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DUURJ
DU Undergraduate Research Journal

Dear University of Denver Community,

We are thrilled to present the fourth issue of the DU Undergraduate Research Journal (DUURJ), the University of Denver's sole entirely student-run biannual peer-reviewed journal, dedicated to showcasing outstanding research and creativity from the undergraduate community. We would like to especially acknowledge the passionate students across campus working to further knowledge in their respective fields and their mentors that devote their time to training the future generation of researchers. Without their ongoing efforts and open sharing of research our mission would only be a concept.

The articles in this issue are representative of a sliver of the high-quality undergraduate research that takes place on DU's campus each day. That said, this publication features original student work analyzing the Chinese healthcare system, media coverage of terrorism, uranium atmospheric deposition, and the post-black death economy, spanning the fields of history, chemistry, international studies, political science, economics and journalism studies. Also featured is an interview with Dr. Corinne Lengsfield, the Associate Provost of Research and Principal Investigator of the DU Spit Lab, a cutting-edge research project that is now capable of testing up to 1,000 people daily for COVID-19 using saliva samples with less than a 24-hour turnaround time.

This publication is a testament to the commitment and collaborative effort of an extraordinary team of dedicated students. We are intensely thankful to the entire DUURJ staff for their patience, flexibility, hard work, and grace as we all navigated unprecedented transition. We would also like to graciously thank Dr. Katherine Tennis and the up-and-coming Center for Undergraduate Scholarship and Honors for consistent support to our young student-run journal.

As for my term as Editor in Chief, in a time of disregard for scientific facts, by some in powerful governmental positions, and a slew of misinformation on social media it is both comforting and encouraging to witness the commitment of my peers to the relentless pursuit of knowledge. I hope you too are inspired and reassured in reading the work of these amazing student researchers and scientists. It was an absolute pleasure serving this journal, and especially knowing that I abided by Robert Baden-Powell's scout's rule: "Try and leave this world a little better than you found it, and when your turn comes to die, you can die happy in feeling at any rate, you have not wasted your time but have done your best."

Sincerely,

Thane Gehring
Editor in Chief

DUURJ

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University of Denver Undergraduate Research Journal

Do Audit Partner Gender and Firm Size Influence Accounting Quality?

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Abstract

This paper examines the association between audit partner gender and client financial reporting quality. I hypothesize that audit engagements with a Big 4 female audit partner will exhibit higher financial reporting quality than with other auditors. I test my hypothesis by estimating a multivariate ordinary least squares regression model. Consistent with my hypothesis, the results indicate that female auditors within the Big 4 accounting firms have the lowest discretionary accruals.

Keywords: audit partner, gender, reporting quality, big 4, discretionary accruals

1 INTRODUCTION

This paper aims to examine the association between audit partner gender and client financial reporting quality. Motivation for this study comes from existing research exploring gender roles in the accounting profession. Prior research has shown that females are more risk averse and conservative, and other studies have shown that male and female auditors respond to information differently[1]. While some studies focus on the differences of gender, there is no research surrounding audit partner gender as it relates to firm size and accounting quality.

Consistent with my hypothesis, the results indicate that female auditors within the Big 4 accounting firms have the lowest discretionary accruals. In other words, female audit partners who work for one of the Big 4 accounting firms have clients that exhibit the highest financial reporting quality relative to other clients.

This paper provides new contributions to the existing literature by expanding on previous studies and providing new insights into the factors that contribute to a client's reporting quality. Past research has explored the relationship between audit partner gender and CFO gender in terms of accounting quality. This paper shows a correlation between audit partner gender, firm size, and accounting quality.

2 LITERATURE REVIEW

Looking at the differences between male and female auditors, the selectivity model shows that males are more selective information processors than females. Males are less likely to look comprehensively at information and rather focus on cues that are readily available or only lead to single inferences[2]. Women, on the other hand, attempt to comprehend all available information and are more likely to notice subtleties. Based on the selectivity model, research finds that males are more likely to outperform females when tasks are of low complexity, but females outperform males when the tasks become more complex[3]. The gender role socialization theory suggests that people acquire emotions, attitudes, and behaviors that are consistent with their gender due to the surrounding environment and culture. Using this theory, studies show that males are more goal-oriented while women prefer to be more democratic and communicative[4]. Theory further suggests that women are more ethical than men, and research confirms that females are less concerned with the commercial, revenue generating side of auditing and are more focused on the quality of the audit[5]. The organizational theory helps to explain the behavior of individuals and groups who interact with each other while striving to reach a common goal. This theory suggests that females are better able to facilitate "tough" decision making and improve organizational outcomes compared to their male counterparts[6]. These cognitive theories are significant when it comes to audit quality since audits require many situations for human judgement.

Additional research shows that if auditors learn their superior partners' viewpoints prior to making their own decisions and judgements, they are influenced by the audit partner. This can be correlated to the theory of motivated reasoning where people have an unconscious bias to interpret information in a way that aligns

with their own goals. Kunda[7] found that motivated reasoning can drive cognitive biases in auditing, and additional research shows that auditors will change their original opinions based on learning the judgements of their partners[8]. Motivated reasoning not only explains why an auditor may take their partner's word at face value, but it can also explain why auditors may convince themselves that a client is being reasonable without practicing appropriate professional skepticism. Additionally, the lead audit partner has the responsibility to determine the type of audit report issued and can suffer serious consequences if there are failures. Therefore, there is much at stake for the audit partner both personally and professionally when it comes to making decisions about the audit. Prior research suggests that males and females make different overall audit decisions which can affect the audit quality and the type of audit report issued[6]. Gender roles can affect the financial reporting quality of the client as well since females are more risk averse, conservative, and likely to follow rules and regulations.

Prior research argues that auditor characteristics affect the audit quality. Studies have found that Big 4 accounting firms have higher-quality audits than non-Big 4 firms since larger firms have a greater incentive to detect and reveal misreporting[9]. DeAngelo[10] shows that the greater number of clients an auditor has, the higher the audit quality will be. Big 4 firms typically have more clients, and auditors at those firms have less incentive to behave opportunistically since there are more clients to financially support them. The larger firms have more to lose if they supply a lower than expected quality of an audit since they have a greater reputation at stake that spans a larger number of clients. Additionally, other studies use the presence of litigation as an indicator of audit quality. Studies show that non-Big 4 firms experience more litigation issues than Big 4 firms despite larger firms having more money available for litigation cases[11]. Since non-Big 4 firms face more litigation issues, it suggests that their audit quality is lower than Big 4 firms. Finally, other research has shown that companies audited by Big 4 firms have a higher earnings response coefficient than ones audited by non-Big 4 firms, thereby showing that Big 4 firms have higher accrual and audit quality[12]. Based on this, researchers predict that non-Big 4 auditors will report higher discretionary accruals than firms with Big 4 auditors[9]. However, it is not only the environment and size of the firm that can affect audit quality.

Research also shows that gender can affect audit quality. Following prior studies, audit quality has been measured by the likelihood of an auditor issuing a disclosure, called a "going concern opinion," that is made when the auditor believes there is substantial doubt that the company will continue into the future. The audit quality is higher when an auditor issues a going concern opinion when the company is in financial distress[5]. Researchers hypothesize that females will issue a going concern opinion more often than males when a firm is in financial distress since females are more ethical and less concerned with generating revenues[5]. The researchers use a sample of 7,105 private, financially distressed Belgian companies to run a multiple regression testing a gender variable that is 1 if the audit engagement partner is female and 0 if it is male. The results support the hypothesis and find that females are more likely to issue a going concern opinion even when the client is high risk or important for generating revenue. Based on the results, the researchers suggest that females produce higher quality audits since they are more risk averse and less willing to impair independence[5]. However, a different study suggests that females are less likely to issue a going concern opinion when the company is in financial distress[6]. The study concluded that males and females make different audit decisions based on their differing risk tolerance levels and that these decisions can influence audit quality. Notably, these opposing studies were conducted in different countries, and varying results could speak more to gender norm differences in the countries rather than the audit quality. The research notes that females use more precise information to make decisions which could explain why researchers in this study found that females are more hesitant to issue a going concern opinion than males. Regardless of the conflicting findings, both studies note that females are more risk averse and offer a consensus that gender plays into an auditor's role on the engagement.

Another study focuses on whether there are systematic differences in financial reporting choices in the context of accounting conservatism between male and female CFOs[1]. The study researches whether female CFOs are more sensitive to certain types of risk than males. The researchers hypothesized that when a firm changes from a male to a female CFO, the female CFO will implement more conservative reporting procedures than her predecessor. The hypothesis was tested using a sample of 974 firm observations with "92 cases of male to female transitions" in addition to 4,239 other firm observations with 353 male to male transitions and 421 female to male transitions[1]. In multivariate analyses, controlling for profitability, leverage, and research and development, among other variables, they find that female CFOs are more conservative in financial reporting decision making than males; however, this increase in conservatism cannot be explained by corporate governance. The results also find that females report more conservatively when there is higher default risk, systematic risk, and management turnover risk[1]. Contrary to the general tendency of managers seeking to report financial results that present a more favorable view of a company regardless of its true performance, conser-

vative reporting is often preferred because it provides users of financial statements with the "worst case scenario" without instilling a false sense of security for the future. Additionally, conservatism encourages management to be more cautious when making operational decisions that will improve the likelihood that a company experiences positive financial performance. This study contributes to the literature because it examines how characteristics and styles of management can affect financial reporting policies and accounting conservatism. These different characteristics can relate to how males and females respond to earnings management, the use of accounting reporting techniques to portray financial statements in an overly positive way. Since females are more risk averse and more likely to follow rules and regulations, studies find that women are less likely than men to manage both discretionary accruals and real activity operations to avoid losses[13]. Because females tend to be more ethical, research suggests that the risk and possible unethical decision to manage earnings deters females more than males from engaging in earnings management. Regardless, several motivations for earnings management still exist. A main motivation is due to pressure from a third party. Research shows that managers are often under great stress from stakeholders and the board to improve company performance. There can be incentives to avoid a debt covenant violation, an agreement that a company will operate within certain rules from its lenders, or to lower the tax burden. This pressure can come from within the organization as well in order to meet internal goals, and often there is a personal incentive for executives to perform successfully which can lead to earnings management to meet benchmarks[14]. Based on these studies, the gender of an auditor may influence client outcomes since females are less likely to engage in and tolerate earnings management.

Not only does research examine the role gender plays in conservative policy choices, but studies also observe the effect of CFO gender on accruals quality. The interest in CFO gender comes after accounting scandals like Enron and the need for CFOs to personally sign off on financial statements. Prior research finds that women tend to be less aggressive in ambiguous situations than men and are more likely to be in compliance with rules and regulations[15]. Based on these factors, the researchers hypothesize that female CFOs would have higher accruals quality. The researchers test their hypothesis using a sample of 2,781 firms over the years of 2004-2005 for their multivariate analyses. The model controls for variables such as total assets, book value of equity to market value, revenue growth, return on assets, operating cash flow, debt to equity, operating cycle, and if the firm was audited by a Big 4 auditor. The research concludes that female CFOs have lower accrual estimation errors and lower absolute abnormal accruals, thereby confirming the hypothesis. Since females are more risk averse than males, females are less likely to overestimate accruals. Risk aversion is seen in women even after controlling for factors such as age, income, and marital status.

3 HYPOTHESIS AND METHODOLOGY

This study explores whether a client's financial reporting quality is associated with the audit partner gender and firm size. Because females are more risk averse, I believe that female audit partners will more strictly enforce conservative accounting policies and will ensure that all rules are being followed. Female audit partners will likely be less flexible with client estimates and require more detail to support estimations. Since females are less focused on the commercial side of auditing, it is likely that they are more concerned with providing accurate information to financial statement users than pleasing their clients. Females are likely less influenced by their clients and will not facilitate misreporting just so the client can reach its reporting objectives. Additionally, since females can better navigate difficult decision making and tend to be more ethical, it is likely that females will not cut corners and will be more willing to report fairly and correctly. Auditors at Big 4 firms have been shown to have higher audit quality because they face fewer litigation issues than non-Big 4 firms. Similar to females, Big 4 auditors in general are less likely to be influenced by their clients since they have more clients that they work for. Big 4 auditors also have a greater reputation at stake that they must not harm by behaving opportunistically. Because women are more risk averse and more often use conservative accounting and Big 4 firms have been proven to have higher audit quality, I state my hypothesis as follows in alternative form:

H1: *Audit engagements with a Big 4 female audit partner will exhibit higher financial reporting quality than those of other audit partners.*

I obtain audit partner information and other audit firm data from Audit Analytics and client data for model variables from Compustat for public companies headquartered in the U.S. from the years 2016 to 2018. I manually code partner gender and use various websites to verify gender for partner names when there are discrepancies. I exclude firm-year observations of regulated firms (i.e., financial institutions and utility firms) due to their unique reporting standards and regulatory requirements. My final sample consists of 6,873 client-year observations (2,914 unique clients).

To study whether female and male audit partners have clients with different levels of earnings management, audit partners will be classified as male or female based on the disclosed engagement partner informa-

	Female Audit Partner 2016: n = 322 2017: n = 402 2018: n = 372				Male Audit Partner 2016: n = 1,672 2017: n = 2,149 2018: n = 1,956				Test of Difference between Mean (Median)
Variables	Mean	Q1	Median	Q3	Mean	Q1	Median	Q3	p-Values
ABS_DD	0.1512	0.0273	0.0686	0.1573	0.1444	0.0256	0.0613	0.1422	< 0.01
AU	0.6825	0.0000	1.0000	1.0000	0.6256	0.0000	1.0000	1.0000	0.10
SIZE	6.0301	4.5725	6.2592	7.6961	6.0066	4.2943	6.2870	7.7977	0.01
BM	0.3736	0.1299	0.3214	0.6413	0.3263	0.1302	0.3185	0.6137	0.91
SGROWTH	0.2303	-0.0390	0.0627	0.2136	0.2257	-0.0306	0.0694	0.2147	0.57
ROA	-0.2103	-0.1983	0.0091	0.0592	-0.2394	-0.1589	0.0134	0.0675	< 0.01
OCF	-0.0838	-0.0655	0.0595	0.1143	-0.0937	-0.0381	0.0632	0.1165	< 0.01
OCF^2	0.3073	0.0037	0.0114	0.0412	0.4066	0.0036	0.0109	0.0328	< 0.01
DE	0.4966	0.0000	0.2086	0.7501	0.5009	0.0000	0.2059	0.7990	< 0.01
OPCYCLE	3.3853	0.0000	4.4851	5.0094	3.5993	0.0000	4.5587	5.1102	0.14

Variable Definitions:

ABS_DD = absolute value of accrual estimation errors using the Dechow and Dichev model[16];
AU = indicator variable takes a value of 1 if the firm is audited by one of the Big 4 auditors and 0 otherwise;
SIZE = natural logarithm of market value of equity;
BM = ratio of book value of equity to market value;
SGROWTH = changes in current year's sales divided by lagged sales;
ROA = return on assets measured as earnings before extraordinary items divided by average total assets;
OCF = operating cash flow scaled by lagged assets;
DE = debt-equity ratio; and
OPCYCLE = natural logarithm of the length of operating cycle measured as the sum of average days of account receivable and average days of inventory.

Table 1 Descriptive Statistics

tion to the PCAOB and various company websites. This study will examine the engagement partners' clients by focusing on factors such as discretionary accruals, real earnings management, and the issuance of going concern comments between male and female partners to determine varying levels of financial reporting quality.

3.1 Regression Model

I conduct a multiple regression model using ordinary least squares to test my hypothesis that audit engagements with a Big 4 female audit partner will have higher financial reporting quality. I employ an augmented regression model of Barua et al.[15] as follows:

$$\begin{aligned} ABS_DD_{it} = {} & \alpha_0 + \alpha_1 PTRNR_GENDER_{it} + \alpha_2 AU_{it} \\ & + \alpha_3 SIZE_{it} + \alpha_4 BM_{it} + \alpha_5 SGROWTH_{it} \\ & + \alpha_6 ROA_{it} + \alpha_7 OCF_{it} + \alpha_8 OCF_{it}^2 + \alpha_9 DE_{it} \\ & + \alpha_{10} OPCYCLE_{it} + \epsilon_{it} \end{aligned}$$

4 RESULTS

4.1 Sample and Descriptive Statistics

Table 1 lists the descriptive statistics for the dependent and independent variables. The data is split based on audit partner gender. Female audit partners make up 16% of the total data over the three-year period. The mean absolute value of accrual estimation errors is 0.1512 for firms with female audit partners compared to 0.1444 for firms with male audit partners. Additionally, the median is 0.0686 for firms with a female audit partner and 0.0613 for firms with a male audit partner. This table also provides the mean and median for the control variables.

4.2 Hypothesis Test

Table 2 shows the results from the multivariate regression using the dependent variable of ABS_DD. The coefficients SIZE, BM, SGROWTH, ROA, and OCF are statistically significant based on the p-value and have signs that are consistent with prior research. The coefficient for partner gender is opposite from the predicted

sign. However, it is still significant with a *p*-value of 0.0490.

Table 3 shows the results from the multivariate regression using ABS_DD as the dependent variable and the interaction term AU_GENDER, which is calculated by multiplying the AU and the PTRNR_GENDER variables together. The coefficient AU_GENDER is statistically significant and consistent with my hypothesis.

		ABS_DD	
Variables	Predicted Sign	Coefficient	*p*-Value
Intercept	?	0.2242	< 0.0001
PTRNR_GENDER	-	0.0172	0.0490
AU	-	-0.0170	0.0620
SIZE	-	-0.0245	< 0.0001
BM	-	-0.0283	< 0.0001
SGROWTH	+	0.0340	< 0.0001
ROA	-	-0.1720	< 0.0001
OCF	?	0.0994	< 0.0001
OCF^2	+	0.0037	0.1860
DE	?	0.0002	0.9040
OPCYCLE	+	0.0039	0.0370
R Squared	36.81%		
No. Observations	6,873		

Table 2 Regression of Absolute Value of Accrual Estimation Errors

		ABS_DD	
Variables	Predicted Sign	Coefficient	*p*-Value
Intercept	?	0.2190	< 0.0001
PTRNR_GENDER	-	0.0664	< 0.0001
AU	-	-0.0062	0.0518
AU_GENDER	-	-0.0724	< 0.0001
SIZE	-	-0.0245	< 0.0001
BM	-	-0.0284	< 0.0001
SGROWTH	+	0.0339	< 0.0001
ROA	-	-0.1722	< 0.0001
OCF	?	0.0999	< 0.0001
OCF^2	+	0.0038	0.1860
DE	?	0.0002	0.9040
OPCYCLE	+	0.0035	0.0370
R Squared	36.84%		
No. Observations	6,873		

Table 3 Regression of Absolute Value of Accrual Estimation Errors Including Interaction Term

5 CONCLUSION

This study investigates the relationship between auditor gender and firm size with respect to the client's financial reporting quality. Based on prior research, Big 4 firms have higher audit quality than non-Big 4 firms. This research confirmed that discretionary accruals are significantly lower for Big 4 firms. The main analysis fails to support my initial hypothesis, suggesting female auditors have clients that exhibit the lowest level of accounting quality. This could likely be due to the lower degree of resources and support at smaller firms to help their female partners succeed. I therefore explore whether clients of Big 4 firms with female auditor partner have higher quality financial reporting. I find evidence that female auditors in Big 4 firms have clients that exhibit superior accounting quality relative to other audit client engagements. This is significant because it suggests that audit firms may increase their client's reporting quality if more audit engagements have females as the lead engagement partner. Additionally, it may benefit audit firms to have female partners on high stake clients or clients that are historically important to help increase the likelihood of the clients' accounting quality. Non-Big 4 firms may want to adopt practices used by the Big 4 to increase the reporting quality of their clients regardless of the partner's gender but especially for those with female partners.

6 FUTURE DIRECTIONS

These results contribute to the accounting research because they link audit gender, firm size, and client accounting quality. This research connects extant research that examines gender and firm size independently in audit settings and provides new insight into differences in reporting quality between clients of female audit partners versus male audit partners. I acknowledge that this study has limitations. Additional research could explore various factors that drive the results. It is possible that the results are being driven by CFO gender, first year engagements of the audit partner-client relationship, audit partner experience, and the workload (i.e., number of private and public companies under audit by the partner) and other correlated omitted variables. Additionally, the results could be driven by the client's duration as a public company, facing reporting burdens that stem from an increase in regulatory compliance requirements. Therefore, more extensive research is warranted to fully understand audit client engagements influenced by audit partner characteristics. Finally, given the nature of the role of monetary incentives in motivating high-quality work, it would be interesting to explore compensation differences between female and male audit partners.

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8 EDITOR'S NOTES

This work was adapted from a senior thesis and has been condensed for publication. Contact DUURJ staff for the full publication.

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Pompeii by Maria Stevens

The Financial Implications of the Chinese Healthcare System

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Abstract

In 1949 one of the world's most powerful and influential countries was born: The People's Republic of China. Perhaps the greatest challenge the country has consistently faced since its inception has been ensuring a fiscally sound healthcare system. Today, China has the world's largest population and a rapidly aging society with 330 million citizens over the age of 65 projected by 2050- nearly the same size as the total U.S. population. Living standards across China have been drastically increasing in recent decades and the Chinese people are desiring better, higher quality healthcare to complement their new lifestyles. With this desire comes China's unique challenge of scale - operating the world's largest healthcare system for 1.4 billion people. This paper introduces the historical perspective and background of China's healthcare system, the major phases of reforms, how successful those reforms have been, and finally explores the financial impact China's healthcare system has had around the globe.

1 INTRODUCTION TO CHINA'S HEALTHCARE SYSTEM

1.1 Overview and the Financial Importance of the Chinese Healthcare System

For a long time, the Chinese economy has relied on factories and investment and not much on spending. The central government has been focused on shifting China's economy to a more consumer-oriented economy with high-tech companies replacing factory workers. A major challenge to achieving this transition is the healthcare system. Too many people are worried about future medical bills and choose to save rather than spend. To help combat this issue, the government has made healthcare reform a priority and is working to increase access, increase the quality of care, and decrease costs[1].

From China to the US to Germany to Brazil, the heart of healthcare debates around the world stems from the question "how do you ensure healthcare is high quality and affordable for everyone without stressing a nation's finances?". The following sections describe China's current healthcare system.

1.2 Government Healthcare

The Chinese government operates on the principle that every citizen is entitled to receive basic health care. Government-sponsored healthcare in China has been increasing gradually over the past decades and the Chinese population is now more than 95 percent covered by government insurance. The central government is responsible for national health legislation, policy, and administration while local governments are responsible for organizing and providing healthcare services. Providing coverage to 1.4 billion people requires a large institutional structure.

