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Welcome

Articles

Cover Art: "The Only Constant Is Change"

Drew Collins-Burke*

"No man ever steps in the same river twice, for it's not the same river and he's not the same man." This quote, attributed to the Greek philosopher Heraclitus, reminds me that our lives are constantly changing. Just as the waterfall constantly erodes and reshapes the surrounding rock, our environment is constantly reforming us and informing our choices. I have to thank a friend of mine for helping me realize Heraclitus was right—we should respond to the gentle nudges our lives offer, just as rock gives way to a stream.

Medium: *Digital photography, EOS Rebel T7, EF-S 18–55 mm lens. Edited with Photos (Windows).*
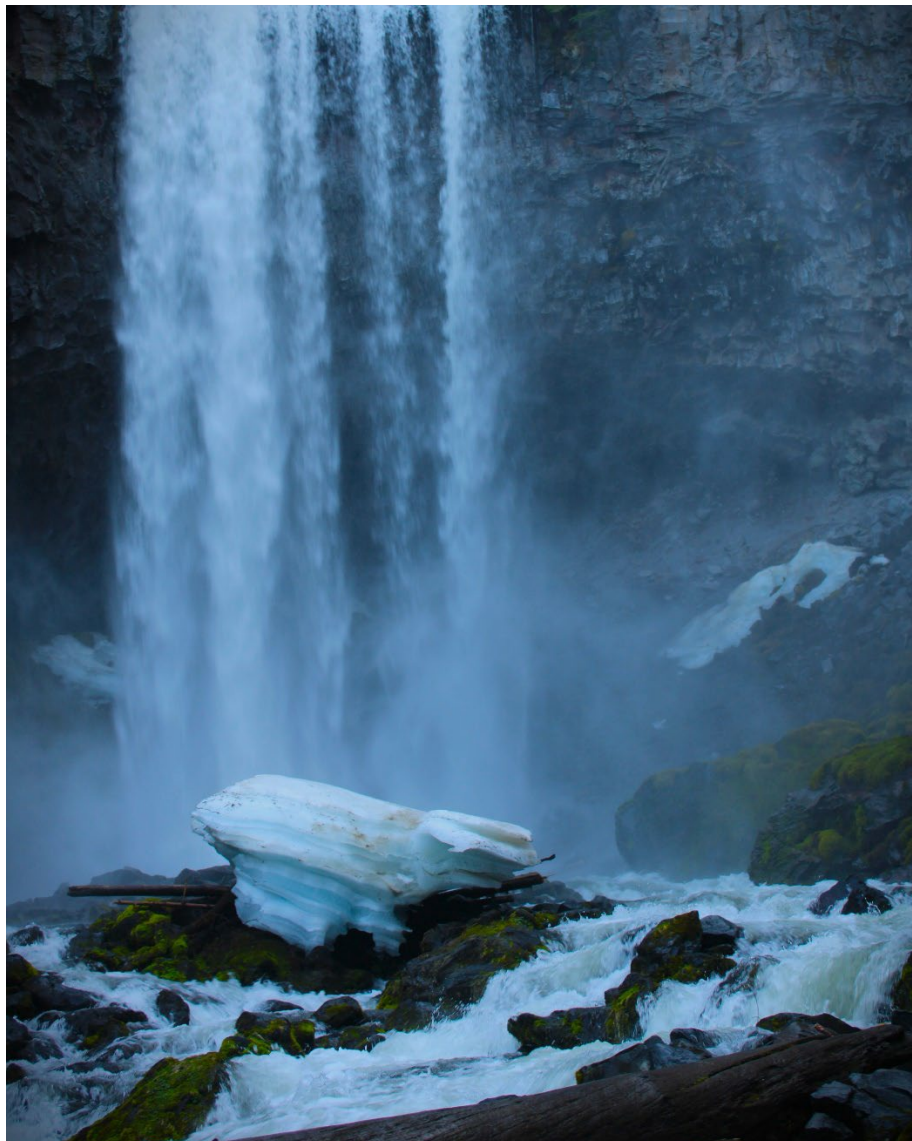
Drew Collins-Burke (dcollin7@uoregon.edu), a rising senior, has academic interests in education, public opinion, and rhetoric, leading him to major in Political Science through the University of Oregon Clark Honors College. Beyond academics, he also enjoys playing tennis, watching sitcoms, and hiking.

Meet the Editorial Board

Kyla Schmitt, Editor-in-Chief – Publications

Kyla Schmitt is a rising junior majoring in Environmental Science and Humanities and minoring in English and Economics while pursuing a degree from the Clark Honors College. Kyla's academic interests include wildlife ecology, contemporary history, rhetorical writing, and behavioral economics. Her latest publication sought to characterize the health, behavior, and habitat preferences of Tryon Creek's native signal crayfish population. Beyond the classroom, Kyla coaches high-school forensics and competes in collegiate forensics, conducts field research with the Tryon Creek Watershed Council and the Sutherland Lab, and spends plenty of time outdoors.
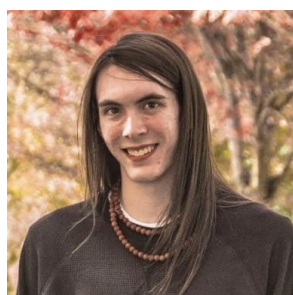
Jay Taylor, Editor-in-Chief – Outreach

Jay Taylor is a senior at the UO majoring in Linguistics. They have served as the Financial Coordinator for the University of Oregon LGBTQA3 office and co-president of the UO Model United Nations club and now help lead the Board and Card Gamer's Association for Maximum Nerdery (BACGAMN). Jay discovered a strong interest in research when they presented on the topic of mental health in South Korea at the 2020 Oregon Undergraduate Research Symposium. Currently, their research examines autism in a new, non-clinical context. They are passionate about learning new languages and teaching, and they hope to make the world a better place through education for all ages and individuals, regardless of background. In their downtime, they enjoy video games, hiking, and playing board games with friends.

Sarah Beaudoin, Senior Editor

Sarah Beaudoin graduated from the Clark Honors College in Spring 2023 with a major in Chemistry and interests in biology and science communication. Beyond academics, she lives in a sustainability-based and multigenerational co-op, volunteers for campus organizations such as the Climate Justice League and in the larger community of Eugene, and does research in the Boettcher Lab. In the lab, Sarah conducts electrochemical and physical chemistry experiments to better understand water electrolysis with the hopes of producing hydrogen fuel to mitigate the need for fossil fuels. Sarah is originally from rural Enterprise, Oregon, and enjoys biking, gardening, sewing, backpacking, and ceramics in her free time.

Rowan Glass, Editor

Rowan Glass graduated from the University of Oregon in Spring 2023 with a major in Cultural Anthropology and minors in Latin American Studies and History. A combination of lifelong wanderlust and academic research has taken Rowan far afield across Latin America, the former USSR, West Africa, and Europe. Aside from editing with OURJ, Rowan is engaged in long-term ethnographic fieldwork with the Kamëntšá people of the Sibundoy Valley, a unique crossroads between the Andes and the Amazon of southwest Colombia. Rowan's research in Colombia focuses on the Kamëntšá struggle for cultural survival and ecosovereignty over their ancestral territory. Similar themes animate Rowan's interest in subaltern resistance movements around the world; he interned with several NGOs in Senegal in the spring and will be filming a documentary with the Zapatistas of southern Mexico this winter. Outside of work, Rowan enjoys photography, creative writing, and indie films.

Teagan Furbish, Editor

Teagan Furbish graduated from the Clark Honors College in Spring 2023 with a major in Biochemistry and a specialty in plant molecular biology. Passionate about discovery in and preservation of our ecosystems, Teagan has worked on research projects spanning from landscape ecology to electrochemistry. Currently, she is working to engineer proteins for artificial gene expression in chloroplasts. With a deep interest in science communication, she hopes to use oral and graphical means to relay the findings of complicated studies to people of all academic specializations. Toward this end, she helped to found the "Climate Justice Network" podcast at UO. Extracurricularly, Teagan leads rock-climbing education trips for women, competes as a part of the UO climbing team, and teaches yoga. In her free time, Teagan loves to read, embroider, slackline, swim, and explore the outdoors.

Art Feature: "Emerald Pools"

Jadon Schmitt*

I took this photograph at Zion National Park's Upper Emerald Pools. At the end of a grueling hike, I was treated to this awe-inspiring waterfall. Shot from a low vantage point looking up the sheer canyon wall, the composition of this photograph emphasizes the expansiveness of the magnificent scene.

Medium: *Digital photography, iPhone 8.*

*Jadon Schmitt graduated from the University of Oregon in Spring 2023 with degrees in Mathematics and Economics and minors in Psychology and Political Science. He currently works in consulting as a Government and Public Services Analyst and as a research assistant in the Social Cognition Lab.

Journal Editorial: "A Gradient Invisible—Blurring Disciplines Through Undergraduate Research"

Eleanor Wakefield*

I usually begin my Introduction to Poetry classes with the Howard Nemerov poem "Because You Asked About the Line Between Prose and Poetry":

> Sparrows were feeding in a freezing drizzle
> That while you watched turned to pieces of snow
> Riding a gradient invisible
> From silver aslant to random, white, and slow.
> There came a moment that you couldn't tell.
> And then they clearly flew instead of fell.[1]

I will not discuss the poem at length, but I will point to the key image that we discuss at the beginning of each new poetry class: the "gradient invisible" that separates and connects drizzle and snow. The poem asks where and what the distinction is, drawing a connection to the title's question about the line between prose and poetry. In short, it can be hard to see quite when one form ends and the other begins; there are phases during which it might be both.

The hazy, sleety space between prose and poetry described in this poem, I suggest, is also an analogy that illuminates the relationships between many of our campus disciplines, and the types of work our undergraduate students (and especially researchers) do. Part of the joy of the undergraduate experience exists within the blurry lines between and among different disciplines, and in the exciting, blended spaces where we learn and innovate.

Though I get to teach Introduction to Poetry every couple of years, most of the classes I teach are academic writing courses—both those required for all UO students and those required only for some majors, like Scientific and Technical Writing. These classes open the door for me to participate in and mentor undergraduate research from a different angle than many of my colleagues; students come to me with projects at various stages that they will continue with me and that they need to share with an audience (even if that audience is just me, because the assignment is for my class), and writing allows us to share our work with others. Moreover, a strong relationship between the research project and effective writing skills allows a researcher to achieve their goals in many ways: proposing a project that is both well-designed and persuasively pitched, documenting the process so others can replicate the research, grounding the project in the existing literature, conveying results, and more.

Even outside of classes specifically focused on writing, we see students and faculty all over campus working across disciplines to innovate and, crucially, communicate those innovations to a wider audience. In my Scientific and Technical Writing class over the past couple of years, we have been lucky to have guest speakers introduce us to a wide variety of instances of using writing in scientific and technical fields; one is the Science and Comics Initiative, where faculty members are paired with student comic artists to create comics about their scientific research. This is an especially fun example of

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[1] Howard Nemerov, "Because You Asked about the Line Between Prose and Poetry," in *Sentences*, (Chicago, IL: University of Chicago Press, 1980).

Eleanor Wakefield has a PhD in poetry and poetics. Her dissertation, "Extending the Line: Early Twentieth-Century American Women's Sonnets," reads poems by Edna St. Vincent Millay, Sara Teasdale, and Helene Johnson. She has taught writing and literature at the University of Oregon since 2010, and elsewhere since 2008. She is the co-editor of the "Politics of Sports" casebook/textbook. She also serves as the secretary for United Academics.

crossdisciplinarity, scientific collaboration that involves the humanities directly (the Comics Studies Minor is housed in the English department), and I encourage people unfamiliar with the initiative to check it out; reading these student comics or exploring other comics about science can be both fun and edifying. And similar projects and collaborations are happening all over our campus, from individual students finding connections between and among their classes to entire departments coming together to create shared minors and other programs.

The opportunity for undergraduate students to participate in research is known to be transformative: students who develop their own projects, students who join ongoing faculty research projects, and students who are involved in undergraduate research in other capacities frequently develop skills, interests, and relationships that improve their undergraduate experiences. But when we think of research as interdisciplinary inherently, and when we think of writing as an essential piece of the research process, we further empower undergraduate researchers to plan, implement, document, and share their important work with other people. Sharing our work adds to an ongoing conversation among students, scholars, and humanity more broadly. Participating in knowledge generation—literally adding to what people know—is some of the most exciting work any of us can do. And we add our work to the figurative library of what is known by writing it down and sharing it.

I can talk much more about writing in and across disciplines, but for my purposes here, I want to reiterate these main points: all of our work bridges disciplines, and the lines between them are often blurry (and even arbitrary); our core education curriculum benefits all of us as scholars and researchers; and the humanities, writing in particular (because that is my main teaching area), are a bigger part of our campus research life than we sometimes remember. OURJ is an exciting space to engage with undergraduate research, including strong, effective student writing; it is a joy to immerse ourselves in these student projects and products, and I hope as you dive into this issue, you think about the role of writing and other disciplines in research more than you might have otherwise.

Art Feature: "Gold Beach, Silver Sky"

Drew Collins-Burke

I took this photo while on vacation with my family during spring break of 2022. According to Oregon Coast Beach Connection, the rocks seen in the ocean were formed by lava rivers around 12 to 18 million years ago. These lava rivers would have devastated any forests they touched, stemming from volcanos 300 miles away. This volcanic activity would have made this area a terrifying sight to see, but millions of years later, it led me to have a serene experience, indicating how experiencing nature and environmental history can inspire both happiness and fear.

Medium: *Digital photography, iPhone X.*

Letter from the Editors

Kyla Schmitt, Jay Taylor

Dear Reader,

Welcome to Volume 21, Issue 2 of the Oregon Undergraduate Research Journal (OURJ). This issue—comprised of a cohort of pieces collected between the Winter and Spring Terms of 2023—has been a long time coming, and it boasts a strong collection of art, scholarship, and research that we are elated to share with the University of Oregon community. Serving as both a snapshot of the previous winter and a tone-setter for the coming fall, the present issue stands as a testament to the hard work of OURJ's editors and collaborators in 2023 while also marking a turning point for the journal in the year to come.

2023 was a year of immense growth for OURJ, both in terms of our editorial team and our on-campus relationships. Our editorial board—peaking in size at a record-setting seven student members on payroll this year—represented diverse academic disciplines, from linguistics to environmental science, cultural anthropology to data science, biochemistry to political science. Beginning in Spring 2023, five of those student editors bid OURJ farewell, many of them freshly graduated from the University and ready to enter into the professional world with their bachelor's degrees and editorial know-how. We thank them for their time and energy, and we wish them the best of luck in their future endeavors.

For those of us that remain, we have a critical task ahead of us: we must decide how we want to shape the culture and direction of OURJ with an entirely fresh team of editorial talent—which parts of the organization to carry on, and which to reimagine—in the 2023–2024 academic year. Thanks to the efforts of Lanch McCormick, Kevin Hatfield, Franny Gaede, and other faculty members who have helped make OURJ what it is today, however, we feel that the journal is in good hands as we look to chart this course.

With financial support from the Center for Undergraduate Research and Engagement, we have made advancements toward issuing OURJ's first-ever scholarship, the Ginieczki Scholarship—named in honor of our most recent editor-in-chief emeritus—to reward particularly strong, innovative, and meritorious undergraduate submissions. Under UO Libraries, we have worked to secure year-after-year funding for the editorial staff to ensure that the journal endures. In collaboration with the McNair Scholars Program, we have assembled a first-of-its-kind special issue—shortly forthcoming—showcasing the research of first-generation and underrepresented college students. Alongside the Office of Academic Advising, we will present at College Block this September, advertising editor, author, and scholarship opportunities to the hundreds of students that attend the fair each year. And to cap off the year, we will work for a second year in a row to further facilitate research advancement opportunities at the Undergraduate Research Symposium in May.

We are excited to see what other developments and opportunities unfold in the 2023–2024 academic year. We hope that many of you—whether as staffers, authors, collaborators, or readers—will join along for the ride. In the meantime, however, we are honored to present this summer volume of OURJ.

Warm regards,

Kyla Schmitt and Jay Taylor, Editors-in-Chief

Sociality and the Microbiome: Gut Microbial Convergence with Infant Presence in the Black-and-White Colobus (*Colobus vellerosus*)

Emma Freedman*

Abstract

While previous studies have demonstrated that social behavior plays an important role in gut microbial variation, there is limited understanding of how changes in social cohesion affect the gut microbiome. This study provides a comprehensive examination of this longitudinal relationship in a population of black-and-white colobus monkey (*Colobus vellerosus*) at the Boabeng-Fiema Monkey Sanctuary (BFMS) in Ghana. Adult female *C. vellerosus* display increases in social interaction after the birth of an infant, indicating a social shift which I utilized to explore the association between changes in social cohesion and the gut microbiome. I used previously collected field data (2018–2020) across four social groups, resulting in 218 total fecal samples and a mean of 17.2 hours of behavioral data per female. These data sets were employed to characterize microbiomes using 16S rRNA sequencing and quantify changes in social cohesion via social network analysis. Infant presence was significantly associated with gut microbial similarity (PERMANOVA: $p<0.01$), and for three of the social groups, gut microbiomes became more similar after infant birth (GLMM: $p<0.036$). Social network analysis did not reveal significant changes in social cohesion with infant presence, indicating that other changes in social interactions not included in this analysis may explain this pattern. Future work would aim to evaluate the basis for differences in gut microbial variation between social groups and explore the presence of grooming with an infant present. Investigating the relationship between social interactions and microbial variation ultimately contributes to our understanding of the factors influencing the assembly, composition, and diversity of the gut microbiome.

1. Introduction

1.1. The Gut Microbiome and the Host

The gut microbiome consists of the community of microbes inhabiting the gastrointestinal tract of a host organism. In vertebrates, while the gut is initially colonized at birth and perhaps in utero, the microbiome exhibits considerable compositional variation throughout an individual's lifetime. These fluctuations have a range of implications on host physiological development and function. Gut microbial composition is essential for nutrient uptake and the prevention of pathogenic invasion (Suzuki et al., 2017), immune system development (Hooper et al., 2012), and the development and function of the brain and associated behavior via the gut-brain axis (Jena et al., 2020). Imbalances in the gut microbiome, known as dysbiosis, may lead to disruptions in these processes and cause negative consequences for the host. For example, studies have found evidence of associations between dysbiosis and obesity (Amabebe et al., 2020),

*Emma Freedman (efreedman12@gmail.com) graduated from the University of Oregon Clark Honors College with a major in Biology and minors in Art and Chemistry. She is passionate about finding ways to combine her interests in art and science to enhance scientific communication, accessibility, and engagement. She was a member of the Ting Lab in the Department of Anthropology, where her honors research focused on investigating the relationship between social behavior and the gut microbiome.

depression (Kelly et al., 2016; Radjabzadeh et al., 2022), anxiety (Clapp et al., 2017) autism-like symptoms (Hsiao et al., 2013), and diabetes (Li et al., 2020). The extensive consequences of dysbiosis have caused the gut microbiome to attract considerable attention in clinical research as a system which has important implications for human health. Research in this area seeks to develop methods which could utilize gut microbes for medical applications concerning preemptive and ad hoc therapeutics for disorders correlated with dysbiosis. While our understanding of the relationship between host function and the gut microbiome continues to advance, we still lack a basic understanding of which factors act to shape the host microbiome and cause natural variation.

1.2. Social Factors Shaping the Gut Microbiome

Prior research has described factors at both the host and environmental level which have some influence on gut microbiome variation, including host diet, genetics, and social environment (Archie & Theis, 2011). The influences of host diet and genetics on gut microbial composition have been studied extensively. However, less work has been done to investigate the aspects of the host's social environment which influence the gut microbiome. As clinical intervention continues to develop at the forefront of microbiome research, understanding these social factors that contribute to microbial variation has valuable implications for the host which could ultimately inform approaches to shape a healthier gut microbiome. Exploring the social transmission of gut microbes may also help explain the evolution of sociality, as the sharing of microbes has been found to confer benefits for group members such as increased pathogen resistance and host immunity (Abt & Pamer, 2014; Ezenwa et al., 2016; Koch & Schmid-Hempel, 2011; Lombardo, 2008).

Some evidence of microbial transmission through social mechanisms has been explored in human subjects; studies have found cases of socially mediated microbial transmission through evaluations of cohabitation in adulthood (Gacesa et al., 2022; Lax et al., 2014; Song et al., 2013; Valles-Colomer et al., 2023) and infant adoption (Tavalire et al., 2021). While human studies provide valuable evidence of socially mediated microbial transmission, detailed characterization of human social behavior can be difficult due to the complexity of human spatial movement and social interactions on a day-to-day basis, which present a number of confounding environmental factors. Non-human primates present an ideal alternative study system for questions related to sociality and the gut microbiome due to their highly studied nature, the ability to collect detailed behavioral, dietary, and biological relatedness data, and their behavioral and phylogenetic similarities to humans. Studies in this area have worked to isolate and evaluate the relationship between host social environment and the non-human primate gut microbial composition in several different species.

In one of the earlier papers on this subject, Tung et al. (2015) evaluated the importance of social group membership and social networks on the structuring of the gut microbiome in a wild population of baboons. Excluding kinship, shared diet, and shared environment in their evaluation, the study found social grooming networks to be predictive of gut microbial similarity; rates of interaction between individuals directly related to compositional variation in the gut microbiome. Other studies have found similar evidence of socially mediated gut microbial transmission in this population of baboons (Grieneisen et al., 2017) as well as other non-human primate species including Verreaux's sifaka (Perofsky et al., 2017), black howler monkeys (Amato et al., 2017), and ring-tailed lemurs (Bennett et al., 2016).

