes an integral part of people, both in aiding them and in their physical identity, a person who wears glasses can be defined as a cyborg. If simply wearing glasses can make someone an "enhanced human," modern technology can embody this theory and expand on it tenfold.

Modern technology as it is understood today is composed mainly of algorithms. These algorithms are mathematical formulas used in code and in the creation of physical pieces of technology (smartphones, drones, robotics, etc.) The algorithms Popova mentions are both the algorithms that were used to create modern technology, but also the algorithms the human brain uses to process data. The algorithms human brains use to process technology, as described in this article, have to do with signifier and signified processing. The technology is viewed, it is compared to the form of technology it is versus how it would be physically represented, and then the brain interprets the information presented. Once processed, the brain makes a decision about how it is going to comprehend and store the information to be used at a later date.

An example of the phenomenon of algorithms that Popova discusses can be seen in the use of Google Maps. Here an address for a home is typed into Google Maps, where Google uses its algorithms to sort information and provide the user with the best possible

answer to their question. In this case, an image of the house and its location on a map is shown. The brain of the Google user then takes this map and the image of the house and classifies it as a location, both on the screen and physically through mental algorithms used to interpret digital data. This process may seem obvious, but in all reality, there are some issues within the mental algorithm. The primary issue is that the ability to use this algorithm and how well it is used directly relates to age. The younger a person is, the more predisposed to the mental and technological algorithms they are. This means that processing technology and relating it to one's actions and daily lives may come more easily to young people than it does to those born in previous generations. In the case of the Google Maps example, a Millennial may automatically classify an address as a location on screen and in reality. For those of the Baby Boomer generation, this process may take some time, first classifying its location as on screen, then classifying its physical location after reading directions or seeing the house in person. This relationship between humans and data is constantly becoming more and more complex as technology further surpasses anything the human mind has ever comprehended before.

The relation to cyborgism that Popova discusses is seen best in Vivian. She uses technology in absolutely every aspect of her life and has done so since she was a child, making her a “digital native’ [as] coined by Marc Prensky” (Lai and Hong 726). In the article “Technology Use And Learning Characteristics Of Students In Higher Education: Do Generational Differences Exist?” the following chart (Table 1) describes what characteristics a digital native has in a learning environment (Lai and Hong 726).

Table 1

Characteristic	Elaboration
Digitally literate	<ul style="list-style-type: none"> • Able to use intuitively a variety of IT devices and navigate the Internet • Comfortable using technology but may have a shallow understanding • Visually literate • More likely to use the Internet for research than a library
Connected Multitaskers	<ul style="list-style-type: none"> • The particular device may change but they are always connected • The move quickly from one activity to another, sometimes performing several simultaneously
Need for immediacy Need for experiential learning	<ul style="list-style-type: none"> • They demand fast responses—more value on speed than accuracy • Prefer to learn by doing rather than being told what to do • Discovery learners
Social	<ul style="list-style-type: none"> • Gravitate towards activities that involve social interaction • Open to diversity • Social nature aligns with preference for team work
Preference for group work	<ul style="list-style-type: none"> • Prefer to learn and work in teams • Depend heavily on peers
Preference for structure in learning/goal orientedness	<ul style="list-style-type: none"> • Prefer structure over ambiguity • Goal oriented
Preference for images over text	<ul style="list-style-type: none"> • Prefer images over text • Do not like reading large amounts of text
Community minded	<ul style="list-style-type: none"> • Prefer to work on “things that matter” • Believe that science and technology can be used to resolve difficult problems

Vivian falls into several of these characteristics, including “digitally literate, multitasker, need for immediacy, and social.” It is very easy to read straight down this chart and understand who she is. Whether it is her phone, her laptop, her iPad, her television, or her gaming systems, she is always using technology. The technological algorithms previously mentioned by Popova and her ability to use them come naturally to Vivian. She has grown up using this sort of technology and can understand it with amazing fluency.