The China People's Congress is responsible for healthcare legislation while the National Health Commission is responsible for formulating health policy and healthcare reform. The Ministry of Finance provides funding for the government healthcare system through a shared system of financing and delivery between local, provincial, and central government entities[2].

1.3 Chinese Hospital Structure

Chinese hospitals are categorized using a three-tier system. Hospitals with over 500 beds are classified as Tier 3 and are considered to have the highest quality of care that China offers. They perform the most advanced, complex procedures and many of China's top doctors work in those facilities[3]. Tier 2 hospitals are medium-sized city or county hospitals. Tier 1 hospitals are local township hospitals. Part of the Chinese healthcare reform, which will be discussed in detail in a later section, has been addressing the imbalance between Tier 1, 2, and 3 hospitals.

1.4 Chinese Healthcare Insurance

China's healthcare insurance system can be broken down into three categories:

1. *Urban Employee Basic Medical Insurance.* This form of insurance is required for those who are employed within a major city and is financed via employee and employer payroll taxes. In 2018, 316.8 million had employer-based insurance[2].
2. *Urban-Rural Resident Basic Medical Insurance.* This form of insurance is primarily paid by the government and partially financed through individual premiums[4]. It covers rural and urban residents who are: self-employed, children, students, elderly adults, and others. Unlike the Urban Employee Basic Medical Insurance, this form of insurance is not mandatory. In 2018, 897.4 million were covered under this insurance program[2].
3. *Private Health Insurance.* This type of insurance is purchased primarily by higher-income individuals. Private insurance can be used to cover deductibles, copayments, and other cost-sharing, as well as provide coverage for expensive services not paid for by public insurance[2]. Although there is no data available for private health insurance in recent years, in 2012, approximately 30 percent of China's urban population had private health insurance while another 20 percent were planning to buy private health insurance in the future[5]. Most Chinese private health insurance plans use private facilitates, since they usually have lower wait times, internationally trained staff, a high standard of service, and high-quality facilities[6]. However, private insurance can also be used at public hospitals.

There are no annual caps on out-of-pocket spending. In 2018, out-of-pocket spending per capita was CNY 1,186, which is equivalent to approximately USD 262[2]. For comparison, the per capita GDP in China is USD 9,770[7]. Meanwhile, in the US, out-of-pocket spending is USD 1,125[8], and the per capita GDP is USD 62,794.59[7].

Total healthcare expenditure in China (including out-of-pocket spending, and insurance/ government spending) per person in 2018 was CNY 4,236, equivalent to approximately USD 648.03[9]. In contrast, the total healthcare expenditure per person in the US was USD 11,582[10]. While these numbers could lead to the conclusion the US has a superior healthcare system, it is important to note raw numbers do not explain the full story. For example, on average other western countries spend about half as much per person on healthcare, yet many have significantly better health outcomes[11]. It is important to remember that efficiency- how healthcare expenditures are utilized and how doctors spend their time- is more important than raw healthcare spending numbers. Readers should be cautioned against basing conclusions about Chinese and American healthcare systems purely on surface-level data.

For citizens who cannot afford their healthcare costs, including out-of-pocket spending, copayments, and insurance premiums, there is a financial assistance program available. This program is funded by local governments and social donations. In 2018, 76.7 million people, approximately 5.5 percent of the population, received this social safety net assistance[2].

2 FINANCIAL CHALLENGES OF THE CHINESE HEALTHCARE SYSTEM

There have been six major phases of reforms in the Chinese healthcare system with the most recent ending in 2020. The reforms are continual, and a seventh reform will be announced for 2021. This section explores the challenges faced by the Chinese population which led to these reforms. Older data was used to showcase the challenges the healthcare system was facing in the 1990s and early 2000s. This section is further divided into the various problems faced by the Chinese population, yet nearly all of them face the same overarching issue of cost control. These challenges have led to a series of governmental healthcare reforms which will be discussed in the section titled "Major Reforms".

2.1 Demographic Shifts

By 2050, it is estimated that almost half of the total Chinese population will be 50 years or older[12]. This is a result of increased living standards triggered by swift economic growth in recent decades, major advances in health technologies, an increase in healthcare insurance coverage, and better education[13]. Additionally, the one-child policy, which limited families to one child from 1979-2015, allowed families to focus healthcare resources and education on one child, which led to a higher life expectancy[14]. At the same time, people are less physically active due to changes in types of work, lifestyle, and modern transportation, resulting in more non-communicable diseases (NCD). These factors have increased the needs and costs of healthcare[13].

Shifts in Chinese demographics have resulted in three important consequences for the Chinese healthcare system:

1. Higher expectations of the healthcare system. Chinese patients have grown accustomed to using health facilities offering a full array of equipment and medical services. Additionally, Chinese patients are no longer required by their insurance to seek medical care in the district where they live, which allows patients to go to any hospital, in any city. Recent advancements in transportation and road networks across China have also led to

increased mobility. This has led to many people from rural or poor districts being able to travel to high-quality healthcare centers like Beijing. This has increased the expected level of care all around China[14].

2. Geriatric and Long-term Care. With a higher life expectancy and a large aging population, the Chinese healthcare system is facing a push to increase the amount of care for the elderly. This includes increasing the number of long-term care facilities, as well as developing more treatments for diseases that typically affect older populations, such as arthritis[14].
3. Increased costs. The recent increase in both healthcare quality and healthcare consumption has put a tremendous financial strain on the healthcare system[13]. Government healthcare decision-makers face the difficult challenge of increasing healthcare technology and quality, to generate the largest health gain with the least possible cost[12].

2.2 Individual Healthcare Costs, Insurance Coverage, and Out-of-Pocket Payments

The costs associated with the Chinese healthcare system have come under scrutiny as citizens have been paying an increasingly large proportion of the bill since the end of the nearly-free Maoist-era healthcare system. By 2003, only 30 percent of the Chinese population could afford insurance[15]. On average, a single inpatient episode in 2003 involved out-of-pocket expenditures equivalent to nearly 55 percent of annual per capita consumption.

By the end of the 1990s, private health spending as a share of total health spending, which was just 20 percent in 1978, exceeded 60 percent[16]. This may be acceptable if a patient is expected to pay 60percent of a 30 dollar flu vaccine but is certainly not acceptable if a patient is expected to pay 60 percent of a 100,000 dollar heart transplant.

Another challenge faced by Chinese patients is that all payments for healthcare treatment must be paid upfront, in one single invoice[14]. Later, insurance may reimburse some of the expenses, but the patient must initially bear the entire cost. This often involves taking out significant loans and coming to the hospital with large sums of cash to be ready to pay for whatever treatment is necessary[17].

2.3 National Healthcare Costs

In addition to individual healthcare costs, the Chinese government has also faced rising healthcare costs in recent decades. The annual rate of healthcare has been increasing 17 percent annually over the past two decades. Total health expenditure, including government spending, collective spending, and private out-of-pocket spending, increased from CNY 74.7 billion in 1990 to CNY 1.998 trillion in 2010. According to the National Health Account Report (conducted by the Chinese government), the increased rate of health care costs in China far exceeded the rate of economic growth during the same period. Since 1980, the government funding appropriated to Chinese health has been in decline, resulting in many hospitals having to directly charge patients. Although prices were regulated, it was done in a way that inadvertently gave providers powerful incentives to focus on medicines and high-tech care at the expense of basic cost-effective interventions and core public health functions. As a result of hospitals' decreased government funding, personal health care costs increased dramatically. Figure 1 shows how high China's patient costs became, in comparison to other countries during the 1980s[13].

2.4 Over-utilization of Tier 3 Hospitals and Over-utilization of Services

Since the economic reforms of the 1980s and beyond, which drastically increase living standards across China, the expected level of treatment quality has risen considerably. The number of establishments able to meet these new, high-quality care expectations, was reduced to only the very best urban hospitals, thus creating high demand and low supply for such treatment. Meanwhile, lower-tier healthcare establishments have found themselves with too much supply, and insufficient demand as their patients travel to seek care at the more advanced Tier 3 hospitals. Contrary to practices in the West, where the patient consults a general practitioner in a healthcare practice for problems that are considered minor, China's public hospitals, especially those referred to as "excellent" deal with both inpatient and outpatient treatment[14]. Thus, if someone has a simple cold and wants to be seen, they go to the hospital, not a general practitioner. Each time they go to a hospital, they may see a different doctor.

In part, the high costs of the 1990s and early 2000s were caused by hospital inefficiency. During the 1990s and early 2000s, patients chose to go to Tier 3 hospitals for even the slightest cold or cough. This resulted in overcrowding at Tier 3 hospitals and drastic underutilization of local Tier 1 and 2 hospitals and clinics, causing nationwide inefficiency. While people waited in lines at Tier 3 hospitals, thousands of beds lay empty in local hospitals and clinics. Underutilized beds tended to be accompanied by underutilized staff and overinvestment in equipment. Costs, as a result, were higher than necessary. For township health centers (THC), the cost of excess capacity was around 40 percent higher than it would have been if their excess capacity had been eliminated. Not only was there more capacity than necessary for the number of patients, the patients who

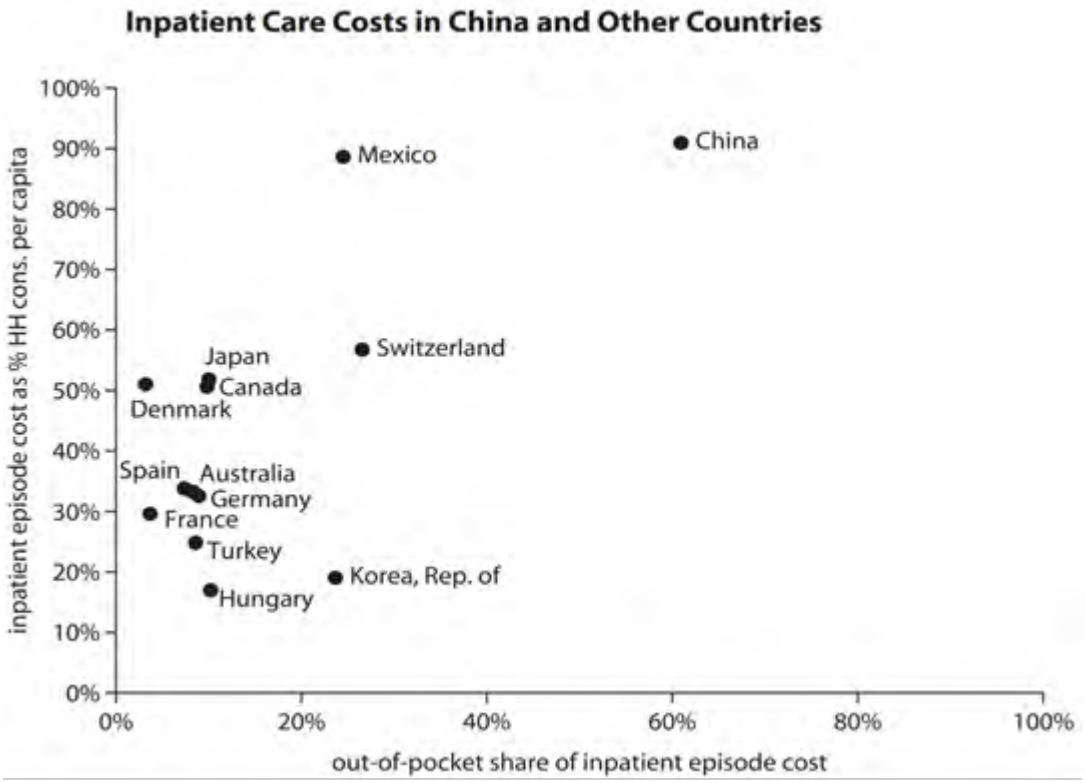

Figure 1

were treated tended to incur very high costs; and in some cases, the higher costs were medically unwarranted[13]. These patients had to bear the burden of a lack of hospital clientele. This, in turn, drove even more patients away from local hospitals and towards Tier 3 hospitals.

With major advances in public transportation and road networks in recent decades, rural residents can easily travel long distances to visit Tier 3 hospitals. Once they arrive, patients may wait for hours or even days in waiting rooms for an outpatient consultation. The result is an overload on Tier 3 facilities, resulting in very long waiting times and short consultations times. This increase in demand for hospital consultations has fueled a healthcare system that gives little incentive to consult locally since patients are entitled to go to any hospital they choose. Major public hospitals account for more than 90 percent of inpatient admissions and more than 50 percent of outpatient consultations, with between 60 and 80 consultations per day per physician[14].

2.5 Urban vs Rural and Rich vs Poor Divide

Prior to the 2003 reforms, rising healthcare costs and out-of-pocket payments made it increasingly difficult for poor patients to pay for healthcare. The World Health Report of 2000 stated China had the most inequitable healthcare system in the world. In 2002, it was found that subsidies for both outpatient and inpatient services were generally allocated to the rich rather than to the poor[18]. In the 2003 National Health Survey, 30% of poor households blamed health care costs for their poverty[16].

Rural areas tended to have fewer hospitals and care facilities, fewer doctors and nurses, and as a result, lower quality of care[14]. In the 1990s, children living in the poorer central and western provinces were more likely to be malnourished than those living in the richer eastern provinces, and rates of malnutrition were found to have fallen faster among children in cities than in the countryside[19].

Prior to the economic reforms of the 1980s, nearly all citizens were covered by some type of health insurance. The bulk of the rural, agricultural population in the 1970s was covered by the Commune Cooperative Medical Scheme (CMS). During the 1980's transition from a planned economy to a market economy, health insurance coverage in rural areas fell dramatically. By 2003, 80 percent of China's rural population—some 640 million people—lacked health insurance and only 10 percent of the rural population was covered by a government scheme. Coverage in China's cities also declined, though less dramatically, and by 1998 nearly half the urban population lacked insurance coverage[16].

2.6 Overuse of Medication

During the 1980's shift to a market economy, hospitals began to turn into for-profit institutions. They typically had a monopoly within their geographic area and acted much like a private company. Doctors and nurses were rewarded with bonuses if they brought in more profit for the hospital. This unfortunately led medical staff to over-diagnose and over-prescribe in order to maximize profit[14]. In 2003, it was found that China had one of the world's highest shares of pharmaceutical expenditures compared to total healthcare expenditure- nearly 45 percent, compared to an OECD (Organization for Economic Co-operation and Development) average of only 15 percent. It was also found that less than 1 percent of drug prescriptions in village clinics were reasonably prescribed[16].

3 MAJOR REFORMS

To address the issues discussed in the previous section, the Chinese government has embarked on a series of reforms. This section will discuss the six phases of the Chinese healthcare system, first beginning with the Maoist-era healthcare system, then the shift to privatization, and finally the modern reforms beginning in 2003 as China moved away from privatized healthcare.

3.1 Phase 1 (1949-1980)

On October 1st, 1949, the creation of The People's Republic of China was declared by Chinese Communist leader Mao Zedong. Shortly after the founding of modern China, a rudimentary healthcare system was established called the Community Medical System (CMS). Healthcare was nearly free for everyone and the system was regulated by tiers. Citizens were required to first go to a Tier 1 hospital/ clinic. If more advanced care was needed, the patient would be referred to a Tier 2 hospital. If further care was needed the patient would be referred to a Tier 3 hospital. This system of healthcare was rudimentary and basic. The quality of care was low, and the equipment was primitive, yet the outcomes were remarkable[14]. This system led to an extraordinary improvement in most major health indicators including a decrease in infant mortality and an increase in life expectancy. Health care financing was largely centralized, with strict budgeting and financing for the system of provincial and local hospitals, with a particular emphasis on controlling costs and delivering basic services through public hospitals[20].

3.2 Phase 2 (1980-2002)

The 1980s brought a time of economic reform and opening-up in China. Communes were phased out and market-oriented reforms were ushered in. With the decollectivization of agriculture, rural citizens were no longer required to contribute to the community medical system. Hospitals and clinics became privatized and government funding quickly dwindled. By 1990, government subsidies made up only 10 percent of hospital budgets. As hospitals became for-profit institutions with effective monopolies in their specified geographic areas, prices began to skyrocket. Hospitals raised drug prices and patient care prices in order to compensate for the government funding that had been withdrawn[14]. Incentives were created for doctors to over-treat, overprescribe, and ignore basic, low-revenue preventative health care. This resulted in fewer Chinese citizens receiving basic, low-cost, preventative primary care.

An additional consequence of the economic reforms of the 1980s was many state-owned enterprises, which made up a major sector of the economy, were broken down into smaller companies to be privatized. State-owned enterprises were gigantic organizations, and each provided healthcare insurance for their employees and their families. The sheer size of these companies made it possible to pool risk. The newly formed, small, private companies had difficulty financing their insurance because the scale/ number of people was greatly reduced which meant risk was pooled on a smaller number of individuals[14]. Financial burdens were increasingly shifted to individuals, who were asked to pay more out-of-pocket for their healthcare[20]. Citizens often could not afford to pay for primary care and waited until they were seriously ill to be seen by a doctor. Often it was too late by the time the patient sought help. As a result of high out-of-pocket costs, Chinese citizens began saving large sums of their income to prepare for future health expenses.

By 1999, only 7 percent of the 900 million rural residents had health insurance coverage and only 49 percent of the 400 million urban residents had insurance. As a reaction to these numbers and the other problems faced by the mostly privatized healthcare system, the government introduced the Urban Employee Basic Medical Insurance (UEBMI) which was discussed earlier[21]. This was the beginning of the healthcare reform area.

3.3 Phase 3 (2003-2008)

Since 2003, new cycles of reform have been pushed toward a more welfare-state oriented healthcare system[14]. In 2003, the Chinese government implemented the first series of reforms, aimed at increasing government healthcare inputs, expanding health insurance coverage, and lowering patient fees.

In urban areas, the government launched the Urban Resident Basic Medical Insurance (URBMI) to compliment the UEBMI which had been created in 1999. The

new URBMI provided urban insurance to those who were not covered by the old UEMBI[13]. This included children, those unable to work, and the retired. The annual premium is primarily paid for by the Chinese government and individuals are required to contribute a small portion. In 2014, reimbursement rates for URBMI reached 70 percent for inpatient visits and 50 percent for outpatient visits[21].

In rural areas, the New Rural Cooperative Medical Scheme (NRCMS) was established to replace the earlier CMS which had dissolved as a result of the 1980's economic reforms. NRCMS is voluntary[20], although today, more than 99 percent of rural residents are covered by NRCMS[21]. NRCMS is funded partially by enrollee contributions and partially by subsidies from central and local governments[16].

In addition to URBMI and NRCMS, the government also created a Medical Assistance program. This program acts as a healthcare safety net to assist those who cannot pay for their premiums and copayments and to help households facing unusually large medical bills for catastrophic events[16].

A deliberate policy to improve healthcare was also enacted and resulted in a massive increase in the number of hospitals and other healthcare structures. The number of hospitals has grown from 18,000 in 2003 to more than 33,000 today (excluding hospitals built for Covid).

Other reforms were aimed at reducing providers' incentives to deliver expensive drugs and high-cost, high-technology care at the expense of basic care. The government has also been moving towards creating a price ceiling system to prevent over-charging of patients. These reforms were the beginning of eliminating perverse incentives to overcharge, increase prices, and charge high out-of-pocket fees.

3.4 Phase 4 (2009-2012

In 2009, the Chinese government introduced a new set of reforms focusing on five key areas:

1. Service delivery
2. Essential medicines
3. Public health
4. Insurance
5. Public hospital reform

The government recommitted itself to the principle of "equalization of access to public services" for all[22]. Between 2009 and 2010, the government invested CNY 42.2 billion in health care facilities, which was more than the sum of all investments in the prior 30 years. In 2011 the government announced they would further increase investments to CNY 1.13 trillion over the next three years. During this time, patient reimbursements greatly increased while individual copayments decreased[21].

3.5 Phase 5 (2012-2016)

In 2012, the Chinese government introduced a five-year plan (for the years 2012-2016), which was aimed at the following major reforms:

1. Expand basic medical insurance programs
2. Establish a national essential drug system
3. Develop a primary healthcare service system
4. Provide equal access to urban and rural residents
5. Continue the reforms of public hospitals[14].

This era of reforms also ushered in some of the first commercial/private companies to assist with healthcare financing. The aim of using commercial insurance companies was to help cover catastrophic disease insurance to prevent families from incurring life-altering debt and poverty after a devastating medical bill[20]. The government also began to support private hospitals, in hopes a free-market hospital system could help ease some of the congestion at public hospitals[14].

Another structure that was introduced to reduce costs of drugs and medical equipment was a collective bidding system. Under this system public hospitals in a city/ province use their collective bargaining power to purchase drugs and equipment. Any qualified pharmaceutical manufacturer or supplier can join the bidding. Then, quality, prices, company's reputation, and delivery services, are reviewed by the government health authority and they select a contract. Internet bidding has also become popular. Hospitals and other health providers publish the needs of pharmaceutical products and their quantities at an internet-based pharmaceutical procurement information platform. Pharmaceutical companies can then make an offer and try to out-bid other companies. This competition, in turn, will hopefully help lower prices.

Additionally, the National Essential Drug List was established in 2012 to prevent unaffordable drug prices. This requires primary care providers to follow a zero-mark-up policy[14].

3.6 Phase 6 (2016-2020)

In 2016, the Chinese government introduced the next five-year plan to cover the years 2016 to 2020. The plan was nicknamed "Healthy China 2020" and focused on the following reforms:

1. Strong efforts to develop advanced medical equipment
2. The development of traditional Chinese medicine (TCM) healthcare services
3. The implementation of a "fitness for all" strategy
4. The encouragement of non-governmental participation in the healthcare services industry
5. Granting non-profit private hospitals, the same status as public hospitals

This era saw a greater focus on private companies in healthcare as a way to help reduce government costs[20].

4 RESULTS

This section evaluates the impact made by the reforms laid out in the previous section. However, it is difficult to measure the effects of the Chinese healthcare reforms for three reasons:

1. There are nearly an infinite number of metrics to measure how "good" a healthcare system is and how much change has occurred- cost, quality of care, life expectancy, insurance coverage, affordability, etc.
2. The healthcare reforms are quite recent, occurring within the last twenty years and many occurring within the past five years. Many policies have not been fully implemented and/or there has not been enough time to accurately measure the reforms.
3. The most recent research available was written between 2011 and 2018 and therefore may not accurately reflect the current healthcare system in China. In the time these studies have been published, new reforms and policies have likely been carried out to further improve the Chinese healthcare system.

This section should be used as a guide to show that China's healthcare reforms so far have been successful in many regards yet still have areas to improve. This section is divided into subsections measuring particular aspects of the Chinese healthcare system with a special focus on financing.

4.1 Insurance Coverage and Insurance Cost

China has drastically expanded insurance coverage from 29% in 2003 to nearly 95% by 2011. This was done through the NRCMS, UEBMI, and URBMI[13]. These insurance programs have provided significant financial protection to Chinese citizens. For rural residents specifically, who faced only a 7% insurance coverage rate prior to the reforms[21], insurance coverage increased 4.6 times between 2003 and 2009.