While these studies provide a better understanding of the social factors that serve as mechanisms for microbial transmission at a specific cross-section in time, the rapidly changing nature of the gut microbiome implores

future work in this area to focus on more comprehensive longitudinal surveys with daily to weekly sampling of individuals spanning multiple years (Björk et al., 2019). There are several recent studies which have taken this approach in non-human primates and have begun to disentangle the factors which may contribute to inter- and intra-individual gut microbial variation. Analyses of well documented populations of chimpanzees over eight years (Moeller et al., 2016) and wild baboons over 13 years (Ren et al., 2016) revealed microbial variation correlating with both host-specific (diet, age, social behavior) and environmental factors (season, annual rainfall). In Verreaux's sifaka, environmental factors were found to define the population-level gut microbial signature, while patterns of host social interactions facilitated the persistence and variation of gut microbial communities over time within groups (Perofsky et al., 2021; Rudolph et al., 2022). In red-bellied lemurs, patterns of social contact (group membership and position within the social network) predicted gut microbial composition (Raulo et al., 2018), and distinct gut microbial profiles were detected in two resultant groups of black-and-white colobus monkeys less than nine months after a new social group split off from the main group (Goodfellow et al., 2019). This research project aims to add to this growing body of work using a combination of fine-grained data on primate social behavior and deep longitudinal sampling of individual gut microbial compositions within social groups.

With a longitudinal approach in mind, I was specifically interested in evaluating how changes in social cohesion influence gut microbial variation. In the context of my project, social cohesion refers to the average physical proximities between members of a social group. To my knowledge, there is only one paper that has directly evaluated this mechanism. The 2019 study examined human cohabitation and closeness in relationships, taking siblings and married couples (all in late adulthood) as their study subjects. As in previous studies, they found that individuals cohabitating with a spouse or partner had more similar gut microbiomes than unmarried, non-cohabitating individuals. Most importantly for the purposes of my project, the authors found that that spouses and siblings that rated themselves as having relatively "close" relationships had more similar gut microbiomes than pairs which did not rate themselves as having "close" relationships (Dill-McFarland et al., 2019). My research builds on these results by tracking expected changes in social cohesion and gut microbial variation over time in a well-documented non-human primate population.

1.3. Research Objectives and Hypotheses

To explore my research question, I focused on a population of black-and-white colobus monkeys (*Colobus vellerosus*) at the Boabeng-Fiema Monkey Sanctuary (BFMS) in central Ghana. The population of colobus monkeys at this site has been studied since 2000, leading to a detailed record of their behavior and group compositions. There are approximately 28 social groups in the area composed of uni- or multi-male/multi-female social groups with sizes ranging from 9–38 individuals (Kankam & Sicotte, 2013; Wong & Sicotte, 2006). Recent research on the BFMS black-and-white colobus population compared diet, relatedness, and the one-meter proximity network to determine which factor was the best predictor of differences in the gut microbiome across eight social groups. The study found that models of social connectedness in the one-meter proximity network best predicted variation in the gut microbiome composition between individuals (Wikberg et al., 2020). As in other non-human primate species, these results support the concept of social interaction as a factor mediating gut microbial transmission. The study also demonstrated that microbial transmission can occur in species with low rates of social interaction (grooming, time in close proximity) relative to other gregarious primate species (Teichroeb et al., 2003) and that proximity

networks can be sufficient for predicting microbial transmission.

The subfamily of monkeys to which black-and-white colobus belong (subfamily Colobinae, or colobine monkeys) are known to exhibit relatively high levels of allomothering behavior, described as an individual's attraction to and handling of another's infant (Bădescu et al., 2015; McKenna, 1979). In order to gain access to a young infant, females spend increased amounts of time grooming the mother, and thus overall grooming rates increase and individuals spend more time in close proximity when an infant younger than three months old is present in a group (Wikberg et al., 2015). Thus, based on previous research that showed 1) social interactions affect gut microbial variation, and 2) social interactions change in the presence of an infant, I used black-and-white colobus monkeys as a model to evaluate the following question, objectives, and hypotheses:

- Question*:* How is gut microbial similarity influenced by the presence of infants within social groups of adult female black-and-white colobus monkeys?
- Objective 1: Compare gut microbial similarities of adult females during time periods with and without a young infant (under three months old) present.
- Objective 2: Evaluate changes in social cohesion during time periods with and without a young infant present.
- Hypothesis 1: Female group members will have more similar gut microbiome compositions when a young infant is present in their social group than they will in the absence of a young infant.
- Hypothesis 2: Adult female group members will display higher levels of social cohesion when a young infant is present in a social group than they will in the absence of a young infant.

I used detailed demographic, behavioral, and microbial sampling from four social groups of black-and-white colobus monkeys at BFMS to quantify the longitudinal relationship between social environment and gut microbial variation. I first tested whether periods with and without young infants present correlated with variation in the gut microbial compositions of adult females in each social group. I then evaluated the type of variation that was occurring. If it was in line with my hypothesis, I expected to see adult female gut microbiomes becoming more similar to each other when a young infant was present. Next, I used social network analysis based on one-meter proximity networks to evaluate changes in social cohesion with a young infant present. Here, I hypothesized that changes in social cohesion (proximity) based on allocare behavior could be a factor contributing to the microbial variation I tested for in the first part of my analysis. This research is novel and significant because it utilizes a longitudinal approach to known social shifts surrounding infant care and employs a fine-grained data set with well-coupled behavioral and microbial sample components. The results of this study expand our understanding of the effects of changes in the social environment on the compositional variation of the gut microbiome on defined temporal scales.

2. Methods

2.1. Fieldwork and Labwork

University of Oregon graduate student Diana Christie conducted the fieldwork and labwork portions of this research. This included behavioral data collection and fecal sample collection from the study population (*Colobus vellerosus*; Boabeng-Fiema Monkey Sanctuary; Ghana). These methods have been described elsewhere (e.g., Goodfellow et al. 2019; Wikberg et al. 2020), but they are briefly documented here to provide context for the downstream data processing and analyses that I conducted.

Christie and her field assistants focused on four social groups for behavioral data collection (Redtail/RT, Wawa/WW, Winter/WT, and Splinter/SP), each containing habituated and identified individuals. Behavioral data were collected from all adult females within the four groups between 2018 and 2020, yielding two consecutive dry seasons of data. Samples were collected in the dry season (~December to April) to avoid the effects of seasonal variability on gut microbial composition (Gomez et al., 2015; Springer et al., 2017). Behavioral data were collected via continuous focal sampling, which involves tracking one individual at a time and recording frequency, duration, and type of behavior exhibited by the focal subject. This method was used to record behaviors during 10-minute intervals for all adult females in each social group. Social and feeding behaviors were recorded continuously. During a focal, point samples were also taken every two and a half minutes identifying all individuals within zero, one, three, and five meters of the focal subject. Behavioral data collection yielded a total of 240.84 hours of focal samples (mean 17.2 hours per female SD +/- 3.96).

Christie and her field assistants collected fecal samples during the same periods of time they were collecting behavioral data. Multiple samples were systematically collected from each focal subject to be used for gut microbial composition characterization via 16S rRNA sequencing. Fecal samples were collected monthly for adult females. After an identified individual defecated, 1–2 g of feces were collected using gloves and sterile collection sticks and dissolved in 4 ml of RNAlater®. The samples were stored in a freezer on site before being shipped to the Ting Lab at University of Oregon for storage at –20 °C. For the purposes of this study, these samples were used to represent the gut microbiome. However, there may be differences between the microbial composition of the samples and the true microbial communities of the host gut microbiome. Therefore, although it is more accurate to say that the samples characterized the hindgut or fecal microbiome, they were used in this context to evaluate socially mediated transmission of gut microbes between individuals.

Christie extracted DNA from each fecal sample using the Qiagen PowerFecal Pro kit, and DNA extracts were quantified on a Qubit Fluorometer. The V4 hypervariable region of the 16S rRNA gene was targeted for sequencing, as this region is useful for identifying taxa at the level of genus or species (Bukin et al., 2019). Library preparation followed protocols described in Goodfellow et al. (2019), and sequencing was conducted on a 300 base pair paired-end run on the Illumina MiSeq platform. Demultiplexing was completed by the core, matching each sample name with its appropriate set of sequenced rRNA reads. These steps produced fastq format files for each sample containing all reads for that specific sample.

2.2. Data Processing

2.2.1. Behavioral Data

The raw behavioral data were encoded in CSV files. I processed these using a combination of Microsoft Excel, Microsoft Command Prompt (CMD), and R (R Core Team, 2021). I first manually cleaned the data in Excel; any cells that were flagged for missing information were corrected and additional information was added where necessary. I then ran each sheet of focal data through a series of Command Prompt checks which involved ensuring files were in CSV format, removing Excel-formatted files, eliminating any spaces in file names or quotation marks in cells, then checking for missed corrections from the manual cleaning. Any missed corrections were subsequently fixed again in Excel, and the processing steps above were repeated. Incorrect ethogram codes were also located using an R script which would return a file with problem focal sheets. These codes were

corrected, and the script was rerun to ensure all inaccuracies were accounted for before the data were formatted for use in R. The overall results of the behavioral data processing included monthly pairwise social matrices for all adult females, and presence/absence of infants under three months. If infants were present, the number of infants under three months was also included.

2.2.2. Sequence Data

Data processing of 16S sequence reads was carried out on the University of Oregon's high performance computing cluster, Talapas, using the bioinformatics processing pipeline QIIME2 (Bolyen et al., 2019). I began by creating a bash script which would allow me to run slurm jobs as I worked through the pipeline. I used the DADA2 (Callahan et al., 2016) plugin for the next series of steps in processing. As each sample was read in both the forward and reverse direction during sequencing, I chose parameters to allow for the appropriate level of overlap between the reads before they were realigned, a process known as denoising. Too much overlap causes the program to throw out more reads as it detects a higher number of unmatched bases, but too little overlap runs the risk of incorrect matches between reads. The values I ended up choosing were determined using a combination of quality score plots generated in the demultiplexing summary and through trial and error. My parameters specified a total length of 274 base pairs (~20 base pair overlap), resulting in an average of 88.3% of reads successfully merged per sample. Once the sequences were aligned, the final step in processing was choosing appropriate sampling depth parameters, a process that results in the removal of samples with relatively low numbers of reads to maintain a robust data set for analysis. I conducted taxonomic classification using the SILVA database (Quast et al., 2013). The outcomes of microbial sample processing included an ASV table, a phylogenetic tree, and taxonomies.

2.2.3. Metadata File Creation

Using demographic and sample data, I produced a metadata file in CSV format which contained information related to each fecal sample. This metadata file was used for much of the initial processing and in QIIME2 as well as other downstream analyses. Pertinent metadata information for each sample included collection month, field season, fecal time point (a period of days within a field season where fecal samples were collected for all adult females in a social group), infant presence, and number of infants present. Infant presence was calculated by referring to a demography data sheet which lists all birth and death/disappearance dates for infants in each of the four social groups. Based on work in mice where microbial variation was tracked after cohousing (Caruso et al., 2019), I estimated the length of time for the gut microbiome to show significant levels of compositional change in an individual to be three days after the birth of an infant, with the assumption of social changes immediately after birth. After this window of time was determined, I reviewed the infant presence periods I created and found no instances of samples collected within three days of an infant birth or an infant death/disappearance and thus no samples needed to be removed from my data set.

2.2.4. Generating a Distance Matrix

I used the qiime2R package (Bisanz, 2018) to import my data from the QIIME2 pipeline into R. With the features table, phylogenetic tree, and taxonomy table from QIIME2 and the metadata file, I used the phyloseq package to create a phyloseq object, a way for microbial information to be stored, manipulated, and analyzed in R (McMurdie and Holmes, 2013). The data were then filtered to remove any samples with fewer than 5000 reads for quality control, removing nine samples out of the original 218. As there was a chance some taxa would have only appeared in those samples that were removed, I included a

command to remove empty spaces in the taxonomy table. I also included a command to remove sequence reads that mapped to chloroplasts or mitochondria instead of the ASVs I was interested in analyzing, as DNA derived from these organelles also contains the 16S gene and can represent a source of contamination.

The next step in preparing the data for statistical analysis was creating a distance matrix of beta diversity indices using Aitchison distance. Beta diversity refers to the compositional dissimilarity between microbial communities. Evaluating levels of similarity between samples allows for the partitioning of how various factors may influence the compositional similarity of the gut microbiome between individuals. I first centered log-ratio (CLR) transformed the data, converting the values from total counts to the dominance for each taxon relative to the mean of all taxa (Gloor et al., 2017). Next, the distance matrix was generated with these data using the Euclidean method. These two steps generate an Aitcheson distance matrix. This distance is widely employed for microbiome work, as it better accounts for the compositional nature of microbial data and avoids compositionality bias (Quinn et al., 2018). The distance matrix itself gives dyadic measurements of microbial similarity between all individuals in which the numerical measures in this case are based on the Aitchison beta diversity metric.

2.3. Statistical Analysis

2.3.1. Preliminary Analysis

Before beginning my analyses, I used a microbiome analytics tutorial to obtain preliminary statistics for my data set and to develop microbiome analysis skills in R using real data. I calculated and plotted the relative abundance of the phyla and observed richness using the phyloseq (McMuride and Holmes, 2013) and ggplot (Wickham, 2016) packages in R. For beta diversity analysis, I generated an Aitchison distance principal coordinate analysis using the packages microbiome (Lahti and Shetty, 2017) and vegan (Oksanen et al., 2022).

### 2.3.2. PERMANOVA: Testing for the Presence of Changes in Microbial Similarity

A permutational multivariate analysis of variance (PERMANOVA) identifies the effects of various factors on microbial variation and their interactions with each other via a permutational ANOVA of a distance matrix (Anderson, 2001). Broadly, the test asks if microbial variability is greater between groups or within groups for a given sample, displaying significance if variability is greater between groups. I ran a specialty version of a PERMANOVA called an adonis using the adonis2 function of the R package vegan. For the purposes of my study, I tested for differences in gut microbial similarity between time periods with and without a young infant present while controlling for other factors shown to have significant effects on gut microbial variation. While collection year and field season were both included in the metadata sheet, I chose to exclude collection year as a factor, as it is similar to field season, and field season better describes temporal changes between collection periods.

In setting up the command, each factor could be incorporated in an additive fashion; or, if I wanted to test for interactions between factors, it could be incorporated in a multiplicative fashion with another factor. Preliminary analysis involved running the PERMANOVA with different variations of factor interactions, which revealed significant interactions between social group and infant status, and between field season and collection month. Therefore, the final formula structure I used included a multiplicative interaction between social group and infant status, a multiplicative interaction between field season and collection month, and individual ID as an additive factor to account for repeat sampling among individuals.

2.3.3. Generalized Linear Mixed Model (GLMM): Evaluating Changes in Distance to Centroid

In the second part of my microbial analysis, I specifically wanted to test if changes in beta diversity (microbial similarity) with the presence of an infant were being driven by individuals in a group becoming *more similar* to one another in gut microbial composition. To do this, I modeled the effect of infant presence on distance to centroid (DTC), which measures how dispersed members of a group are from a central location. Because, in this case, dispersion of points correlates with the level of microbial similarity between samples, the measure of distance to centroid can be used to compare microbial similarity between groups (see Figure 1). I used phyloseq to subset the data by fecal time point and create Aitchison distance (beta diversity) matrices, then used the usedist package (Bittinger, 2020) to generate distance to centroid measurements for each fecal time point.
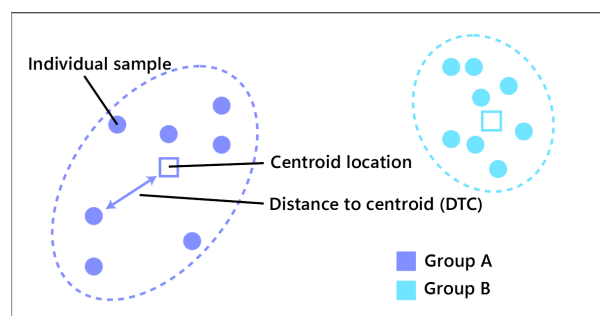
Figure 1. Conceptual figure of distance to centroid. Distance to centroid measures how dispersed all members of a group are in relation to a central point (centroid location). In this case, individual samples refer to the microbial samples, and the distance to centroid was calculated based on Aitchison distance metrics (Quinn et al., 2018).

The most appropriate way to handle repeat sampling in my data was to utilize a mixed effects model to account for random effects in addition to fixed effects. A Shapiro test for normality revealed the data were non-normal and thus unfit for a linear mixed effects model. Therefore, the glmmTMB package (Brooks et al., 2017) was used to run a generalized linear mixed model (GLMM) as it does not rely on normality as an assumption.

To improve the fit of the GLMM, the outcome variable (DTC) was also log transformed. The best factor interactions for the gamma fit test were determined using AIC-based model selection (models with lowest AIC values were chosen) and the drop function in R. The selected model structure included the log link model of the GLMM with infant status as a fixed effect and group, ID, and collection month as random effects. Field season was excluded as a factor, as it could not converge as a fixed or random effect. The model was compared to the null model which fitted the data by only the random effects without infant status. The effects of the model were plotted using the effects package in R (Fox and Weisberg, 2019; Fox, 2003) to visualize the interactions between the DTC and infant status.

Because the social group Winter (WT) showed divergent patterns in the results of the GLMM (see Results), it was eventually removed from the data set, and model selection and drop were used to determine the best factor interactions. Without WT, this was a log link model of the GLMM with infant status as a fixed effect and ID and collection month as additive random effects. This model was also compared to the null model, and the effects of the model were plotted again using the effects package in R.

2.3.4. Social Networks and Centralization: Evaluating Changes in Social Cohesion

Social cohesion in this study refers to the average level of physical proximities between all adult female members in a social group. Higher social cohesion, for example, would correlate with individuals spending more time in close proximity. In order to explore changes in social cohesion associated with infant presence, I used social network analysis, a method of calculating standardized sociability measures that allows for evaluation of relationships within social groups (de Lima & Ferreira, 2021). This approach generates social networks in which points (nodes) represent individuals and the lines between

points (edges) represent the social interactions of those individuals.

For each social group, the time periods where infants were present and absent were determined, and the data were subset by infant status (young infant present = Y or N). This resulted in nine social networks being generated; there were two "Y" and one "N" infant status time periods for each social group. All networks were constructed using continuous approaches to within one meter from the focal follows collected by Christie during field sampling. The social group Redtail (RT) was excluded from this analysis because it did not have a minimum of one "Y" and one "N" infant status period with sufficiently dense behavioral data. Each distance matrix was loaded into R studio and converted to an undirected weighted edgelist using igraph (Csardi and Nepusz, 2006). Exploratory modularity analysis was run for each matrix using igraph, applying an optimization algorithm which identified groups of strongly connected individuals ("communities") in the network, differentiating each via color overlays on the social networks (Brandes et al., 2008). igraph was also used to run a statistical analysis of network-level metrics for the centralization of the social groups, which included evaluation of degree, closeness, betweenness, and eigenvector centralization values, each measuring different aspects of social structure within a group. Given the relatively small size and well-connected nature of the social groups, I chose to focus on eigenvector values for my statistical analysis, as they consider both number and strength of connections, capturing the greatest amount of variation in my data (Hanneman and Riddle, 2005).

To evaluate the relationship between infant status and the social cohesion (eigenvector centralization) of adult females in a social group, I used a nested ANOVA in R. For my data sheet, I included the eigenvector values in a table along with IDs for each social network (SPY1, SPN1, etc.), social group (SP, WW, WT), and infant status (Y/N). To test for a significant difference in social cohesion with or without a young infant present across all social groups, I ran the nested ANOVA with social group nested within infant status.

I also ran the same set of tests with a different social network metric called mean network strength. While eigenvector centralization describes the extent of cohesion around particular focal individuals in a group, mean strength more generally describes how connected all individuals are to each other, which is similar to the method used in Wikberg et al. (2015). To calculate this metric, I found the average value for each social network matrix, making sure to have each dyad represented one time. I ran the same nested ANOVA discussed above using this second network metric. I chose to run tests using both types of network metrics because they measure social structure in slightly different ways, and significant results for either one would provide insight into how social cohesion might vary with the presence of an infant.

3. RESULTS

3.1 Preliminary Analysis

After filtering, there were 209 total samples with an average of 79254 reads per sample. There were 30 phyla and 3828 taxa represented in the data set. As expected, observed amplicon sequence variants (ASV) correlated with total read count. From a visual overview, the principal coordinate analysis (PCoA) displayed subtle differences in gut microbial clustering and dispersion between the four social groups (Figure 2).
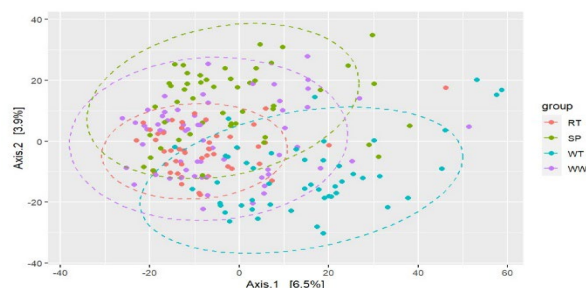
Figure 2. Principal coordinate analysis. Ordination plot generated from the identified principal coordinates of my data set. The four social groups displayed differences in clustering and dispersion based on Aitchison distance metrics.