On the other end of the technological spectrum is Evelyn. Though she works with technology daily, it is mostly through her cell phone and television. Learning curves can be observed, for example, when conducting her interview. Her interview was mostly conducted over email, though part of it was face-to-face. Her digital answers were short, to the point, and ill-formatted. Upon discussing her interview at a later date, she asked “did my email come through?” as though she had clicked the send button incorrectly, her email may have never arrived. Her trust of the technological algorithms, and her ability to use and understand them, is slim. In Table 1, Evelyn only falls into a few of the digital

native characteristics: need for immediacy, preference for group work, and goal oriented. Lack of digital nativity stems from not being exposed to the digital world at a developmental age, resulting in her technological pathways for algorithms being underdeveloped. She will most likely never overcome her low fluency in digital cyborgism.


The human experience with technology and curiosity may be understood through observations of other model organisms. Orangutans may play a key role in understanding how age plays a role in technological comprehension. Though this may seem unlikely at first, in all actuality orangutans are extremely close to humans genetically (sharing 97% of DNA with humans) (The Kansas City Zoo). At the Kansas City Zoo, orangutans in an orangutan outreach program interact with technology in ways that would normally only be associated with human use. This program provides iPads to zoos across the country for use in orangutan enrichment. The enrichment initiative at the Kansas City Zoo allows orangutans to play games where they can play bongos, keyboard, and draw. Most of the games they play provide a sound and treat reward. The orangutans are not forced to play these games on the iPad, but make the decision for themselves. According to orangutan keepers during a daily Zookeeper Chat, they discussed that younger female orangutans seem to be the most interested in the games played on the iPads while the older orangutans, though they may show some interest, prefer more physical means of enrichment (The Kansas City Zoo). This initial model aids in supporting the theory that generational understandings of technology may be seen in other mammalian organisms. It also gives backing to the hypothesis that females of other organisms may show initial inquisitiveness in technology that is equivalent to, or even surpassing of, the inquisitiveness of males in regard to working with new technologies. Only further research will tell whether or not this model is useful in understanding generational and gender differences in the ability to understand technology.

In the growing world of technology and science, women show generational divides in their education, career types, relationship

to STEM, and ability to comprehend the algorithms that make up modern technology. The idea of generational divides demonstrates that younger generations of women are acquiring more education, entering science and technology related fields, and are living as digital natives. On the other hand, older generations lie in a spectrum that ranges from attempting to further their education and reassociating with their innate curiosity to continuing their lives completely unassociated with the STEM movement. The movement of younger generations of women into STEM fields can be closely associated with the work of those in STEM outreach, who encourage women to seek out careers in traditionally male fields. Despite this improvement, due to learning curves in technology and lack of education, older generations are less likely to enter STEM careers. This trend may be attributed to the limited exposure such women had to technology at a young age. Moreover, society's discouragement of women in "masculine" fields was especially strong in previous generations and likely contributed to this trend. Ultimately, younger generations of women will increasingly enter STEM careers as modern technology continues to advance and women hold true to their underlying STEM aspirations.

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HOW ATTITUDE AFFECTS WORKER-CLIENT RELATIONSHIPS AMONG MISSOURI SOCIAL SERVICE WORKERS

BY JORDAN ALLEN

Worker-client relationships have much to do with the attitudes and perceptions held by social service workers, especially in regards to their clients. The success of social service programs often hinge on the worker's ability to form trusting relationships with her clients (Iliffe and Steed, 2000). Social service workers' positive opinions of their clients have been linked to the worker's length of time in social service work, their familiarity with the type of individuals they work with, their gender, and their feelings of self-efficacy (Strozier, 1995; Iliffe and Steed, 2000; Bullock, 2004; Schwartz, 2011). This study uses data collected from the Missouri Family Development Training and Credentialing Program Evaluation. Survey information collected from 233 Missouri social service workers were analyzed to determine factors contributing to how these workers form opinions of their clients. The purpose of this research is to answer the question: What factors influence a social service worker's positive opinion of their clients?