Inpatient reimbursement rates increased by more than three times on average, and by 7.5 times in rural areas[23]. The NRCMS made significant progress in closing the rural-urban insurance coverage divide. Today, rural coverage now exceeds urban coverage. The insurance coverage gap between the poorest and the wealthiest in China has also been closed, with no significant differences found between the poorest and wealthiest groups. Additionally, inpatient reimbursement rates rose rapidly beginning in 2003 as did hospital admissions and household spending. Inpatient self-discharge (a patient discharging themselves from a hospital without a doctor's recommendation) declined as a result of the reforms[23]. The reason for this decrease is thought to be as follows. Increased insurance coverage and reimbursement rates could cause both the increase in hospital admissions and the decrease in self-discharge. Citizens felt more comfortable going to a hospital when they felt ill since they knew they would be at least partially covered by insurance. This could also be the reason for the lowered self-discharge rate. Prior to the reforms nearly half of rural patients would discharge themselves, against their doctor's advice. Of those who self-discharged nearly, 85% said that they could not afford the expense of treatment[16].

Unfortunately, increased hospital admissions contrasts with the overall reform goals of emphasizing higher uses of primary care. The financial incentives of the insurance programs do not motivate citizens to seek primary care. Instead, insurance systems unintentionally incentivize citizens to seek inpatient care at large hospitals by providing higher reimbursement rates for those visits and lower reimbursement rates for primary care visits[23].

4.2 Individual and Out-of-Pocket Costs

An interesting trend emerges when comparing individual payments before and after the reforms. On one hand, the reforms seem to have encouraged more people to seek treatment and have narrowed the gap in treatment and reimbursement rates between poor and wealthy households, yet on the other, households are spending more on healthcare and even experience slightly higher rates of catastrophic health expenses.

In 2002, only about 58.33% of the poorest and 68.14% of the less poor who reported illness sought treatment. In 2007, the corresponding percentages were 71.43% and 84.00%, suggesting a large increase in the amount of people who are seeking treatment. The increased use of health services by poor households is attributed to expanded coverage thanks to NRCMS[18]. However, while NRCMS has been crucial in increasing coverage, there are high deductibles, many services are uncovered, and patients still pay large out-of-pocket sums[16].

Parity has been achieved in reimbursement rates between poorer and wealthier households, yet poor households still face a greater financial burden since health expenditures make up a larger percentage of their income. Although the health reforms have made many positive changes throughout the Chinese healthcare system, the reforms have not yet helped to decrease the percentage of households experiencing catastrophic health expenses. In fact, the percent of households experiencing catastrophic health expenses actually increased slightly by 0.2% between 2003 and 2011. Approximately 13% of households, or 173 million people, faced catas-

trophic health expenses in 2011 and poor households experienced catastrophic health expenses at twice the rate of wealthier households. Health spending as a share of total household expenditures continued to rise, and households dedicate on average 13% of their annual expenditure to paying healthcare costs[23].

Thankfully, the Chinese government continues to increase the amount of reimbursement patients receive and more services are continually being covered by insurance which should eventually help bring down individual out-of-pocket healthcare costs[18]. The insurance programs set ceilings for maximum levels of patient reimbursement, which applies largely to inpatient care. These ceilings have recently been increased for the government insurance programs which may help to reduce catastrophic health expenses. In 2011, pilot programs were initiated for covering the costs of diseases and treatments that are typically associated with extremely high healthcare costs such as childhood leukemia, congenital heart disease, kidney dialysis, and cervical and breast cancer therapies. These patients receive a subsidy that covers 20% more of treatment costs that are not already covered by insurance[23].

4.3 National Cost of the Chinese Healthcare System

Since the beginning of the reform era, the cost of the healthcare system has been rising. This is to be expected since the government has taken on an increased role in healthcare, providing insurance to nearly the entire Chinese population, increasing the number of hospitals, and more. When looking at the increased rate of healthcare spending, it is important to compare it to the economic growth rate to determine if the increased spending is sustainable. Figure 2 shows that economic growth is decreasing while healthcare spending as a percentage of GDP is increasing.

This shows an important trend. In recent years, the Chinese economic growth rate has slowed, and it is important that government healthcare spending does not dramatically exceed economic growth. If spending consistently outpaces growth, the Chinese government will have to find new ways to finance the healthcare system such as increasing taxes or employing foreign direct investment.

4.4 Financial Incentives to Over-Prescribe and Over-Treat

The financial incentives for hospitals and doctors to over-prescribe and over-treat have largely been removed. Hospitals are now required to have a 0% drug markup which has helped to significantly lower the cost of prescription drugs for patients. Bidding methods have helped to lower drug costs for hospitals which have helped further lower costs for patients. Some hospitals have moved away from fee-for-service compensation systems for doctors and toward a fixed salary. This, along with other new salary methods, has helped to reduce the incentives for doctors to over-treat, or provide only high-technology treatment while providing few primary and preventative care options[13].

4.5 Medical Outcomes and Access to Medical Care

While results remain somewhat mixed for how the reforms have affected financial healthcare protection, it is quite clear the reforms have been successful in increasing health outcomes, especially for rural residents. Maternal mortality dropped from 80 per 100,000 live births in 1991 to 25 per 100,000 live births in 2012. The neonatal mortality dropped from 33 per 1,000 live births in 1991 to 7 per 1,000 live births in 2012. The difference in urban and rural maternal mortality narrowed from 1:2 in 2005 to 1:1 in 2010[21]. Gaps in access to hospital child delivery no longer exist between rural and urban residents and the supply of health services has expanded significantly[23]. Life expectancy has increased from 71.4 years in 2000 to 76.6 years in 2019[24].

5 PRIMARY RESEARCH

In order to partially compensate for the fact that research used in this paper was primarily from prior years and may not accurately reflect the current state of the Chinese healthcare system, primary research was conducted. While not extensive, this one-question survey can help the reader partially gauge the current healthcare system and how the reforms have evolved and continued to improve since much of the research in this paper was written. The author will also add some of her own experiences living in China while analyzing the results of the survey.

The following question was asked to 207 Chinese citizens, currently living in China:

"The healthcare system is an important topic and many countries are constantly trying to improve their own healthcare systems. Please rank the following in order of importance to you with 1 being the most important and 5 being the least important:

(a) Increase the amount of healthcare coverage accessible to rural citizens
(b) Increase the quality of healthcare for citizens
(c) Decrease out-of-pocket costs for patients
(d) Increase preventative healthcare measures
(e) Decrease wait times at major hospitals"

An average composite score was then calculated for each option. The lower the average, the more important

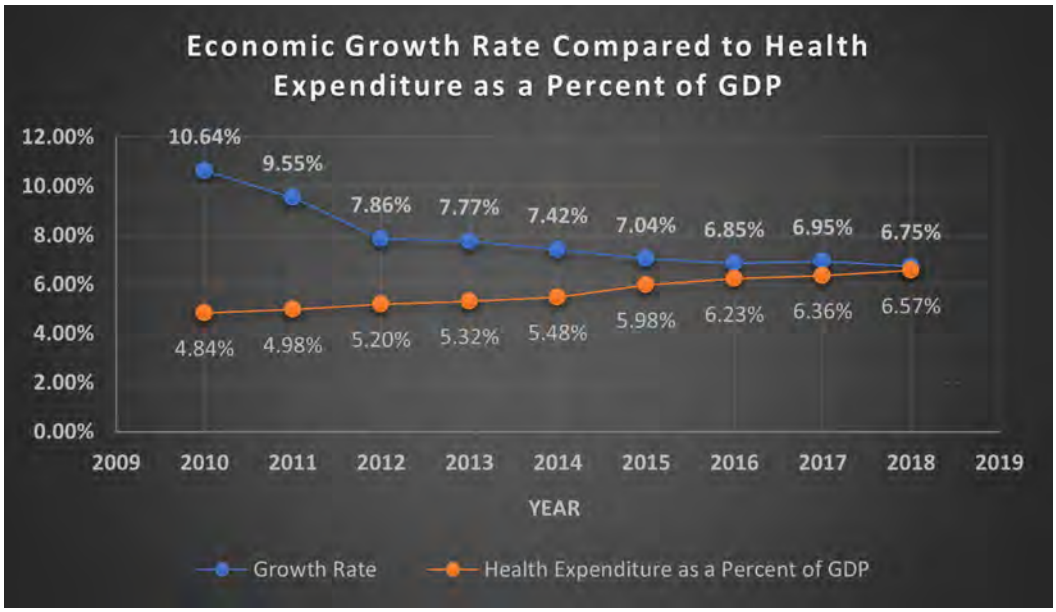

Figure 2

(closer to 1 indicates the higher importance). Figure 3 shows the results.

The most important issue to the surveyed group was increasing preventative healthcare measures. This makes sense since the Chinese healthcare system is still operating on a system where citizens only go to the hospital when they are sick and do not have a regular primary care physician to assist with preventative care. While studying abroad in China in the fall of 2019, I witnessed first-hand this system of hospital care. My Chinese friends and co-workers would go to the hospital if they had even a minor ailment since they did not have a primary care provider. Many US citizens who have a minor ailment will schedule an appointment with their primary care physician in a local office rather than going to the hospital.

The second most important issue to respondents was decreasing wait times at major hospitals. This is consistent with my experience in China. My friends and family in China often discussed the wait times at hospitals. They suggested that to be seen in a timely manner, it was important to be at the hospital as soon as they open, and often there was a queuing line outside the hospital before opening. It is important to note that my friends and family live in Beijing, one of the largest and busiest cities in China. In addition, the survey was likely collected from people in or around Beijing, thus their perspective may be different from someone in a smaller city or rural area. For example, a citizen in Beijing- a city with nearly 22 million inhabitants, may wait longer than a citizen in Luoyang- a city with only 2 million inhabitants. Wait times at major hospitals in large urban centers are an issue faced by countries around the world.

The third most important issue to survey respondents was increasing quality of care for citizens. This suggests that while China's healthcare quality has improved drastically in recent decades, there is still improvement to be made.

The fourth most important issue to survey respondents was increasing the amount of healthcare coverage accessible to rural citizens. Since this option was ranked second to last, it shows Chinese citizens are relatively satisfied with the amount of healthcare coverage available to rural citizens. This would match the data presented above, which states that more than 98% of rural citizens are covered by government health insurance. However, this survey was taken predominantly by people living in Beijing, which could distort the results. A different result may have been yielded if the survey were given exclusively to rural residents.

The least important issue to respondents was decreasing out-of-pocket costs for patients. This is the most unexpected result from the survey since the data presented in the "Results" section of this paper suggested that citizens still had to pay a majority of healthcare costs out-of-pocket. The "Results" section also noted the government was working on increasing reimbursement rates and providing more insurance coverage. It could be concluded that the measures the government took between 2011 (the time that study was conducted) and today have helped to decrease out-of-pocket costs to the point where residents rank this as the lowest priority.

While these results give some insight into the healthcare system today, it is important to note the difference between the highest ranked and lowest ranked was less than 1 point. This suggests that all the options held a

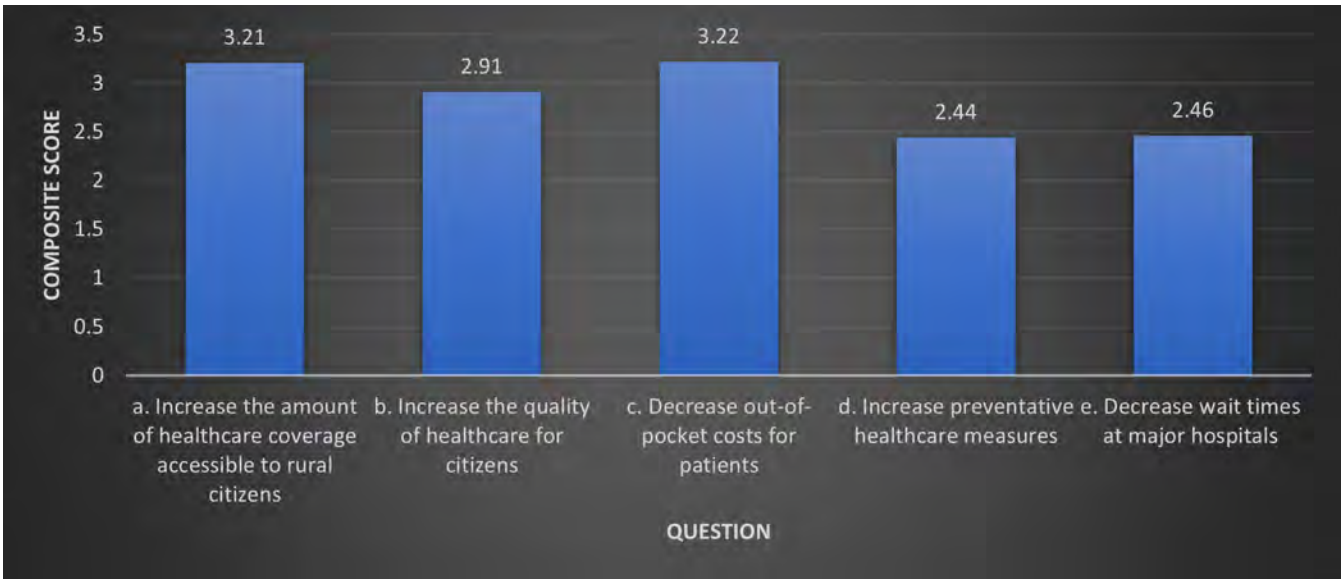

Figure 3

relatively similar importance. More research would be needed to draw definitive conclusions.

6 RECOMMENDATIONS

The following sections are the five recommendations the author makes based on the results of the reforms. These recommendations are intended to address only the financial side of the Chinese healthcare system and do not delve deeply into the health implications of such recommendations.

6.1 Introduction of Primary and Preventative Care

"Unlike some western countries, Chinese patients usually do not have a regular physician like a general practitioner"[21]. As a result, preventative care is rarely sought, and citizens only go to hospitals when they are quite ill. Instituting a primary healthcare system would have three benefits.

1. A primary healthcare system would help identify diseases and disorders at an early stage when more significant treatment options are available to ensure a better long-term outcome.
2. Identifying diseases and disorders earlier in addition to making use of preventative care will help to decrease the overall cost of patient care. For example, seeing a dermatologist annually for a physical exam can help to identify Melanoma and other types of skin cancer. When caught early on, Melanoma is an easily treatable cancer. However, if patients wait until they are experiencing severe symptoms, it is likely the cancer has spread and is too late to treat. A patient may experience severe financial difficulties, physical pain, and emotional hardship trying to treat late-stage Melanoma which could have been easily treated if caught early.
3. Introducing more primary facilities and physicians could help to decrease Tier 3 hospital crowding. Primary care physicians could be located in Tier 1 and 2 hospitals to help shift some patients away from major Tier 3 hospitals.

6.2 Insurance Consolidation

Consolidating the three insurance schemes (UEBMI, URBMI, and NRCMS) could bring several benefits to the healthcare system. First, merging would provide significant cost benefits. It is inefficient for each insurance scheme to have its own provider payment system, certify its providers, and have their own financial management and auditing system. Merging the three systems would create opportunities for economies of scale. Consolidating management and financial systems would help to reduce cost and oversight. It would also allow for a larger pool of citizens which could help to reduce overall risk and the costs associated with higher risk[16]. Second, merging these three systems could benefit the Chinese people directly. At present, the insurance systems are developing at different paces, meaning some citizens get better care on one insurance than on another[21]. Not only does this have questionable ethical implications, but it also creates perverse financial incentives. If patients with UEBMI have larger insurance compensation than URBMI and NCMS patients, hospitals and providers are more likely to see UEBMI patients first, give them more time, and more treatment.

Meanwhile, URBMI and NCMS patients may be sent to the end of the treatment queue[16]. Combining the insurance schemes would create more equitable financial incentives.

In January 2016, the State Council issued a document on 'Integrating the Basic Medical Insurance Systems for Urban and Rural Residents' to establish a unified basic medical insurance system for urban and rural residents…". The merged systems will be run at the national level[21]. This is certainly a step in the right direction and more progress should continue to be made on unifying the insurance systems.

Another option to help decrease health insurance cost is to allow for the development of private health insurance schemes. One of the goals of the 'Phase 6' reform period for the years 2016-2020, was to encourage non-governmental participation in the healthcare services industry. Continuing to allow for private insurance could help decrease the cost of government health insurance.

Foreign investment is also another viable option for reducing healthcare insurance costs. Given the opportunity to operate in China, foreign health insurance companies could help to further develop the private insurance market. Companies like Cigna, Aetna, and MSH have begun to introduce high-end Chinese health insurance but so far it has mainly catered to expatriates and has yet to gain traction throughout China[5].

6.3 Insurance and Healthcare Cost Control

One concern of the new governmental healthcare system is cost control. Since the reforms began, each year the government spends more and more on the healthcare and insurance system.

One way to control overall healthcare costs is to change the insurance systems from passive bill-payers to active purchasers of healthcare. If government-run insurance systems were able to "shop" for the best care, costs would decrease and care would increase[16].

In order for this system to work, a platform like eBay for health insurance would need to be developed where hospitals would openly list their prices, death rates, readmission rates, patient reviews, and a host of other performance metrics. Although this online system would likely be quite complex and costly, changing how insurance systems operate could help to increase competition in both quality and price among hospitals, and thus reduce the overall cost of the healthcare system. Of course, some restrictions would have to be implemented. For example, this system would likely not work for emergency treatment since the patient would have to go to the closest hospital and would not have time to consider cost or quality.

6.4 Decrease Catastrophic Health Expenses

To help alleviate the catastrophic health expenses families continue to experience despite the reforms, the government could increase funding for the Medical Assistance scheme. This system was established to be a vehicle for helping the poor with insurance contributions and copayments. This program could be funded by the money saved from combining the three insurance schemes. If additional funding is needed, perhaps taxes would need to be increased, or insurance premiums would need to be raised.

Another way to decrease catastrophic health expenses would be to create a cap on annual out-of-pocket medical payments. Once a patient reaches a certain amount of out-of-pocket spending, insurance would cover the rest. This would likely be a costly measure and would also require the government to find additional sources of funding.

6.5 Continue to Change Provider Incentive Structures

One goal of the reforms was to change the pay-for-performance incentive structure for doctors and other healthcare providers. This structure promotes over-treatment and over-prescription for those with the most serious and costly diseases. Hospitals should continue to shift towards fixed salaries or fixed salaries with performance bonuses. This way, doctors have a financial incentive to spend time with each patient, prescribe the appropriate treatment, and ensure they receive the best care possible.

7 CONCLUSION AND IMPORTANCE FOR THE FIELD OF FINANCE

After the de-collectivization, opening up, and privatization of the Chinese economy in the 1980s, China's health care system was left in shambles. Most citizens lost their insurance, hospitals operated as for-profit monopolies, and major divides in access to care existed between rural and urban, and wealthy and poor. Households began saving large portions of their income to pay for medical bills, which was inhibiting the Chinese economy from its full growth potential. Today, insurance coverage is now nearly universal, government healthcare spending has increased drastically in the past two decades, and the gap between rural and urban access to healthcare has closed. Of course, there are still areas of the Chinese healthcare system to improve such as continuing to lower out-of-pocket costs and catastrophic health expenses. The financial impact of the Chinese healthcare reforms on the Chinese people and the Chinese government is undeniable. But how do these financial reforms impact the field of finance and

the financial state of the rest of the world?

China's healthcare system impacts global economies. This became increasingly clear with the Covid-19 pandemic. When China's health system falters, the world economy suffers. As a result of Covid, 3.3 billion people have had their formal workplace fully or partially closed[25], and of the approximately 2 billion people working in the informal sector, it is estimated more than 80% have been significantly affected. Global economic growth is projected to be negative 4.9% in 2020 and global trade has contracted by 3.5% this year thanks to Covid-19[26]. China's healthcare system matters not only to global health but also to global economic wellbeing. Everyone- whether Chinese, American, or Brazilian, a business owner, investor, or employee- has an interest in the success of Chinese healthcare.

Aside from Covid-19 economic implications, healthcare system improvement in general results in better health. Better health improves productivity and strengthens human capital, thereby contributing to stronger economic performance. The good health of citizens also results in an overall better economy and thus investing in better healthcare helps to boost income, GDP, and productivity, and helps to alleviate poverty. It was shown that "an annual improvement of 1 year in life expectancy increases economic growth by 4%" and "an increase in healthcare expenditure has a positive relationship with economic performance"[27].

Additionally, if China does not control its healthcare costs, it will increase the fiscal deficit so much that it could reduce China's ability to lend overseas. China holds USD 1.06 trillion in U.S. securities and a decreased ability to lend could impact the US economy and economies around the world[28]. With China making up a large portion of the global economy and playing a vital role in the global supply chain, their citizens need to be healthy so their economy can continue to grow. Living in an increasingly globalized world means that China's healthcare system must succeed for the sake of the global economy.

8 EDITOR'S NOTES

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University of Denver Undergraduate Research Journal

An Ominous Horizon: Fascism on the Rise

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1 INTRODUCTION

Italian Fascism began in the face of economic stagnation and widespread frustration with liberal democracy following the conclusion of the Great War. It promised national renewal amidst humiliation and offered a prosperous future against seemingly inevitable decline and misery. In the drive for national revival and glory, Fascism led to war. This essay will compare the tactics of Benito Mussolini and his marauding Fascists (Mussolini's connection with Italians, Fascist economics, expansionist nationalism, and extreme political violence) with the conditions in the country (economic misfortune, nationalist anger, and government weakness) that set the stage for Fascism's impregnable reign of terror. This essay argues that economic decay, shrinking confidence in democracy, and nationalist indignation coupled with various political methods promulgated the rise of Fascism in Italy and formed the foundation of Mussolini's absolute rule that lasted more than two decades.

2 POSTWAR ITALY

The end of the First World War brought a languid economy with slow development to Italy. Unemployment was high and strikes were widespread. Industrial production lagged, agricultural output stalled, and the lingering specter of inflation stalked the land. The ominous cloud of the Communist menace constantly loomed overhead[1]. Economic misfortunes combined with the frustrations of many Italians with what they believed was a poor deal their country got after the war[2]. Economic hardship and nationalist anguish ultimately set the stage for Fascism's ineffaceable rise, and where many Italians saw frustration and misery, Mussolini and his Fascists saw opportunity.