3.2. PERMANOVA

All factors of interest showed significant effects on beta diversity (microbial similarity); collection month (R2=0.04456, p<0.001) and field season (R2=0.03502, p<0.001) explained a moderate amount of variation in beta diversity and had a significant interaction (R2=0.01995, p<0.001). After controlling for all other variables, infant presence had a small but significant effect on gut microbial variation (R2=0.007131, p<0.001). Social group and infant presence also had a significant interaction after controlling for other variables (R2=0.01907, p<0.001). See Table 1 for a full summary of PERMANOVA results.

Table 1. Summary of PERMANOVA results. All factors of interest showed significant effects on beta diversity. Infant presence exerted a small but significant effect on beta diversity (R2=0.007131, p<0.001). Social group and infant presence also showed a significant interaction (R2=0.01907, p<0.001).

|	Df	SumOfSqs	R2	F	Pr(>F)
group	3	79437.033	0.0825626	7.688397	0.001
inf.pres	1	6861.465	0.0071314	1.992282	0.001
field.season	4	33692.438	0.0350181	2.445719	0.001
coll.month	7	42871.560	0.0445584	1.778301	0.001
id	22	196921.537	0.2046697	2.598990	0.001
group:inf.pres	3	18344.420	0.0190662	1.775484	0.001
field.season:coll.month	4	19194.826	0.0199501	1.393344	0.001
Residual	164	564819.659	0.5870434	NA	NA
Total	208	962142.938	1.0000000	NA	NA

3.3. Generalized Linear Mixed Model

Across all four social groups, infant presence was not found to have a significant influence on distance to centroid and the null model was selected over the full model (Table 2). However, visually there was a slight decrease in DTC when a young infant was present (Figure 3). The social group WT stood out as being significantly different than the other three social groups in the GLMM (group [WT]: p<0.021, Table 2).

Table 2. Generalized linear mixed model for distance to centroid across all social groups. Infant status did not show a significant effect on distance to centroid across all social groups (p<0.319). The social group Winter (WT) was significantly different than the other three social groups (p<0.021).

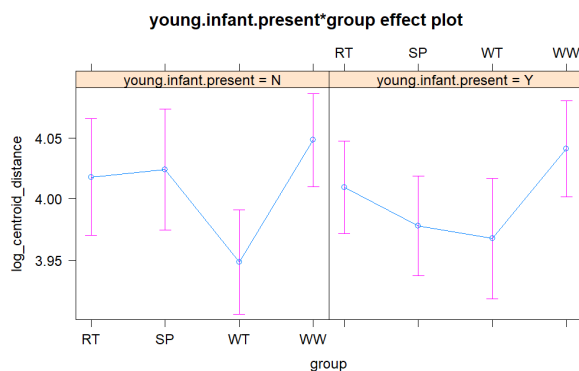|	log_centroid_distance			
Predictors	*Estimates*	*std. Error*	*CI*	*p*
(Intercept)	4.02	0.02	3.98 – 4.06	**<0.001**
young infant present [Y]	1.00	0.00	0.99 – 1.00	0.319
group [SP]	0.99	0.01	0.98 – 1.01	0.395
group [WT]	0.98	0.01	0.97 – 1.00	**0.021**
group [WW]	1.01	0.01	1.00 – 1.02	0.227
Random Effects				
σ^2	0.00			
τ_{00} id	0.00			
τ_{00} coll.month	0.00			
ICC	0.14			
N_{id}	26			
$N_{coll.month}$	9			
Observations	208			
Marginal R^2 / Conditional R^2	0.115 / 0.242			
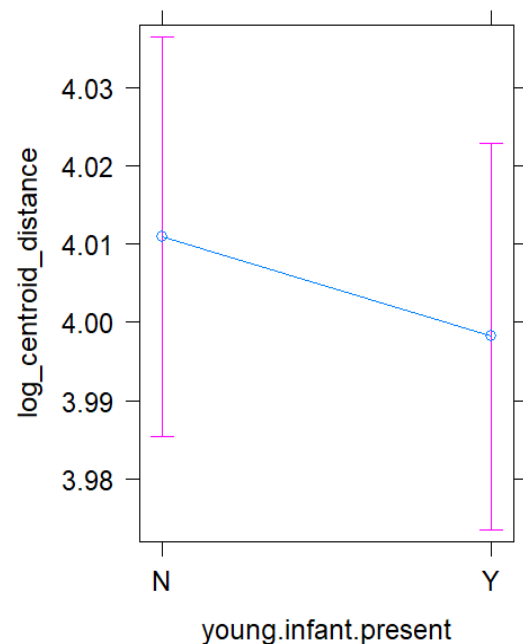
Figure 3. Effects plot of infant presence on distance to centroid across all social groups. The plotted effects of the GLMM showed a decrease in distance to centroid with a young infant present, however as seen in the GLMM results, this trend did not rise to the level of significance with all four social groups (p<0.319).
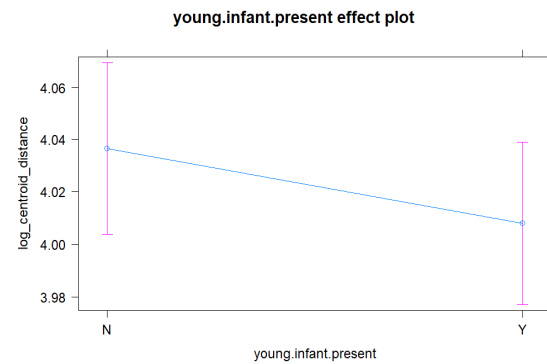
The effects plot revealed that WT also had lower distances to centroid across time points and showed a different pattern of directional differences in distance to centroid in response to infant presence (Figure 4). Based on these results, WT was removed from the data set, and the tests were rerun. The results of this second test without WT (Table 3) showed significant results for infant presence affecting distance to centroid across all remaining groups (p< 0.036) and the full model was selected over the null. The plotted effects again showed a decrease in distance to centroid when a young infant was present (Figure 5).

Figure 5. Effects plot of infant status on distance to centroid without WT. With WT removed from the data set, the other three social groups showed a decrease in distance to centroid with a young infant present (young.infant.present = Y).

3.4. Social Networks and Centralization

There was not a significant difference in social cohesion between time periods with or without a young infant present across all social groups based on either metric I used for my analysis (eigenvector centralization, p<0.152; mean strength, p<0.496). Based on a visual overview, I did see structural differences with and without a young infant present in the weighted edge list visualizations; the social groups SP and WW changed in some way between time periods whereas WT does not show such distinct changes. WT also lacked the sub-structuring seen in the other social groups, visualized through differences in the color overlays (Figure 6).

Figure 4. Effects plot of infant status on distance to centroid partitioned by social group. A visualization of the interaction between infant status and distance to centroid by social group showed that WT had an overall lower distance to centroid across time periods and showed a different pattern of directional changes in distance to centroid with a young infant present.

Table 3. Generalized linear mixed model for distance to centroid without WT. With the social group WT removed, infant presence showed a significant effect on distance to centroid for the remaining three groups in the GLMM (young infant present [Y]: p<0.036).
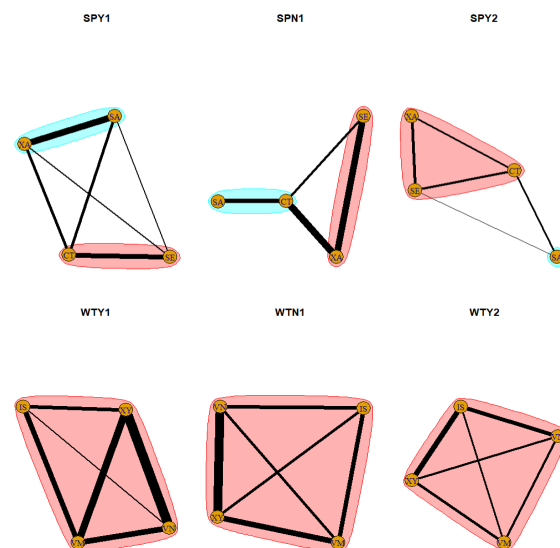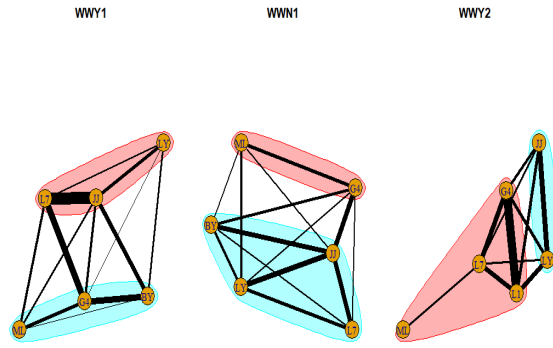
Predictors	log_centroid_distance			
	Estimates	std. Error	CI	p
(Intercept)	4.04	0.02	4.00 – 4.07	**<0.001**
young infant present [Y]	0.99	0.00	0.99 – 1.00	**0.036**
Random Effects				
σ^2	0.00			
$\tau_{00\ id}$	0.00			
$\tau_{00\ coll.month}$	0.00			
ICC	0.28			
N_{id}	21			
$N_{coll.month}$	9			
Observations	160			
Marginal R^2 / Conditional R^2	0.023 / 0.299			

WWY1   WWN1   WWY2

Figure 6. Weighted and undirected social networks with modularity for SP, WT, and WW. Distance matrices constructed from one-meter approaches were used to create undirected weighted edge lists with modularity analysis overlays. The edge weights denote the connection strength between individuals, and the color overlays distinguish different modules ("communities") within the network. The name of each set of matrices identifies the group (SP, WT, WW) and infant presence (Y, N). The numbers denote the time periods, differentiating between the two infant presence = Y periods, and the letters in the nodes are individuals in the group. The social group RT was excluded from the analysis as it did not have sufficient behavioral data. WT having a single-color overlay for all individuals (no sub-structuring) suggested that all members in the group were closely connected.

4. Discussion

4.1. Infant Presence Influences Gut Microbial Similarity in Adult Females

Through my first objective, I aimed to test whether changes occurred in gut microbial composition in adult female black-and-white colobus monkeys between time periods with and without a young infant present. Using a PERMANOVA, I found significant evidence of changes in gut microbial similarity between time periods while controlling for confounding variables (collection month, field season, ID). While this analysis did reveal that the presence of an infant was having a small but significant effect on gut microbial similarity, the test was quite broad and did not indicate what change was occurring. The significant interaction between social group and infant presence in the PERMANOVA also suggested that in some way, infant status was differentially affecting gut microbial similarity between social groups.

4.2. Gut Microbiomes Become More Similar with Infant Presence in Most Study Groups

While the PERMANOVA suggested that changes in microbial similarity were indeed present across groups, I was specifically interested in testing whether the gut microbiomes of adult females in social groups became more similar in the presence of a young infant. I hypothesized that the gut microbiomes of adult females would become more similar in the presence of a young infant. Across all groups, I did not see a significant interaction between infant presence and distance to centroid in the GLMM results, suggesting that infant presence was not increasing gut microbial similarity across all social groups. However, as shown in the PERMANOVA results (Table 1), it is possible that the presence of infants affected the social groups in different ways, supporting an inquiry into how certain social groups influenced the GLMM result. The GLMM results by group (Table 2) and the effects plot for the interaction between infant presence and distance to centroid (Figure 4) showed that the social group Winter (WT) was different than the other three social groups. Because of this trend, I hypothesized that WT could be disproportionately influencing the results of the GLMM, so I removed it and ran the test again. Once WT was removed, there was a significant effect of infant presence on gut microbial similarity for the remaining three social groups; the trends of WT seemed to be masking the significant results of the other groups (Table 3). The plotted effects of the model excluding WT showed a decrease in distance to centroid with a young infant present (Figure 5), suggesting that in social groups with a young infant, the overall gut microbial compositions of the female members became more similar to each other, thus supporting Hypothesis 1. It is important to interpret the results of the DTC analysis with caution; while I found evidence for

an increase in gut microbial similarity with infant presence, this effect may be group- or context-dependent, as it arose in only three out of four groups and thus requires further exploration at a group level.

4.3. No Correlation Between Infant Presence and Social Cohesion between Groups

After finding evidence of variation in gut microbial similarity following changes in infant status, my second objective aimed to explore if this variation was in fact a result of changes in social cohesion. This idea was based on a previously documented increase in grooming with a young infant present among black-and-white colobus monkeys (Wikberg et al., 2015), and the fact that social proximity was found to be the best predictor of gut microbial similarity within the same study population (Wikberg et al., 2020). I hypothesized that when a young infant was present in a group, there would be an increase in social proximity among adult females. This could in turn facilitate increased gut microbial transmission, leading to the increase in gut microbial similarity I observed in the first part of my analysis.

I did not find a significant difference in social proximity between time periods with and without a young infant present for any of the social groups, which suggests that infant presence did not exert a significant influence on social network cohesion. This result failed to support Hypothesis 2. However, it is possible that using a one-meter proximity network was too broad of a method to evaluate changes in social cohesion; allomothering has nuances that may not have been detected within the parameters of my analyses. Research on a semi-free-ranging group of capuchin monkeys found that lactating females (having recently given birth) did have a larger number of grooming partners, but this did not result in significant changes in social proximity (de Lima and Ferreira, 2021). This

finding suggests that although Wikberg et al. (2015) did note increases in grooming behavior with a young infant present, this does not necessarily translate to an increase in social proximity. Female black-and-white colobus monkeys are also more likely to participate in allomothering behavior with the infants of their maternal kin (Bădescu et al., 2015). These same kin members have been found to generally spend more time in close proximity within social groups independent of allomothering behavior (Wikberg et al., 2014). If the prospective allomothers and the mother were already spending time in close proximity, when an infant was born there may not have been a change in the amount of one-meter approaches between these individuals (tested in my analysis) but rather a change in the amount of direct contact via females grooming the mother to gain access to the infant as well as females grooming the infant itself (Bădescu et al., 2015; McKenna, 1979). As in other primate species, grooming on its own is likely a mediator for transmission of gut microbes in this study population with the most direct mechanism being anogenital grooming (Tung et al., 2015), however any direct contact between the mouth and hands of one individual and the fur of another could provide a means of transmission. Adult-female-to-adult-female grooming could lead to direct transmission of gut microbes. Similarly, an infant could act as a microbial reservoir and allow for an indirect source of microbial transmission between handlers.

While my statistical analyses did not detect significant changes in social cohesion, the social networks generated in igraph did show notable changes in edge weight (connection strength) and modularity (sub-structuring) between time periods. These results further indicate that my evaluation of changes in social cohesion may not have been granular enough to capture changes occurring across time periods, suggesting the need for an investigation of other measures of social cohesion within this study population. As in the microbial analysis, WT also stood out from

the other social groups, in this case because it did not show changes in sub-structuring between time periods. This is consistent with the fact that WT had the most similar gut microbial compositions (lowest DTC) across time periods, and again demonstrates the need to further investigate differences between social groups.

4.4. Study Group Winter (WT) Is an Outlier

My results for both the microbial and social network analyses suggest that WT may have experienced very different dynamics than the other three social groups during the sampling periods. At this time, it is unclear what the cause of this difference is, but it could have been due to sampling bias and/or biological differences. I checked for any variance in sampling that could have given rise to the differences seen for WT. There were no significant differences in time between sample collection or the number of samples for each group. I did find that for both the number of days and the number of samples collected with a young infant present, there was unevenness across social groups, but the GLMM model fit I used for my DTC analysis has been shown to be relatively robust to uneven sampling (Pinheiro, 2014). The trends seen for the social group WT fail to support Hypothesis 1, which again predicted an increase in gut microbial similarity among adult females with an infant present.

It is possible that there were behavioral differences between WT and the other groups that gave rise to the differences seen in my analyses. Higher overall affiliation rates within the group could drive gut microbiome homogenization, resulting in the lower overall DTC values observed in WT and reducing the likelihood of a significant change in social structure or DTC with a young infant present. Females tend to exhibit increased rates of affiliation and grooming in periods of high stress (Cheney & Seyfarth, 2009; Engh et al., 2006; Rodrigues, 2013). If there was a threat present

during time periods of data collection, such as an alpha male takeover or male immigration, the females in WT may have already been spending time in close proximity. Kinship between females has also been shown to predict rates of grooming and affiliation in other primate species (Sueur et al., 2011; Tinsley Johnson et al., 2014), and it is possible that if the females in WT had a higher degree of relatedness, then they may have already been participating in higher rates of grooming and affiliation. Conversely, allomothering behavior tends to happen among related females in this population (Bădescu et al. 2015), so if WT females had a lower degree of relatedness, perhaps they displayed less allomothering behaviors, thus explaining why the presence of an infant did not have much of an effect on gut microbial similarity.

5. Future Directions

The results of this study offer promising insights. However, further research needs to be conducted to fully explore the nuances of my study population in relation to my research question. While there were significant changes in gut microbial similarity between time periods, the change was not consistent and requires further analysis at the group level. One future direction would be evaluating WT for any biological differences compared to the other groups including kin composition or instances of high stress during the sampling period. As adult females in WT showed more similar gut microbial compositions overall (GLMM effects plot) and did not show changes in sub-structuring within their group (social network visualizations) between time periods with and without a young infant present, directly testing overall rates of affiliative behavior may be another way to help explain the differences seen in WT.

Another future direction for this work would be to evaluate social changes within groups when a young infant is present using metrics beyond one-meter approaches—mainly grooming and

infant handling. For example, it could be beneficial to create and analyze grooming rates and networks as opposed to proximity networks for each social group or weight the proximity networks with grooming rates. Future directions could also include more complex statistical approaches for determining small-scale changes in social networks. Understanding the source of microbial variation seen in my data, even if it is not the same mechanism I initially proposed, would still offer insight into the role of the social environment in shaping the composition of the gut microbiome on a temporal scale.

6. Conclusions

The gut microbiome has gained considerable attention as a system which has important implications for many aspects of host health and function. Current research has focused on investigating how gut microbial variation affects host systems. However, it is of equal importance to understand what causes gut microbial variation in the first place. This study aims to provide a more comprehensive longitudinal evaluation of how changes in social environment influence gut microbial similarity using known social changes among black-and-white colobus monkeys after the birth of an infant. I found evidence of increases in gut microbial similarity during time periods with an infant present. However, the effect was small and seems to be context- or group-dependent, motivating further investigation into the compositional and behavioral differences between social groups. This trend was also not found to be associated with any change in social proximity, and further research is required to investigate more fine-grained behavioral changes that may lead to this variation. While the means of microbial transmission was not fully revealed, this work provides insight into the temporal nature of microbial variation and builds on an understanding of how social context may influence compositional variation of the gut

microbiome over time. Given the important role of the microbiome in host physiology, establishing a comprehensive understanding of the factors contributing to natural inter- and intra- individual variation could ultimately inform strategies to investigate, maintain, and shape a healthier gut microbiome.

Acknowledgements

Bibliography

Amabebe, E., Robert, F. O., Agbalalah, T., & Orubu, E. S. F. (2020). Microbial dysbiosis-induced obesity: Role of gut microbiota in homoeostasis of energy metabolism. *British Journal of Nutrition*, *123*(10), 1127–1137. https://doi.org/10.1017/S0007114520000380

Amato, K. R., Van Belle, S., Di Fiore, A., Estrada,

A., Stumpf, R., White, B., Nelson, K. E., Knight, R., & Leigh, S. R. (2017). Patterns in Gut Microbiota Similarity Associated with Degree of Sociality among Sex Classes of a Neotropical Primate. *Microbial Ecology*, *74*(1), 250–258. https://doi.org/10.1007/s00248-017-0938-6

Anderson, M. J. (2001). A new method for non-parametric multivariate analysis of variance. *Austral ecology*, *26*(1), 32–46.

Archie, E. A., & Theis, K. R. (2011). Animal behaviour meets microbial ecology. *Animal Behaviour*, *82*(3), 425–436. https://doi.org/10.1016/j.anbehav.2011.05.029

Bădescu, I., Sicotte, P., Ting, N., & Wikberg, E. C. (2015). Female parity, maternal kinship, infant age and sex influence natal attraction and infant handling in a wild colobine (*Colobus vellerosus*): Infant Handling in *Colobus*. *American Journal of Primatology*, *77*(4), 376–387. https://doi.org/10.1002/ajp.22353

Bennett, G., Malone, M., Sauther, M. L., Cuozzo, F. P., White, B., Nelson, K. E., Stumpf, R. M., Knight, R., Leigh, S. R., & Amato, K. R. (2016). Host age, social group, and habitat type influence the gut microbiota of wild ring-tailed lemurs (Lemur catta). American Journal of Primatology, 78(8), 883–892. https://doi.org/10.1002/ajp.22555

Bittinger K (2020). usedist: Distance Matrix Utilities. R package version 0.4.0, https://CRAN.R-project.org/package=usedist.