Through frequency tables, t-tests, and a correlation table, statistically significant relationships were found between the number of years social service workers are employed in their field and how positively they think of their clients. There was also a statistically significant relationship between social service workers' self-efficacy and their positive opinions of their clients. The results revealed the importance of experience within the field of social service work and the high self-efficacy among the social service workers surveyed. Therefore, these results suggest that mentoring

programs between younger workers and more experienced workers may yield more positive relationships between workers and their clients. (Collins, 1994; Kelly, 2001; Meyette, 2015).

Literature Review

While working within social service programs, workers frequently face a number of clients who have been through particularly difficult circumstances (Iliffe & Steed, 2000; Schwartz, 2011; Acker, 2010; Alpert & Britner, 2005; Strozier, 1995). As social service workers aim to help others within society, much of their time and energy goes into serving their clients. Several studies have been conducted to find what factors influence social service workers' opinions of their clients, thus leading to a better understanding of how social service workers can best tend to their clients' needs. It is important to understand how these social service workers perceive their clients in order to understand ways we can improve worker-client relationships.

A social service worker's opinion of her clients influences how well the clients accept and benefit from their social service worker (Bullock, 2004; Strozier, 1995). Determining what factors contribute to these opinion formations can allow social service workers to be more aware of their conduct and to better assess their helpfulness. As many studies have pointed out, the success of social service programs often relies on the ability of the workers to adequately interact and connect with their clients in order to make a difference (Acker, 2010, Iliffe & Steed, 2000). Social service work can often involve working with clients such as domestic abuse perpetrators and survivors, substance abusers, illegal immigrants, welfare dependent individuals and families, and children taken into child services. When dealing with such individuals and families, workers' attitudes and optimism level hinge on their perception of their clients. Experience, exhaustion, history of personal connection with the type of clients they are working with, and other factors may influence the way a social worker perceives his or her clients (Strozier, 1995). Negative attitudes held by the worker can lead to negative emotions felt by the client

(Park, Bhuyan, Richards, Rundle, 2011). What is most necessary to understand from this connection is the function and development of attitudinal responses to one's clients.

A few factors found to influence social service workers' opinions of their clients, which will be discussed at length individually, include the following: years worked within the field of social service work (Strozier, 1995), the personal experiences of the worker (Redmund, Guerin, Devitt, 2008), the self-efficacy of the worker (Iliffe & Steed, 2000), the confidence of the social worker, in both themselves and in the system in which they work (Schwartz, 2011), gender (Jones, 1994, Liebkind & Eranen, 2001, Strozier, 1995), and the race and/or ethnicity of the worker (Park, Bhuyan, Richards, Rundle, 2011).

Personal Experience and Length of Work Experience

The past experiences of social service workers are found to be a highly influential aspect of their day-to-day perceptions of their clients. Iliffe and Steed (2000) found the past experiences of domestic violence social service workers can influence their positive or negative attitudes towards their clients. These attitudes were evaluated by assessing the breakage of trust between workers and clients. Moreover, issues connected to the workers' personal experiences with domestic violence were assessed. Both a worker's past experience with the specific areas within which they work and preconceived notions surrounding one's clients have been linked to the way social service workers form opinions of their clients (Redmund, Guerin, Devitt, 2008).

Strozier (1995) found that workers who personally dealt with substance abuse have more optimistic and positive attitudes towards their clients when helping them receive treatment for their substance abuse. This research also found that the longer social service workers were in their line of work, the more optimistic they were towards their clients. Thus, the worker's experience encourages optimistic attitudes among their clients toward treatment. Other studies have linked workers' personal experiences to the way in which workers interact and behave with

their clients (Park, Bhuyan, Richards, Rundle, 2011). Their research found workers of Hispanic background have more understanding and helpful attitudes towards immigrant clients, especially illegal immigrants, than non-Hispanic social service workers. Strozier (1995) and Park, Bhuyan, Richards, and Rundle (2011) found within their study of personal experience the length of time workers spent within their line of work led to reports of better attitudes towards their clients.