3 CONNECTION WITH ITALIANS

3.1 The Power of Benevolence

A central tenet to Mussolini's appeal came from his sacrosanct image[3]. "...He seemed like a God," writes historian, R.J.B. Bosworth[1]. Through his fabulous benevolence to individual citizens and communities throughout Italy, Mussolini was able to build a powerful base, fashioning a belief that he could right any wrong[3]. A significant part of Mussolini's support came from the view of him as an "all-seeing, humane, and protective father figure"[3]. Acting as the Patron Saint of Italy, Mussolini crafted an image that he was never too busy to "deal with the plight of an individual"[3]. Popular legends of the leader's charity advanced a belief that Mussolini "was endowed with remarkable powers, and yet was at the same time down to earth and unexceptional – like an ordinary peasant"[3]. Zelmira Marazio summed up this view, remembering something that she heard a passenger on a train say:

> "Do you see...all this cultivated land? Until yesterday this was a land of poverty and malaria. Who has brought about this transformation? An ordinary little man...with a big heart and an even bigger head. He has created a new Italy[3]."

Surely, the view of Mussolini as "ordinary" advanced a belief amongst many Italians that the Duce was one of them and that he understood them and their experiences. "The intimate relationship of the masses with the leader," writes historian, Christopher Duggan, "was at the heart of much of (Mussolini's)...appeal"[3]. Stories of the Duce's benevolence – true, exaggerated, or otherwise, and personal accounts of his philanthropy to individuals coupled with his prodigious charisma and colossal stature as the head of state seemed to inspire an intense admiration for the leader that advanced a strong desire among many to be directly connected with him. Throughout his rule, many boys were named in his honor. Christopher Duggan writes, "The desire to feel organically linked to Mussolini and his family found additional expression in names given to children...or in requests to the Duce to stand as godfather to a newborn child"[3]. Indeed, the attraction to Fascism came more from "admiration for the Duce," than it did from policies or support for the Fascist Party[3]. "If only the Duce knew," pervaded the Fascist political

creed amongst many Italian citizens[3]. Many Italians literally worshipped their leader. In times of difficulty, great achievement, or otherwise, thousands of admiring Italians wrote letters to the leader, seeking his console and help, while others adorned him with obsequious praise[3]. One of these letters read:

> "I believe in You, Duce, the Man sent by God to preach once again the Doctrine of Christ and correct what has been falsified by egoism... I believe that Your daily toil irradiates the light of God, and that everything You undertake is part of the great mission assigned to You by the Almighty... [3]."

"Many of those who appealed to the Duce for... help," writes Christopher Duggan, "did so from a belief that he occupied a position of absolute power and also from a sense that he would view supplicants with the kindness of a father and the charity of a man blessed by God"[3].

A collectively written letter thanking the Duce for providing a small mountain village with an aqueduct read:

> "You who know how much we have suffered for lack of water can understand our uncontainable joy and infinite gratitude. We used to feel truly forgotten by everyone... But You, DUCE... though beset by the most pressing work, have seen and thought even of us... [3]"

A popular belief held that "Mussolini was travelling around on his own with the specific aim of meeting the poor... and in disguise" on a holy mission to save them from their misfortunes[3]. Rosina Menin recounted a childhood memory of meeting the Duce:

> "He was passing our house and came in, and for a while we couldn't really work out who it was, because he was dressed, it seemed, so as not to be recognized. He asked my father two or three questions... and then he suddenly disappeared... He left when he saw that he must have been recognized. He had his motorbike... and (he) went... to Malconsiglio... when there were workers there. And he stopped to ask the workers how things were going and if their companies were paying them well and if they were happy. Then they recognized him and knew who it was: 'It's Benito Mussolini!!!'[3]"

3.2 Saint of Italy

Many Italians who met Mussolini reported witnessing an extraordinary transformation upon the occasion. Tullio Lucetto, despite himself having been beaten and jailed by local Fascists for his failure to attend a parade celebrating the leader, recalled admiringly:

> "... The weather was bad. Then he arrived... and the clouds went and there was sun. It seemed like something from God. And when he finished making all his speech, down came the water again. How often do we think: was this Duce some kind of Saint Anthony or what![3]"

Clearly, for Tullio Lucetto, Mussolini was saving the country and Italians, particularly the poor, from hopeless despair, as Saint Anthony for Catholics is the Patron Saint of the recovery of what is lost.

The economic stress experienced by many Italians after the Great War allowed for Mussolini to craft an image as the hero of Italy. Many Italians saw Mussolini as blessed by God[3]. One of the many who wrote to the Duce told him, "For us Italians, you are our God on earth, and so we turn to you faithful and certain of being heard"[3]. Summing up Italians' seemingly devout loyalty to Mussolini, Riccardo Martini, a soldier in the Italian Army, reflected on his devotion to the leader, "God has sent the Duce for the good and civilization of the world"[3]. Martini later contemplated his dedication to Mussolini. "For me," the soldier remembered, "Fascism was not a party: it was a religion, like the one my mother taught me as a child"[3].

So strong was the Cult of Ducismo that a university professor got a phone call from concerned test administrators after the professor's son had written about his sister for a free-response question on a secondary school admission exam that asked "... who after your parents do you love most?" The puzzled examiners told the professor that all the other 39 students had written about the Duce in response to that question[3].

As the Patron Saint of Italy, opposing Mussolini at least equaled going against the people, and, at worst, presented a blasphemous insult to God. Mussolini's stupendous charisma and impressive philanthropy contributed a significant piece to the leader's political appeal and fomented his indestructible power through his cult-like following, as many Italians had elevated "politics into a religion"[3].

4 FASCIST ECONOMICS

4.1 Liberal Decay

Using the moment of the time to claim absolute power, Mussolini set about planning his reforms for a beleaguered economy. Reflecting on the sub-optimal economic setting, the Fascist leader blamed Italy's postwar recession on rapacious materialism, selfish individualism, liberal economics, and capitalism, more generally[2]. The Duce insisted that the "bourgeois" was to blame for

the country's economic misfortunes[2]. Mussolini pursued further, declaring democracy to be at fault for Italy's economic afflictions. "The democratic regime may be defined," Mussolini wrote, "as from time to time giving the people the illusion of sovereignty, while the real effective sovereignty lies in the hands of other concealed and irreversible forces."

"Democracy," the leader continued, "is a regime nominally without a king, but it is ruled by many kings – more absolute, tyrannical, and ruinous than one sole king, even though a tyrant,"[2]. The oligarchs of democracy, Mussolini insisted, were the architects of Italy's economic misfortunes. The Duce explained his anti-democratic motivations, drawing reference to the country's founders, Giuseppe Mazzini and Giuseppe Garibaldi. "As for Italian unity," wrote Mussolini, "its debt to Liberalism is completely inferior in contrast to that which it owes to the work of Mazzini and Garibaldi, who were not Liberals"[2]. The leader summed up his perspective when he wrote, "Fascism has taken up an attitude of complete opposition to the doctrines of Liberalism, both in the political field and the field of economics"[2]. Reaffirming his claim as the guardian of Italy, Mussolini wrote, "Fascism is the doctrine best adapted to represent the tendencies and the aspirations of a people…"[2]. Christopher Duggan explained Fascism's purpose, writing, "From the outset, Fascism regarded itself as a movement of the spirit, determined to counter the corrosive materialism of both liberalism and socialism…"[3]. Mussolini justified his drive for total power, saying in a 1933 speech that "Political power creates wealth…"[4].

4.2 Corporatism

To solve Italy's postwar economic quandary, Mussolini favored a system connecting the state to the private sector that he called Corporatism[2]. Mussolini explained this concept to be the deployment of Fascist bureaucrats to supervise organizations for the purpose of creating what he insisted was necessary command over the economic sector in order to promote national wealth and rescue the country from, "the general crisis of capitalism"[4]. Speaking before the National Corporative Council in Rome in 1933, Mussolini defended the illiberal principles outlined in his essay "The Political and Social Doctrine of Fascism" as necessary to overcome the strife of the time:

> "…Three conditions are required. The first is a single political party in order that political discipline may exist alongside economic discipline and that the bond of common fate may unite everyone above conflicting interests…Beside the single political party there must be a totalitarian State, a State which by absorbing the energy, interests, and aspirations of the people may transform and uplift them. But even this is not enough. The third and last and most important condition is to live in an atmosphere of strong ideal tension[4]."

4.3 A Fascist Solution

The tension the Duce spoke of can be understood to be Italians' unquestioned, incorruptible commitment to the Fascist Party and to Mussolini as the leader. Through Corporatism, Mussolini was able to control an important part of society: the economy. Through his supervision of private enterprises, Mussolini was able to quickly spot and silence any opposition and to ensure that organizations properly supported Fascist principles. With his image as a profit through his mystical aura, his amazing benevolence, and his alluring charisma, the Duce's dictatorship was justified as a necessary establishment for the betterment the Italian people rather than a repressive regime of tyranny. Therefore, the controlling nature of Corporatism was vindicated as part of the philanthropic effort to redeem the Italian citizenry from their postwar gloom. Mussolini insisted that this establishment was critical so that "the masses may improve their standard of life"[4]. Mussolini pursued, "At a given moment, the worker…must be able to say to himself and to his family: 'If I am…better off today, I owe it to the…Fascist Revolution'"[4]. Along with Corporatism, the Duce proposed a series of welfare programs and other reforms, further cementing his image as a magnanimous saint[3]. Christopher Duggan writes:

> "The government responded to the country's economic hardships with an enormous increase in state expenditure. In the 1930s the outlay on welfare schemes, including maternity benefits and family allowances, went up from 1.5 billion to 6.7 billion lire – more than 20 percent of the country's total receipts from taxation – thereby creating the prototype of the modern welfare state. The pace of land reclamation projects and other public works programs accelerated, and the regime was able to claim that it had spent more in this field in just ten years than liberalism had done in sixty[3]."

These initiatives, Duggan points out, contributed a huge role to elevating the Duce's already staggering image[3].

5 EXPANSIONIST NATIONALISM

5.1 An Italian Empire

Also important to Mussolini's attraction was his promise to redeem Italy from its postwar humiliation and to build an Italian empire. Historian, Giuseppe Finaldi writes, "Fascism arose in opposition to left-wing radicalism and was an expression of nationalist resentment at the poor deal Italy got after the war"[2]. Historian, Denis Mack-Smith argues that the Duce aspired to recreate the Roman Empire and raise Italy to imperial dominance[5]. Historian, R.J.B. Bosworth writes, "...the Duce spoke in the same way Julius Caesar did"[1].

Importantly, Fascism had a highly diverse appeal. Mack-Smith summed this up, writing: "Fascism, according to circumstance could be either 'reactionary' or 'revolutionary' and could adapt as necessary to either class war or class cooperation. Inside (Fascism), there was room for all political beliefs or none at all"[5].

"Everyone, whether militaristic, reactionary, or extreme pacifist on the left, could see his heart's desire" in Fascism, the Duce promised (Mack-Smith, 40). Despite these diverse, and sometimes contradictory persuasions, the conviction that united all these miscellaneous beliefs, Mussolini asserted, was Italians' dedication to national glory. Mussolini, Mack-Smith argued, framed his movement as one of "national renewal"[5]. Mack-Smith described the leader as an extreme nationalist who proclaimed Italy's destiny to control all the Adriatic and Dalmatian Coasts. The Duce, Mack-Smith points out, proposed a "piratical exhibition" to ensure the country's right to empire[5].

Although many Italians mostly held unfavorable views of colonialism, Mussolini's nationalist rhetoric was an important source of Fascism's political attraction[1]. Historian, Jeff Pearce points out that "an expansionist, militaristic nationalism was an essential component of (Mussolini's) Fascist credo"[6]. Mussolini justified Fascist imperial ambitions as for "Italians..., as proud representatives of the Aryan race" to exercise their natural right to conquer and rule, dismissing Ethiopia in his 1935 speech preceding the invasion as "a barbarous country...unworthy of taking its place with the civilized peoples" of the world[6]. Nevertheless, considering what he wrote in his essay, "The Political and Social Doctrine of Fascism", a number of his speeches, and the works of several prominent historians, it appears that structures and institutions (ineffective democracy and greed in capitalism) were more central to Fascist political doctrine than racial politics probably was[5]. The militant expansionism of Fascist Italy is well demonstrated in the country's notorious invasion of Ethiopia in 1935. This campaign heralded Italy's independence from what Mussolini asserted was the country's subjugation by the Allies and Geneva and proved a powerful answer to the anger many Italians expressed at what they insisted was an unfair deal their country got in the Treaty of Versailles[1]. This aggressive crusade marked the beginning of a series of belligerent acts by Fascist Italy.

5.2 World War I and the Treaty of Versailles

Reflecting on Italy's contributions to the Allied cause in World War I, Mussolini indignantly pronounced, "how many promises!"[6]. He followed up by reiterating Italian war losses and lamenting that "...when it came to sitting around the table of the mean peace to us were left only the crumbs from the sumptuous colonial booty from others"[6]. The Duce went on to denounce the League of Nations for sanctioning the Southern European country after its incursion into Ethiopia[6]. The leader finished his diatribe with "a cry of justice..."[6]. With his intense nationalism, Mussolini insisted on claiming for the country what he asserted Italy was wrongfully denied in the Treaty of Versailles. This powerful message coupled with Mussolini's sacrosanct image and the economic despair the country suffered under cemented his creation of an absolute dictatorship. At this point, Fascism was in full control and there was no going back.

Despite the significant roles each of the last three factors contributed to Mussolini's indelible rule, neither of them seems to offer a reasonable understanding for how he came to power so quickly. Mussolini became Prime Minister of Italy in 1922 – 3 years after the Treaty of Versailles concluded the peace settlements for the Great War. The situation in Italy was no doubt bad when Mussolini came to power, but it was not catastrophic. In many ways, it was very similar to other countries nearby that did not witness their own Fascist apocalypse. "...Strikes and inflation were as serious a problem in Italy as elsewhere," Mack-Smith writes[5]. Clearly, the setting in Italy was not nearly as dire as it was in Germany at the time, where, despite the arguably calamitous situation, it would still be around a decade before the Nazis took over[7]. Even so, Mussolini's Fascists seized power in Italy suddenly, while in Germany, the Nazis were still far away from their preeminence in spite of far worse circumstances. One factor does offer an explanation for the Fascists' rapid rise, though.

6 THE FASCIST WAY: VIOLENCE AND CORRUPTION

6.1 A Reign of Terror

A significant reason for Mussolini's sudden rise to power was the "illegality" of Fascism[5]. Brazen public political violence and blatant corruption were arguably Mussolini's favorite tools for creating power. Nonethe-

less, an environment of coercion and licentious electoral and campaign cheating seemed to contribute a substantial role to the ascent of Mussolini and his plundering Fascists. Denis Mack-Smith writes, "Mussolini knew instinctively that one way to consolidate his power was to create a reign of terror"[5]. The Fascist leader was reported to have employed uniformed, armed hooligans to attend his meetings and rallies. He once bragged that "…he preferred using bombs and guns rather than ballot papers against his opponents"[5]. When he was asked one time rather the pen or the sword was mightier, Mussolini replied, "the sword, because it cuts. Cuts ends things" (Mack-Smith, 114). Speaking about power, Mussolini once said, "fifty thousand guns are better than the support of five million voters"[5]. Mussolini actively used death squads and recruited a private army to terrorize his opponents[5]. In 1919, a band of Fascist thugs "threw a bomb into a parade held by the Socialists. Several small bombs were also sent in packages to the cardinal archbishop of Milan (who opposed Mussolini) and the Socialist mayor"[5].

Fascist violence only escalated in the coming years, as the elections of 1921 took place in a setting of particularly alarming savagery. "…Perhaps as many as a hundred people were killed," writes Denis Mack-Smith[5]. This atmosphere of intimidation and unmitigated, plainly visible violence "influenced the results (of the election) significantly – some areas of Italy were virtually under Fascist control and [the] Socialists could not even hold their election meetings"[5]. With the support of the police and the military fully behind him, Mussolini and his Fascists became unstoppable[5]. "The police sometimes lent their trucks to Fascist squads; some units of the army gave them weapons; magistrates tended to decide any prosecutions in their favor…"[5]. When Parliament was in session, "armed Fascists guarded the doors…during debate, and militiamen in the public galleries ostentatiously fingered their daggers and revolvers"[5].

6.2 Cowing the Opposition

During the election of 1922, Mussolini's Fascists killed three opposition members of Parliament and "some fifty others [were] physically attacked, mostly in public and in broad daylight…"[5]. Two years prior, Mussolini proposed a march on Rome with his newly established Blackshirts, that he claimed would have the support of the military and the police, to seize power from a government he dismissed as "spineless"[5]. Ultimately, this scheme brought Mussolini to power, inaugurating his 23-year reign of terror[5].

Shortly after the new Parliament started its session, Fascist deputies, under Mussolini's instructions, pitched a Communist deputy out of a window on a high floor of a building[5]. Perhaps the most notorious and well documented Fascist murder was the killing of Giacomo Matteoti, the Socialist leader and longtime rival of Mussolini who dared to expose the Duce's corruption and the barbarity of the Fascists[5]. Matteoti was tortured to death in a manner so gruesome that Denis Mack-Smith, instead of describing the grisly details of the assassination, wrote that the slaying was "too vulgar and horrific to be reported…"[5].

This scene of shockingly visible violence convinced many non-Fascists to not seek office, as nearly all of those who continued their electoral ambitions died on the campaign trail or shortly thereafter, the latest victims of Fascist terrorism[5]. Mussolini made it plainly clear that he would not tolerate dissent. He is reported to have said, "get rid of him," "teach him a lesson," "he must be made to disappear," or "he must fall back on the revolver" when speaking about his opponents in private[5]. Any brave journalist who dared to report Fascist atrocities risked savage beatings, a drink of castor oil – which was sometimes mixed with petroleum – a cocktail that nearly always proved to be deadly, or worse[5].

Denis Mack-Smith argues that without this display of highly visible and disturbing violence, the Fascists would probably not have been able to acquire the overwhelming majority in Parliament needed for absolute power[5]. This scene of assassinations, beatings, and public torture led Mack-Smith to conclude that Mussolini's Fascist revolution presented little more than a "vulgar riot of bludgeons and castor oil"[5]. A weak response from the democratic government and limited intervention from the police, Mack-Smith insists, contributed a significant role to Mussolini's sudden ascent to power[5]. Although the violence of the Fascists led to Mussolini's arrest along with other Fascist leaders in 1919, he was promptly released the next day on government order[5]. The democratic government's "astonishing reluctance to punish Fascist" crimes "was to be a major factor in bringing Mussolini to power," Mack-Smith argues[5].

7 AN EPIDEMIC OF VIOLENCE

In 1925, Mussolini addressed the Chamber of Deputies in a speech that historian, Stanislao Pugliese argued marked the "beginning of the full Fascist dictatorship"[8]. The Duce responded to accusations that he had promoted arbitrary savagery, answering that Fascist violence had a purpose, and that purpose, he insisted, was not to impose terror. "Violence, to be effective, must be surgical, intelligent, and chivalrous," the Duce declared[8]. He followed up by claiming full responsibility for, and complete control over, all political violence in postwar Italy, which was shockingly common[8;5]. "I now declare before this assembly," Mussolini announced, "…that I assume, I alone, full political, moral, and historical responsibility for all that has happened"[8].

"If Fascism has been nothing more than castor oil and the rubber truncheon, instead of being a proud passion of the best part of Italian youth," he continued, "then I am to blame!"[8]

"If Fascism has been a criminal association, then I am the chief of this criminal association... Let me take responsibility for this," Mussolini beseeched the Chamber[8]. A year before delivering this intrepid speech, Mussolini took over control of the police and used their authority to arrest and harass Fascist opponents[5]. Shortly after this audacious speech, "Freedom of the press and of association were banned by decree, and all political parties were outlawed. Political opponents... were arrested and sentenced to long prison terms by the Special Tribunal"[8]. By claiming complete control over all political violence in the country at the time and stating the intentionality of that violence, Mussolini made it plainly clear that anyone who should dare question his right to rule, and Fascist politics, was placing him/herself in a position of immeasurable danger. Immediately after this speech, the last non-Fascists in the government resigned[5]. With the government under complete Fascist control, Mussolini's dictatorship had begun.

"Violence obviously attracted youth, and students in particular took pleasure in administering castor oil by the liter..." to their helpless victims, Mack-Smith points out[5]. During the elections of 1921, a gang of Fascist students murdered a Socialist deputy seeking reelection[5]. With Mussolini's dominance now unquestioned and the authority of the police and the military fully behind him, violence and state terrorism became fully incorporated and began to take place as a regular part of Italian life.

An elderly man once overheard a woman on train complaining to a friend that the bread on sale gave her pains. Because the woman had the temerity to insult the Duce's bread, the old man escorted the woman to a pharmacy after she got off and "forced her to drink half a glass of castor oil (or else face 'something worse')." Christopher Duggan points out that, "...the man was probably not a police informer," but just a good Fascist performing his duty to the leader[3].

7.1 Fascist Corruption

Prosecutions for Fascist violence were rare; arrests were even less common, convictions were almost unheard of, and, in the few cases when a conviction was secured, sentences were short and were nearly always over-turned within a few years[5] Along with the appalling barbarity of the Fascists, election corruption was disgustingly high. Denis Mack-Smith writes:

> "...These elections were gerrymandered more shamelessly than any election before them. Voting certificates were confiscated from opponents and then used many times over by Fascists; the secrecy of the ballot was violated in a dozen ways; illiterates were illegally put on the voting roll, as were names of the dead; official circulars to local Fascist parties gave detailed instructions about destroying opposition voting papers in the urns and otherwise manipulating results..."[5]

This level of rank corruption and frightening violence arguably largely characterized the sudden ascent of Fascism in Italy right after World War 1 and both were to contribute substantial roles to bringing Mussolini to power.

8 CONCLUSION

Ultimately, a stagnant postwar economy and widespread nationalist umbrage set the stage for Mussolini and his Fascists who offered not only an instant remedy for Italy's postwar misfortunes but also prosperity and empire. Mussolini's magnetic charisma coupled with his magnanimous philanthropy allowed the Duce to solidify an image as the savior of Italy. By claiming the covenant as the hero of Italy, Mussolini put challenging his guidance out of the question, with his absolute rule justified as part of an altruistic effort to redeem the country from its postwar woes. Widespread frustration with liberal democracy amongst many Italians and a series of clever political tactics by Mussolini ultimately advanced the rise of Fascism in Italy and formed the base of Mussolini's absolute rule that lasted almost a quarter century.

The inability of the democratic government - already beset with the staggering task to rebuild an ailing postwar economy and to respond effectively to Fascist criminal activity ultimately led to the death of Italian democracy in the years immediately after the war. Mussolini and his Fascists continually tested the government's reserves with more and more shocking displays of open violence. By blaming liberal institutions for allowing economic stagnation and national humiliation to manifest, the Duce vindicated his movement. The initial improvements to Italian quality of life through Fascist welfare programs further elevated the Duce's popularity and justified his dictatorship.