Bisanz, J (2018). "qiime2R: Importing QIIME2 artifacts and associated data into R sessions." https://github.com/jbisanz/qiime2R

Bjork, J. R., Dasari, M., Grieneisen, L., & Archie, E. A. (2019). Primate microbiomes over time: Longitudinal answers to standing questions in microbiome research. *American Journal of Primatology*, *81*(10–11). https://doi.org/10.1002/ajp.22970

Bolyen E, Rideout JR, Dillon MR, Bokulich NA, Abnet CC, Al-Ghalith GA, Alexander H, Alm EJ, Arumugam M, Asnicar F, Bai Y, Bisanz JE,

Bittinger K, Brejnrod A, Brislawn CJ, Brown CT, Callahan BJ, Caraballo-Rodríguez AM, Chase J, Cope EK, Da Silva R, Diener C, Dorrestein PC, Douglas GM, Durall DM, Duvallet C, Edwardson CF, Ernst M, Estaki M, Fouquier J, Gauglitz JM, Gibbons SM, Gibson DL, Gonzalez A, Gorlick K, Guo J, Hillmann B, Holmes S, Holste H, Huttenhower C, Huttley GA, Janssen S, Jarmusch AK, Jiang L, Kaehler BD, Kang KB, Keefe CR, Keim P, Kelley ST, Knights D, Koester I, Kosciolek T, Kreps J, Langille MGI, Lee J, Ley R, Liu YX, Loftfield E, Lozupone C, Maher M, Marotz C, Martin BD, McDonald D, McIver LJ, Melnik AV, Metcalf JL, Morgan SC, Morton JT, Naimey AT, Navas-Molina JA, Nothias LF, Orchanian SB, Pearson T, Peoples SL, Petras D, Preuss ML, Pruesse E, Rasmussen LB, Rivers A, Robeson MS, Rosenthal P, Segata N, Shaffer M, Shiffer A, Sinha R, Song SJ, Spear JR, Swafford AD, Thompson LR, Torres PJ, Trinh P, Tripathi A, Turnbaugh PJ, Ul-Hasan S, van der Hooft JJJ, Vargas F, Vázquez-Baeza Y, Vogtmann E, von Hippel M, Walters W, Wan Y, Wang M, Warren J, Weber KC, Williamson CHD, Willis AD, Xu ZZ, Zaneveld JR, Zhang Y, Zhu Q, Knight R, and Caporaso JG. (2019). Reproducible, interactive, scalable and extensible microbiome data science using QIIME 2. Nature Biotechnology 37: 852–857. https://doi.org/10.1038/s41587-019-0209-9

Brandes, U., Delling, D., Gaertler, M., Gorke, R., Hoefer, M., Nikoloski, Z., & Wagner, D. (2008). On Modularity Clustering. IEEE Transactions on Knowledge and Data Engineering, 20(2), 172–188. https://doi.org/10.1109/TKDE.2007.190689

Brooks ME, Kristensen K, van Benthem KJ, Magnusson A, Berg CW, Nielsen A, Skaug HJ, Maechler M, Bolker BM (2017). "glmmTMB Balances Speed and Flexibility Among Packages for Zero-inflated Generalized Linear Mixed Modeling." *The R Journal*, **9**(2), 378–400. doi:10.32614/RJ-2017-066.

Bukin, Y. S., Galachyants, Y. P., Morozov, I. V.,

Bukin, S. V., Zakharenko, A. S., & Zemskaya, T. I. (2019). The effect of 16S rRNA region choice on bacterial community metabarcoding results. *Scientific Data*, *6*(1), Article 1. https://doi.org/10.1038/sdata.2019.7

Callahan, B. J., McMurdie, P. J., Rosen, M. J., Han, A. W., Johnson, A. J. A., & Holmes, S. P. (2016). DADA2: High resolution sample inference from Illumina amplicon data. *Nature Methods*, *13*(7), 581–583. https://doi.org/10.1038/nmeth.3869

Caruso, R., Ono, M., Bunker, M. E., Núñez, G., & Inohara, N. (2019). Dynamic and Asymmetric Changes of the Microbial Communities after Cohousing in Laboratory Mice. *Cell Reports*, *27*(11), 3401–3412.e3. https://doi.org/10.1016/j.celrep.2019.05.042

Cheney, D. L., & Seyfarth, R. M. (2009). Chapter 1 Stress and Coping Mechanisms in Female Primates. In *Advances in the Study of Behavior* (Vol. 39, pp. 1–44). Elsevier. https://doi.org/10.1016/S0065-3454(09)39001-4

Clapp, M., Aurora, N., Herrera, L., Bhatia, M., Wilen, E., & Wakefield, S. (2017). Gut Microbiota's Effect on Mental Health: The Gut-Brain Axis. *Clinics and Practice*, *7*(4), 987. https://doi.org/10.4081/cp.2017.987

Csardi G, Nepusz T (2006). "The igraph software package for complex network research." *InterJournal*, Complex Systems, 1695. https://igraph.org.

de Lima, V. C. C., & Ferreira, R. G. (2021). Social network changes during the development of immature capuchin monkeys (Sapajus spp.). *Primates*, *62*(5), 801–815. https://doi.org/10.1007/s10329-021-00918-6

Degnan, P. H., Pusey, A. E., Lonsdorf, E. V., Goodall, J., Wroblewski, E. E., Wilson, M. L., Rudicell, R. S., Hahn, B. H., & Ochman, H. (2012). Factors associated with the diversification of the gut microbial communities within chimpanzees from Gombe National Park. *Proceedings of the National Academy of Sciences*, *109*(32), 13034–13039.

https://doi.org/10.1073/pnas.1110994109

Dill-McFarland, K. A., Tang, Z.-Z., Kemis, J. H., Kerby, R. L., Chen, G., Palloni, A., Sorenson, T., Rey, F. E., & Herd, P. (2019). Close social relationships correlate with human gut microbiota composition. *Scientific Reports*, *9*(1), 703. https://doi.org/10.1038/s41598-018-37298-9

Engh, A. L., Beehner, J. C., Bergman, T. J., Whitten, P. L., Hoffmeier, R. R., Seyfarth, R. M., & Cheney, D. L. (2006). Behavioural and hormonal responses to predation in female chacma baboons (Papio hamadryas ursinus). *Proceedings of the Royal Society B: Biological Sciences*, *273*(1587), 707–712. https://doi.org/10.1098/rspb.2005.3378

Ezenwa, V. O., Ghai, R. R., McKay, A. F., & Williams, A. E. (2016). Group living and pathogen infection revisited. *Current Opinion in Behavioral Sciences*, *12*, 66–72. https://doi.org/10.1016/j.cobeha.2016.09.006

Fox J (2003). "Effect Displays in R for Generalised Linear Models." Journal of Statistical Software, 8(15), 1–27. doi:10.18637/jss.v008.i15.

Fox J, Weisberg S (2019). An R Companion to Applied Regression, 3rd edition. Sage, Thousand Oaks CA. https://socialsciences.mcmaster.ca/jfox/Books/Companion/index.html.

Gacesa, R., Kurilshikov, A., Vich Vila, A., Sinha, T., Klaassen, M. A. Y., Bolte, L. A., Andreu-Sánchez, S., Chen, L., Collij, V., Hu, S., Dekens, J. A. M., Lenters, V. C., Björk, J. R., Swarte, J. C., Swertz, M. A., Jansen, B. H., Gelderloos-Arends, J., Jankipersadsing, S., Hofker, M., … Weersma, R. K. (2022). Environmental factors shaping the gut microbiome in a Dutch population. *Nature*, *604*(7907), 732–739. https://doi.org/10.1038/s41586-022-04567-7

Gloor, G. B., Macklaim, J. M., Pawlowsky-Glahn, V., & Egozcue, J. J. (2017). Microbiome datasets are compositional: and this is not optional. *Frontiers in microbiology*, *8*, 2224.

Gomez, A., Petrzelkova, K., Yeoman, C. J., Vlckova, K., Mrázek, J., Koppova, I., Carbonero, F., Ulanov, A., Modry, D., Todd, A., Torralba, M., Nelson, K. E., Gaskins, H. R., Wilson, B., Stumpf, R. M., White, B. A., & Leigh, S. R. (2015). Gut microbiome composition and metabolomic profiles of wild western lowland gorillas (*Gorilla gorilla gorilla*) reflect host ecology. *Molecular Ecology*, *24*(10), 2551–2565. https://doi.org/10.1111/mec.13181

Goodfellow, C. K., Whitney, T., Christie, D. M., Sicotte, P., Wikberg, E. C., & Ting, N. (2019). Divergence in gut microbial communities mirrors a social group fission event in a black-and-white colobus monkey (*Colobus vellerosus*). *American Journal of Primatology*, *81*(10–11). https://doi.org/10.1002/ajp.22966

Grieneisen, L. E., Livermore, J., Alberts, S., Tung, J., & Archie, E. A. (2017). Group Living and Male Dispersal Predict the Core Gut Microbiome in Wild Baboons. *Integrative and Comparative Biology*, *57*(4), 770–785. https://doi.org/10.1093/icb/icx046

Hanneman, R. A., & Riddle, M. (2005). Introduction to social network methods. Riverside: University of California, Riverside.

Hooper, L. V., Littman, D. R., & Macpherson, A. J. (2012). Interactions Between the Microbiota and the Immune System. *Science*, *336*(6086), 1268–1273. https://doi.org/10.1126/science.1223490

Hsiao, E. Y., McBride, S. W., Hsien, S., Sharon, G., Hyde, E. R., McCue, T., Codelli, J. A., Chow, J., Reisman, S. E., Petrosino, J. F., Patterson, P. H., & Mazmanian, S. K. (2013). Microbiota Modulate Behavioral and Physiological Abnormalities Associated with Neurodevelopmental Disorders. *Cell*, *155*(7), 1451–1463. https://doi.org/10.1016/j.cell.2013.11.024

Jena, A., Montoya, C. A., Mullaney, J. A., Dilger, R. N., Young, W., McNabb, W. C., & Roy, N. C. (2020). Gut-Brain Axis in the Early Postnatal Years of Life: A Developmental Perspective. *Frontiers in Integrative Neuroscience*, *14*, 44. https://doi.org/10.3389/fnint.2020.00044

Kankam, B. O., & Sicotte, P. (2013). The Effect of Forest Fragment Characteristics on Abundance of Colobus vellerosus in the Forest-Savanna Transition Zone of Ghana. *Folia Primatologica*, *84*(2), 74–86. https://doi.org/10.1159/000348307

Kelly, J. R., Borre, Y., O' Brien, C., Patterson, E., El Aidy, S., Deane, J., Kennedy, P. J., Beers, S., Scott, K., Moloney, G., Hoban, A. E., Scott, L., Fitzgerald, P., Ross, P., Stanton, C., Clarke, G., Cryan, J. F., & Dinan, T. G. (2016). Transferring the blues: Depression-associated gut microbiota induces neurobehavioural changes in the rat. *Journal of Psychiatric Research*, *82*, 109–118. https://doi.org/10.1016/j.jpsychires.2016.07.019

Koch, H., & Schmid-Hempel, P. (2011). Socially transmitted gut microbiota protect bumble bees against an intestinal parasite. *Proceedings of the National Academy of Sciences*, *108*(48), 19288–19292. https://doi.org/10.1073/pnas.1110474108

Lahti L, Shetty S (2017). Tools for microbiome analysis in R. Microbiome package version 1.19.1, http://microbiome.github.com/microbiome.

Lax, S., Smith, D. P., Hampton-Marcell, J., Owens, S. M., Handley, K. M., Scott, N. M., Gibbons, S. M., Larsen, P., Shogan, B. D., Weiss, S., Metcalf, J. L., Ursell, L. K., Vázquez-Baeza, Y., Van Treuren, W., Hasan, N. A., Gibson, M. K., Colwell, R., Dantas, G., Knight, R., & Gilbert, J. A. (2014). Longitudinal analysis of microbial interaction between humans and the indoor environment. *Science (New York, N.Y.)*, *345*(6200), 1048–1052. https://doi.org/10.1126/science.1254529

Li, W.-Z., Stirling, K., Yang, J.-J., & Zhang, L. (2020). Gut microbiota and diabetes: From correlation to causality and mechanism.

World Journal of Diabetes, 11(7), 293–308. https://doi.org/10.4239/wjd.v11.i7.293

Lombardo, M. P. (2008). Access to mutualistic endosymbiotic microbes: An underappreciated benefit of group living. *Behavioral Ecology and Sociobiology, 62*(4), 479–497. https://doi.org/10.1007/s00265-007-0428-9

McKenna, J. J. (1979). The Evolution of Allomothering Behavior among Colobine Monkeys: Function and Opportunism in Evolution. *American Anthropologist, 81*(4), 818–840. https://doi.org/10.1525/aa.1979.81.4.02a00040

McMurdie PJ, Holmes S (2013). "phyloseq: An R package for reproducible interactive analysis and graphics of microbiome census data." *PLoS ONE,* 8(4), e61217. http://dx.plos.org/10.1371/journal.pone.0061217.

Moeller, A. H., Foerster, S., Wilson, M. L., Pusey, A. E., Hahn, B. H., & Ochman, H. (2016). Social behavior shapes the chimpanzee pan-microbiome. *Science Advances, 2*(1), e1500997. https://doi.org/10.1126/sciadv.1500997

Oksanen J, Simpson G, Blanchet F, Kindt R, Legendre P, Minchin P, O'Hara R, Solymos P, Stevens M, Szoecs E, Wagner H, Barbour M, Bedward M, Bolker B, Borcard D, Carvalho G, Chirico M, De Caceres M, Durand S, Evangelista H, FitzJohn R, Friendly, M, Furneaux B, Hannigan G, Hill M, Lahti L, McGlinn D, Ouellette M, Ribeiro Cunha E, Smith T, Stier A, Ter Braak C, Weedon J (2022). vegan: Community Ecology Package. R package version 2.6-2, https://CRAN.R-project.org/package=vegan.

Perofsky, A. C., Ancel Meyers, L., Abondano, L. A., Di Fiore, A., & Lewis, R. J. (2021). Social groups constrain the spatiotemporal dynamics of wild sifaka gut microbiomes. *Molecular Ecology, 30*(24), 6759–6775. https://doi.org/10.1111/mec.16193

Perofsky, A. C., Lewis, R. J., Abondano, L. A., Di Fiore, A., & Meyers, L. A. (2017). Hierarchical social networks shape gut microbial composition in wild Verreaux's sifaka. *Proceedings of the Royal Society B: Biological Sciences, 284*(1868), 20172274. https://doi.org/10.1098/rspb.2017.2274

Pinheiro, J. C. (2014). Linear mixed effects models for longitudinal data. Wiley StatsRef: Statistics Reference Online

Quast, C., Pruesse, E., Yilmaz, P., Gerken, J., Schweer, T., Yarza, P., Peplies, J., & Glöckner, F. O. (2013). The SILVA ribosomal RNA gene database project: improved data processing and web-based tools. Nucleic acids research, 41(Database issue), D590–D596. https://doi.org/10.1093/nar/gks1219

Quinn, T. P., Erb, I., Richardson, M. F., & Crowley, T. M. (2018). Understanding sequencing data as compositions: An outlook and review. *Bioinformatics, 34*(16), 2870–2878. https://doi.org/10.1093/bioinformatics/bty175

Radjabzadeh, D., Bosch, J. A., Uitterlinden, A. G., Zwinderman, A. H., Ikram, M. A., van Meurs, J. B. J., Luik, A. I., Nieuwdorp, M., Lok, A., van Duijn, C. M., Kraaij, R., & Amin, N. (2022). Gut microbiome-wide association study of depressive symptoms. *Nature Communications, 13*(1), 7128. https://doi.org/10.1038/s41467-022-34502-3

Raulo, A., Ruokolainen, L., Lane, A., Amato, K., Knight, R., Leigh, S., Stumpf, R., White, B., Nelson, K. E., Baden, A. L., & Tecot, S. R. (2018). Social behaviour and gut microbiota in red-bellied lemurs (Eulemur rubriventer): In search of the role of immunity in the evolution of sociality. *Journal of Animal Ecology, 87*(2), 388–399. https://doi.org/10.1111/1365-2656.12781

Ren, T., Grieneisen, L. E., Alberts, S. C., Archie, E. A., & Wu, M. (2016). Development, diet and dynamism: Longitudinal and cross-sectional predictors of gut microbial communities in wild baboons: Gut microbiota in wild baboons. *Environmental Microbiology, 18*(5), 1312–1325. https://doi.org/10.1111/1462-2920.12852

Rodrigues, M. A. (2013). *Stress and sociality in a patrilocal primate: Do female spider monkeys tend-and-befriend?* (Doctoral dissertation, The Ohio State University).

Rudolph, K., Schneider, D., Fichtel, C., Daniel, R., Heistermann, M., & Kappeler, P. M. (2022). Drivers of gut microbiome variation within and between groups of a wild Malagasy primate. *Microbiome*, *10*(1), 28. https://doi.org/10.1186/s40168-021-01223-6

R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/.

Song, S. J., Lauber, C., Costello, E. K., Lozupone, C. A., Humphrey, G., Berg-Lyons, D., Caporaso, J. G., Knights, D., Clemente, J. C., Nakielny, S., Gordon, J. I., Fierer, N., & Knight, R. (2013). Cohabiting family members share microbiota with one another and with their dogs. *ELife*, *2*, e00458. https://doi.org/10.7554/eLife.00458

Springer, A., Fichtel, C., Al-Ghalith, G. A., Koch, F., Amato, K. R., Clayton, J. B., Knights, D., & Kappeler, P. M. (2017). Patterns of seasonality and group membership characterize the gut microbiota in a longitudinal study of wild Verreaux's sifakas (*Propithecus verreauxi*). *Ecology and Evolution*, *7*(15), 5732–5745. https://doi.org/10.1002/ece3.3148

Sueur, C., Petit, O., De Marco, A., Jacobs, A. T., Watanabe, K., & Thierry, B. (2011). A comparative network analysis of social style in macaques. *Animal Behaviour*, *82*(4), 845–852. https://doi.org/10.1016/j.anbehav.2011.07.020

Suzuki, T. A. (2017). Links between Natural Variation in the Microbiome and Host Fitness in Wild Mammals. *Integrative and Comparative Biology*, *57*(4), 756–769. https://doi.org/10.1093/icb/icx104

Tavalire, H. F., Christie, D. M., Leve, L. D., Ting, N., Cresko, W. A., & Bohannan, B. J. M. (2021). Shared Environment and Genetics Shape the Gut Microbiome after Infant Adoption. *MBio*, *12*(2), e00548-21. https://doi.org/10.1128/mBio.00548-21

Teichroeb, J. A., Saj, T. L., Paterson, J. D., & Sicotte, P. (2003). Effect of Group Size on Activity Budgets of Colobus vellerosus in Ghana. *International Journal of Primatology*.

Tinsley Johnson, E., Snyder-Mackler, N., Beehner, J. C., & Bergman, T. J. (2014). Kinship and Dominance Rank Influence the Strength of Social Bonds in Female Geladas (Theropithecus gelada). *International Journal of Primatology*, *35*(1), 288–304. https://doi.org/10.1007/s10764-013-9733-5

Tung, J., Barreiro, L. B., Burns, M. B., Grenier, J.-C., Lynch, J., Grieneisen, L. E., Altmann, J., Alberts, S. C., Blekhman, R., & Archie, E. A. (2015). Social networks predict gut microbiome composition in wild baboons. *ELife*, *4*, e05224. https://doi.org/10.7554/eLife.05224

Valles-Colomer, M., Blanco-Míguez, A., Manghi, P., Asnicar, F., Dubois, L., Golzato, D., Armanini, F., Cumbo, F., Huang, K. D., Manara, S., Masetti, G., Pinto, F., Piperni, E., Punčochář, M., Ricci, L., Zolfo, M., Farrant, O., Goncalves, A., Selma-Royo, M., … Segata, N. (2023). The person-to-person transmission landscape of the gut and oral microbiomes. *Nature*, *614*(7946), 125–135. https://doi.org/10.1038/s41586-022-05620-1

Wickham H (2016). *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. ISBN 978-3-319-24277-4, https://ggplot2.tidyverse.org.

Wikberg, E. C., Christie, D., Sicotte, P., & Ting, N. (2020). Interactions between social groups of colobus monkeys (Colobus vellerosus) explain similarities in their gut microbiomes. *Animal Behaviour*, *163*, 17–31. https://doi.org/10.1016/j.anbehav.2020.02.011

Wikberg, E. C., Ting, N., & Sicotte, P. (2014). Kinship and similarity in residency status structure female social networks in black-and-white colobus monkeys (colobus vellerosus): SOCIAL NETWORKS IN FEMALE

COLOBUS VELLEROSUS. American Journal of Physical Anthropology, *153*(3), 365–376. https://doi.org/10.1002/ajpa.22435

Wikberg, E. C., Ting, N., & Sicotte, P. (2015). Demographic Factors Are Associated with Intergroup Variation in the Grooming Networks of Female Colobus (Colobus vellerosus). *International Journal of Primatology*, *36*(1), 124–142. https://doi.org/10.1007/s10764-015-9816-6

Wong, S. N. P., & Sicotte, P. (2006). Population size and density of Colobus vellerosus at the Boabeng-Fiema Monkey Sanctuary and surrounding forest fragments in Ghana. *American Journal of Primatology*, *68*(5), 465–476. https://doi.org/10.1002/ajp.20242

Marilyn in the Media: The Male Gaze of Conspiracy

Lena Wehn*

Abstract

2022 marked the 60th anniversary of Marilyn Monroe's death. Her name is once again making headlines. The notable uptick in recent media coverage surrounding Monroe underscores that her cultural significance extends far beyond being an iconic actress. Monroe's life and legacy have become inseparable from her death, which is famously wrought with conspiracy. Conspiracy theories, typically associated with the socio-political sector, have pushed beyond the political sphere and permeated pop culture. Conspiracy theories stem from a fixation with and desire to rationalize the unknown. For celebrities that reach superstardom, coupling their fame with any mysteriousness creates the perfect breeding ground for conspiracy theories to brew. By examining several theories about how and why Monroe died (in lieu of suicide), this paper dissects how her life and death have been permanently punctuated by conspiracies pushed by men. Monroe was not only at the mercy of conspiracy, but she was infamously, inescapably defined by men. Her story has been told through men's eyes, both in life and after death. In addition to conspiracy theories, I use news reports (entirely written by men) from the day she was found dead to investigate the extent to which Monroe's life and legacy was impacted by being hypersexualized. I propose that conspiracy theories, like pop culture and the media, are subject to the male perspective creating, dominating, and directing the narrative. I use Monroe and the conspiracy theories which surround her as a case study to exemplify how destructive and reductive the male gaze becomes when it is left unchecked.