Trust

In a study conducted using 41 welfare recipients and 39 social service workers, Bullock (2004) found that the trust in one's client was an important indicator of the worker's attitude. If workers felt they were unable to trust the clients seeking assistance, they were less likely to view their clients and their needs positively. Other studies that have evaluated social service workers' trust levels with their clients found poor trust leads to more negative attitudes towards their clients, especially when dealing with cases of abuse (Iliffe and Steed, 2000). Alpert and Britner (2005) found that child protection service workers dealing with parents and children often have less positive perceptions of the parents if they are unable to trust them and their story. Among social workers, beliefs about welfare recipients were affected by perceptions or experiences of dishonesty among those who applied for welfare as well as questions of the legitimacy of the welfare system itself, as well as cultural beliefs in regards to the cyclical nature of poverty and the need for social welfare programs (Bullock, 2004).

Self-Efficacy Characteristics and Gender

Feelings of self-efficacy and self-confidence have been positively linked to feelings of job satisfaction and positive attitudes (Iliffe and Steed, 2000). Feelings of ability and efficacy manifest in behavior and can be experienced when closely working with such individuals as social service workers (McMahon, et al., 2013). When working closely with clients undergoing difficult or desperate situations, confidence and satisfaction within one's

own situation can be beneficial in positively contributing towards someone else's. Iliffe and Steed (2000) found that several factors led to social service workers' negative attitudes toward their work and their clients, including a loss of confidence in themselves and the justice system. They also found that some workers feel insecure and believe they take on too much responsibility in working with their clients.

Gender has also been studied as a potential factor when assessing attitudes of social service workers. Strozier (1995) found female workers were more likely to have optimistic attitudes towards their clients in regards to treatment outcomes of chemically dependent individuals than did male social service workers in the same situations. Significant differences were found between female and male social workers on three of the scales used. Two hundred and two female social service workers were measured and scored significantly lower on the permissiveness scale and lower on nonmoralism (the linkage between substance abuse and low moral character). These workers scored higher on treatment optimism, however, meaning female social service workers tended to have more moralistic and less permissive attitudes toward substance abuse, but were more optimistic about treatment outcomes for alcoholics and other drug abusing clients. Findings from a 1994 study with a sample of 146 social workers revealed that female social workers were more likely to use external attributions for clients' problems than internal attributions. This means that female social workers within this particular study link client issues to their personal characteristics or choices rather than unavoidable circumstances in their lives (Jones, 1994). Jones (1994) explains that these findings potentially reflect the impact of discriminatory practices against women and reveal the influence of responsibilities that are common among women, such as familial commitments. Liebkind and Eranen's 2001 study of 875 respondents found that among the university students surveyed, female respondents expressed more positive attitudes towards hypothetical victims. They state, "Gender difference may reflect more or less universal value differences between men and women. Individuals' values

relate systematically to their attitudes and behavior” (Liebkind & Eranen, 2001, p. 469). This study as well as the study conducted by Strozier (1995) reveal important information regarding gender, social service work, and worker attitudes towards clients. It is important to recognize potential gender differences, as these past studies have done, in order to understand perception formation and manifesting behavior when studying these worker-client relationships.

Methods

Sample

This research uses data collected from the the Missouri Family Development Training and Credentialing (FDC) Program Evaluation of Missouri social service workers (Smith, 2002). The sample size of this group is 232 participants; of these, 170 participants provided all of the information necessary for this specific project. Survey collection dates were between October 2002 and March 2004. Of those surveyed, an 84% majority were female and respondents had an average age of 43 years.

Dependent Variable

This study's dependent variable is the workers' attitudes toward their clients, which was measured using their responses on a Likert scale. This scale uses answers from strongly agree to strongly disagree, as a response to the statement, “My clients include some of the finest people I have ever met.” The answer to this statement provides a way to measure a social service worker's opinion of her clients; high responses mean they think highly of their clients while low responses mean negative opinions of their clients. For the purpose of this paper, the dependent variable will be referred to as the workers' opinion of their clients.