A series of weak government responses and unpunished Fascist violence ultimately emboldened the insurgent Fascists, who used this as evidence for the failure of democracy and allowed Mussolini to destroy liberal institutions in Italy and replace them with his own. Through his passionate crusade for national revitalization, Mussolini led his country on a deadly path of destruction that ended with war. As the Duce would later find out, though, the new institutions he created were only as strong as his leadership. When he fell, his

institutions crumbled, and his empire collapsed. In the end, an unpleasant situation coupled with a violent revolution led by a charismatic leader proposing grand and immediate solutions matched by government languor allowed Fascism to spring from the shadows in Italy. For democracy to survive, going forward, it is critical that when democratic governments witness similar conditions met with a similarly violent uprising and pretentious political appeals by a charismatic leader, that the government respond quickly and strongly or they too could watch Fascism rise again.

9 EDITOR'S NOTES

This article was peer reviewed.

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Denial by Grace Gonzalez

University of Denver Undergraduate Research Journal

Media Framing in the Centennial Olympic Park Bombing: How Media Coverage of Terrorism Shifts When a Suspect Is Revealed

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Abstract

Terrorist attacks often dominate news cycles as reporters seek to interpret the attack through their own desired framing tools. Since "humans are predisposed to attend to negative and threatening information"[1], news coverage of terrorist attacks receive a lot of attention and how the attack is framed can manipulate the narrative portrayed to the public. This study utilized the Nexus database to examine framing techniques used by a local and an international newspaper in reporting on the Atlanta Centennial Olympic Park bombings both before and after a subject was identified by the FBI. This case study raises major concerns about the responsibility of journalists in balancing the pursuit of a story and ethical obligations surrounding the presumption of innocence. This paper explores how perpetrator identity, legitimacy in sources, and perceived future threats influenced how the bombing was covered and the consequences of these framing tools. Overall, once a suspect had been named, both news outlets utilized "othering" techniques to deemphasize the domestic terrorism label, their sources cited became less qualified, and they stopped speculating about the possibility of another attack.

On July 27, 1996 during the Summer Olympics, a pipe bomb exploded at the Centennial Olympic Park in Atlanta, Georgia, killing two people and injuring over one hundred more. The explosion would have been far deadlier if the bag concealing the bomb had not been discovered by security guard Richard Jewell, who began clearing the area after alerting the Georgia Bureau of Investigation[2]. Despite Jewell's critical role in discovering the bomb, the news organizations that had first deemed him a "hero" quickly changed their narrative once the FBI labeled him as a suspect in the bombing. The notion of being innocent until proven guilty is a cardinal principle of the United States' legal system. Entwined with the concept of presumed innocence is the burden of proof. In criminal cases, the prosecution must prove beyond a reasonable doubt that the plaintiff is guilty of the charge in which they are accused. Yet this issue of criminal jurisprudence often becomes irrelevant in a media driven world since journalists are not held to the same standards as actors in the legal system. The case of the Centennial Olympic Park bombing raises major concerns about the responsibility of journalists in balancing the pursuit of a story and ethical obligations surrounding the presumption of innocence, especially in sensitive cases such as terrorism.

The Atlanta Centennial Olympic Park bombing serves as an excellent reflection of how much power the media holds in our society. This study examined two articles from two sources to determine how The Atlanta Journal Constitution (AJC) and USA Today covered this terrorist incident as well as what factors influenced how the attack was framed. Because the AJC was the first newspaper to release Jewell's name as a suspect, their reporting set the tone for several other local news outlets. USA Today was also included in the study to represent an international media outlet to determine if audience size would influence how the media distilled information to their perspective audiences. Both of the newspapers selected are highly credible outlets with only moderate political alignments, to reduce the influence of political bias on their analyses.

Professor Entman from Northwestern University described framing as a way to "select some aspects of a perceived reality and make them more salient. . . "[3]. By choosing what is seen as "salient," a media outlet can manipulate the narrative and influence how their audience interprets an event. This immense power of being able to shape opinions and perceptions of reality is one reason why ethical principles such as transparency and objectivity are so essential in the field of professional journalism. Keeping Entman's definition in mind, this study examined how perpetrator identity, legitimacy

in sources, and perceived future threats effected how the bombing was covered. Overall, once a suspect had been named, both news outlets utilized "othering" techniques to deemphasize the domestic terrorism label, the sources cited became less qualified, and both outlets stopped speculating about the possibility of another attack.

In the days following the bombing, no terrorist group took responsibility for the attack, leaving investigators scrambling to find a potential motive. What makes an attack qualify as terrorism can vary across different circumstances, therefore there is no universally accepted definition of terrorism. Despite this challenge, the FBI, who investigated the bombing, uses two broad definitions for international and domestic terrorism. Because the 911 call that warned police about the bomb came from a pay phone near the park and the caller did not identify themselves as a member of a terrorist group, it is unlikely the attack could be categorized under the international terrorism definition[2]. Therefore, the Atlanta Centennial Olympic Park bombing fell under the FBI's definition of domestic terrorism which is defined as "violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, racial, or environmental nature"[4].

The true perpetrator of the bombings, Eric Rudolph, had not yet been identified as a suspect, therefore his anti-abortionist motivations had yet to be revealed. Years later after finally being caught by the FBI, Rudolph admitted, "the purpose of the attack on July 27th was to confound, anger and embarrass the Washington government in the eyes of the world for its abominable sanctioning of abortion on demand"[5]. However, even without this insight, investigators at the time still believed the attack to be domestic terrorism. Security experts quoted in the AJC stated that international terrorist groups would likely have used an explosive such as TNT, which has a bigger blast radius than a pipe bomb, and that easy access to escape routes would make the park setting more attractive for an individual person rather than a group. There was also speculation that the Olympics could have served as a symbolic target of attack for a greater unknown purpose[6].

Even in 1996, terrorist attacks were not uncommon, however, whether or not an attack received adequate media coverage was dependent on several factors, one of which was perpetrator identity. Perpetrator identity is a common frame that is often utilized to portray the attacker as an outsider to normal society. This form of "othering" can be based on the perpetrator's religion, ethnicity, mental faculties, or any other factor that can distance them from the average reader. Thus, by framing the perpetrator as an outsider, the reader can distance themselves both from the perpetrator and the act of violence itself[7].

Within the first day after the attack, neither the AJC nor USA Today had a possible suspect to report on, so their speculations of possible perpetrators remained very general. The AJC quoted several security experts and police officials who thought the bombing was the work of "home-grown terrorists"[6]. The article also speculated that the perpetrator could be "white supremacists" or even an "extreme anti-government movement." The USA Today article released at the same time, chose to be more vague by quoting an FBI agent who stated, "we are not focused in any one specific direction"[8].

However, after Jewell was labeled a suspect on July 31, 1996, neither news article used the terms "terrorism" or "terrorist." Instead, the AJC and USA Today focused on Jewel's "bumpy road" in policing. Both news outlets emphasized how Jewel "bounced around a number of jobs" in law enforcement and cited several less-than-flattering reviews from his former employers depicting him as "erratic," "overly aggressive," and "gung-ho"[9;8]. This phenomenon is consistent with previous literature that has examined how labeling the attack as terrorism versus crime determines what "othering" characteristic the media will utilize. When an incident is labeled as terrorism, the perpetrator is "othered mainly based on his religious and ethnic background." On the other hand, when the incident is seen as a crime, "othering occurs through pathologizing the perpetrator"[7]. This is clearly seen in the Atlanta Centennial Park bombing because at first the incident was depicted as domestic terrorism even though there were no suspects. However, when the suspect was revealed to be a white male with a history in law enforcement, the media pathologized him as an attention-seeking police officer that fit the profile of an individual with a "messiah complex." By othering Jewell based on his previously failed jobs, the attack became framed as a one-time crime by an attention seeking police officer rather than as an act of terrorism.

At this point in time, Jewell had not been charged with any crime and therefore, was still innocent until proven guilty. One of the major problems that occurs when the media does not respect the principle of presumed innocence, is that they can stigmatize the alleged perpetrator in the eyes of their audience. Jewell moved to Atlanta at the age of four after his mother remarried and relocated the family. He grew up in Atlanta, attended school in the area, and went on to establish his career in nearby towns[10]. Atlanta was his community, filled with the people who taught and cared for him growing up. But, because terrorist attacks are magnets for media attention, there was a lot of competition to break the story of the bombing first, especially for the AJC as the attack happened in their own backyard. It was while under this pressure, that the media failed to disclose that no charges had been filed and utilized

"othering" language to ostracize Jewell from the very community he grew up in. Following headlines that deemed Richard Jewell as a possible suspect, the former security guard was subjected to intense media attention, constant surveillance, and a slew of bad publicity. After eighty-eight days, Jewell was cleared as a suspect, but the accusations took their toll. Jewell eventually died from a heart attack at the age of forty-four. To this day, his mother still attests that "the media scrutiny and his negative public image played a role in his death"[10].

The AJC and USA Today also shared a similarity in the authority and legitimacy of the sources they quoted in their articles. On July 27, before Jewell's name became publicized, the AJC cited police officials, a president of a security consultant firm, and several security experts for their professional opinions on the attack. Similarly, only a day later USA Today quoted FBI special agents, an ATF agent, a chief executive officer of the Atlanta Olympic Committee, and several other police officers. Almost every single person quoted or mentioned in the initial articles was a law enforcement officer in some capacity, thus lending legitimacy to their speculations[6;8].

However, once Jewell was named a suspect, there was a noticeable drop in the qualifications of the sources being quoted. There was a major shift from "security experts" to people close to Jewell such as his neighbor, his former employers, his cousin, and even the maintenance man of his apartment complex. With this devolution in the quality of the sources, came a decrease in the credibility of the articles. The quotations used by both news outlets were no longer expert opinions, but very subject speculations by biased individuals. What is also interesting is that the quotes almost all centered around Jewell and his character rather than speculations about the bombing. There was also a significant decrease in mentioning titles, instead simply referring to sources vaguely as "officials" when regarding why Jewell was even under suspicion[9;8].

Cultivating credible sources is an essential role of ethical reporting, as to provide the most accurate information to the public. Utilizing quotes from high-quality, experts adds to the ethos of the piece and builds the outlet's reputation as a trustworthy source of information to the public. When media outlets do not respect the principle of presumed innocence and use biased or irrelevant sources to support their claims, they abandon their role as simply reporting the news and take on the role of judge, jury, and executioner. This does not mean that journalists should not provide detailed accounts or descriptions of incriminating evidence, but rather they must still treat the people accused of a crime as innocent until they are proven guilty by a court of law. Only implementing sources to fit one's own narrative may increase audience size, especially when paraphrasing especially incriminating quotes, but the practice has severe consequences. In the case of Jewell, the decrease in source quality after his pronouncement as a suspect was detrimental to his future career prospects and sullied his reputation without offering him any way to defend himself.

While perpetrator identity and source legitimacy are two powerful framing techniques, the most impactful frame is the possibility of future attacks. Previous literature shows that audiences are more attuned to attacks that pose an immediate, violent threat. This is because "humans are predisposed to attend to negative and threatening information"[1]. Therefore, by mentioning the possibility of a future attack, audiences develop a sense of fear which requires them to pay more attention to the media and what it reports.

While the tone of the July 27 AJC article began as informational, it ended on a note of fear by quoting a New Orleans security consultant saying that "there's no reason for him [the unknown bomber] not to consider doing it again…"[6]. Similarly, the USA Today article ended on an ominous note with the chief executive officer of the Atlanta Olympic committee stating, "we all need some time to re-evaluate security at the park and decide where we go from here"[8]. Both articles used ambiguous quotes from credible sources to make the reader question whether or not there will be another bombing. By quoting experts who are weary, the media created the narrative that another attack was a real and imminent possibility.

However, once Richard Jewell was identified as a suspect, neither news outlet discussed the possibility of another attack. There is no mention of a need for increased security measures, ambiguous quotes, or other forms of fear mongering. Instead, both articles made the case for why Richard Jewell was a rightful suspect. This, in turn, lulled the public into a false sense of security by making them believe that the bomber had been caught and there would be no future attacks[9;8].

The danger in this is that we now know that Richard Jewell was not the bomber. In fact, the real perpetrator, Eric Rudolph, was not caught until years later after orchestrating three more bombings, bombings for which the public was unprepared. When the media begins to tailor their coverage to what they believe their audience wants to hear, the cost is not just keeping information from the public. The cost could be in human lives. Terrorist events are media magnets because high casualties equate more viewers. However as previous literature suggests, more coverage of terrorist attacks may encourage an increase in terrorist activity because terrorists want to be seen[1]. The media thus has a responsibility to cover terrorist attacks in a fair way regardless of whether there is an individual suspected of being responsible for the attack.

Overall, both the AJC and USA Today shifted how they framed perpetrator identity, legitimacy in sources, and perceived future threats once Richard Jewell was

labeled as a possible suspect. Rather than staying objective and recognizing that Jewell had never been officially charged by any law enforcement agency, both news outlets attempted to frame the bombings into a narrative that fit what they wanted. Both news outlets othered Jewell through disparaging quotes to distance him from their viewing audience. Both news outlets used less-qualified sources to villainize Jewell rather than continue quoting the experts they previously worked beside. Both news outlets stopped speculating about the possibility of another attack. Therefore, both news outlets are responsible for diverting the public attention to an innocent man while the real terrorist got away with three more bombings.

It is clear that the media plays a vital role in shaping public opinion and therefore should be held to strict ethical standards. Standards that include recognizing and using language that acknowledges the legal significance of presumed innocence. Jewell's life was upended by the media as he endured the stress of having his reputation tarnished across the very country he hoped to serve as a security officer. Ostracized by his own community, Jewell's perspective job opportunities were severely affected and his personal relationships were impacted by over eager reporters, desperate to break a story without first having all the facts. The Centennial Olympic Park bombing is just one case study that exemplifies the responsibility that journalists face in balancing the pursuit of a story with ethical obligations concerning presumed innocence. After all, by respecting that people are innocent until proven guilty, we show our respect for the cardinal principles of our legal system as well as prioritize justice over sensationalism.

1 EDITOR'S NOTES

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Red Sky by Maria Stevens

University of Denver Undergraduate Research Journal

Developing Effective Intervention: A Case Study of Genocidal Moments in Sebrenica and Kosovo

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Abstract

Despite numerous treaties and international agreements aimed at stopping genocide, genocidal mass killings continue to take place within the current international system. In order to better understand how to best combat genocide, scholars have developed two main approaches: *intervention* and *prevention*. The interventionist approach argues genocide can be stopped in its tracks through use of military force and targeted diplomacy, while the preventionist approach argues pre-emptive action is needed to truly stop genocide. Both approaches, however, have relied too heavily on hypothetical analysis of how past genocides could have turned out differently given certain factors. This study instead aims to use case study analysis to compare two "genocidal moments"—one where genocide did take place, Srebrenica in 1995, and one where genocide did not take place, the Kosovo War in 1998 and 1999. To define this term, "genocidal moment," this study uses Gregory Stanton's "The 10 Stages of Genocide." Ultimately, this study concludes that effective humanitarian interventions cannot remain neutral and, instead, must side with victims and against perpetrators.

Keywords: genocide, genocidal moment, humanitarian intervention, genocide prevention, Srebrenica genocide, Kosovo War

1 INTRODUCTION

Despite the efforts of many different NGOs, international organizations, and individual states since the end of World War II, genocide and similar mass killings have continued to take place. In particular, the United Nations has created numerous genocide-prevention institutions that the international community has failed to live up to[1;2]. Given their longstanding use of rhetoric condemning genocide and the catastrophic consequences of inaction, it is necessary for international organizations like the UN to change their approach with regards to genocide in order to truly improve international norms. This research will use the term "genocidal moment"—which itself will be defined using Genocide Watch's "The Ten Stages of Genocide"—in order to refer to both instances of completed genocide and instances of potential genocide that never progressed to Stanton's "extermination" stage[3]. This research aims to compare two specific cases—the genocide in Srebrenica and the Kosovo War—to isolate what variables are most important to stopping "genocidal moments." Indeed, what are the necessary conditions to stop genocidal moments from progressing to extermination? By examining genocidal moments in Srebrenica and Kosovo, this paper attempts to answer that question.

2 LITERATURE REVIEW

In the field of genocide studies, two main approaches to avoiding genocide predominate: *intervention* and *prevention*. The first approach supports the use of "humanitarian intervention"—a combination of targeted diplomacy and military force by the international community—to stop genocide in its tracks[4;5;6]. The latter approach, on the other hand, doubts the effectiveness of this humanitarian intervention and instead supports the prevention of genocide before it can even begin, often by fostering appropriate conditions for reducing conflict in countries where warning signs of genocide exist[7;8;2]. While both sides agree that it would be preferable if genocide never occurred at all, preventionists doubt the international community's ability to effectively intervene while interventionists, more optimistic on that front, doubt the international community's ability to first predict, and then prevent, genocide. Nevertheless, both interventionist and preventionist scholars have largely used hypothetical analyses to speculate on how past genocides might have been avoided in developing their policy recommendations. This is an obvious weakness in much of the genocide studies literature and my own research attempts to avoid this hypothetical analysis by examining the different outcomes of two actual genocidal moments: the Srebrenica Genocide and

the Kosovo War. But first, what solutions to genocide have previous scholars developed?

To start with, interventionist scholars, for the most part, have focused on how military force can be used to stop genocide. Interventionists all agree that military force can be an effective tool for stopping genocide, but debate among themselves on the appropriate ways military force should be used to be most effective[4;5;6]. Scott Feil, for example, reported on a conference held by the Carnegie Corporation that aimed to determine what the ideal military response would have been to the Rwandan genocide to save the most lives[4]. The conference of mostly military experts, including General Romeo Dallaire, who led the UNAMIR peacekeeping force in Rwanda during the genocide, ultimately found that a force of about 5,000 appropriately armed, trained, and organized men could have significantly altered the outcome of the genocide if they deployed between April 7th and April 20th, 1994[4].

Similarly, in an analysis of NATO intervention in Kosovo during the 1998-1999 Kosovo War, Peter Ronayne argued that military force could have been used in specific ways to significantly improve outcomes in Kosovo. While Ronayne still acknowledged that the NATO airstrikes played a significant role in avoiding a potential humanitarian disaster—mostly by breaking Serbian domestic support for war—he argued that the use of ground troops could have importantly hindered Serbian forces in a way that airstrikes did not[6]. Ronayne thus warned the lessons from Kosovo should be taken with caution as the air campaign only defeated Serbian forces politically, and not militarily[6].

Another interventionist scholar, Arash Pashakhanlou, disagreed that NATO airstrikes were significant in ending the conflict in Kosovo, but similarly argued that the use of ground troops could have dramatically changed outcomes. Pashakhanlou argued that, not only were the airstrikes militarily ineffective, but that they actually "accelerated… human rights abuses" before Serbian President Slobodan Milosevic caved to diplomatic pressure. In particular, Pashakhanlou pointed out that atrocities were committed by Serbian forces during every day of the three-month NATO air campaign[5]. He compared airstrikes in Kosovo to a similar NATO air campaign in Libya where Libyan rebels acted as surrogate ground forces. According to Pashakhanlou, the air campaign in Libya was far more effective because of this added ground support as well as because of several other key factors like better "geography, diplomacy and technology"[5]. In any case, despite some disagreement, the research conducted by the Carnegie Corporation, Ronayne, and Pashakhanlou all similarly ventured to discover the specific uses of military force needed to improve the effectiveness of humanitarian intervention by the international community.

Preventionist scholars, by contrast, have claimed that there are fundamental flaws with this approach[7;9;2]. For example, in an analysis of the Rwandan genocide, Alan Kuperman assessed a specific, hypothetical scenario where "The president of the United States, upon determining that a genocide was in progress in Rwanda, had unilaterally ordered the expeditious deployment of an U.S. intervention force"[8]. To ensure his hypothetical was "legitimate" and "contendable," Kuperman limited his alterations to the past to that single counterfactual statement and, through an analysis of government reports and on-the-ground primary source accounts, found that military intervention would have failed to save most of the victims[8]. In particular, Kuperman argued that, while military preparedness could have been improved, the main reason why military intervention would have failed is because the international community would not have realized genocide was taking place and responded properly before at least three quarters of the Tutsi population was already killed, given the speed of the genocide[8]. Instead of military intervention, Kuprman argued international actors should emphasize de-escalating civil wars diplomatically since genocide often occurs after civil war[8].

David Hamburg similarly called for a preventionist approach. According to Hamburg, early warning signs present themselves years before killing takes place in every genocide[7]. Furthermore, he argued that within well-crafted cooperative international institutions, "strong democracies and humane organizations could reach out *proactively* to nations in trouble"[7]. Specifically, he argued that this "proactive" aid should target certain "pillars of prevention," which included preventive diplomacy, democratization, equitable socio-economic development, education, international justice, and restraints on weaponry[7].

Finally, in their analysis of United Nations responses to genocide, Samuel Totten and Paul Barthrop were far less optimistic than Hamburg concerning the role cooperative international institutions could play in preventing genocide. Totten and Barthrop found that the United Nations rarely acted to prevent genocide throughout its history because of Cold War tensions and a still-present reluctance among member-states to violate the principle of state sovereignty[2]. Totten and Barthrop also argued that when the UN did act to intervene in genocide, it was mostly ineffective (they cited the examples of Rwanda and Bosnia while acknowledging the exception of East Timor). Totten and Barthtop, therefore, doubted humanitarian intervention's effectiveness primarily because they doubted that the human rights norms necessary for international action actually exist, despite the rhetoric used since the UN conventions on genocide in 1948. In this sense, Kuperman, Hamburg, and Totten and Barhtrop all doubted the effectiveness of humanitarian intervention in their research.

In any case, as mentioned above, interventionist and preventionist scholars alike have relied far too heavily on hypothetical analysis for developing solutions to the problem of genocide. While this has not always been the case, such as Hamburg's discussion on actual genocide prevention in South Africa or Pashakhanlou's discussion on effective airstrikes in Libya, many scholars have opted to ask "what if" in determining how genocides can be stopped. This research instead aims to look at how key genocidal moments actually ended in the hopes that this may teach scholars and policymakers something about how to stop genocide. To learn if any generalizable findings exist around how genocidal moments have actually ended, this study compares the cases of the genocide in Srebrenica and the Kosovo War.

3 RESEARCH BODY

3.1 Method – Defining "Genocidal Moment" and Selecting Cases

In order to best compare the various factors that could possibly stop genocide, it is important that this study does not limit itself to only one set of outcomes. Therefore, this study will not only consider events in which genocide occurred, but also events where—while indicators of genocide existed—genocide did not occur. This research, therefore, builds on the premise some scholars have suggested that genocide is always preceded by observable indicators[8;7]. Furthermore, to describe these indicators, this research will use Genocide Watch's "The 10 Stages of Genocide"[3]. This study argues that in "genocidal moments" many of these ten stages occur, but that the crucial stage, "extermination," does not necessarily take place. This concept of "genocidal moment" is used in order to determine the case selection of this study.