1. Introduction

A timeless blonde bombshell, the standard of sexual aesthetic. Her name, her voice, and her body created the epitome of a Hollywood sex symbol. Marilyn Monroe's iconic image established the blueprint for women's sexuality. The movie star persona, however, reduced Monroe to a doll manipulated by a male-dominated Hollywood and by the desires and demands of the patriarchal American public. The symbol she came to embody was seldom looked beyond. As a result, Marilyn Monroe was reduced to a one-dimensional figure designed to perfectly serve the fantasies and fetishes of men. The male gaze Monroe was subjected to, ever present in the film industry and in American pop culture, has played an equally heavy hand in conspiratorial thinking. There have been countless publications put forth by men contending the true series of events that led to Monroe's death. The conspiracy theories that surround Monroe's death have cast her in the same hyper-sexualized role she held in life, underscoring the consequences of conspiracy theories permeated by the male gaze.

2. Background

Behind the blonde tresses and impeccable glamor was a woman who came from a humble yet tumultuous background. Monroe was born in

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1926 as Norma Jeane Mortenson.[2] Her biological mother suffered from schizophrenia and spent time in and out of mental asylums.[3] As a result, her children passed through numerous temporary foster homes and orphanages.[4] Stability was ephemeral at best and non-existent at worst for young Monroe. The psychological impact of an unstable childhood undeniably affected Monroe for the rest of her life. When she struck stardom in the early 1950s, her image, the symbol "M.M.," became synonymous with her personhood. Norma Jeane was reinvented as Marilyn Monroe: sultry seductress and comedienne. Despite fame and fortune, Monroe still lacked the stability she craved. As the woman atop the American pop culture pedestal, Marilyn stood alone. She was condemned to personify an unobtainable prototype. Monroe was no longer human in the eyes of America, but a symbol and object. The standard she was expected to unfailingly achieve—that of the ultimate sexual aesthetic—was, and still is, an impossible standard to uphold. I suspect that these continued and unrelenting pressures weighed heavily on Monroe, further isolating her from a sense of normalcy. She must have been impossibly, constantly drained knowing her worth was wrapped up in her sex appeal. The weight of iconic stardom could have only worsened Monroe's inability to find contentment and balance in life.

During her thirty-six years, Monroe weathered three divorces. The first was from an aircraft factory worker who she married and separated from pre-fame. The second was from Joe DiMaggio, with whom she was married for under a year, from January 1954 to October 1954.[5] Her final divorce came after four years with Arthur Miller, ending in 1961.[6] She tried desperately to conceive with Miller but was unable to fulfill her dream of having children.[7] Monroe failed to achieve the 1950s "staples" of womanhood: she couldn't keep a man (although it is important to note that she filed for divorce all three times), and she didn't succeed at having a child. "She suffered at least two miscarriages and was never able to have a child," *The New York Times* wrote. "Her emotional insecurity deepened,"[8] as would anyone's when handling such intense losses, especially without a strong support system.

In addition to these stressors in her personal life, about a year prior to Monroe's death her acting career took a downward turn because of disillusionment with the industry. Her poor attendance had her fired from a role, and recent films were box-office flops. This culminated in Monroe's increased drug abuse.[9] She was known to drink heavily, champagne being a favorite, often mixing alcohol with prescription pills. Ultimately, drugs would be the death of Marilyn Monroe on August 4th, 1962. She was found face down in her bed in her Brentwood, Los Angeles home. She was found by her housekeeper, Eunice Murray. Murray initially called Monroe's psychoanalyst Dr. Ralph Greenson; later, the police were called. It was assumed, following the nature of the life events leading up to her death and the condition she was found in, that she committed suicide.[10] The official police report

[2] The Editors of Encyclopaedia Britannica, "Marilyn Monroe American Actress," accessed December 9, 2022, https://www.britannica.com/biography/Marilyn-Monroe.

[3] Special to The New York Times, "First Scene Put Her in Limelight," August 6, 1962, https://archive.nytimes.com/www.nytimes.com/books/98/11/22/specials/monroe-obit3.html.

[4] The Editors of Encyclopaedia Britannica, "Marilyn Monroe American Actress."

[5] "Marilyn Monroe and Joe DiMaggio: The End of a Marriage, 1954," *LIFE* (blog), January 14, 2014, https://www.life.com/people/tearful-photos-from-the-day-marilyn-divorced-dimaggio-in-1954/.

[6] "Marilyn Monroe and Joe DiMaggio."

[7] The Editors of Encyclopaedia Britannica, "Marilyn Monroe American Actress."

[8] Special to The New York Times, "First Scene Put Her in Limelight."

[9] Robert W. Welkos, "Marilyn's Secret Tapes," Los Angeles Times, September 15, 2014, https://www.latimes.com/news/la-et-marilyn5aug05-story.html.s

[10] History com Editors, "Marilyn Monroe Is Found Dead," HISTORY, accessed December 9, 2022,

rules a "probable suicide."[11] It is highly possible that the overdose was accidental. It is also possible and has been postulated by numerous male conspiracists over the years, that she was intentionally drugged with the intent to kill.

3. Definitions

To ensure clarity of analysis, the term "male gaze" will be defined specifically within the context of this essay. The "male gaze" is a term coined by Laura Mulvey in her paper "Visual Pleasure and Narrative Cinema," published in 1975. According to Mulvey, "[t]he male gaze refers to the way women are objectified by the camera lens in Hollywood movies because men are in control of the production process and make decisions that appeal to their own values and interests."[12] The male gaze is pervasive beyond the cinematic realm; the concept can easily be lifted from film and transplanted into a conspiratorial context. The term is also particularly apt in the scope of this research, considering Monroe was famously subjected to the male gaze throughout her career. In this paper, I draw on the concept of the male gaze to examine how men control the conspiratorial narratives around Monroe's death to drive interpretations that appeal to "their own values and interests."

As an actress, Monroe was hyper-sexualized. My definition of hyper-sexuality for this discussion's purpose will be two-fold. First, the term refers to the minimization and objectification of people, especially women, for their aesthetically sexual and seductive qualities, including their face, body, voice, mannerisms, and personality. The use of "hyper" implies that the objectification goes beyond what is considered normal and reduces the person to

nothing more than their perceived allure based shallowly on physical appearance and mannerisms. Again, it is predominantly levied against women to reduce them to an item to be marveled at or procured, rather than a human being. The second implication of hyper-sexuality is far more nuanced. It deals with the tendency to use the reduced version of the hyper-sexualized person as an item, pawn, or object. It serves to lessen the depth and space someone is allowed to take up because of stripped agency from their personhood. This form of reductionist hyper-sexualization is common throughout the discussion of Monroe's death conspiracy. She has been repeatedly understood and contextualized through her value to men, such as the Kennedys, or as a pawn in a political game.

4. Hyper-Sexuality and the Male Gaze

Monroe's narrative has been controlled by men since well before she died. As a young actress, Monroe was molded into the woman she became on screen. Like countless other golden-age Hollywood actresses, Monroe was rebranded—stripped of her given name and appearance in favor of a title and look suitable for the silver screen. Norma Jeane Mortenson, a modest woman, was reborn as Marilyn Monroe: a symbol fit to be flashed around the world. Bosley Crowther, journalist for *The New York Times* wrote: "at one time, even the magical initials, M. M., and the image of the shapely, soft, blonde charmer would seductively swim into mind."[13] This was published on August 6th, 1962, the day after Monroe was discovered dead. It is clear from Crowther's choice of descriptive language—"shapely," "soft," "seductive," "magical," "charmer"—that Monroe's public image was jejune, even infantile. Crowther's diction

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https://www.history.com/this-day-in-history/marilyn-monroe-is-found-dead.

[11] Jay Margolis and Buskin, Richard, *The Murder of Marilyn Monroe: Case Closed* (Skyhorse, 2016).

[12] "Laura Mulvey's 'Male Gaze,'" Media Studies, August 2, 2021, https://media-studies.com/male-gaze/.

[13] Bosley Crowther, "Actress as a Symbol," August 6, 1962, https://archive.nytimes.com/www.nytimes.com/books/98/11/22/specials/monroe-obit4.html.

demonstrates a trend in the articles that directly followed news of Monroe's death. Though she ought to have been mourned and remembered, a modern lens reveals that these publications give jarring, often vile and wildly inappropriate descriptions that exemplify how the star was appraised in life. Crowther continues: "It was the image of feminine allurement, compounded of the silver-blonde tresses, the wide-eyed stare, the pouting lips, the baby-talk burble in a husky sing-song voice and the remarkable body that were the physical attributes of Miss Monroe."[14] Despite being an article about her life in honor of her passing, there is a distinct focus on the "remarkable body" and "physical attributes" that characterized Monroe, in lieu of attention to her career, cultural importance, and achievements. The pointed commentary on her "wide-eyed stare," "pouting lips," and most concerning, "baby-talk burble," are deeply disturbing observations, underlining the extent to which Monroe was systematically fetishized and infantilized in the media. The broader implications of how fixated the article is on her child-like features suggests a troubling, dangerous understanding of what the epitome of female sexuality looks like. Monroe's persona connected problematic physical and aesthetic standards of beauty with limiting social requirements for women. Touting one of the most admired women in the world as nothing more than an adult baby essentially sets the sexual standard at child. Even with a generous interpretation of these descriptions, the expectation set for women was coy, "wide-eyed" helplessness. Women portrayed as childlike crafted a cultural understanding of an ideal woman: someone who remained dependent upon men for support and direction.

A large part of the hyper-sexualization that Monroe endured was the constant pressure to be prototype perfect. When she was found dead, men at *The Los Angeles Times* reported that "She was unkempt and in need of a manicure and pedicure, indicating listlessness and a lack of interest in maintaining her usually glamorous appearance."[15] The implication that the simple lack of polished nails indicated "listlessness," with a more severe undertone of depression, considering Monroe failed to maintain a "glamorous appearance," sets an egregious aesthetic standard for women. The presence or lack of nail polish is not an indication of mental health. It is humiliating and demeaning to comment on such trivial aspects of Monroe's appearance when she was found deceased. It perpetuates the extreme standard of beauty and sexuality Monroe had to maintain to appease the druthers of men, even in death.

In her short career, Monroe quickly became a national and even global figure. The media was acutely aware of her status as a symbol, and how limiting it was. In fact, the point is belabored in the articles written posthumously. The Marilyn Monroe we know and love "was fashioned into the female image that was … flashed as a symbol around the world," explained Crowther.[16] By definition, a symbol is an "object having cultural significance and the capacity to excite or objectify a response."[17] Monroe certainly had the "capacity to excite," and she was more than just objectified. Crowther continues: "The persistence of this image of the exceptionally lovely movie star could be explained by the fact that in the common view, she was more a symbol than an artist."[18] Crowther did not hesitate to take this opportunity to insult Monroe by questioning her validity as "an artist." He simultaneously and inadvertently acknowledged that Monroe's status as a symbol detracted from the respect she garnered as an artist. She was so "exceptionally

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[14] Crowther.

[15] Howard Hertel and Don Neff, "From the Archives: Marilyn Monroe Dies; Pills Blamed," Los Angeles Times, August 6, 1962, https://www.latimes.com/local/obituaries/archives/la-me-marilyn-monroe-19620806-story.html.
[16] Crowther, "Actress as a Symbol."
[17] "Definition of SYMBOL," accessed December 9, 2022, https://www.merriam-webster.com/dictionary/symbol.
[18] Crowther, "Actress as a Symbol."

lovely" that "the common view" never bothered to consider her more deeply, beyond the allure and glamor. For a woman so popularly regarded, it is devastating, but not astonishing, that the esteem she earned as an actress was denied as a symptom of hyper-sexualization in the public eye. As a repercussion of the constant, unyielding sexualization, it became nearly impossible for Monroe to be valued for anything other than her physical features.

5. The Conspiracies

Myriad conspiracy theories have been advanced since Monroe's death sixty years ago. While most often centered around the Kennedy family, a prominent political family of socialites, many theories involve the CIA, FBI, the Chicago mob, and Monroe's own therapist as well. Male conspiracists and reporters make up an overwhelming majority of contributors to the conspiratorial canon that encircles Monroe's death. Unsurprisingly, each of these theories position Monroe as a gambit in schemes far larger than herself.

Monroe's legacy, especially her death, is inherently contextualized by her relationship with the Kennedys. This is a result of the significance of the family in American culture overall. The Kennedys are famous in part for being entrenched in conspiracies of their own. Relating the Kennedys closely to Monroe's death enhances the mystery of how she died by weaving her into the extensive Kennedy conspiracy net. It is also a result of direct and suspected links to the Kennedys when she died. Monroe's infamous performance of "Happy Birthday, Mr. President" in honor of John F. Kennedy has been touted as sultry at best, and downright seductive at worst. It spurred rumors that Monroe was having an affair with the President.[19] That is followed by a rumor that when John F. Kennedy was over her, he handed her off to his brother, Attorney General Robert Kennedy.[20] Today it is widely accepted that Monroe did have an affair with JFK and likely Robert Kennedy as well. Most importantly, however, Monroe's involvement with the Kennedy family reflects the tendency to conceptualize women in terms of their relationships to men, especially powerful men. The association between women and powerful men reflects historical patriarchal ideals in which women were the property of men. Viewing women primarily in relation to men is one of the more sinister reductionist tools employed by the patriarchy to ensure women remain subjugated, because it dissolves women's autonomy and diminishes the respect they are perceived to deserve. It is a recurring theme, especially in the conspiracies surrounding her death, to see Monroe presented via her usefulness or lack thereof to a man.

It is no surprise, then, that "Monroe's purported relationship with the Kennedy family factors into almost all conspiracy theories about her death."[21] The first conspiracy theory published, aside from friends who "were nearly unanimous in believing her death was accidental" as opposed to by her own hands, was in 1964, two years after her death. [22] Frank A. Capell wrote the book *The Strange Death of Marilyn Monroe*. A piece of propaganda, Capell used his book to advance the theory that Monroe and everyone close to her was a communist spy. Reviewer David Marshall wrote that the book was full of "staunch anti-Kennedy, anti-Communist, high moral preachings of the far right.[23] Immediately, the political motives are abundantly clear. Marshall

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[19] Welkos, "Marilyn's Secret Tapes."

[20] Tierney McAfee, "All About Marilyn Monroe's Alleged Affair with John F. Kennedy and Robert F. Kennedy," Peoplemag, October 16, 2022, https://people.com/politics/marilyn-monroe-affair-john-f-kennedy-robert-f-kennedy/.
[21] Carli Velocci, "7 Conspiracy Theories About Marilyn Monroe's Death From Murderous Kennedys to UFOs," June 1, 2017, https://www.thewrap.com/7-theories-marilyn-monroe-death/.
[22] Hertel and Neff, "From the Archives."
[23] David Marshall, "The Strange Death of Marilyn Monroe by Frank Capell," Collection Master, marilynmonroe.ca, 2006, http://www.marilynmonroe.ca/camera/books/89.html.

continues that it was "[Capell's] vicious attacks on Monroe that truly surprise[d]. The feeling one gets from Capell is that sure Marilyn was a tramp who played with fire and got what she deserved, but tramp or not, the Commies were behind the whole thing and that's what we need to focus on ... And EVERYONE is a Communist in Marilyn's world."[24] It is no surprise that Capell's discussion of Monroe paints her as a "tramp who played with fire," both degrading her for her sexual nature and blaming her for her own demise, claiming that, essentially, "she asked for it." Capell's angle was to smear Robert Kennedy's name by relating him closely to the evil communists, who are also, in Capell's world, known to include deviant sexual women deserving of their fates, like Monroe. The more scandalous, raunchy, and perverted, the more incendiary and effective the piece of propaganda. It is important to remember that at the heart of Capell's attacks was the election of 1964, in which Robert Kennedy "was running for the Senate."[25] Capell was vehemently right-wing, while Robert Kennedy represented more liberal ideologies. Capell's demeaning theory about Monroe's death was the first to severely reduce Monroe to a mere political pawn, a hapless victim. It served primarily to advance Capell's anti-Kennedy, anti-communist propaganda, and further his right-wing political agenda. Although one of the first, Capell was certainly not the last man to objectify and shame Monroe following her death.

In 1975, journalist Anthony Scaduto followed Capell's Monroe-was-a-Communist Conspiracy with his article *Who Killed Marilyn Monroe* in *Oui* Magazine.[26] Scaduto claimed Monroe "was murdered and that police and the coroner's office participated in a cover up."[27] He connected her death to Robert Kennedy, who, according to Scaduto, killed Monroe to keep her silent about a "diary filled with incriminating information she overheard from the Kennedys."[28] This theory advanced the notion of Monroe's expendability to the Kennedys. As soon as she became a liability, Monroe was no longer of use. The theory suggests that because she was already essentially an object to Robert Kennedy, he chose to have her dealt with permanently to protect himself. Monroe as a disposable asset is a recurring theme in the proposed narratives detailing the events that led up to her death. Scaduto provided another male-created conspiracy about Monroe, advancing the canon that she was basically a throw-away factor in grander cover-ups. As a hyper-sexualized woman in American pop culture, it is no shock that she was, and continues to be, viewed as disposable.

Another conspiracy was proposed by Anthony Summers in his 1985 book *Goddess: The Secret Lives of Marilyn Monroe*.[29] Once again, the Kennedys are heavily implicated in the theory. Summers, while an acclaimed author, only further convolutes the pool of Monroe's conspiracy theories. He claimed that when "Robert Kennedy broke off their affair, Monroe threatened to go public," so Kennedy and his brother-in-law Peter Lawford (also a friend of Monroe's) pushed her drug addiction to the point of accidental overdose.[30] The death was then covered up by Kennedy and Lawford, and somehow incriminated FBI Director J. Edgar Hoover in the whole affair.[31][32] Summers' theory once again contextualized Monroe in relation to the men she associated with.

Donald Spoto, an American biographer,

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[24] Marshall.

[25] Marshall.

[26] Velocci, "7 Conspiracy Theories About Marilyn Monroe's Death From Murderous Kennedys to UFOs."

[27] Jeff Wilson, "Marilyn Monroe Death Documents Reveal Peter Lawford's Anguish," AP NEWS, September 24, 1985, https://apnews.com/article/709c9cb3a0afa87c7277c64ebffaada1.

[28] Velocci, "7 Conspiracy Theories About Marilyn Monroe's Death From Murderous Kennedys to UFOs."

[29] Velocci.

[30] Velocci.

[31] Velocci.

[32] Kaytie Norman, "Anthony Summers Discusses 'Goddess: The Secret Lives of Marilyn Monroe,'" earlybirdbooks.com, April 1, 2022, https://earlybirdbooks.com/anthony-summers-interview-goddess-marilyn-monroe.

claims that Monroe's death was unrelated to the Kennedy family entirely.[33] Remarkably, it is the only serious conspiracy theory put forth that is not somehow related to the Kennedys. In fact, Spoto says that "[t]he Kennedys had almost nothing to do with her."[34] She was killed instead by her psychiatrist Dr. Greenson, who had the housekeeper—the same one that found Monroe the following morning—administer a lethal dosage of drugs via enema. It was proposed that "[t]o stay on the payroll, Spoto suggests they 'conspired to keep her drugged and dependent.' The shrink was retreating into a 'psychoneurotic fear of abandonment and rejection'" because Monroe was not interested in working with him anymore.[35] In this case, Dr. Greensons's personal obsession and fixation with Monroe was the force that killed her. An obsession of that magnitude speaks to how severely she was reduced from an autonomous human being to a person who was controlled by others. It has also been alleged that Monroe was having an affair with Greenson, which would further an unhealthy, potentially lethal obsession.[36] Spoto's claim positions Monroe as a victim of male temper and possessiveness; the fear of losing her was so overwhelming that Dr. Greenson chose murder over treating her as a woman with personal autonomy.

The 2004 conspiracy put forth by Matthew Smith in the book *Victim: The Secret Tapes of Marilyn Monroe* implicates the CIA in Monroe's murder, claiming she was killed as revenge for the Kennedys' Bay of Pigs invasion.[37] Smith argues that Monroe was "a woman in full charge of her life," which staunchly opposes the anecdote that she was depressed and suicidal leading up to her death.[38] He does, however, further the notion that Monroe was reduced to a token in the CIA's game. Similarly, in 2010 members of the Chicago Mob published *Double Cross*, which takes responsibility for Monroe's death as payback to Robert Kennedy for his sustained attack on the mob. The Mob's goal was to frame Robert Kennedy for Monroe's death, with "evidence of Bobby's presence there only hours old."[39] To the "Chicago Godfather's disappointment, FBI agents quickly removed all traces of Bobby's presence at the apartment," implying a substantial cover up.[40] Monroe was dead, and the alleged desired outcome—pinning the murder on Robert—was not achieved. In the conspiracy proposed in *Double Cross*, it seemed as if it were almost automatic protocol to wipe all traces of Kennedy's supposed presence. In both conspiracies, Monroe is treated as nothing more than collateral. She was a pawn in men's sick games of revenge and the pursuit of political power.

6. Discussion

As discussed throughout the conspiracies put forth about Monroe's death, she is continually perceived to be dependent upon or at the mercy of the men around her. Predictably, it is solely male reporters and conspiracy theorists who have advanced these narratives. In fact, these men are expanding upon a persistent fixation. That is abundantly clear from the decades of iterations of conspiracies about Monroe's death that have

[33] Neil Genzlinger, "Donald Spoto, Biographer of Hitchcock and Many More, Dies at 81," The New York Times, February 17, 2023, https://www.nytimes.com/2023/02/17/books/donald-spoto-dead.html.