Independent Variables

The independent variables include measures for work experience in terms of time in field, gender, two measures for

trust, and two measures for self-efficacy using a Likert scale measurement of specific statements. The statements, “I am often upset and depressed by my client's problems” and, “I am confident in my ability to effectively serve my clients” were used to measure self-efficacy. The response to the statement, “I feel I am making an important contribution to people's lives with my work,” and “I sometimes feel I am a true partner with my clients in their efforts to improve their lives” are used to measure trust.

Univariate Analytic Strategy

Each independent variable was assessed using frequency and central tendency tables to determine suitability for use in the bivariate analyses. Frequency tables allow us to measure the mean, median, mode, and standard deviation within the data to determine central tendencies and areas of possible correlation. The univariate analyses of the statements used to measure trust, self-efficacy, and workers' opinion of their clients were analyzed based on their measures of central tendencies, as well as the percent frequencies to study the distribution and commonality among the responses.

Bivariate Analytic Strategy

Correlation tables were used to find significant relationships between the dependent and independent variables of self-efficacy, trust, and time spent working in field. T-test analyses are used to determine significant relationships between the dependent variable of workers' opinion of their client and gender.

Results

Univariate

The univariate analysis of the “Years worked” variable revealed that out of the 170 responses, the mean average number of years an individual had worked in their current position was nearly 11 years and 6 months. The median reported amount of time was nine years, meaning 50% of the respondents had worked at their current job for more or less than nine years. The mode, or most

common reported number of years spent in their job, was two years. This mode reveals the importance of studying the range of these responses, which is 45 years, meaning there is a difference of 45 years between the longest and shortest job lengths reported. The percent frequency univariate analyses for the “female” independent variable was reported as 16% of the respondents were male, while 84% were female.

Bivariate

The Correlation Table revealed a number of statistically significant relationships between the 0.05 and 0.01 level. The relationships found to be significant at the 0.05 level include the relationship between the number of years they had worked in their current position and the worker's opinion of her clients with a correlation coefficient of 0.244. The relationship between the statement, “I am confident in my ability to effectively serve my clients,” and the statement, “I feel I am making an important contribution to people's lives with my work,” is shown to be statistically significant at the 0.01 level with a correlation coefficient of 0.436. There was also a significant relationship between both measures of self-efficacy and the measure for trust through the statement, “I sometimes feel I am a true partner with my clients in their efforts to improve their lives” with a correlation coefficient of 0.528 and 0.336 at the 0.01 level. The relationship between the statement, “I feel I am making an important contribution to people's lives with my work,” and “My clients are some of the finest people I have ever met,” is shown to be statistically significant at the 0.01 level with a correlation coefficient of 0.384. This result reveals support for the correlation between positive measures of self efficacy and positive opinions of one's clients. The relationship between the statement, “I am confident in my ability to effectively serve my clients,” and a positive opinion of their clients is also statistically significant at the 0.01 level with a correlation coefficient of 0.264. The relationship between the statement, “I sometimes feel I am a true partner with my clients in their efforts to improve their lives” and a positive opinion of their clients revealed a correlation

coefficient of 0.417 at the 0.01 level. This data reveals significance in regards to the correlation of positive attitude towards clients and high levels of trust in regards to said clients.

The results of the Independent Sample t-test using a 95% Confidence Interval revealed no statistically significant relationship between gender and the attitude of the worker toward their clients because the significance level is much higher than 0.05 at 0.464, which indicates a relationship worth further study.

Discussion

Although results did not reveal a statistically significant relationship between gender and workers' positive opinion of their clients within the t-test analyses, the results still identify useful and meaningful relationships within the data through our Correlation Table. One of the most important findings is between “years worked” and the response to the question “My clients include some of the finest people I have ever met.” This indicates that the level of experience in one's work and their opinion towards their clients are likely to be positive due to a significant relationship in the data. This is in line with much of the research that suggests as a social service worker gains experience and spends more time within his or her line of work, that person better understands their clients and has better attitudes towards them. Years worked within the field does not reveal the exact cause of more positive opinions of their clients, but could be represented by those workers who are predisposed to helping others and thus hold more positive opinions of their clients. It is not within the scope of this study to determine how said workers form positive opinions, as some attitudes vary based on individual due to causes outside of experience or other factors measured.