Somewhat unhelpfully, however, Genocide Watch's founder, Gregory Stanton, defers to legal definitions of genocide when describing extermination: "extermination begins, and quickly becomes the mass killing legally called 'genocide.' It is 'extermination' to the killers because they do not believe their victims to be fully human"[3]. Therefore, to supplement Stanton's stages, this research will also use the widely-cited legal definition of genocide used by the United Nations in Article III of the 1948 Convention on the Prevention and Punishment of the Crime of Genocide:

> "In the present Convention, genocide means any of the following acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group, as such: (a) Killing members of the group; (b) Causing serious bodily or mental harm to members of the group; (c) Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part; (d) Imposing measures intended to prevent births within the group; (e) Forcibly transferring children of the group to another group[10]."

Given Stanton's description of extermination as the "mass killing legally called genocide," this study will use this UN definition to determine extermination in various genocidal moments.

This research compares the genocidal moments of the Srebrenica genocide and the Kosovo War. This study argues that both cases constitute genocidal moments because throughout both the Kosovo War and the Srebrenica genocide several key stages of genocide were reached—including the later stages of organization, polarization, preparation, and persecution[3]. The genocidal moment of the Kosovo War, however, was stopped before extermination occurred, whereas in Srebrenica extermination was allowed to take place.

This study follows a "most similar" selection strategy in comparing the Srebrenica genocide and the Kosovo War. In both cases, the perpetrators were the same, or close to the same, (Bosnian Serbs supported by Serbia/Yugoslavia in Srebrenica and Kosovo Serbs/Serbian/Yugoslavian forces in Kosovo) and because the context was similar (armed conflict following the dissolution of Yugoslavia in both cases). These similarities make it easier to determine important variables that contributed to the differing outcomes of these genocidal moments.

3.2 Case 1: Srebrenica

The genocide of Muslim men and boys that took place in Srebrenica in July of 1995 occurred within the broader context of Bosnia and Herzegovina's bloody civil war and the collapse of communist Yugoslavia. As communism ended within Yugoslavia, old nationalist and ethnic tensions began to rise between the various constituent republics; these resurgent ethnic/nationalist tensions were a necessary progression on the path to genocide in Srebrenica[11]. Still, Stanton's first stage of genocide, classification—or the existence of "categories to distinguish people into 'us and them' by ethnicity, race, religion, or nationality"—had long existed in Srebrenica and Yugoslavia broadly as people living in the region were often categorized by their nationality or ethnicity (Serb, Bosniak, Croat, Albanian etc.) and were further categorized by their religion (Muslim, Christian etc.)[3]. Moreover, for Muslim peoples living in Yugoslavia like Bosniaks or Kosovar Albanians, the second stage—symbolization—had also long existed since differences between Muslim and Christian dress often made it visually obvious who belonged to what group. Importantly, Stanton notes that "Classification and symbolization are universally human and do not necessarily

result in genocide unless they lead to dehumanization" so their long existence in Srebrenica and Yugoslavia is not surprising and does not necessarily constitute a "genocidal moment"[3].

In any case, ethnic and nationalist tensions further escalated in post-communist Yugoslavia when the constituent republic, Serbia, opportunistically seized unilateral power over the federal government in the early 1990s[11]. Serbian President, Slobodan Milosevic supported Serbian minority movements demanding for the resignation of the governments in Montenegro and in the autonomous province, Vojvodina, and, following these resignations, "hand-picked Milosevic men" were put in power in both governments[11]. Milosevic then, using military force, stripped Kosovo of its autonomy, giving Serbia its vote in the federal government[11]. With the federal votes of Serbia, Montenegro, Vojvodina, and Kosovo, Milosevic was able to effectively dominate the Yugoslavian federal government[11]. Fearing a Serbian dominated Yugoslavia, Croatia and Slovenia soon seceded in 1991 and following these secessions war soon broke out. Accepting his failure to dominate all of former Yugoslavia, Milosevic did little to resist the secession of areas with no significant Serbian population like Slovenia, and instead focused on creating a "Greater Serbia" where large parts of the other republics with Serbian minorities were brought under Serbian rule[11].

This included large parts of Croatia, resulting in the war which broke out between Croatia and Serbia/Yugoslavia in 1991, but more importantly, it included even larger portions of the ethnically diverse Bosnia and Herzegovina. Sharing Milosevic's vision of a "Greater Serbia," Serbian paramilitaries supplied by Yugoslavia seized large areas within Bosnia and Herzegovina and declared independence[12]. Supported by Yugoslavia, this newly independent, Respublika Srpska well outmatched Bosniak and Croat fighting forces in Bosnia and Herzegovina and "seized control of about 60 percent of Bosnia"[11].

Within the territory they captured, Bosnian Serbs then began brutal campaigns of ethnic cleansing in which other Bosnian minorities—especially Croats and the Muslim, Bosniaks—were forcibly removed from their homes by military forces[11;12]. This ethnic cleansing campaign represented a rapid progression through the stages of genocide. Stage three, discrimination, occurred because Serbs used their political power to deny the property rights of Bosniaks and Croats. Stage four, dehumanization, occurred because Serbs used dehumanizing hate propaganda to justify the campaign. Stage five, organization, occurred because Serb paramilitaries were established to fight the war, carry out the ethnic cleansing, and "to provide deniability of state responsibility" for Yugoslavia/Serbia[3]. And finally, stage six, polarization, occurred because extremists drove "the groups apart" physically and rhetorically, isolating moderates advocating for Serb, Croat, and Bosniak coexistence[3]. Moreover, to accomplish their ethnic cleansing campaign, Serb paramilitaries used "mass killings, forced displacement, torture and rape, and the destruction of private and public property, including religious objects"[12].

By April of 1992, this violence reached Srebrenica when Bosnian Serbs attacked the city—killing 27 people[12]. Soon after, however, "the Bosnian Army recaptured the city" and Srebrenica became an enclave within Bosnian Serb territory "into which refugees streamed from throughout the Podrinje region"[12]. By the end of 1992, the population of Srebrenica had risen to around 30,000 of mostly refugees[12].

In response to the atrocities being committed in Bosnia and Herzegovina, the United Nations—which had already declared a peacekeeping mission in the ongoing war in Croatia—extended the mandate of the United Nation Protection Force (UNPROFOR) in Croatia to also include Bosnia and Herzegovina in the summer of 1992[13;14;15]; UNSC Resolution 770; Tardy 2015). Alongside the extension of UNPROFOR's mandate, peace talks were also opened up between the Bosnian government and the Respublika Srpska in September 1992[11]. The approach of the United Nations, however, was guided by a view of "the conflict as a part of a long-term ethnic contest that had been underway for many centuries and whose real origins lay in a murky Balkan past. Since all sides were equally guilty the argument went, the only solution was to mediate and compromise over territorial issues"[11]. This view directed the peacekeeping mission and negotiations; negotiations aimed at dividing up Bosnian and Herzegovina into different territories for different ethnicities while the peacekeeping mission focused on humanitarian aid and the "creation of so-called 'safe-areas'"[15]. These efforts did not properly target Bosnian Serbs as aggressors and, instead, aimed to separate belligerents. Of course, this peacekeeping mission represents a form of "humanitarian intervention" by the international community, although interventionist genocide scholars will be quick to point out this intervention was not meant to stop an ongoing genocide, but instead was meant to protect civilians during a civil war.

On April 16, 1993, the UN declared that "all parties and others concerned treat Srebrenica and its surroundings as a safe area which should be free from any armed attack or any other hostile act" in a Security Council resolution[16]. About 7,600 UNPROFOR forces were deployed to maintain this and other "safe areas" ("Sarajevo, Tuzla, Bihac, Zepa, and Gorazdje") within Bosnia and Herzegovina and were authorized only to use force in self-defense[12;15]. Despite the declaration of a "safe area," Bosniak forces in Srebrenica still "maintained its own defenses" which included some 1,500 lightly armed soldiers[12].

The following year, in March of 1994, a "Dutch battalion of 570 soldiers relieved" older UNPROFOR troops in Srebrenica[12]. These Dutch troops were the active force in the UNPROFOR mission in Srebrenica when the genocide took place in the summer of 1995. Upon arriving in Srebrenica, the Dutch battalion became frustrated with the refusal of Bosniak forces to demilitarize and with the "dismal conditions within the enclave;" some of the soldiers even seemed to treat the refugee population with contempt as one piece graffiti in their barracks demonstrated: "No teeth…?/A moustache…?/Smells like shit…?/Bosnian girl!"[12]. Well before the 1995 attack, relations between the UN soldiers and the Bosniak refugees were "tense" and "often marked by mutual distrust"[12].

In June of 1995, Bosnian Serbs ignored UN Security Council Resolution 819 and attacked Srebrenica[12]. The Bosnian Serbs quickly captured two Dutch observation posts with little resistance in early July[12]. On July 6, upon receiving fire, UNPROFOR commander Tom Karremans surrendered more posts without putting up a fight[12]. More UN positions fell, and by July 9 the Bosnian Serbs were attacking the city of Srebrenica itself[12]. Hesitation among UN decision makers halted UNPROFOR requests of NATO air strikes[12]. Bosniak forces too hesitated in responding to the Bosnian Serb aggression, worried that by fighting in the designated "safe area," they might deprive themselves of UN and NATO support[12]. Disastrously, this led to the complete victory of the Bosnian Serbs who, by July 11, had captured the city and began separating Bosniak men and boys from the women; following negotiations with UN forces, the women and young children were also forcibly deported from the city with assistance from the UN peacekeepers[12]. By this point, Bosnian Serb paramilitaries were already planning the genocidal killings of the Bosniak men and boys; as such the situation progressed to Stanton's seventh stage, preparation. Furthermore, by separating the men and boys and gathering them in a concentrated area, the Bosnian Serbs also committed stage eight, persecution, where "Victims are identified and separated out because of their ethnic or religious identity"[12]. In this case, gender identity was also a determining factor for separating victims.

Fearing the worst, however, many of the separated Bosniak men decided to try and escape and formed a column that ventured into the woods hoping to flee to Bosnian-government held territory[12]. The column was shelled and ambushed by Bosnian Serbs who used machine guns and small arms on the Bosniaks while they ran through the forest. The vast majority of the men were killed[12]. Men captured from the column and many of those who chose not to flee were also executed in mass and by July 17 an estimated 8,000 Bosniak men and boys had been killed[12]. Stage nine, extermination, had been reached. In the years following the genocide, Serbia also progressed to the final stage in Stanton's model, denial[12].

3.3 Case 2: Kosovo War

The 1998-1999 Kosovo War was preceded by a long history of Serbian domination in the majority-Albanian region of Kosovo and, similar to the Bosnian War, the conflict was caused in part by communism's collapse in Yugoslavia. Despite an overwhelming Albanian majority, Kosovo had long been a constituent region within Serbia, and later Yugoslavia, since the 1913 Balkans War[6]. Under communist rule, Kosovo had been allowed some autonomy as Tito's regime "emphasized 'Yugoslav' identity," but this changed as communism's hold over the Balkans weakened in the late 1980s[6]. Succumbing to military pressure by Serbian leader, Slobodan Milosevic, the Kosovo Parliament, "ringed with Yugoslav army tanks," was forced to pass a constitutional amendment giving up regional autonomy in November of 1988. Civil rights abuses—including the removal of ethnic Albanians from government and the suppression of Albanian language newspapers—followed the dissolution of regional autonomy[6]. Like in Bosnia, stages one and two—classification and symbolization—had long existed in Kosovo. People were classified by their national identities—namely, Serb and Albanian—and differences in Muslim and Christian dress often visually demonstrated who belonged to what group. The civil rights abuses caused by Serbia's takeover of power further progressed the situation to stage three, discrimination[3].

For many Serbs, Kosovo's importance to Serbian national identity stretched back much farther than Serbia's 20th century rule over the region. It had been on Kosovar land that the 1389 Battle of Kosovo Polje—or "the Field of Black Birds"—had taken place. In this battle, Serbian Prince Lazar faced off against the invading Ottoman Empire in what became a semi-mythical battle of martyrdom for Christian Serbs[11;6]. For many, this battle made Kosovo integral to Serbian national identity. Kosovo was seen as a part of Serbia's ancestral homeland and many Serbs were greatly alarmed at the "growing Albanian birth rate, and Serbian emigration patterns" which led to Kosovar Albanians making up "some 90 percent of the population" by the late 1990s[6]. This concern over national heritage led many Serbs to feel culturally threatened by the very existence of Albanians in Kosovo and it significantly contributed to the popularity of hateful rhetoric against Albanians in Serbian media. As Albanians began to resist their discrimination, this hate escalated and soon stage four, dehumanization, was reached where "hate propaganda in print and on hate radios… [was] used to vilify the victim group [Albanians]"[3].

At first, Albanian resistance to increasingly discriminatory Serb rule was peaceful; many non-violently followed the literary historian, Dr. Ibrahim Rugova[6]. By the mid-1990s, however, frustration with a lack of success led the movement for Kosovo independence and Albanian civil rights to turn violent[6]. A new organization, the Kosovo Liberation Army (KLA/UCK), began a campaign of terrorist attacks against Serbian authorities, first starting with attacks against policemen and bombing in Serb refugee camps in 1996[17]. By 1998, Serbia sent security forces to Kosovo in order to combat the KLA and fighting escalated[17]. Soon, Serbian forces began not only fighting the KLA, but used violence against the civilian population in their effort to quell the insurgents[17]. Notably, in March of 1998, Serbian security forces killed "fifty-three Kosovo Albanians (half of whom were women and children) in response to a KLA attack near Drenica"[6]. Massacres like this quickly escalated the threat of genocide. With Serb forces mobilized against civilians, stage five, organization, had been reached. Furthermore, by connecting ordinary civilian Albanians with the insurgent KLA, Serb media further pushed the situation into stage six, polarization, where moderates in the perpetrator group were drowned out by extremist messages driving Serbs and Albanians apart[3].

The potentially genocidal violence against the Albanian population drew the attention of many international actors, including the UN, NATO, Organization for Security and Co-Operation in Europe (OSCE), and the "Contact Group"—including France, Germany, Russia, Great Britain, Italy, and the United States[6]. In response to the March 1998 civilian killings, the UN Security Council imposed economic sanctions on Serbia[6]. Nevertheless, as the fighting continued, violence against the civilian population only became more widespread and "by mid-September 1998 some 250,000 Kosovo Albanians had been driven from their homes and some 50,000 were still in the open as winter approached"[6].

In February of 1999, negotiations were established in Rambouillet, France, between a Kosovo Albanian delegation and the Yugoslavian/Serbian government[6]. The talks aimed to protect the rights of all sides and give Kosovo autonomy, but not independence[6]. While the Kosovo Albanian delegation signed a draft of the agreement, the Serbs refused to commit to it and talks were suspended in March 1999 when an estimated "40,000 police and soldiers and 300 tanks" were positioned by Serbia around Kosovo[6]. By now, stage seven—preparation—seemed to be rapidly manifesting as the Serb forces surrounding Kosovo were likely preparing for more violence against civilians. The "extrajudicial killings" and "genocidal massacres" that occurred in 1998 were also key signs of stage eight, persecution, in Stanton's model[3].

Without UN approval, direct NATO action in the conflict began on March 24, 1999 in response to the failed negotiations[17]. Rather than continue third-party diplomacy, NATO became "a secondary warring party to the conflict" and launched an air campaign that attacked Yugoslavian military targets around Kosovo and within Serbia[17]. The military effectiveness of the campaign was questionable, however; planes were not flown from below 15,000 feet and the actual damage to Yugoslavian forces seems to be lower than what NATO reported[5]. According to a third-party, Munitions Effectiveness Assessment Team (MEAT), the campaign only scored 18 APC (Armored Personnel Carrier) kills and 20 artillery piece kills—lower than what NATO estimated in its self-assessment[18]. Operating at 15,000-feet, NATO planes were also more likely to hit civilian targets by mistake[5].

Nevertheless, the air campaign was effective because of its impact on the political situation in Yugoslavia. NATO bombings made Milosevic's war in Kosovo unpopular. A series of contemporary newspaper articles written by New York Times journalist, Steven Erlanger, in 1999, demonstrates this impact. "NATO Attacks Darkens City and Areas of Serbia" (May 3, 1999) discussed the impact NATO bombings of a hydroelectric dam had on Belgrade's population. "Bombs Pound Heart of Serbia's Capital" (May 1, 1999) discussed the devastating effect NATO misses had on residential areas in Serbia. And "Pressure on Milosevic Grows: Key Opposition Leader Joins Rally Asking Milosevic to Resign"—while written shortly after Serbian capitulation—discusses a rally of 20,000 Serbs opposed to Milosevic that demonstrated Serb dissatisfaction with the Milosevic regime. In the rally, opposition leader, Vuk Draskovic "spoke of the need for Serbs 'to discuss and accept the shame for what was done in Kosovo'"[19].

On June 10, 1999, the Yugoslavian president finally capitulated. Serbian forces were withdrawn and "Nearly all of the Kosovar Albanians returned to the province"[6]. As part of the agreement, Kosovo remained a part of Serbia, but was governed by the UN Interim Administration in Kosovo (UNMIK) and continually protected by UN/NATO forces[6]. UN sanctions and negotiations sponsored by the international community had both failed; in the end, NATO bombs brought an end to the killing in Kosovo and Stanton's key stage nine, extermination, was avoided.

4 CONCLUSION AND FURTHER DIRECTIONS

4.1 Discussion

The most important difference between the two genocidal moments of Srebrenica in 1995 and Kosovo in 1999 was the approach the international community took in military intervention. Both cases had otherwise similar contexts as they both took place due to the Milosevic

Table 1 Comparison of Variables Important to the Ending of Each Genocidal Moment

Dependent Variable and Potential Explanatory Conditions	Srebrenica Genocide	Kosovo War
DV: Did extermination occur?	**Yes**, the Bosniak population was forced from Srebrenica and an estimated 8,000 Bosniak men and boys were killed	**No**, while civilians were killed, NATO action eventually put an end to the conflict and allowed for the return home of almost all Kosovar Albanian refugees
Were negotiations attempted?	**Yes**, peace talks opened up in September of 1992	**Yes**, talks were established in Rambouillet in April of 1999
Were negotiations effective?	**No**, the Bosnian Serbs did not accept the negotiations because they already held more territory than negotiators were offering them[11]	**No**, talks fell through in March 1999; a peace agreement was only reached after NATO intervention
Was there international pressure against perpetrators?	**Yes**, the UN enacted sanctions against Yugoslavia and UN peacekeepers were sent into Bosnia	**Yes**, UN sanctions were enacted and many diplomatic efforts were made by the Contact Group
Were victims completely unarmed?	**No**, Bosniak forces managed to repel the Bosnian Serbs for a time but eventually succumbed; most victims after the fall of the city were civilians	**No**, the KLA engaged in combat with Serbian forces throughout the war
Were the perpetrators defeated militarily?	**No**, in Srebrenica the killing only stopped when the entire city had been "cleansed" by the Bosnian Serbs	**No**, when Milosevic capitulated, Serbian forces still had the upper hand against the KLA
Were interventionist forces targeting perpetrators?	**No**, UNFORPOR did not attack the Bosnian Serbs; they treated Serbs and Bosniaks as mutually culpable belligerents to be separated from one another and even showed contempt for the Bosniak population in Srebrenica	**Yes**, NATO forces aided the KLA militarily by targeting Serbian forces

regime's quest for a "Greater Serbia." Moreover, there was little difference in the effectiveness of international diplomacy, which failed in both instances. The key difference that allowed for a better outcome in Kosovo was NATO's clear marking of Serbia as perpetrator and its subsequent use of military force against Serbia. While the air campaign was not necessarily a military success, it had a profound effect on Milosevic's political support and that brought an end to the conflict. By contrast, the UNPROFOR troops deployed to Srebrenica during the Bosnian War failed to designate the Bosnian Serbs as the aggressors and aimed to create a neutral "safe zone" in Srebrenica. This approach failed disastrously when UN forces quickly surrendered to attacking Bosnian Serbs in 1995 and extermination followed thereafter.

Nevertheless, while Kosovo was certainly a more successful intervention than the abject failure of UN peacekeeping in Srebrenica, it is important not to ignore its limitations. In both the case of Srebrenica and Kosovo, intervention forces were too worried about protecting their own personnel and material to effectively influence the military situation—UN forces surrendered without a fight and NATO refused to deploy ground troops or fly below 15,000 feet because they worried even light causalities would be too costly[6]. Used against a more politically stable regime, it is hard to say that the approach NATO intervention took in the Kosovo War would be effective.

This research, therefore, has limited generalizability. The Kosovo War turned out to be more complicated than a clear-cut NATO success story, even if extermination was avoided. Atrocities were allowed to continue against the Albanian population throughout NATO's intervention and Serbian civilians were mistakenly killed by missed bombings. Moreover, NATO intervention likely only succeeded because of the specific political instability of the Milosevic regime in 1999. Still, this research does find that intervention was at least somewhat successful in Kosovo and unsuccessful in Srebrenica. It reveals little about the effectiveness of preventionist approaches, however, as this was not substantially attempted in either case. Furthermore, it shows that when the international community intervenes in genocidal moments, it is important to distinguish between preparator and victim and not to treat both sides with mutual distrust.

Finally, this research shows that in Srebrenica the genocide only ended when the Bosniak population was almost totally removed from the region. This horrific end demonstrates that if there is no intervention in an ongoing genocidal moment, it will not likely otherwise stop until it has run an extremely destructive course. By contrast, much of the Albanian population in Kosovo was spared due to an early end to the conflict and almost all Kosovar refugees were allowed to return home. From this finding, it might be concluded that interventionist strategies should be developed, even if only in conjunction with more proactive preventionist ones, because without them genocidal moments that have progressed past preventionist measures cannot be combatted. A genocidal moment cut short is still better than one left alone, even if its most preferable that genocidal moments never occur at all.

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6 EDITOR'S NOTES

This article was peer reviewed.