[34] Paul Rosenfield, "Leave the Kennedys Out of It: MARILYN MONROE: The Biography, By Donald Spoto," Los Angeles Times, May 2, 1993, https://www.latimes.com/archives/la-xpm-1993-05-02-bk-29911-story.html.

[35] Rosenfield.

[36] Margolis and Buskin, Richard, *The Murder of Marilyn Monroe: Case Closed*.

[37] Velocci, "7 Conspiracy Theories About Marilyn Monroe's Death From Murderous Kennedys to UFOs."

[38] Matthew Smith, *Victim: The Secret Tapes of Marilyn Monroe* (London: Arrow, 2004), https://archive.org/details/victimsecrettape0000smit_f0i8.

[39] "U.S.-Star – Marilyn Monroe Was Killed on Orders of Mafia Godfather in 'Perfect' Hit | Double Cross," Double Corss, accessed December 7, 2022, http://doublecrossthebook.com/in-the-news/u-s-star-marilyn-monroe-was-killed-on-orders-of-mafia-godfather-in-perfect-hit/.

[40] "U.S.-Star – Marilyn Monroe Was Killed on Orders of Mafia Godfather in 'Perfect' Hit | Double Cross."

been devised and published by men. Monroe was self-made, self-educated, and a career woman, despite mental health struggles, an unstable early life, and the constant pressure of perfection—that is, she was anything but infantile and helpless.

As a result of the hyper-sexualized stardom, Monroe was and continues to be placed into a limiting societal box where she is exclusively seen as tragic, fragile, vulnerable, and frivolous. Fueled by the fascination and fixation of men, this is maintained in the discussion around her death. The potency and longevity of the conspiracies that swirl around Monroe's death are the culmination of the hyper-sexualization she was subjected to in life.

Men have been bickering over who gets the final word on Monroe's death for decades. In the neurotic efforts to pin her passing on something larger than herself, men have entirely co-opted the narrative. The male gaze has permeated every aspect of the conspiracy theories surrounding Monroe's death, resulting in the perpetuation of a warped, limited understanding of who Monroe was in life.

Setting the hyper-sexualization and fetishization aside, it could be argued that stardom at the level Monroe achieved it, in tandem with her untimely death, is enough to launch conspiracy theories. There are notable similarities in the case of Elvis, a superstar and prescription pill addict who met a premature end. The distinction, however, is that Elvis is rumored to still be alive. The big "theory is that Elvis didn't die, that he faked his death to protect himself and his family from death threats stemming from his work as a government agent, that rumors about his drug use were spread to support the cover-up, and that he has been living under an assumed identity in a government protection program ever since."[41] Even though Elvis easily rivals Monroe as a hyper-sexualized pop-culture symbol, his death will never hold the same intense

fetishization because as a man, he was not subjected to the male gaze as Monroe was. Instead of being killed as collateral by government agents, it is theorized that Elvis was a government agent.[42] Instead of dying a drug abuser's death, it is hypothesized that drugs were a cover for Elvis to slip away into obscurity. As much as people obsess over Elvis, instead of becoming a political pawn having all personal agency stripped as Monroe has been in her conspiracies, he is rumored to be living a peaceful life with a new identity—a far cry from the stories that were born out of Monroe's death. The contrast is clear: conspiracy theories about Elvis preserve autonomy over his body and life, whereas Monroe's conspiracies deprive her of such privileges.

7. Conclusion

Monroe's legacy, death, and most significantly the conspiracy theories that surround her death reveal the potent effect the male gaze has on media and pop culture. Monroe is the ideal case study of a woman inescapably contextualized by men. She epitomizes hyper-sexualization, so much so that the objectification she fell victim to in life is deeply ingrained in the narrative around her death. Regardless of how she died, or what led up to her untimely death, Monroe's capacity to maintain the American public's obsession and the American man's infatuation speaks to how powerful, dangerous, and damning superstar, sex-symbol status can be. The precarious pedestal women like Monroe are put on provides a platform for toxic and destructive treatment. That treatment has since been over-analyzed and extrapolated by male conspiracy theorists, further stripping Monroe of her agency and autonomy in death. Monroe's is a cautionary tale for women. She was, and still is, a victim of the perils of demeaning hyper-sexualization and the derogatory male gaze. Marilyn Monroe deserves

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[41] Mark Morrison, "THE ELVIS CONSPIRACY," September 15, 1994, https://scholar.lib.vt.edu/VA-news/ROA-Times/issues/1994/rt0994/940915/09160009.htm.

[42] Morrison.

to be remembered as more than a sex symbol, more than an item to be hoarded, and more than a disposable pawn in grand political schemes; she deserves to be remembered as a human.

Acknowledgements

Bibliography

Crowther, Bosley. "Actress as a Symbol," August 6, 1962. https://archive.nytimes.com/www.nytimes.com/books/98/11/22/specials/monroe-obit4.html.

"Definition of SYMBOL." Accessed December 9, 2022. https://www.merriam-webster.com/dictionary/symbol.

Double Corss. "U.S.-Star – Marilyn Monroe Was Killed on Orders of Mafia Godfather in 'Perfect' Hit | Double Cross." Accessed December 7, 2022. http://doublecrossthebook.com/in-the-news/u-s-star-marilyn-monroe-was-killed-on-orders-of-mafia-godfather-in-perfect-hit/.

Editors, History com. "Marilyn Monroe Is Found Dead." HISTORY. Accessed December 9, 2022. https://www.history.com/this-day-in-history/marilyn-monroe-is-found-dead.

Genzlinger, Neil. "Donald Spoto, Biographer of Hitchcock and Many More, Dies at 81." The New York Times, February 17, 2023. https://www.nytimes.com/2023/02/17/books/donald-spoto-dead.html.

Hertel, Howard, and Don Neff. "From the Archives: Marilyn Monroe Dies; Pills Blamed." Los Angeles Times, August 6, 1962. https://www.latimes.com/local/obituaries/archives/la-me-marilyn-monroe-19620806-story.html.

LIFE. "Marilyn Monroe and Joe DiMaggio: The End of a Marriage, 1954," January 14, 2014. https://www.life.com/people/tearful-photos-from-the-day-marilyn-divorced-dimaggio-in-1954/.

Margolis, Jay and Buskin, Richard. *The Murder of Marilyn Monroe: Case Closed*. Skyhorse, 2016.

Marshall, David. "The Strange Death of Marilyn Monroe by Frank Capell." Collection Master. marilynmonroe.ca, 2006. http://www.marilynmonroe.ca/camera/books/89.html.

Media Studies. "Laura Mulvey's 'Male Gaze,'" August 2, 2021. https://media-studies.com/male-gaze/.

Morrison, Mark. "THE ELVIS CONSPIRACY," September 15, 1994. https://scholar.lib.vt.edu/VA-news/ROA-Times/issues/1994/rt0994/940915/09160009.htm.

Norman, Kaytie. "Anthony Summers Discusses 'Goddess: The Secret Lives of Marilyn Monroe.'" earlybirdbooks.com, April 1, 2022. https://earlybirdbooks.com/anthony-summers-interview-goddess-marilyn-monroe.

Rosenfield, Paul. "Leave the Kennedys Out of It : MARILYN MONROE: The Biography, By Donald Spoto." Los Angeles Times, May 2, 1993. https://www.latimes.com/archives/la-xpm-1993-05-02-bk-29911-story.html.

Smith, Matthew. *Victim: The Secret Tapes of Marilyn Monroe*. London: Arrow, 2004.

https://archive.org/details/victimsecrettape00 00smit_f0i8.

Special to The New York Times. "First Scene Put Her in Limelight," August 6, 1962. https://archive.nytimes.com/www.nytimes.com/books/98/11/22/specials/monroe-obit3.html.

The Editors of Encyclopaedia Britannica. "Marilyn Monroe American Actress." Accessed December 9, 2022. https://www.britannica.com/biography/Marilyn-Monroe.

Tierney McAfee. "All About Marilyn Monroe's Alleged Affair with John F. Kennedy and Robert F. Kennedy." Peoplemag, October 16, 2022. https://people.com/politics/marilyn-monroe-affair-john-f-kennedy-robert-f-kennedy/.

Velocci, Carli. "7 Conspiracy Theories About Marilyn Monroe's Death From Murderous Kennedys to UFOs," June 1, 2017. https://www.thewrap.com/7-theories-marilyn-monroe-death/.

Welkos, Robert W. "Marilyn's Secret Tapes." Los Angeles Times, September 15, 2014. https://www.latimes.com/news/la-et-marilyn5aug05-story.html.

Wilson, Jeff. "Marilyn Monroe Death Documents Reveal Peter Lawford's Anguish." AP NEWS, September 24, 1985. https://apnews.com/article/709c9cb3a0afa87c7277c64ebffaada1.

Culture in Higher Education: Understanding the Dimensions of Educational Inequality

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Abstract

By connecting historical context and a statistical review of the present-day consequences of White hegemony within higher education, I argue that the exclusion of students of color in higher education by means of cultural isolation is a verifiable issue today. The distinctive habits, customs, and norms of White, Anglo-Saxon, protestant (WASP) cultural practices function as a system of gatekeeping, limiting access to higher education for communities of color that cannot conform to these cultural practices. While the barriers that disproportionately block students of color from accessing higher education were initially a formal institution of segregation—which was since outlawed—universities still contain vestiges of this system, continuing to extend cultural barriers that inhibit minority students seeking access to higher education. Statistical analysis of the discrepancies in success rates of students of color and White students demonstrates the material outcomes of unequal access within higher education. While some scholars point strictly to economic factors or different individual aspirations or values to explain these discrepancies, these theories fail to address the root causes of the inequalities that minority students face—namely, that historically segregated systems remain ineffective at fostering diverse and representative student bodies. By actively recognizing these systems as fundamentally unjust by design, the conversation regarding how to fix or approach racial inequality in higher education can be effectively begun.

1. Introduction

While students of color in the United States are no longer legally limited in opportunity, vestiges of cultural segregation still pervade American education. Higher education in the United States, as a system, remains bound to the behaviors, beliefs, and norms that the White, Anglo-Saxon, protestant (WASP) culture encompasses. In this essay, I conceptualize American colleges as part of a power structure that restricts minority students looking to access and succeed in higher education. First, I explore the historical context behind how culture has functioned to restrict minority students; I then discuss modern-day cultural developments. Next, I conduct a statistical review to show the disparity between WASP and minority students in higher education. Finally, I debunk the scholarly counterargument to my own that most or all educational disparities can be explained by economic inequality. I conclude with the implications of my research and potential next steps forward for educational inequality discourse.

2. Historical Context

WASP culture, the dominant racial culture in America, maintains institutional control over higher education today. Minority cultures have, as a byproduct of exclusion, come to view higher

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education as something foreign and hostile. There exists a power imbalance between WASP and minority students within higher education, and the lack of influence that minority cultures exert within higher education has created an environment wherein minority students do not have the same resources or opportunities to access and succeed within universities. Thus, through their systemic exclusion of minorities from higher education, universities further perpetuate the economic inequality that minority communities in the face in the United States.

In analyzing how pervasive cultural exclusion limits equal educational opportunity, an understanding of the historical racial dynamics in the United States is essential. The dynamic between the various cultures of minority communities today and the American educational system must be understood through the context of the racism and prejudice that these communities have faced throughout history. Historically, I argue, barriers to educational opportunity for minorities in the United States were built upon racist and nativist foundations. Within the United States, race has consistently existed not as a biological reality, but as a tool with which those with social power can exclude those they deem as the "other." For instance, Irish immigrants who would now be socially considered "White" faced substantial xenophobia for much of the 19th century (Williams, 1996). Eastern European immigrants faced violent hostility when arriving in the United States in the early 1900s. Concepts of race and "Whiteness" within America are not a fixed reality, but social descriptors that reflect the dominant cultural norms of the era. For much of the United States' existence as a nation, these norms were that people of color—and people of any culture that was not aligned with WASP culture—did not deserve equal opportunity. Thus, certain people were deemed not "White" enough to be allowed to access education. WASP culture emphasized a strong Christian affiliation, accruing wealth, succeeding in academia, exclusivity, and

superiority. Soft spokenness, mild manners, and a reverence for the norm were the foundational social attributes. Educational systems within America upheld these social expectations, tacitly ensuring that its "best and brightest" would conform to the valuations of the governing WASP culture (Kaufmann, 2004). Non-White groups that have historically been able to conform to these expectations have been gradually accepted into certain folds of "White" culture (Zhang, 2016). Those that did not were legally and socially restricted from accessing higher education.

Black communities in particular were targeted by the exclusionary policies of WASP society. Up until 1954, Black students were fully segregated from White students and placed into less desirable school districts, given less funding, and deprived of resources to access higher education (Dawkins and Braddock, 1994). As a result, most Black communities remained almost entirely unable to gain formal education and thus remained amongst the poorest economic groups in America. Until the Civil Rights Act of 1964, Historically Black Colleges and Universities (HBCUs) remained one of the only ways for Black students to reach higher education. These universities served as a lifeline for economic opportunity, but while they were extremely valuable to the communities they served, they remained woefully underfunded, understaffed, and limited in the resources they could provide in relation to more established, Predominantly White Institutions (PWIs). Even after PWIs were legally desegregated, Black students struggled to be accepted into PWIs, as Black communities lacked a strong educational foundation by means of well-funded schools. To this day, "[t]he majority of Black and Hispanic youth attend high-poverty schools while the majority of White youth attend low-poverty schools" (Majors, 2019).

Within underfunded districts, college remained an unattainable goal due to an overall lack of opportunity. While the direct legal discrimination against racial minoritieshas since been reduced, cultural discrimination against

these groups pervades. The WASP culture that has maintained dominance within institutions of higher education still poses a barrier to minority success in the United States by perpetuating existing economic and educational disparities within minority communities. Thus, the lack of a platform for minority cultures in higher education has effectively limited minority communities' use of higher education as a tool for economic mobility.

3. Cultural Developments

Throughout the historical development of legal—and later, cultural—segregation within education, a distinct culture has maintained power. This culture emphasizes WASP ideals and minimizes the ability of other cultures to have influence within universities. There exist two key reasons why WASP culture maintains dominance in university.

The first is that a disproportionately large percentage of the faculty employed by most universities is White. A 2020 study conducted by the National Center for Education Statistics concluded that 74 percent of all American college faculty was White (National Center for Education Statistics, 2020). Along with a predominantly White faculty comes, naturally, a predominantly White culture. While the majority of White students can take advantage of the fact that university culture caters to their success, students of color tend to feel alienated and disconnected from faculty (ASHE, 2007). Amongst Black students, there is a belief that even Black faculty members are uninterested in helping them succeed (ASHE, 2007).

The second reason that WASP culture has maintained hegemony can be attributed to university demographics: a disproportionately low percentage of minority students attend universities, especially at predominantly White institutions (PWIs) (Bonilla-Silva and Peoples, 2022). PWIs are typically the most "elite," selective universities, exercising historical advantages in financial support, scholarships, research opportunities, and prestige. PWIs, while no longer capable of legal discrimination, perpetuate White cultural hegemony in university culture through selective admissions. The main way that college admissions restrict minorities is through their use of "college readiness" as a metric for admission. "College readiness" applies the same basic set of standards to all students and "does not address racial gaps or the college readiness of any specific racial groups" (Majors, 2019). Instead of accounting for the racial inequality of prior educational experiences amongst students, it applies the same blanket requirements to all of them; by default, White students, because of their (on average) socioeconomic and educational advantages, will be more capable of meeting them. Because minority students often do not have access to the resources or support systems that White students tend to have—both socially and economically—they are not admitted into these schools as frequently. This disparity is evinced by the fact that, while Latinos comprise 19 percent of the national population in the United States, they constitute only 9 percent of the student body in the 28 most elite universities in the country (Rivas-Drake and Mooney, 2008).

By enrolling a disproportionate number of White students, PWIs perpetuate White cultural hegemony in higher education. Even when students of color are accepted by these universities, they are more prone to struggling academically and socially than White students. Many minority students may feel as though they are choosing between a more prestigious PWI or a school that will be more accommodating of their culture or race. This dichotomy may be, on a more abstract level, interpreted as a minority student's choice between preserving their own culture and assimilating to WASP culture. A study by the Association for the Study for Higher Education concluded that first-generation immigrant students, being of a different national origin, struggle to navigate the cultural

differences between American university environments and those they had grown up with (ASHE, 2007). When students chose to prioritize their cultural identities through, for example, an HBCU, students tended to be more successful because the institutions were not as susceptible to White cultural influence and were instead able to prioritize Black students' needs (Kugelmass and Ready, 2007). Nonetheless, graduates of these minority-focused universities lack the respect and prestige that attending a prominent PWI would entail. Essentially, many students of color feel pressured to decide between a school that offers more cultural security and inclusivity, or one that promises greater social standing and economic opportunity upon graduation.

4. Disparities Today

The perpetuation of WASP culture in higher education and the simultaneous exclusion of minority ones has led to disastrous impacts on minority communities. While the majority of White students maintain the ability to access higher education as a means to social mobility, minority communities have fallen further behind (Rothwell, 2015). Though WASP students are able to more smoothly assimilate into the demands and culture of higher education, accessing tools and systems that benefit their future, minority students often lack the resources to succeed. One of the most effective ways that WASP culture limits minority opportunity and success in universities is by outcompeting non-White candidates through the metric of "college worthiness." College worthiness is defined as "the sum of three requisite components, college awareness (parent/guardian and student knowledge of the procedural and planning aspects of college attendance), college eligibility (completing the coursework necessary for college admission), and college preparation (students' ability to put their college awareness skills into action)" (Convertino and Graboski-Bauer, 2017). College awareness, the first aspect of college

readiness, is something that minority students lack at a much higher rate than White students; this can be attributed to a historical lack of opportunity for minorities to reach and graduate from universities. Psychological evidence shows that students are more likely to reach the university level when they consistently report having had college-planning conversations with their parents as children (Jessard and Juvonen, 2022). I theorize that such conversations are more likely to take place in White households because the parents are far more likely, and will continue to be far more likely, to have gone to and *graduated* from university. The rate of White students reaching the university level is 42 percent, with Black students at 38 percent and Hispanic students at 39 percent (National Center for Education Statistics, 2019); furthermore, White students have a 5-year graduation rate of 62.2 percent, Hispanic students of 41.5 percent, and Black students of 40.5 percent (Hansen, 2022). Thus, even those Hispanic and Black students that do reach university have a far lower chance of graduating. These disparities carry down to the next generation, resulting in lower chances for minority families to have the conversations about education that are so critical to allowing their children to reach and succeed in universities.

A lack of college eligibility, the second aspect of college readiness, can be traced to a lack of support systems within school districts that have predominantly minority students. Minority communities tend to have less educational opportunities and support structures than White communities, lacking rigorous frameworks such as gifted programs (Peters and Carter, 2022). This absence of structure leads to students of color having a much more difficult time finding opportunities to succeed in school.

A lack of college preparation—defined as possessing an understanding of the strategies that are required to succeed in universities—can be explained by the lack of both college awareness and eligibility. Many students of color are never

even given the chance to reach a college preparation stage because they lack the tools and support to arrive at that part of the process.

5. Economic Perspective

When analyzing the argument that universities do not foster a culture that allows for the success of minority students, a counterargument worth addressing is the idea that financial restrictions are the sole reason that many students do not see attending university as achievable. To reach the economic conclusion, one would begin with the question *Why do students in predominantly minority communities not see college as a possibility?* From an economic perspective, a logical next step would be to state that minority communities tend to be lower-income (U.S. Census Bureau, 2022), and as such, a variety of other outcomes would become clear. In lower-income neighborhoods, the quality of education tends to be worse (Quillian, 2017), leading to lower levels of achievement for students. This may directly cause a reduction in the number of students from these schools pursuing higher education, in turn making the next generation of students doubtful of the possibility of reaching university due to lack of parental experience. Outside of school, low-income households cannot provide the same opportunities that higher-income communities can because they cannot afford it. Parents have less disposable income with which to send their children to tutoring programs or other educational enrichment opportunities, leading to less academic achievement. Low-income communities have higher crime rates, with poor neighborhoods having a violent victimization rate of over double that of high income neighborhoods (Harrell et al., 2014), leading, I argue, to a lack of stability for students and less ability to focus. The financial factors that contribute to a lack of educational success in low-income communities are endless.

The general argument regarding economic limitations as the sole factor inhibiting higher education concludes that minority students do not lack the ability to reach university because they are racial and cultural minorities, but solely because they are low-income. One of the most popular ideas supporting this argument is that of the model minority. For instance, Asian success in higher education is used as an example that minorities who work hard, fulfill the American Dream, and succeed financially can help their children gain academic success to the same level that the rest of the country enjoys. Statistically, people of Asian descent do make more money than other minorities, and Asian students do generally succeed more academically than other minority students (U.S. Census Bureau, 2022; National Center for Education Statistics, 2019). Given these statistics, Asian students are used as a reference group for other minority students to show that minorities who work hard and focus on providing for their families have the exact same opportunities that White people have. By following the example of the Asian community, other minority communities would be able to attain success in higher education. Thus, the idea of the model minority develops the notion that minority students do not lack success because they are minorities, but because they come from lower-income families. However, this argument is problematic because it oversimplifies a multidimensional issue into the single dimension of economics, claiming that the issue of a lack of educational success for students of color can be solved by minority communities making more money.