Implications

Due to the results of these data analyses, I suggest that more mentoring programs be implemented to provide guidance for

those with little experience in social service work. A study by Sanders and Nassar (1995) involving 27 second-career women in a Master's of Social Work program found that the availability of mentors in the program led to greater likelihood of completing the program. Kelly (2001) found that among 39 managers of a state social service agency, where 41% of the managers were female, 57% of the mentor relationships reported involved female mentors. Kelly also found that benefits from mentoring programs include greater levels of self-efficacy (found through measures of self-confidence and feelings of recognition) as well as greater career advancement opportunities. These studies reveal important information regarding the effects of mentoring, especially among a predominantly female population of mentors within this study.

Mentoring programs have a significant impact on both the mentor's and protégé's career satisfaction and career success (Collins, 1994; Pereira, Valentine, & Wilson, 2002). Career satisfaction and success of the worker can be correlated to positive opinions of one's clients and greater feelings of self-efficacy (Illiffe & Steed, 2000, Acker, 2010). These programs encourage the work of those who have put much time and effort into their particular field and may garner more positive relationships among newer workers and their clients. As Meyette explains, "Receiving suggestions and guidance from an experienced mentor can greatly benefit the mentee. Seeing their jobs through the fresh eyes of a new social worker can greatly benefit the mentor" (Meyette, 2015, p.25). While the data reveals that experience of social service workers within their field can correlate to higher ranked opinions of their clients, it is important to consider the devotion and positivity of those workers. Pairing the most experienced workers with the least experienced workers allows those dedicated to social service to share their love of her work with their less experienced peers (Meyette, 2015).

Overall, this research project reveals that further studies are needed to better assess factors that could contribute to workers' opinions of their clients. Further research could measure the way these opinions are received by clients through an analysis

of the clients' perceptions. When considering how attitude and perception affect how one both behaves and acts, it is important for us to consider which positions and relationships are most impactful. Given the importance of social service workers in the lives of their clients, it is crucial to assess how workers form attitudes to their jobs and clients.

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Carolyn Nordengren is a junior majoring in art history. She chose to attend UMKC for a number of reasons, including the university's small campus feel within a major metropolitan area. She also loves UMKC's atmosphere, and she felt at home from the minute she arrived for her first campus visit. Within art history, Carolyn is interested in the ancient Romans, Early Modern art, museum education, and curation. In her free time, Carolyn does yoga and loves to read. After graduation, Carolyn plans to attend graduate school with the ultimate goal of obtaining a Ph.D. in Art History and becoming a museum curator. She is thankful for the support of Dr. Robert Cohon, who introduced her to art history and encouraged her to pursue it. Carolyn appreciates the countless opportunities he has provided for her to work in the field and for always encouraging her to do better.

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Chelsea Bihlmeyer graduated from UMKC with a degree in communications. She is now a graduate student and instructor in the Communications Department at Indiana University-Purdue University Fort Wayne. Her hobbies include applying for grant funding, cooking, and smashing the patriarchy. Chelsea is grateful for the guidance, recommendations, and oversight that Dr. Steven Melling contributed to her project. She would also like to thank Dr. Jason Martin, whose belief in her as a scholar was formative in starting her career in communications and who saw her through the end as well. Both Dr. Melling and Dr. Martin contributed to the person that Chelsea is today.

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Morgan Robertson is pursuing a double major in English and French. She chose UMKC because of her love for its urban setting. She is highly involved in her church community, teaching English as a second language to a few Congolese families, and volunteering for the Good News Club when she can. After graduation, Morgan plans on completing a master's degree in Teaching English as a Second Language (TESL). She would like to thank Dr. Henrietta Rix Wood for teaching the class for which her *Lucerna* essay was written; she appreciates Dr. Wood's efforts to challenge her students to be better researchers and writers through observation and reflection.

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