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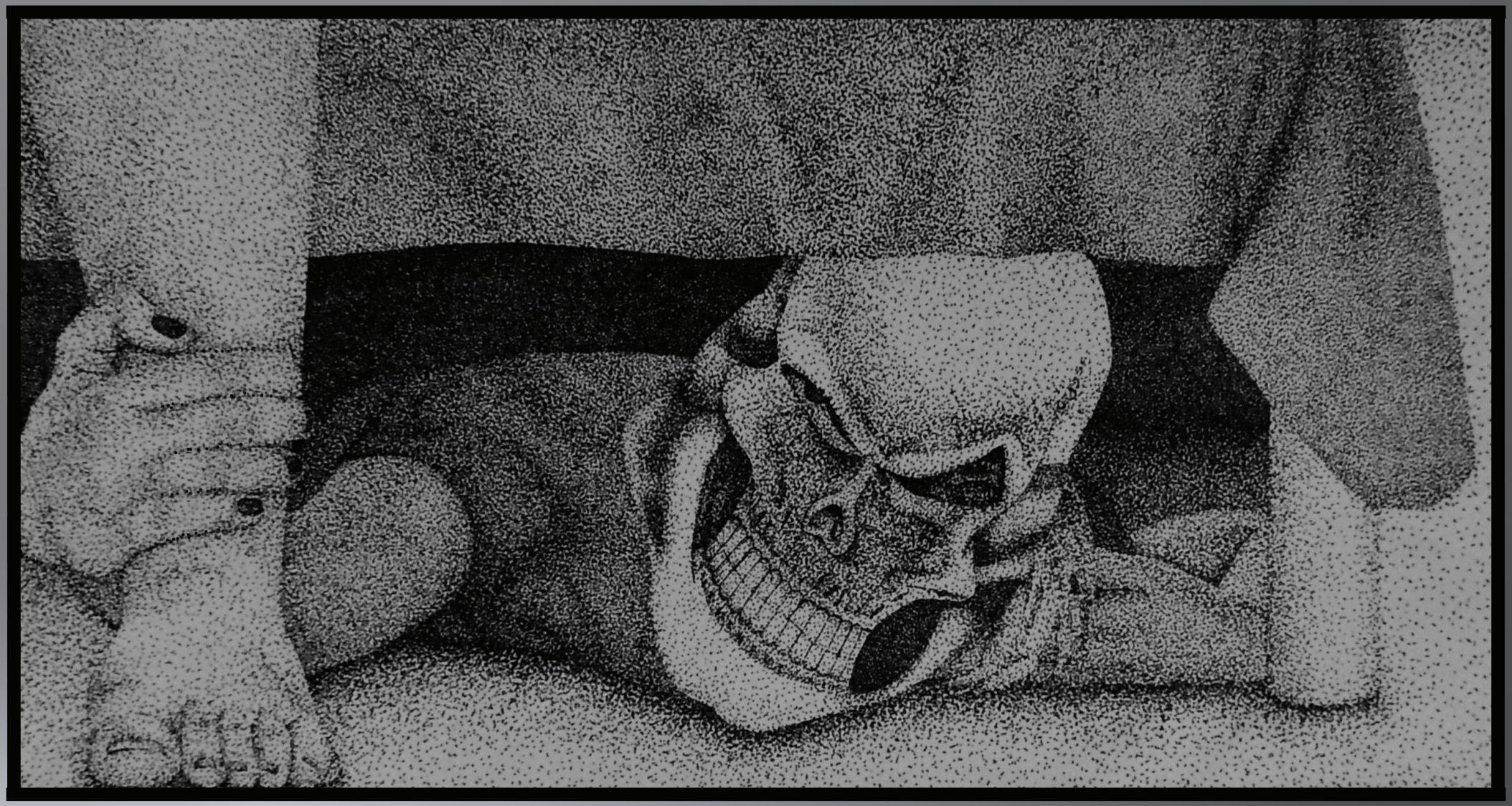

Monsters Under the Bed
by Grace Gonzalez

University of Denver Undergraduate Research Journal

Meddling in the Post-Black Death Economy: Edward III's Policies to Repress the Peasantry

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1 INTRODUCTION

Open any medieval textbook and you will find that the fourteenth century is referred to as a period of 'crisis.' England, specifically, faced wars with France and Scotland, climatic changes, several devastating famines, and, of course, the Black Death[1;2;3]. Being a peasant in medieval England was no easy task, especially during such arduous times. Throughout the thirteenth century, there had been population growth, increased agricultural output, the development of widespread market networks, and the rise in the number of people dependent on the market for food[1]. It was a booming time. All of this expansion did not survive the chaos of the fourteenth century because, as Barbara F. Harvey notes, in the decades prior to the arrival of the Black Death, the "expansive economic trends of the earlier Middle Ages were first halted and then put into reverse"[4]. Population growth stalled and started to decrease with the Great Famine; laborers' wages were low; prices were high[5]. All this combined to make life rather bleak for the average peasants even before the arrival of the Black Death.

The Black Death originated in the Caucasus region in 1346 where it began to ravage the population. As people and goods moved west along trade routes, they brought with them the bacterium *Yersinia pestis*; Gabriele de' Mussis, from Piancenza, Italy, noted that "it was as if they had brought evil spirits with them: every city, every settlement, every place was poisoned by the contagious pestilence, and their inhabitants, both men and women, died suddenly"[6]. By 1348, the plague was working its way across Continental Europe. Geoffrey le Baker, a clerk of Swinbrook in Oxfordshire, explains that "at last fierce destruction came to the countries beyond the Alps, and from there, in stages to western France and Germany, and in the seventh year since its beginning, to England"[7]. In the summer of 1348 sources report its arrival in England through the port at Melcombe in the southern county of Dorset. The Franciscans of Lynn chronicled the arrival of the plague and noted that "two ships. . . landed at Melcombe in Dorset a little before Midsummer. In them were sailors from Gascony who were infected with an unheard of epidemic illness called pestilence"[8]. From there, the plague began to spread northward and devastate all of England, as Geoffrey le Baker recorded:

> "First it virtually stripped a Dorset seaport and then its hinterland of the inhabitants, and then it ravaged Devon and Somerset up to Bristol. As a result, the people of Gloucester denied admission to people from Bristol, believing that the breath of those who had lived among the dying would be infectious. But in the end, Gloucester, and then Oxford and London too, and finally the whole of England were so violently attacked that scarcely a tenth of either sex survived[7]."

The plague ended its devastation in England a year after it arrived in the south[9]. According to sources such as Thomas Stubbs, the chronicler for the archbishop of York in c.1373, it finally reached the northern city of York in late May 1349 before dying out sometime in late July[10].

Coming on the heels of devastating famines and wars, the arrival of the plague only made life more difficult for the peasants. According to John of Reading, a monk of Westminster, "ulcers broke out in the groin and armpit, which tortured the dying for three days"[11]. Which, as the chronicler Robert of Avesbury notes, "remov[ed] them from human concerns in the course of a morning"[12]. While we know now that the Black Death killed somewhere between a third and a half of the population[3], people in the fourteenth century, surrounded by all the death at the time, were terrified. Some, such as the chronicler, Ralph Higden, estimated "that scarcely a tenth of mankind was left alive" by the time the plague ended. Thus, by the middle of the fourteenth century, in addition to the stresses brought on by the stagnating economy, English peasants were worried about dying, their family and friends dying, and what life they would have after the disease ended[13]. They had no idea if they

would survive the pandemic or what would be left of the world if they did.

If they survived the plague, however, peasants were actually presented with surprisingly robust economic opportunities. Land availability increased after the Black Death, allowing peasants to rent and cultivate larger plots. Laborers were in high demand and that gave them the power to negotiate for better terms and higher wages. After living with the difficulties of a declining economy and the plague, life seemed to be getting better. But that was not to be. The early promise of the post-Black Death benefits such as increasing wages, decreasing prices, improved standards of living, and increased personal freedoms, was not to be. Instead, wages rose for a short period after the plague before stagnating; prices rose and continued to rise for decades; standards of living only slightly improved; and peasants continued to be repressed. All this begs the question: why did the expected benefits of the Black Death prove to be so short-lived? Why did life not dramatically improve for the survivors? These are the core questions that this paper will seek to answer.

To answer these questions, it is necessary to look beyond the peasants and economic theories to another key actor of the time: the Crown. What becomes clear is that Edward III, king of England since 1327, and his ministers could not allow the economy to function on its own. With no concept of laissez-faire, they meddled with prices and wages, interfering with the natural ramifications of the mass mortality caused by the Black Death. What drove them to these actions? Above all, it was about maintaining the status quo, a system that the elites of society, the king included, had created to ensure their position in society. The king meddled with the economy by introducing new regulations in order to appease the elites, who faced financial and social losses after the plague. He did this because in the established social order he depended on the support of the aristocracy to govern as he pleased. Edward III had specific policy priorities in the mid-fourteenth century, such as controlling the economy and fighting France in the Hundred Year's War, which he could not undertake without the backing of England's elites. What I argue, therefore, is that it was Edward III's continued institutional repression of the peasantry in the wake of the Black Death that explains the failure of post-plague social and economic mobility. By maintaining the status quo via economic and legal measures, Edward III ensured the support of the upper echelons of society at the expense of the peasantry. In so doing, I seek to bridge the gap that exists in the current scholarship between economic history and politico-legal history. By examining the motivations of Edward III and the English aristocracy, I demonstrate both the centrality of the English crown to late medieval economics and the ways in which the goals and motivation of elites impacted the lives of people in every station, just as dramatically as any plague.

2 THE AFTERMATH OF THE PLAGUE

The Black Death spread quickly through England after its arrival in the summer of 1348, lasting about a year, and killing between thirty and fifty percent of the population[8;7;9;14;3]. This mass mortality impacted the peasants immediately. They had endured low wages and harsh working conditions throughout the first half of the fourteenth century due to high population rates and competition for work[5]. When the plague swept through England, the surviving peasants were presented with more opportunities for work and the possibility to negotiate for higher wages, which in turn gave them a chance for social mobility[5;15]. However, as I will discuss below, this rise in peasant influence was only short-lived. English elites worked to minimize the increased status of peasants to maintain the status quo as it had been for generations.

The mass mortality generated a higher demand for labor. In order to retain workers, employers had to pay more, and thus, peasants were able to secure higher wages. This was especially significant in agrarian areas because the lords needed tenants and laborers to work their land. Without enough tenants and laborers, not all the land would be worked and that which was worked would not have been taken care of at the same level as before the plague[16;17]. This meant that the food supply would not only decrease in the first year after the Black Death, but continue to be diminished in subsequent years, because the pre-plague levels of production were not recovered[16]. But even beyond this concern for subsistence, the landowners' were worried about the financial impacts the plague would have on their estates. They lost out on revenue from both rents and the sale of crops from their own lands due to the mortality of numerous tenants and the subsequent fall in agricultural production. According to an inquiry undertaken by the exchequer, for example, the Bishop of Worcester lost "£84 4*s* ½*d* [84 pounds, four shillings, and half a pence]… because of the lack of tenants who used to pay the rent and of customary tenants who used to perform the labor services" in the immediate aftermath of the plague[18]. This was a loss of nearly seventy percent of the expected income of that land ("£123 16*s* 2*d*")[18]; and that sum of just over £84 was the equivalent to at least 4210 days, or about 11½ years, of wages for a skilled tradesman[19]. When landowners then needed to pay more for labor, their income further decreased.

English elites were clearly displeased about having to pay their laborers more. The chronicler in Rochester noted that "such a shortage of workers ensued that the humble turned up their noses at employment, and could scarcely be persuaded to serve the eminent unless

for triple wages"[20]. This chronicler, one William de la Dene, a monk and member of the wealthy Cathedral Priory of Rochester, clearly writes from the perspective of the elites. The lowest in society, or the "humble," were expected to take whatever opportunities were offered to them by those higher in society, or the "eminent," because it was what had been done for generations. This division was, in fact, the bedrock principle of medieval society, which as Marc Bloch describes it, was "divided into three 'orders': those who prayed, those who fought, and those who worked"[21]. Elites saw the peasant's demands for higher wages as an affront to this established order of society; from their viewpoint, the peasants were being greedy by trying to get more out of life than their position in society allowed for. Peasants saw the post-Black Death situation as a time to hope for a better life as more opportunities presented themselves. And so, they were able to do something new and make demands of the landholders which, if met, would have improved their standards of living. These changes in peasant attitudes towards the elites caused the landowners significant financial losses. Moreover, the economic changes in the wake of the Black Death also had the potential to result in a loss of social status for the elites and even the potential for complete societal upheaval. If the peasants could increase their standing in society, the difference between them and the elites would shrink, thereby diminishing the importance and power that the elites held in society[22]. Landowners, concerned with their own well-being in the post-Black Death economy and society, implored the king to help them maintain their status.

3 MEDDLING THE POST-BLACK DEATH ECONOMY

And Edward III did help the nobles. It is this move by elites and subsequently by the king to prevent a disruption of social hierarchy that can help explain the key conundrum regarding wages in the period after the Black Death that is at the heart of this paper. Despite the peasants leveraging their newfound power to get higher wages and opportunities for social mobility, the aftermath of the Black Death was not the beginning of a new social order. Wages rose for peasants, but only for a couple of years; then they remained stagnant for two decades[5]. In 1347, the wages for mowing and reaping wheat were 5d and 5¾d per acre, respectively; the wages for the same work in 1350 were 11d and 7¾d per acre. However, in 1352 the wages for mowing and reaping wheat were 6¼d and 6½d per acre, respectively; and those wages fluctuated very little until 1371 when the wages for that work were 8d and 11d[23]. What caused wages to stagnate this way when their rising seems so natural after the plague? Christopher Dyer, one of the foremost scholars in economic and social history of medieval England, offers a few potential explanations for this: perhaps, he argues, previously unemployed people filled the gaps left in the labor market after the Black Death. But this is unlikely because wages were not at rock-bottom prior to 1348. Alternatively, he suggests that "social and institutional restraints" worked to keep the wages down[23]. I would argue that this is far more likely to be the case, with the institutional restraints that Dyer refers to being the Crown's interventions in the labor economy to stop the rising wages after the plague. Edward III meddled with the English economy by introducing new regulations that disrupted the natural course of the impacts of the Black Death. He did this in order to maintain the established social order, which was upset when the peasantry gained more influence in society after the plague. The king was concerned with the lives of nobles and how they affected his own standing in society and his ability to govern; he was far less concerned with the lives of peasants. Edward III based his post-Black Death management of the English government and economy on these priorities. And so, though rising wages should have been an expected repercussion of the mass mortality, rather than a boost in their livelihood, peasants quickly found themselves repressed once more by the upper echelons of English society.

Intent on maintaining their finances and social status, the nobility wasted no time taking their concerns about peasant wages to the king, and he wasted no time drafting a response to the problem. In 1349, as the plague still ravaged England, the Crown issued the "Ordinance of Laborers," which ordered that "workers take only the wages, livery, meed, or salary, which were accustomed to be given in the places where he oweth to serve, the twentieth year of our reign of England, or five or six other commone years next before"[24]. This law was an attempt to reverse the rise in wages and return them to what they were prior to the Black Death. However, most of the country did not abide by this ordinance and wages continued to rise. In another attempt to force wages down, the Crown issued the "Statute of Laborers" in 1351[25]. This law was written to reiterate and enforce the "Ordinance of Laborers." The "Ordinance," in 1349, had relied on local and private enforcement, but the punishments of fines and jail times were not implemented effectively or consistently enough to thoroughly coerce peasants into accepting the lower wages[26]. As indicated by the issuance of a second rendition of the law, the widespread disobedience was noticed by the Crown and rising peasant wages continued to be a problem. The "Statute of Laborers" goes further than the "Ordinance" in that it specifies enforcement measures:

> "The said stewards, bailiffs and constables of the said towns be sworn before the same jus-

> tices that they will inquire diligently … about all those who act contrary to the ordinance, and that they will certify their names to the justices whenever they come into the area to hold their sessions, so that the said justices, having received the names of such rebels from the stewards, bailiffs and constables, may have them arrested to appear before the justices and answer for their offences, so that they may make a fine and ransom to the king if they are convicted, and over that let them be sent to prison, there to remain until they find surety that they will take employment and wages, and carry out their work … in the manner specified[25]."

This was a novel addition to the powers granted to local authorities and alike, as they were now tasked with seeking out offenders and punishing them, where they had previously only settled disputes that were brought to them[27]. The enforcement of the "Statute of Laborers" resulted in workers having to swear twice a year, in front of local officials, to obey the law and if they refused, they would be fined or jailed until they agreed, giving local officials more extensive authority over the local laborers[26]. It also established a greater system of cooperation between the royal government and local authorities, because they now had a task that required them to work together, rather than in opposition to each other. Because the power granted to them in the "Statute of Laborers" came directly from the king, the local officials now gained more authority; in a way, local officials became agents of national authority after the Black Death. In turn, the king gained more access to local networks of power, heightening his own central authority[26]. With the "Statute of Laborers," the king, with the cooperation of local authorities, was able to effectively suppress peasant wages, not just in the immediate aftermath of the plague, but for the next two decades.

The effects of the plague disrupted English society at a fundamental level. Peasants found a way to exert more influence in society than they ever had before, which undermined the system of oppression based on status that had been in place for generations. In order to prevent this trend of increasing peasant power from solidifying in English society, Edward III took active measures to maintain the status quo and appease his noble landholders. Despite a defiant labor force, he reissued failed laws attempting to restrict peasant wages and, by extension, peasant influence. He sought previously unheard-of powers from the local elites and, in exchange, helped entrench those same local elites. In fact, the Crown and the elites formed a balance of power so that they could both fulfill their needs while also supporting each other. In the wake of the Black Death, the nobles needed the king to help them maintain their estates because their power and wealth were being threatened. The king placated them with the new laws regulating labor because he needed the support of the nobles to implement his political agenda. In the middle of the fourteenth century, that agenda primarily included an attempt to more fully control England's economy and to defend and expand his holdings on the continent via war with France, both of which were a part of his central goal of maintaining and increasing his royal power. Neither the elites nor the king could accomplish their goals without the support of the other. Through a system of accommodations, the ruling classes of English society, king and nobles alike, were able to implement processes that maintained the status quo, even in the wake of the disaster brought about by the Black Death.

The ruling elites of England hoped to maintain their wealth, power, and status in society by inviting greater royal control into their economic affairs. At its core, these elites can be divided into two categories: the nobles and the gentry. The nobles were those who were granted land and titles by the king. The highest among them were the earls, who worked closely with the king and were often his friends, family members, and confidants. Below them were the various barons, who were distinguished from the earls by the size of their landholdings, their wealth, and their status – they were not as close to the king, though they still had considerable authority. When it came to politics, the nobles were those who made up the House of Lords in Parliament and had the most direct access to the king. By the end of the fourteenth century, there were about seventy noble families in England[27]. The gentry, then, sat below the nobles, in terms of social hierarchy. They consisted of all the landowners below barons but above yeomen (those peasants who owned their own farms and thus did not owe rent or labor on other men's land); even the lowest gentry would have typically owned enough land to have tenants. Each county throughout England typically had between fifty and seventy gentry families, from which the local officials, such as sheriffs, justices, and members of the House of Commons of Parliament, were chosen[27]. From local officials to the whole of Parliament, the nobility and the gentry comprised the entirety of the English political community. They not only excluded the peasants from the decision-making processes but maintained their own power and wealth by profiting off their labor.

The demographic changes in the wake of the plague threatened to upset the established societal structure, which the nobles and gentry were accustomed to controlling. It made sense for them to cooperate with the king's policies to control the situation because they received their authority from the king and thus believed in his power to preserve it. The nobles, especially, were

chosen by the king to hold a greater amount of power. In 1337, Edward III appointed an almost entirely new group of earls by filling posts that were left vacant due to the deaths of the previous earls and by creating six new earldoms[27]. With these appointments often came money and land. For example, Henry of Grosmont was named earl of Derby and was given both the lands typically associated with that title and "1000 marks yearly out of the king's customs"[28;27]. For both the nobles and the gentry, the political power granted to them by the king was key to their cooperation with him. Having a seat in Parliament gave them a say in the national government. It was in Parliament that laws were made. A common issue could be presented to them and then they would take it to the king; a statute would be written depending on the king's response, but it also had to have the assent of both the House of Lords and the House of Commons, the two branches of elite landholders, to become an official law. Parliament was also responsible for approving all direct taxations that the king requested[29]. The monarchy gave the elites of Parliament the power to approve taxes because direct taxation was an easier method of raising funds than holding them accountable to feudal obligations[29]. By doing this the Crown traded some of its power over the elites in order to collect more money from the realm in a simpler way. However, it did mean that if the king requested taxes too often or at too high of a rate, Parliament could refuse him. An early example of this is from 1297 when Edward I demanded a heavy tax, the earls refused him and blocked the collection of the funds until he was willing to confirm the charters of their land grants. Through this, the give-and-take between the Crown and elites is clear: the charters needed the king's approval to be legal documents and the earls held the purse strings[29;30]. During the first half of the fourteenth century, the overall power of the elites continued to grow as they became more central to the governing of England. It was the maintenance and growth of their wealth and power that was the fundamental concern for the nobles and gentry[31]. Because these largely came from the Crown via grants of titles, land, and opportunities for prestige, the elites were willing to cooperate with the king in order to ensure that they protected their power and place within the social order.

While it may seem as though the king was giving a lot of power without receiving much in return, that is not the case. In working with the nobles, Edward III gained support for his policies, funds from taxes, and increased central power. By the mid-fourteenth century, the elites throughout the country had essentially become an extension of the king's governance; this can be seen throughout the *Calendars of the Patent Rolls* when the king chose members of the gentry and nobility to carry out his directives, such as purchasing food and bringing it to London, collecting funds and supplies for the ongoing war, and overseeing the implementation of legislation and justice. But, all of this came with strings attached. Each decision Edward III made regarding his elites was politically calculated in order to maintain political stability. By the mid-fourteenth century, the English Crown could do very little without the support of the elites because the established system required consensus amongst those in power; kings who did not acknowledge this found themselves in political crises. Perhaps the best example of this is when King John lost the support of his barons by asking too much from them and was forced to sign the *Magna Carta* in 1215[32]. Edward III understood this when he appointed his new nobility in 1337. He chose people for those positions that he specifically believed would understand his decisions and be loyal to him throughout his reign[27]. The nobles and gentry needed to feel important to the king and the governance of the country. Edward III gave this to them by granting them the authorities that were so important to them. As long as he could keep them satisfied with their positions in society, he knew that he would have their support. If he did not, or if he pushed too hard against their power and privileges, he knew that they would turn against him. He had become king at the young age of fourteen, because the elites turned against his father, Edward II, in a coup led by the powerful baron Roger Mortimer and Queen Isabella. Edward II had favorite nobles to whom he granted immense power and privileges, which combined with poor economic decisions and military failure led the rest of the elites, in the countryside as well as in the city of London, to turn against him and support his deposers[31]. The first three years of Edward III's reign were then ruled by his mother as regent with Mortimer as her main advisor. It was only after Edward III staged his own coup in 1330 that he took control of the government[27].

Throughout his reign, therefore, Edward III worked consistently to retain the broad support of England's elites and to avoid the fate of his father. In the wake of the Black Death, this was no different. The elites were displeased with the increased influence that the peasants attempted to take hold of because it could have meant their societal downfall, which could have, in turn, led to the end of Edward III's reign if he did not address the situation. So, Edward III implemented policies, such as the "Ordinance" and "Statute of Laborers" to reinforce the societal status quo. If, in the quest for maintenance of the established social order, elites sought to retain their power and authority, Edward III, in turn, sought to retain support for his policies. Each side gained what was most important to them, the implications of which can be seen in his tactics to more fully control England's economy and to defend and expand his holdings on the continent via war with France, both of which fundamentally depended on elite

support.