To address the problem with the economic argument, the idea of Asians as a model minority must be deconstructed. While, statistically, Asians do tend to attain greater academic success than other minority groups, the truth is far more complicated. When adjusting for socioeconomic status, Asians students face the same barriers that other minorities do (Wong et al., 1998). While money solves some of the issues, it cannot address anywhere near all of them. While Asian students do reach university more often than

other minority students, they struggle with the same cultural barriers that other minority students do (National Center for Education Statistics, 2019; Tan, 2023). The reason that Asian students reach the university level at a higher rate than other minority groups tends to be attributed to economic factors *and* preexisting cultural and family expectations (Wong et al., 1998). Other minority communities do not hold the advantage of the pre-existing cultural value of university, and, as such, achieve less highly in education. The fact remains that minority students struggle far more to assimilate to the culture at university *because* the culture of university maintains WASP values. The overarching issue is far larger than an economic one, and while understanding the economic aspect is pertinent, it is important to not overvalue it.

The economic argument neglects the nuance of the situation and effectively removes the barriers caused by race, religion, and culture from the debate. It reduces a vast, complicated, and difficult conversation to one that can be solved with financial help alone. While economic limitations are certainly a major part of why minority students see college as an option less often, they remain only one aspect of a problem that is multifaceted and deeply ingrained into American society. To reduce the issue to one of a purely economic nature is reductive and naive. The reality of the situation is that there exist far more than financial limitations to student success. This is demonstrated through consistent research showing that even in higher-income, well-educated minority communities, there remains a discrepancy in minority student success in universities (Roderick, 2009). Research shows that parents' education level is a major factor in determining whether children would reach university in all races except for Latino (ASHE, 2007). This finding fundamentally opposes the belief that, with more educated and higher-income minority communities, university enrollment and success rates would increase.

The argument that economic equality alone would solve the issue of inequality in higher education is only further broken by the fact that Black university students regularly interpret the environments of their universities as hostile. While White students fit into the culture of higher education, minority students tend to feel at odds with the culture at universities (ASHE, 2007). This hostility is prevalent within every facet of the system. Another example is the ways in which universities' use of "college readiness" as an admissions tool results in the exclusion of minorities from prestigious institutions (Majors, 2019). These are problems that must be understood for what they are: as systems that, while perhaps not intending to do so, fundamentally segregate non-White cultures from higher education.

6. Conclusion

Due directly to the White cultural hegemony that is maintained within higher education in the United States, minority students continue to suffer from inequality of access and success within university settings. The systemic racism and segregation that the United States was built upon continue to hurt minority success in the field of higher education. Only by first recognizing these historical, culturally exclusive practices can we begin to address the disparity between the success rates of students of color and White students. While this article is far from providing a direct solution to this complex issue, it is an attempt at beginning to change the discourse surrounding minority success in higher education. By addressing the problem as what it really is—a cultural one—and not simply as an issue that can be fixed economically, we can begin to work towards a permanent solution.

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Works Cited

ASHE Higher Education Report (2007). Social Class Effects and Multiple Identities. *ASHE Higher Education Report, 33*(1):59–68. https://doi.org/10.1002/aehe.v33:1

Bonilla-Silva, E., and Peoples, C. E. (2022). Historically White Colleges and Universities: The Unbearable Whiteness of (Most) Colleges and Universities in America. *American Behavioral Scientist* 6(11). https://journals.sagepub.com/doi/10.1177/00027642211066047

Convertino, C. and Graboski-Bauer, A. (2017). College Readiness versus College Worthiness: Examining the Role of Principal Beliefs on College Readiness Initiatives in an Urban U.S. High School. *The Urban Review, 50*((1)):45–68. https://doi.org/10.1007/s11256-017-0429-6

Dawkins, M. P., and Braddock, J. H. (1994). The Continuing Significance of Desegregation: School Racial Composition and African American Inclusion in American Society. *The Journal of Negro Education, 63*(3), 394. https://doi.org/10.2307/2967190.

Hanson, M. (2023). College graduation statistics [2023]: Total graduates per year. *Education Data Initiative.* https://educationdata.org/number-of-college-graduates

Harrell, E., Langton, L., Berzofsky, M., Couzens, L., and Smiley-McDonald, H. (2014). Household poverty and nonfatal violent victimization, 2008–2012. *Bureau of Justice Statistics.* https://bjs.ojp.gov/content/pub/pdf/hpnvv0812.pdf

Jessard, L.M. and Juvonen, J. (2022) Supplemental Material for Developmental Changes in the Frequency and Functions of School-Related Communication with Friends and Family across High School: Effects on College Enrollment. *Developmental Psychology, 58*(3). https://doi.org/10.1037/dev0001003.supp

Kaufmann, E. P. (2004). The Rise and Fall of Anglo-America. *Harvard University Press.*

Kugelmass, H. and Ready, D.D. (2010). Racial/Ethnic Disparities in Collegiate Cognitive Gains: A Multilevel Analysis of Institutional Influences on Learning and Its Equitable Distribution. *Research in Higher Education, 52*(4):323–348. https://doi.org/10.1007/s11162-010-9200-5

Majors, A.T. (2019). From the Editorial Board: College Readiness: A Critical Race Theory Perspective. *The High School Journal, 102*(3):183–188. https://doi.org/10.1353/hsj.2019.0005

National Center for Education Statistics (2019). Indicator 19: College participation rates. *National Center for Education Statistics.* https://nces.ed.gov/programs/raceindicators/indicator_rea.asp

National Center for Education Statistics (n.d.). Race/ethnicity of college faculty (National Center for Education Statistics). *U.S. Department of Education.* https://nces.ed.gov/fastfacts/display.asp?id=61

Peters, S.J. and Carter, J.S. (2022). Predictors of Access to Gifted Education: What Makes for a Successful School? *Exceptional Children* 88(4):341–358. https://doi.org/10.1177/00144029221081092

Quillian, L. (2017). Poverty, Neighborhood, and School Setting. *Focus* 33(2). www.irp.wisc.edu/publications/focus/pdfs/foc332e.pdf.

Rivas-Drake, D. and Mooney, M. Profiles of Latino Adaptation at Elite Colleges and Universities. *American Journal of Community Psychology,* 42(1):1–16. https://doi.org/10.1007/s10464-008-9194-8

Roderick, M., Nagaoka, J., and Coca, V. (2009). College Readiness for All: The Challenge for

Urban High Schools. *The Future of Children*, *19*(1):185–210. https://doi.org/10.1353/foc.0.0024

Rothwell, J. (2015). Black Students at Top Colleges: Exceptions, Not the Rule. *Brookings*. www.brookings.edu/articles/black-students-at-top-colleges-exceptions-not-the-rule/.

Tan, G. Asian Americans in Today's U.S. Higher Education: An Overview of Their Challenges and Recommendations for Practitioners. files.eric.ed.gov/fulltext/ED556901.pdf. Accessed 26 July 2023.

U.S. Census Bureau. (2022). Current Population Survey Annual Social and Economical Supplement: Sex for Race, Hispanic Origin and Foreign-Born Populations. *Census.Gov.* www.census.gov/newsroom/press-releases/2022/current-population-survey-tables.html.

Williams, W.H. (1996).'Twas Only an Irishman's Dream: The Image of Ireland and the Irish in American Popular Song Lyrics, 1800-1920. *University of Illinois Press*.

Wong, P., Lai, C.F., Nagasawa, R., and Lin, T-1 . (1998). Asian Americans as a Model Minority: Self-Perceptions and Perceptions by Other Racial Groups. *Sociological Perspectives*, *41*(1):95–118. https://doi.org/10.2307/1389355

Zhang, M. (2015). WASPs–.*Wiley Online Library*.onlinelibrary.wiley.com/doi/abs/10.1002/9781118663202.wberen692

Media Conglomeration, Automation, and Alienation: A Marxist Critique

Lauren Tokos*

Abstract

The rise of the so-called "digital age" in the twenty-first century absorbs individuals' livelihoods and disconnects them from the natural world. Over time, modern society has adapted to digital news and entertainment media's unremitting chokehold on daily life. What enabled this change and how does the corporate structure of digital news and entertainment media impact the everyday worker? The contemporary American digital news and entertainment media market is almost exclusively regulated by five major corporations: AT&T, The Walt Disney Corporation, NewsCorp, Paramount Global (formerly Viacom CBS), and Comcast. Although the titles and rank of these corporations have changed over time, their ownership has stayed consistent. Through corporate conglomeration and horizontal and vertical integration, the major five media corporations vie for control over the media marketplace. Those in positions of power seldom experience the effects of their decision-making; instead, the worker, producing intellectual or material commodities, fails to truly experience the creative realization of their labor. Instead, the worker's labor is the property of the corporation for which they work. Media workers are alienated from the product of their labor, as it belongs to the owners of the means of production. Mass media stakeholders, as owners of the means of production, maintain structural control over the dominant social ideology, reflected in the economy, government, and media. Media workers, beholden to mass media stakeholders, are unable to realize their full creative capacity, as they are confined to the restrictions set forth by the capitalist media economy.

1. Introduction

The American media market has grown substantially over the course of the twenty-first century. What was once dominated by print media, radio, and cable television has expanded to a vast media landscape which makes use of digital technologies to challenge traditional forms of media. Yet, the media landscape feels eerily monotonous. Between 1983 and 2004, the number of mass media corporations at the top of the market fell from fifty to five.[1] The aims of the big

five—AT&T, The Walt Disney Corporation, NewsCorp, Paramount Global (formerly Viacom CBS), and Comcast—are broadly similar: to control the dominant social ideology promoted by media and consumed by a public audience. Cross-sector ownership allows for more market dominance, and thus more leverage with politicians who determine media regulation. The acclaimed journalist and media critic Ben Bagdikian writes, "the fewer the owning corporations, the larger each one's share of the annual harvest of the billions of consumer dollars."[2] Further, Bagdikian contends, "[media

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[1] Bagdikian Ben H. 2004. *The New Media Monopoly*. Boston: Beacon Press, pg. 16.

[2] Ibid, pg. 30.

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conglomeration] is, tragically, a self-feeding process: the larger the media corporation, the greater its political influence, which produces a still larger media corporation with still greater political power."[3] Through vertical and horizontal integration, the big five and their thousands of subsidiaries capitalized on each other's individual strengths to increase their combined control of the media market. Media conglomerates impose productivity expectations and creative stipulations that workers in the digital media space cannot achieve without being objectified and alienated from the product of their work. Zooming in from the industry at large down to the individual media worker, this investigation analyzes the current mass media structure through the lens of Classical Marxism and critical theory. An examination of the history of media conglomeration and its impact on the media market is followed by a Classical Marxist critique, drawing on the concepts of alienation, technological automation, and the base-superstructure dynamic.

The term "alienation" refers to the levels of separation between a worker and the eventual product of their work. Under capitalism, a wage or salaried employee creates a product for sale on the free market; the product no longer belongs to the individual who created it and is thus something *alien* to them. Alienation takes place in all sectors of the capitalist economy, but due to the high levels of competition for market dominance and subjectivity of creative content, media workers' labor is more prone to exploitation by corporate administrators.

Furthermore, the theory of technological automation refers to the emancipatory power of technology. Technological automation is the most developed form of "fixed capital."[4] Capitalism

requires that individuals have an income source to procure goods and services which reproduce their daily life, but technological automation threatens that requirement in the realm of digital media. Software tools such as artificial intelligence mimic human capabilities, thus threatening to displace jobs in the digital media market. This could be of particular interest to media conglomerates, which seek to maximize profit and minimize expenditures.

Marx's concept of the base-superstructure dynamic encapsulates the social stratification involved in the production of media content. Traditionally used to describe the reciprocal relationship between the economic base of society and its ideological superstructure, I employ this concept to define the relationship between money, power, and influence in the media market. "Direct knowledge workers" produce content that is disseminated and consumed through the media, while "indirect knowledge workers" create and reproduce the conditions that enable this process. In other words, direct knowledge workers are media workers (i.e., employees of media conglomerates), while indirect knowledge workers are the owners of the means of production (i.e., shareholders, executives, directorial board members) who determine the ideological content produced by direct knowledge workers.

Combined, the three frameworks described above are used as the analytical lens for considering how media workers relate to the work they produce within the confines of the corporate media structure.

2. The Big Five

2.1. Historical Context

The first of the major five media corporations is AT&T. Currently, AT&T's most notable subsidiary

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[3] Ibid, pg. 17.

[4] Fixed capital is defined as a type of investment which generates profit. For example, a t-shirt company needs to invest in a screen printer to transfer designs onto the shirts themselves. In this scenario, fixed capital is the screen printer, as it costs money to procure, but generates money once operable.

companies are Time Warner, CNN, and HBO.[5] Until the rise of mobile technology, Time Warner was the dominant name in media ownership. In 2000, Time Warner and America Online (AOL) merged to combine AOL's emerging internet market with Time Warner's traditional print and television media. This initial merger synergized the media industry; together their strength was greater than individually. As Bagdikian describes, "Time Warner had by this time a large quantity of media products from magazines to movies, and AOL had the best pipeline through which to send this 'content."[6] After its initial merge with AOL, AT&T acquired Time Warner in 2016, further developing AT&T's cross-platform content creation and distribution capabilities.

The second of the major five media corporations is the Walt Disney Corporation. In 1995, Disney merged with ABC/Capital Cities. Disney purchased ABC/Capital Cities for approximately 19 billion dollars; the move came with an interest in mitigating market competition, though the companies claim it was done to enhance consumers' access to diverse content.[7] In addition to news media, ABC/Capital Cities managed several other subsidiary corporations and joint ventures, the most profitable of which was ESPN. Together, Disney brings name recognition and financial prowess while ABC/Capital Cities touts a geographically diverse network of cable television and telecommunications investments.

News Corp is the third of the five major media corporations, and the only one with a clear political association, although it is not formally documented. News Corp currently owns Fox Network, *The Wall Street Journal*, the *New York Post*, Harper Collins Publishing and more. The architect of News Corp, Rupert Murdoch, was a

Marxist at university before inheriting his father's European media empire. Murdoch successfully ran numerous British and Austrian mass media ventures before expanding to the United States. Murdoch's first American acquisition was the formerly left-leaning newspaper, the *New York Post*, which now leans conservative.[8] News Corp, under Murdoch's direction, used horizontal integration to diversify its audience demographic and overall reach. Horizontal integration refers to the lateral acquisition of disparate businesses within the same market segment. In 1987, News Corp took possession of Harper & Row, which later joined forces with the Scottish publisher William Collins.[9][10] Between the procurement of Harper & Row and William Collins, News Corp also attained Triangle Publications Inc., which includes *Seventeen Magazine*, *TV Guide*, and *Daily Racing Forum*.[11] News Corp went on to expand internationally by obtaining *Star TV* from China.[12] It wasn't until 1996 that News Corp officially launched Fox News Network as a 24-hour news channel to supplement the entertainment division, which they took complete ownership of in 2005.[13] To streamline the dissemination process, News Corp took partial ownership of

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[5] "AT&T to Acquire Time Warner," AT&T, October 22, 2016, https://about.att.com/story/att_to_acquire_time_warner.html.
[6] Bagdikian Ben H. 2004. *The New Media Monopoly*. Boston: Beacon Press, pg. 31.
[7] Fabrikant, Geraldine. "The Media Business: The Merger; Walt Disney to Acquire ABC in $19 Billion Deal to Build a Giant for Entertainment." *The New York Times*. August 1, 1995.

[8] Bagdikian Ben H. 2004. *The New Media Monopoly*. Boston: Beacon Press, pg. 41.
[9] Rosenthal, Thomas B. 1987. "Murdoch to Buy Harper & Row for $300 Million : Media Baron's Purchase of Book Publisher Will Leave Few Independents in Field - Los Angeles Times." *Los Angeles Times*, March 31, 1987. https://www.latimes.com/archives/la-xpm-1987-03-31-fi-1385-story.html.
[10] Unknown. 1989. "Murdoch Takes Over Collins for $721 Million - Los Angeles Times." *Los Angeles Times*, January 7, 1989. https://www.latimes.com/archives/la-xpm-1989-01-07-fi-259-story.html.
[11] *The New York Times*. 1988. "THE MEDIA BUSINESS; Murdoch Agrees to Buy TV Guide In a $3 Billion Sale by Annenberg - The New York Times," August 8, 1988. https://www.nytimes.com/1988/08/08/business/media-business-murdoch-agrees-buy-tv-guide-3-billion-sale-annenberg.html.
[12] Shenon, Philip. 1993. "THE MEDIA BUSINESS; Star TV Extends Murdoch's Reach - The New York Times." *The New York Times*, August 23, 1993.
[13] Mifflin, Lawrie. 1996. "Fox Presents Its Lineup for News Channel - The New York Times." *The New York Times*, September 5, 1996. https://www.nytimes.com/1996/09/05/arts/fox-presents-its-lineup-for-news-channel.html.

DirecTV Group (formerly controlled by Hughes Electronics) in 2003. Bagdikian writes that through this strategic move, "Murdoch realized he could use DirecTV to put himself on both sides of bargaining tables. He is a tough and patient negotiator and can use earlier acquisitions of his own cluster of Fox sports channels plus DirecTV to get his own price for carrying schedules of big sports teams and special events."[14]

The fourth of the five major media corporations is Viacom CBS, which has recently rebranded as Paramount Global.[15] Columbia Broadcasting System (CBS) was initially nothing more than a disorganized set of television and radio stations. Just before CBS went bankrupt prior to WWII, it was picked up by father-son duo William and Sam Paley. Sam Paley revolutionized CBS' reach by extending the network overseas during WWII which earned CBS a reputation for reliable and relevant news. Viacom purchased CBS in the 1990s, rebranding as 'Viacom CBS' and diverting its focus on the film distribution industry. Viacom CBS hoped the addition of CBS would diversify the company's portfolio. The company has now rebranded for a third time, changing its name to "Paramount Global." Paramount Global has a stake in broadcast news, television entertainment, and digital streaming with their new platform, Paramount+.

The fifth and final major media corporation is Comcast, which also owns NBC Universal, Telemundo, and Universal Studios.[16] Comcast has been the dominant cable and internet service provider since the turn of the century, but it has since expanded into the digital streaming market

after its merger with NBC Universal (also affiliated with the industrial conglomerate, General Electric) in 2011. The conglomerate has since attained DreamWorks Animation as an additional subsidiary investment. Comcast maintains control over numerous telecommunications channels through cable infrastructure (with the help of General Electric), news, entertainment, digital streaming, and film production.

2.2. Impact on Industry

One of the primary critiques of media conglomeration is the impact it has on content relevancy, which translates to matters of market production and consumption through advertising. Maintaining a diverse portfolio provides media conglomerates a chance to advertise across their platforms, creating a cohesive brand image. Media scholar David Croteau describes how "broadcast networks now routinely [incorporate] entertainment, celebrities, human interest, and other light fare into their broadcasts."[17] Media conglomeration has blurred the line between fact and fiction. The popularity of entertainment media is financially advantageous for media conglomerates because it provides a larger audience for commercial advertisements. Consequently, the majority of the big five media conglomerates possess subsidiary ventures in digital streaming, where they can charge consumers extra to eliminate ads, benefiting the conglomerates' bottom line by encouraging greater consumer investment.

Media conglomerates expand their influence through vertical and horizontal integration. As defined in reference to News Corp's acquisitions, horizontal integration "refers to the process by which one company buys different forms of media."[18] Alternatively, vertical integration in the

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[14] Bagdikian, Ben H. 2004. *The New Media Monopoly*. Boston: Beacon Press. Pg. 37

[15] ViacomCBS Staff, "Viacomcbs Unveils New Company Name, Global Content Slate and International Expansion Plans for Paramount+ at Investor Event: Paramount," Paramount (Paramount/Viacom CBS, February 15, 2022), https://www.paramount.com/press/viacomcbs-unveils-new-company-name-global-content-slate-and-international-expansion-plans-for-paramount-at-investor-event.

[16] "Comcast Company Timeline." Comcast. Comcast / NBCUniversal, July 11, 2022. https://corporate.comcast.com/press/timeline#:~:text=2011,transaction%20to%20form%20NBCUniversal%2C%20LLC.

[17] Croteau, David and William. Hoynes. 2014. *Media/society: Industries, Images, and Audiences.* Thousand Oaks, CA, SAGE Publications, pg. 44.

[18] Ibid, pg. 42.

media industry refers to when "one owner acquires all aspects of production and distribution."[19] In the context of media conglomeration, horizontal integration provides media companies with greater reach over separate industries while vertical integration allows for the monopolization of specific media products.

3. Marxist Critique

3.1. Alienation of the Worker

When media companies conglomerate, they strip previously independent media corporations, and subsequently the employees carrying out media creation, of individuality in favor of the acquiring company's creative ideals. The act of conglomeration is "alienating" in the terms devised by Karl Marx. Marx contends that a worker is alienated from the product of their labor because they are not producing it for their individual consumption. Rather, their labor is an instrument in the greater process of commodity production, with the goal of capital accumulation.[20] Marx developed his notion of labor alienation and objectification in the context of the Industrial Revolution, though it can now be used as a framework for analyzing the relationship between media ownership, media workers, and media products.

In Marx's time, the introduction of factory production, which sought to meet increasing consumer demands, separated factory workers from the product of their labor. Similarly, as demand for media increased with the introduction of new technology, the need for market variation resulted in the corporate media conglomerates we see today. Instead of producing a good for their own consumption, observational enjoyment, or creative expression,

the factory worker produced a commodity for its exchange-value in a capitalist economy. Formerly independent media corporations generated content for the sake of graphic and technological innovation, while the current structure does so for the sole purpose of increasing corporate profit margins. Factory workers received a wage as compensation for their productive power, which did not reflect the exchange-value of the product when sold in the free market. Today, employees of corporate media conglomerates likewise receive a wage or salary which pales in comparison to the overall profit their work generates.

Under a capitalist structure, media workers are alienated from the product of their labor through various degrees of separation produced by the capitalist market, ultimately stripping them of creative fulfilment that would otherwise be attained if the media artifact were produced independent of a corporation. For example, interns often work similar or longer hours than their superiors, but due to lack of experience, they are paid far less—if at all. This rationale is often accepted within the confines of a capitalist economy. But when considering this dynamic within Marx's conception of the product to labor relationship, interns (a low-tier media worker) are never compensated for the full value of their work. Imagine that an intern working at an animation studio produces a short promotional video. That video is then used to market the animation company's new children's movie. Instead of being paid directly for the level of audience engagement with the promotional video (either through cable television views, digital streaming views, or social media engagement) the intern is paid an hourly wage. During their tenure with the media corporation, the sum of this hourly wage amounts to a small percentage of the overall profit the intern generated through their work on the video. The degrees of separation generated through the hierarchical compensation structure of large media conglomerates alienates the media worker from

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[19] Ibid, pg. 40.
[20] Marx, Karl. 2007. *Economic and Philosophic Manuscripts of 1844*. Translated by Martin Milligan. Dover Books on Western Philosophy. New York, NY: Dover Publications.

the product of their work and disincentivizes genuine creativity.

The individual alienation of media workers is compounded by the mutual relationship between media conglomerates and the American political system. Media conglomerates benefit from lenient corporate legislation, allowing for further cross-sector dominance. Cross-sector dominance and the accumulation of subsidiaries increases opportunities for the exploitation of media labor.

3.2. Production Automation

Production automation, as Marx conceives of it, is a consequence of machine technology replacing innate human exertion. As Marx describes in the *Grundrisse*, "in machinery as an automatic system, the means of labour is transformed as regards its use value, i.e. as regards its material existence, into an existence suitable for fixed capital in general; and the form in which it was assimilated as a direct means of labor into the production process of capital is transformed into one imposed by capital and in accordance with it."[21] Under capitalist conditions, machinery exists because of capital and for the regenerative use of capital. The machine possesses many of the same characteristics as humans, replacing the media worker's skill and labor power. Marx associated automated machinery with "fixed capital" in its most developed form. Fixed capital has the capacity to emancipate the media worker from the confines of wage labor so long as it reproduces daily life for the worker. Under capitalist conditions, daily life is solely reproduced by the wages earned through labor. Technological automation alienates the media worker because automation *replaces* the need for human labor. Alternatively, under socialist conditions, automation *frees* the worker from the confines of work because workers' subsistence is produced by machinery. It is only through a

change in the social structure (i.e., from capitalism towards socialism) that automation reproduces daily life.

The transition from print media towards digital media enabled the rise of information and communications technology (ICTs), reducing the desirability of print media. Corporate conglomeration in the media, whether through vertical or horizontal integration (or both), streamlines the production process of digital media. At the same time, these strategies allow corporations to reduce their labor force and lay off non-essential and duplicate workers. Production efficiency is financially beneficial for the media corporation, but not for the media worker. Conglomeration is another means of production automation. In the media sphere, automation refers to the application of IT software to replace repetitive and generative tasks, resulting in increasingly less human labor to achieve the same output. Conglomeration increases media automation by combining two separate labor forces from the merging media corporations, thus putting more responsibility on the remaining media workers to produce the desired good or service in optimal time.

According to Kumar Thangavelsamy, an expert in management science at XIM University in Bhubaneswar, India, "in the information age, the effect of automation on the relationship between capital and labor is such that there is a danger of many low-end information workers losing their jobs and even if they have jobs, those jobs will be ones that foster alienation."[22] As Thangavelsamy describes, media automation results in the loss of low-wage media jobs, thus increasing the gap between the owners of the means of production (shareholders) and the knowledge workers carrying out the owners' labor (low and mid-level employees). When utilizing media automation, the owners of the

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[21] Marx, Karl, and David McLellan. *The Grundrisse*. First U.S. edition. New York: Harper & Row, Publishers, 1971. Print. pg. 132-133

[22] Kumar, T., & Jena, L. K. (2020). Capital vs. Digital Labor in the Post-industrial Information Age: A Marxist Analysis. *Emerging Economy Studies*, 6(1), 50–60. https://doi.org/10.1177/2394901520907707

means of production redirect the capital that would have been used for wages towards business operations, infrastructural development, or as dividends for the owners of the means of production.

Additionally, media conglomeration furthers the employment hierarchy by establishing one single authoritative body for what was once two separate media corporations. In the information age, the hierarchy created by media conglomeration and automation creates two separate types of information workers: the "routine worker" and the "creative worker." The routine worker facilitates the back-end software development while the creative worker cultivates the desired set of knowledge for the routine worker to engage with.[23] Management theorist Peter Drucker writes:

> Knowledge itself has become a means of production. Hence, workers who work with their knowledge will own the means of production, namely their own knowledge... though on an overall basis, all labor force faces insecurity in the information age, a minority of information professionals are able to relatively benefit more from capitalism of the information age while the majority finds that their position has become very vulnerable.[24]

Only the creative worker benefits from the automation and conglomeration process because they have a sense of self-direction and agency over the product of their labor. Alternatively, the routine worker—whose position is most vulnerable to automized outsourcing—does not choose what product they produce. The routine workers' skillset is enlisted as an instrumental tool for producing the product. Their labor is thus objectified, and they become alienated from the product of said labor.

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[23] Ibid.
[24] Ibid.

3.3. Noam Chomsky's Propaganda Model

In the text *Manufacturing Consent* by Noam Chomsky and Edward Herman, these authors describe how the United States government uses media as a propaganda machine. The relationship between the big five media corporations and the United States government informs the regulatory structure of the media and delineates its importance within the globalized economy. There are five primary components to Chomsky and Herman's model:

> (1) [T]he size, concentrated ownership, owner wealth, and profit orientation of the dominant mass-media firms; (2) advertising as the primary income source of the mass media; (3) the reliance of the media on information provided by government, business, and "experts" funded and approved by these primary sources and agents of power; (4) "flak" as a means of disciplining the media; and (5) "anticommunism" as a national religion and control mechanism.[25]

Media is the conduit connecting the ruler to the ruled. The government and stock market are both "rulers" in this dynamic, working together to maintain control over the means of media production and its eventual products. The big five media conglomerates are all publicly traded on the securities market, while the largest stockholders of each company remain the originating families that once maintained full control of the business. This stronghold is increasingly challenged by "improving market opportunities for selling media properties,"[26] spurred by the deregulation of legislation that formerly limited the concentration and conglomeration of media entities.

Outside of ownership itself, the media conglomerates maintain directorial boards that

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[25] Herman, Edward S and Noam. Chomsky, *Manufacturing Consent: The Political Economy of the Mass Media*. New York, Pantheon Books, 1988. Pg. 1
[26] Ibid. pg. 8

contribute to corporate decision-making. Chomsky and Herman note that:

> active corporate executives and bankers together account for a little over half the total of the outside directors of ten media giants; and the lawyers and corporate-banker retirees (who account for nine of the thirteen under "Retired") push the corporate total to about two-thirds of the outside-director aggregate.[27]

Figure 1 below highlights the link between market stakeholders and media manipulators. In 1986, directorial board membership also included former politicians and members of the council on foreign relations, further demonstrating the connections between mass media and the United States government.

TABLE 1-3

AFFILIATIONS OF THE OUTSIDE DIRECTORS OF TEN LARGE MEDIA COMPANIES (OR THEIR PARENTS) IN 1986*

PRIMARY AFFILIATION	NUMBER	PERCENT
Corporate executive	39	41.1
Lawyer	8	8.'
Retired (former corporate executive or banker)	13 (9)	13.7 (9.5)
Banker	8	8.'
Consultant	●	'.2
Nonprofit organization	15	15.8
Other	8	8.'
Total	95	100.0

OTHER RELATIONSHIPS

Other directorships (bank directorships)	255 (36)
Former government officials	15
Member of Council on Foreign Relations	20

* Dow Jones & Co.; Washington Post; New York Times; Time, Inc.; CBS; Times-Mirror; Capital Cities; General Electric; Gannett; and Knight-Ridder.

Figure 1. Table 1–3: "Affiliations of the outside directors of ten large media companies (or their parents) in 1986."[28]

Additionally, Chomsky and Herman describe the fact that media giants procure much of their financing through commercial banks and investors, who also advise on stock ventures. In return, these financial institutions remain some of the largest stockholders of media conglomerates outside of the originating families. The stock market is the great binding factor, incentivized by the prospect of financial gain, which unites the government and media decision-makers. The government and stock market both maintain a vested interest in the content disseminated through media channels and recognize it as a financial asset.

3.4. The Ruling Class Ideology

One of the focuses of Marxist theory is social stratification. Marx asserts that "the ideas of the ruling class are in every epoch the ruling ideas, i.e., the class, which is the ruling *material force* of society, is at the same time its ruling *intellectual force*."[29] Marx maintains that the values of the ruling class are the dominant ideological values of all classes in a given society. The ruling class has the most access to the means of material (and thus intellectual) production, which provide them the power to decide what knowledge to distribute to the masses and how to distribute it. The ruling class is beholden to nothing and nobody; they sit at the top of the social ladder, exercising hegemonic control over all other classes by manipulating the means of production. It is evident that the mechanisms of economic control over the media in a capitalist society (vertical and horizontal integration, corporate conglomeration, directorial board membership, stock block ownership, etc.) are the primary tools enabling the dissemination of ruling class ideology. The overlap between media stakeholders, the government, and the primary distributors of wealth within the economy (banks, owners of large corporations) make up the ruling elite.

The class dynamic between the ruling class

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[27] Ibid. pg. 10
[28] Ibid. pg. 11

[29] Marx Karl Friedrich Engels and C. J Arthur. 1972. *The German Ideology. Art One : With Selections from Parts Two and Three Together with Marx's "Introduction to a Critique of Political Economy"*. New York: International. Pg. 64-66.

and the ruled is defined through their social roles as direct and indirect knowledge workers; as one writer notes, "there are direct knowledge workers (either employed as wage labour in firms or outsourced, self-employed labour) that produce knowledge goods and services that are sold as commodities on the market (...) and indirect knowledge workers that produce and reproduce the social conditions of the existence of capital and wage labour."[30] In this sense, the ruling class *are* indirect knowledge workers and the ruled (or working class) *are* direct knowledge workers.[31]
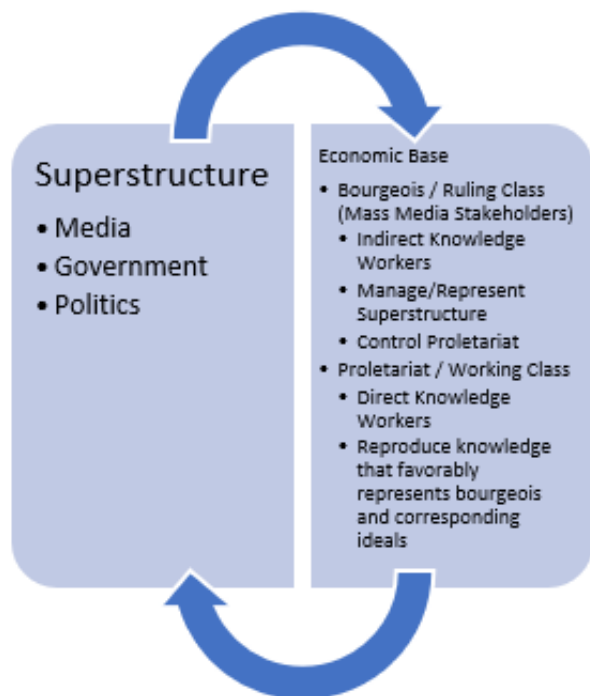
Figure 2. Marxist superstructure and base within mass media.[32]

Direct knowledge workers reify the ideals set by indirect knowledge workers, who, as owners of the means of production, are stakeholders in decisions pertaining to the regulation of the superstructure. Indirect knowledge workers contribute to decision-making across each sector of the superstructure. An example of this is the directorial board membership of mass media corporations. Mass media corporations have boards of directors who oversee business decision making. These boards are made up of members of the bourgeoisie, the capitalist class, representing the ideological interests of the owners of the means of production. Under a capitalist structure, the interests of the media then become the interests of the bourgeoisie. Those who work for the media then reiterate bourgeois values because the superstructure reflects them.

3.5. Repression & The Illusion of Choice Within the Superstructure

In the text *The Containment of Social Change in Industrial Society,* Marxist social theorist Herbert Marcuse describes the falsity of our supposed "technological society." According to Marcuse, a true "technological society" efficiently and rationally utilizes its available resources while producing the minimum amount of tangible and intangible waste. Conversely, modern capitalist society is the *opposite* of a "technological society"; it subverts civilian autonomy "by the blocking, by the arrest, and by the perversion of technological rationality—or, in one word, by the use of technology as an instrument of repression, an instrument of domination."[33] Outside of the traditional psychoanalytic definition of repression, Marcuse contends that repression must consider past, present, and *potential* repression of the individual, as represented by the labor opportunities available to them. Citizens of the twenty-first century who utilize digital media are repressed through the technological domination of media conglomerates and the ruling elites who ideologically inform the beliefs disseminated

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[30] Fuchs, Christian. "Class, Knowledge and New Media." *Media, Culture & Society 32,* no. 1 (2010): 141–150. Pg. 141.

[31] Tokos, Lauren. "Marxist Superstructure & Base within Mass Media." *Media Conglomeration and Automation: A Marxist Critique.* The Ethics of Enterprise and Exchange. Fall 2022.

[32] This diagram specifically leaves out aspects of the original superstructure/base diagram to emphasize the media's role within the traditional model.

[33] Marcuse, Herbert, and Douglas Kellner. *Towards a Critical Theory of Society.* New York: Routledge, 2001.

through the superstructure, thus enabling media conglomeration. Individuals utilize media platforms, which are predominantly owned by the same five companies, who compete with one another—and buy one another out—to ideologically manipulate the masses. To media conglomerates, individuals are merely consumers who, by using their platform, generate tangible and intangible capital for the company. In turn, the individual "[a]ppears to be increasingly powerless, confronted with the technological and political apparatus which this society has built up."[34]

Technological developments enabled the rise of industrial society which promoted consumerism through the capitalist economic structure. Consumerism is thus promoted through the media via advertising, providing individuals with the illusion of choice and opportunity. As Marcuse describes, "[t]he irrational in this society appears as rational because people indeed have more comforts, and more fun. Domination appears as freedom because people indeed have the choice of prefabricated goods and prefabricated candidates."[35]

4. Concluding Remarks

The digital media landscape we navigate today is primarily dominated by five media conglomerates: AT&T, The Walt Disney Corporation, NewsCorp, Paramount Global (formerly Viacom CBS), and Comcast. Although they once operated as a few amongst many, these conglomerates and their thousands of subsidiary companies own and operate much of the digital news media, television entertainment, and streaming services we use daily. American media legislation enabled the rise of these conglomerates through lenient legislation towards horizontal and vertical integration

efforts. Political influences on the media industry impact the corporate structure, and more specifically, employees within media corporations who carry out media labor.

Using Marx's framework of labor alienation, employees of media conglomerates are *alienated* from the creative work they do—whether it be videography, animation, copy writing, etc.—as their work is produced for a media conglomerate. Marxist theory contends that for a worker to realize their full human capacity, they must create a product for their own consumption, creative expression, or observational enjoyment. When employees of media conglomerates produce content for public consumption, they do so for the sake of compensation. This compensation is ultimately disproportionate to the profit margin generated by the content's dissemination within a capitalist economy. Media conglomeration strips individual employees of their capacity to create by defining success by what sells rather than what is most creatively fulfilling.

Media conglomeration perpetuates social stratification through corporate hierarchy, directorial board membership, and the need to increase shareholder value. The hierarchical corporate structure enables wage disparity between creative producers and the true value of the content they produce. Although corporate media employees generate value for their employer, they are paid a wage or salary that is disproportionate to the profit gained by the product of their labor. Shareholders, as owners of the means of production, profit from the labor of low and mid-level employees and ideologically control the type of content that the company—and by proxy, the low and mid-level employees carrying out this work—produces. The owners of the means of production unilaterally control the dissemination of ideas across media conglomerates through directorial board ownership. As Chomsky and Hermann identify, directorial boards are tasked with aiding in long-term decision making at media conglomerates;

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[34] Ibid. pg. 84.
[35] Ibid. pg. 86.

the decision-making body is comprised of owners of the means of production in other market sectors, and sometimes the same market sector. Together, media executives and directorial board members control the dominant ideology that is circulated through the media.

Despite the overarching structural domination of media conglomeration, consumers have the choice to decide the type of content they consume and the source of content they support. Consumers are changemakers. With enough pushback against corporate conglomeration in the media industry, consumers *can* change the structure of the market. Although the scope of this research is particular to the media industry, corporate conglomeration takes place in many sectors of the free market economy. Consumers have the power to educate themselves on the philosophical considerations associated with conglomeration and *choose* if it is worth supporting.

Works Cited

"AT&T to Acquire Time Warner | AT&T." 2016. AT&T. October 22, 2016. https://about.att.com/story/att_to_acquire_time_warner.html.

Bagdikian, Ben H. 2004. *The New Media Monopoly*. Boston: Beacon Press.

"Company Timeline." n.d. Comcast. Accessed May 21, 2023. https://corporate.comcast.com/press/timeline.

Croteau, David, and William Hoynes. 2012. *Media/Society: Industries, Images, and Audiences, 4th Edition*. Sage Publications. https://cadmus.eui.eu/handle/1814/19235.

Eichenwald, Kurt. 1988. "Murdoch Agrees to Buy TV Guide In a $3 Billion Sale by Annenberg." *The New York Times*, August 8, 1988. https://www.nytimes.com/1988/08/08/business/media-business-murdoch-agrees-buy-tv-guide-3-billion-sale-annenberg.html.

Fabrikant, Geraldine. 1995. "The Media Business:

The Merger; Walt Disney to Acquire ABC in $19 Billion Deal to Build a Giant for Entertainment." *The New York Times*, August 1, 1995. https://www.nytimes.com/1995/08/01/business/media-business-merger-walt-disney-acquire-abc-19-billion-deal-build-giant-for.html.

Fuchs, Christian. 2010. "Class, Knowledge and New Media." *Media, Culture and Society* 32 (1): 141–50. https://doi.org/10.1177/0163443709350375/ASSET/0163443709350375.FP.PNG_V03.

Herman, Edward S., and Noam. Chomsky. 1988. *Manufacturing Consent: The Political Economy of the Mass Media*. 1st ed. Pantheon Books.

Johnson, Helen. 2021. "The Unprecedented Consolidation of the Modern Media Industry Has Severe Consequences." *The Miscellany News*, April 29, 2021. https://miscellanynews.org/2021/04/29/opinions/the-unprecedented-consolidation-of-the-modern-media-industry-has-severe-consequences/.

Kumar, T., and Lalatendu Kesari Jena. 2020. "Capital vs. Digital Labor in the Post-Industrial Information Age: A Marxist Analysis." *Emerging Economy Studies* 6 (1): 50–60. https://doi.org/10.1177/2394901520907707.

Marcuse, Herbert. 2017. *Towards a Critical Theory of Society: Collected Papers of Herbert Marcuse*. Edited by Douglas Kellner. 2nd ed. Taylor & Francis. https://www.routledge.com/Towards-a-Critical-Theory-of-Society-Collected-Papers-of-Herbert-Marcuse/Marcuse-Kellner/p/book/9780815371663.

Marx, Karl, and Friedrich Engels. 1972. *The German Ideology*. Edited by C.J. Arthur. New York, NY: International Publishers. https://www.worldcat.org/title/704570.

Marx, Karl. "Chapter Free Time and the Production Process in Capitalist and Communist Society." Essay. In *The Grundrisse. Edited and Translated by David McLellan. 1st U.*

S. Ed., 153–56. New York: Harper & Row, 1971.

Marx, Karl. *Economic and Philosophic Manuscripts of 1844*. Dover ed. Newburyport: Dover Publications, 2012.

Mifflin, Lawrie. 1996. "Fox Presents Its Lineup for News Channel." *The New York Times*, September 5, 1996. https://www.nytimes.com/1996/09/05/arts/fox-presents-its-lineup-for-news-channel.html.

Rosenthal, Thomas B. 1987. "Murdoch to Buy Harper & Row for $300 Million: Media Baron's Purchase of Book Publisher Will Leave Few Independents in Field." *Los Angeles Times*, March 31, 1987. https://www.latimes.com/archives/la-xpm-1987-03-31-fi-1385-story.html.

Shenon, Philip. 1993. "Star TV Extends Murdoch's Reach." *The New York Times*, August 23, 1993. https://www.nytimes.com/1993/08/23/business/the-media-business-star-tv-extends-murdoch-s-reach.html.

"Murdoch Takes Over Collins for $721 Million." *Los Angeles Times*, January 7, 1989. https://www.latimes.com/archives/la-xpm-1989-01-07-fi-259-story.html.

ViacomCBS Staff. 2022. "ViacomCBS Unveils New Company Name, Global Content Slate and International Expansion Plans for Paramount+ at Investor Event." ViacomCBS. February 15, 2022. https://www.paramount.com/press/viacomcbs-unveils-new-company-name-global-content-slate-and-international-expansion-plans-for-paramount-at-investor-event