As seen above, the immediate economic effects of the Black Death, such as the rising wages of laborers, the decreased agricultural production, and the reduction of rent income resulted in an overall loss of profits for landholders. The "Ordinance" and "Statute of Laborers" were both efforts to counteract these effects, because, as noted by W.M. Ormrod, the king was concerned with recreating "the economic conditions that had prevailed before the plague"[22]. In the decade prior to the plague, the king and the elites had managed an economic system that brought them prosperity; they cooperated to ensure both their needs were met in terms of power and wealth for the nobles and gentry and adequate elite backing for the king[33]. When, after the Black Death, the peasants began to push against the established system, it upset not only the elites but the king as well. In fact, the *Calendar of the Patent Rolls* mentions the king "resist[ing] the sloth and malice of servants who when others died in the pestilence seeing the necessity of their lords would not serve them unless they received excessive stipends"[34]. This parallels the sentiment of the nobility that the Rochester chronicler captured when writing about the peasants seeking higher wages[20]. Peasants were viewed by the Crown, nobles, and gentry alike as being selfish; they refused to continue working for the same low wages as before the plague because they were going against the system that the elites had built to benefit themselves. Maintenance of the status quo in agrarian areas mattered to the king, not only in order to appease the elites, but also because he was a landholder himself, and was, therefore, directly impacted by the peasant demands for higher wages. He was, in fact, the largest landholder in the realm. Technically, the monarchy owned all the land in England since the Norman Conquest, but that was not a feasible system to operate under. It was during the reign of Henry II that the system for managing the Crown's estate that Edward III used was established. The king would grant pieces of the royal estate through tenurial arrangements to royal servants whom he wished to elevate in status, such as when he appointed new earls. By the mid-fourteenth century, the most important grants of the royal estate were to endow other members of the royal family, so the majority of those lands were still connected to the king. Because of just how much land the king owned, even with such grants, he still had the largest land holdings in the realm[35;36]. Therefore, the economic issues created in the aftermath of the Black Death were of concern to Edward III both because he had to keep his elites satisfied with their economic status and wealth and because it directly impacted the management of his own lands and familial lands which reflected his own status, power, and wealth in the country.

The king's efforts to institute greater economic controls also extended to the control of prices. Beyond any ideological element, Edward III might have noticed that higher wages often meant higher prices and, therefore, believed that artificially lowering the wages would also lower the prices of foodstuffs. Knighton recorded in 1349 that "the necessities of life became so dear, that what in previous times was worth 1d. now cost 4d. or 5d"[9]. This inflation was yet another economic consequence of the Black Death. We have seen how the spread of the plague decreased agricultural production, which in turn caused the food supply to be diminished below the necessary levels to sustain the population. Price inflation, therefore, seems like a natural response to having less supply than demand; however, medieval England did not function with the theories of a modern market-based economy. It functioned with the medieval economic concept of balance: stable wages and prices meant that the system was working as the elites had built it to. Rising wages and rising prices in the wake of the Black Death signaled a substantial disruption to the established economic system. Because economics and politics were inseparable, Edward III felt the need to use his economic power, which was theoretically absolute, to control both wages and prices in order to reestablish balance within the economy[37]. One of the king's attempts to lower prices was the issuance of two statutes in 1351, the "Free Trade Statute" and the "Statute of Forestallers"[38]. Combined, these two laws protected free trade without interference and punished anyone who forestalled (buying victuals before they reached the market, intending to resell them later at a higher price)[1]. Edward III's goal with these was to decrease the prices of foodstuffs[1]. That, however, did not take place. Grain prices remained high for years after the issuance of these laws. From the early 1340s to the early 1370s, grain prices rose by forty-three percent. When wages were on the rise, the rise in prices would have meant that the real wages were about the same as prior to the Black Death[39]. Instead, because wages were forced down by the Crown, the real wages actually decreased, leaving the peasants worse off than were before the plague. These policies were not successful in driving down prices as Edward III had intended, which meant that he would have to find other ways to control the economy. However, the success of the labor regulations balanced out this failure and gave the king and the elites enough control over the economy to placate their needs for power over the peasants for decades to come.

But it was not just out of a concern for the maintenance of the social structure that Edward III tried to control the economy, he also had another specific economic agenda tied to his political agenda: the Hundred Years' War. By the time the plague arrived in 1348, Edward III and Philip VI, king of France, had been at war for just over ten years, only the beginning of what would be a century-long ordeal. There were two major points of

contention between the French and English monarchs: longstanding feudal land issues and the succession of the French throne. The English kings had been the noble lords of Aquitaine since the eleventh century, but beginning in the middle of the thirteenth century, a series of French kings had slowly but relentlessly seized that land, until it was fully under French control, thus making the English kings nobles under the French kings. This situation and the ensuing land disputes created a strained political situation between the two countries because one monarch cannot be beholden to another monarch and retain the same level of power. Adding to this was the dispute over the French throne: Edward III had a strong claim to it when his uncle, Charles IV died with no direct heirs, but the French chose Philip of Valois as his successor instead. Political tensions between the two countries came to a head in 1337 when Philip VI seized Aquitaine, which was the property of the kings of England in their role as dukes since the twelfth century, and in retaliation, Edward III declared himself king of France[2]. For the remainder of his reign, the war would be a key priority for Edward III because war was a good way to manage the balance of power between himself and the nobles.

Edward III quickly learned that making war is expensive. Throughout the war, the English had troops on the continent in Gascony, their last major crown holding on the continent, and in Calais, which they captured in 1347, just before the arrival of the plague[2]. Those troops required routine supplies to keep the war effort going. Calais and Gascony were both heavily dependent on England for victuals, which the Crown had to pay for[2]. Even though the royal government paid less than the market price, the prices were still, to some extent, regulated by the market. Therefore, the king was concerned with changes in the market[40]. The rising prices after the Black Death meant that the royal government would have to pay more for the supplies needed for the military. Thus, Edward III's efforts to diminish wages through the "Ordinance" and "Statute of Laborers" was based on a desire to reduce grain prices, not just because he was worried about having to pay more at home, but because he was worried about having to pay more for victuals to supply the military efforts of the Hundred Years' War.

The two main ways by which the Crown raised supplies were purveyance and taxation. Purveyance was when officers of the central government would go to a county, as specified by the king, to purchase a designated number of victuals for lower than the market price, and the counties were required to provide these supplies[40]. The king would regularly issue purveyances to supply the war effort. For example, in January 1347 the king issued a "licence [sic] for Bernard … to take from the port of Sandwich 700 quarters of wheat … to Gascony for the sustenance of [the] men there in the king's service"[41]. Taxation, on the other hand, was the principal way in which the Crown made money. The lay subsidy was the tax levied to finance the war; it was not levied every year, but once the Hundred Years' War began, it became a considerable burden for the peasantry, even before the additional challenges in the aftermath of the Black Death[5]. However, Edward III would not have been able to fund his war in this way without the support of England's elites. Taxes could not be levied without the approval of the nobles and gentry in Parliament, and he needed local officials to collect the victuals ordered in each purveyance[29]. The English elites supported the king's war with France and allowed the burdensome taxations and purveyances to fund it because participation in the war helped them achieve their fundamental goal of maintaining and growing their wealth and power. Just as Edward III was seeking additional political and economic power by going to war with France, so too were the nobles and gentry who supported him. The give-and-take structure of the political sphere in England was crucial to the king's war-making efforts. Neither side could, therefore, afford to lose wealth, land, and power over the peasantry, which was the consequence if they refused to cooperate in their political endeavors.

Beyond financing the war, the king also needed soldiers and military leadership to wage war. The nobles and gentry were crucial both for the skills as soldiers and their role in raising and leading troops from across England. By the mid-fourteenth century, the king and elites could no longer require their tenants to serve in the military based on feudal obligations, instead, they had to convince them to join in other ways. The gentry were pivotal to the recruitment of foot soldiers for the war because they were both in positions of authority and had access to the masses; the recruiting agents would emphasize the pay and potential for material rewards from fighting to convince men to enlist voluntarily[2]. The nobles and gentry themselves participated in the war in positions of leadership. Those in higher positions of social standing typically had higher ranks in the military, but the war also presented an opportunity for advancement. If a knight or lesser noble performed well in the war, their social status could be elevated from the prestige and material goods won in the war[31]. One of the best examples of how knights earned prestige is with the creation of the Order of the Garter. In 1349, amidst the chaos of the plague, Edward III formed the Order of the Garter "made up of himself and his sons and the bravest and noblest in England," as Jean Froissart, an important chronicler of the Hundred Year's War, explained it[42*]. Twenty-four knights were

*There exists some debate over the actual founding date of the Order. Froissart states that the Order of the Garter was formed in 1344, but modern historians typically put its founding in 1348 or 1349. Despite this discrepancy in dates, the Order was still an important

chosen as the founding members of the Order, all of whom contributed to England's military victory against the French at Crécy in 1346. Membership in a chivalric order provided incredible prestige and glory to a knight, not least of all, proximity to the king himself, which is what all elites sought when fighting in war[43]. The king thanked those who were successful in battle for furthering his agenda by rewarding them with political advancement. The elites' monetary gains of war came mainly from significant booties and ransoms because they were not paid salaries the way foot soldiers were. Because of the ample possibilities to increase one's social standing through fighting, war became the principal activity for many elites during Edward III's reign. It was important to them to take any opportunity that they could to increase their authority and wealth because the more powerful they were, the more secure their position was in society for themselves and their children[31]. It was the promise of glory, prestige, and profits for both the king and the elites that guaranteed their cooperation throughout the war.

The Black Death and its mass mortality, however, nearly stopped the war; military activity paused from 1348 to 1355[2]. Nonetheless, the troops in Gascony and Calais remained, and continued to need supplies from England. As we have seen, after the plague, agriculture production in England diminished dramatically and that impacted the Crown's ability to collect victuals. For example, in July 1350 the king appointed "Roger Larcher to purvey 1000 quarters of wheat, 500 quarters of oats, 200 carcasses of [beefs] and 200 bacon pigs in the counties of Southampton and Wilts … to bring the same to Gascony for the king's lieges there," however, the order was "vacated and nothing was done thereof"[44]. Roger Larcher was unable to complete the purveyance because of the food supply shortage that began in the wake of the Black Death. This, however, did not dissuade Edward III from continuing purveyance efforts. In early October 1350, "Nicholas Lambe [was appointed] to purvey 40 quarters of wheat, 80 quarters of oats and 20 cartloads of hay, in the counties of Southampton and Wilts, for the passage to Gascony"[45]. There is a stark contrast in the number of supplies required between these two purveyances. Such a difference is due to the king being made aware of the hardships caused by the Black Death and having to lower his expectations. The elites responsible for collecting the first purveyance would have made it clear to him that victuals in that amount could not have been provided without causing undue hardship on the local peasants and the elites themselves. In other words, the elites could not support the larger purveyance requirement, so the king lowered his demands because getting fewer supplies with the support of the elites was better than getting no supplies with the elites against him.

Edward III, however, could have stopped purveyances altogether, allowing his people to keep their food supplies and recover after the Black Death faster. The fact he did not do this indicates that the war with France was a greater priority than any concerns over domestic welfare. For the king, the fight against the French kings was a part of a larger effort to maintain and elevate his social standing. The French monarchy was seen as the aggressor, attempting to take what was rightfully Edward III's through his lineage[2]. It is clear just how important it was by the fact that he denied the chance to become the Holy Roman Emperor, "saying that he would rather seek his rights" to the lands and throne in France[9]. Additionally, throughout the more general sources from the period, we can see how the war had become a fundamental component of Edward III's reign. In *Knighton's Chronicle*, the pages before and after his discussion of the Black Death are about the ongoing war[9]. And, even amidst his points about the plague, Knighton comes back to the war. For example, after telling of deaths in Avignon, he states that "in the mean time the commons of Flanders … gained Bruges by deceit, and beheaded and hanged those Flemings whom … supported the king of England." Then, "King Edward assembled his army"[9]. By the time the plague arrived, the war was, in fact, a part of the status quo. And, therefore, it was expected that it would continue. The king had invested most of his political clout into the continuation of the war and was not going to give it up simply because the Black Death caused delays. The elites, also, continued to need the war to support their insatiable desire for power and wealth. However, they were unable to do this unless they continued to control the peasantry; if the peasants did not continue their agricultural work as they had before the plague, society would lose its basic functionality, and the elites, therefore, would be unable to pursue their higher goals.

All of this shows that the Crown's intervention in the post-Black Death economy and government was a tactic to further the king's own agenda. Edward III meddled with prices and wages to repress the peasantry and retain the nobles' support both for the Hundred Years' War and more broadly. By doing this, the Crown prevented the natural economic responses to the Black Death. We can therefore see how the peasantry was connected to elites and the Crown in the Middle Ages. Without peasants doing their work in the lower parts of society, the upper echelons of society could not function as they were used to. The king and elites had a system in place that allowed them both to pursue their goals without encroaching upon each other. The Black Death, and its impacts on peasants, disrupted that system. The economic regulations put in place by Edward III in the wake of the plague were intended to continue the

creation of the mid-fourteenth century, highlighting the value of chivalry in Edward III's royal government and agenda.

repression of the peasants so that the elites and the king could maintain their status quo and their pursuit of power, prestige, and wealth.

4 CONCLUSION

The Black Death occurred in the middle of a tumultuous century and only added to the chaos. The disease itself killed at least a third of the population in England, which had dramatic effects on the society and economy. The peasants that survived the pestilence were presented with the potential to improve their lives. The king and elites, displeased with the changes in the peasantry's status, worked to counteract their gains in order to preserve the status quo from before the Black Death. Edward III meddled with the economy by regulating prices and wages, which halted the peasants' advancements. This was all in an effort to maintain the established social order that underpinned the king and his aristocracies' working relationship, a relationship that allowed them each to pursue power and prestige, all the while, controlling and limiting the peasants. The natural ramifications of the Black Death, therefore, were not able to play out in the ways that we would have expected them to. When there is a struggle between natural economics and governmental policies, the Crown wins to the detriment of the peasants.

By the mid-1350s, England probably thought that they were done with the plague and its impacts, but unbeknownst to them, they would face three more outbreaks before the century was over. The brief taste of power that the peasants got after the Black Death would not be forgotten, and neither would the policies implemented to repress them. When writing of the impacts of the "Statute of Laborers," Knighton noted that it meant that wage-earning peasants "served their masters worse than ever before"[9]. Moreover, the ramifications of the first outbreak would continue to reverberate for decades to come. The "Statute of Laborers" would be enforced throughout the second half of the fourteenth century. This set the stage for the growth of states' ability to legislate and intervene in the lives of peasants which, combined with other encroachments on peasants' lives, contributed to pushbacks against the status quo of the elites. The most notable of these would be the 1381 Peasants' Revolt, the culmination of grievances that had their origins in the aftermath of the 1348 outbreak of the plague.

In studying the aftermath of the Black Death, we can see the way that the various systems that make up a society interact. Nothing happens in isolation. One person, or one place, or one event is always connected to countless other pieces of society. This is how the impacts of the plague on grain production could be connected to the king passing labor regulation, which was, in turn, connected to a personal political war across the Channel. Peasants, gentry, nobles, and royalty were all linked together when the Black Death devastated England, and when one of them sought to change their position in society, all the others were impacted and had to react. The complex intertwining of society can seem simple in a time of stability, but its true colors come out during crises.

Crises, such as the Black Death, expose the elements of a society that impact and inform governments' decisions. It all comes down to who has the power and what their priorities are. As we have seen, in fourteenth-century England, the king, the nobles, and the gentry held the power; peasants, while the base of society, had no palpable authority. This meant that despite their slight gains immediately after the plague, the peasants were always at the mercy of the elites. It was the elites' perpetual quest for power, prestige, and wealth that guided the implementation of the new economic regulations. Very little concern was ever given to the peasants and their livelihoods. And so, peasants continued to be held down by the powerful elites, even though the crisis could have been a time of change.

When we look at the Black Death today it is hard not to draw parallels with our own crises. The current coronavirus pandemic is one of only a few pandemics that have occurred in the past seven hundred years since the Black Death. We could attempt to use this study of the plague and its impacts on society to analyze the predicament that faces our world now, but the modern disease and the world it impacts are drastically different from their medieval counterparts. Despite those differences, we look for explanations, for ways to understand what is happening in the world around us. One way this study of the Black Death might be used to understand the coronavirus pandemic is as a reminder that government priorities do not always align with the priorities of its constituents. We see how governments around the world are attempting to manage the impacts of the disease and we are already facing the economic and political consequences. Just like in the fourteenth century, the way forward will be determined by the complex interchanges of power that drive our modern world.

5 EDITOR'S NOTES

This article was peer reviewed.

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Lethargy by Kiernan McCarty

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Records of Enriched Uranium Atmospheric Deposition in Pond Sediments in Piketon, OH

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Abstract

The enrichment of uranium, often for nuclear weapons programs and commercial nuclear reactors, produces higher concentrations of radioactive uranium 235 (^{235}U) than what naturally occurs, which can pose a human health hazard. The most abundant naturally occurring uranium isotope is ^{238}U, which is still radioactive; however, a higher concentration of ^{235}U skews the observed isotopic uranium distribution. The Department of Energy Portsmouth Gaseous Diffusion Plant, located near Piketon, OH, enriched uranium from 1954 to 2001 and ^{235}U pollution has recently been detected in air and sediment samples in the surrounding community. The extent of the ^{235}U contamination was tested using sediment core samples from ponds within the vicinity of the plant. Cores were processed in the laboratory by depth intervals to capture the history of atmospheric deposition of ^{235}U. Analyzing the samples with mass spectrometry allowed for ratios between enriched ^{235}U and naturally occurring ^{238}U to be calculated, thus unearthing the level of contamination. Clear evidence of enriched uranium in the Piketon, OH community was found in all sediment core and surface sediment grab samples, which each exhibited some degree of elevated ^{235}U/^{238}U. These results will provide the citizens of Piketon, OH with scientific evidence to facilitate their understanding of the uranium contamination within their community.

1 INTRODUCTION

Naturally occurring uranium (U) comes in two major isotopes, 99.3% uranium 238 (^{238}U) and 0.7% uranium 235 (^{235}U), and two minor isotopes, 0.0055% uranium 234 (^{234}U) and <10-8 % uranium 236 (^{236}U[1]). When uranium is enriched, this naturally occurring ratio shifts so that there is a greater abundance of ^{235}U. While the uranium isotopes ^{238}U and ^{235}U are chemically identical, they have different masses. The difference in mass allows the uranium isotopes to be separated, thus making it possible to increase the percentage of ^{235}U in a given sample[1].

Just south of the rural town of Piketon, OH in Pike County is the former Department of Energy Portsmouth Gaseous Diffusion Plant (coordinates: 39.012982, −83.000872). This Department of Energy (DOE) facility enriched uranium from 1954 to 2001. Initially this uranium was for use in the United States' nuclear weapons program during the Cold War. Following the Cold War, the DOE leased the facility to the private sector and uranium, which was no longer weapons-grade, was enriched for commercial nuclear reactors. This uranium enrichment aimed to create large quantities of ^{235}U, the desired uranium isotope for nuclear applications. The enrichment process relies on conversion of U compounds to uranium hexafluoride (UF_6; g), which is separated isotopically based upon differences in the rate of effusion through a porous barrier. An environmental cleanup program was implemented at the site in 1989 by the DOE's Office of Environmental Management, and decontamination and decommissioning of the plant started in 2011[2].

In general, greater amounts of uranium coincide with an increase in human health hazards. The presence of enriched uranium in an environment particularly escalates health hazards because it is often associated with an elevation in total uranium concentration. Additionally, as uranium is enriched, the proportions of the shorter-lived, more radioactive isotopes ^{234}U and ^{235}U are enhanced versus nature; therefore, enriched uranium is more radioactive than naturally occurring uranium on a mass basis. Studies have found that uranium poses human health risks beyond those caused by radiation exposure; uranium exposure can be genotoxic and mutagenic by forming strand breaks in DNA[3]. Uranium exposure also has the potential to be carcinogenic, and a 2011 study found that incidences of colorectal, breast, kidney, and total cancer may be greater in areas that suffer from elevated levels of U in groundwater and experience more frequent groundwater usage[4].

There is currently radioactive pollution, particularly

in the form of enriched ^{235}U, in the Piketon community surrounding the Portsmouth Gaseous Diffusion site. Enriched uranium has been found in several sediment and air samples in the Piketon area within the past year. In April 2019, sediments, interior dusts, and surface waters in the community were confirmed to be contaminated with ^{235}U and non-fallout plutonium and neptunium 237[5]. Shorter after in June 2019, it was found that the local Zahn's Corner Middle School was contaminated with ^{235}U[6]. Determining the history of enriched uranium from this gaseous diffusion facility will grant the citizens of Piketon, OH scientific evidence that will facilitate their understanding of the uranium contamination issue in their community. The extent of the enriched uranium contamination is not well understood at this time; the DOE is in the process of conducting a "third party" study of the environment within a 7-mile radius of the facility. Naturally, the Piketon community is immensely concerned about the potential health implications of this probable uranium pollution and would like answers in order to take action. The mission of this research project is to determine if there is history of atmospheric deposition of enriched uranium in the areas surrounding the Portsmouth Gaseous Diffusion Plant, and if so, what the extent of that pollution is.

2 METHODS

Pond sediment core samples and surface sediment grab samples were collected in the Piketon area within the vicinity of the DOE facility on October 5, 2019 by Dr. Michael Ketterer, Mrs. Elizabeth Lamerson, and Mr. Josh Lamerson. Samples were collected from three different farm ponds known by locals to have not been dredged or disturbed since the 1950s when the DOE facility was built. These ponds are the Bobo Road pond (coordinates: 39.010000, −82.972778), the Bailey Chapel pond (coordinates: 38.993056, −82.995278), and the Dutch Run pond (coordinates: 39.010556, −82.983889; Figure 1).

The first samples were collected from the Bobo Road pond, which was on the Lamerson's property. The pond was approximately 10-12 ft. deep at its deepest sections, had an outflow and moving water, and had been drained to remove built-up surface material approximately 8 years ago (this did not affect the sediment in the pond). Two sediment core samples (named Lam0098 and Lam0099) were each collected by plunging a 19mm internal diameter copper pipe straight down into the pond and underlying sediment to maximum depth. Pipes were pulled out, capped with copper end caps, sealed with electrical tape, and labeled with sample name and collection date. A surface sediment grab sample was also collected from the Bobo Road pond (named Lam0100) by scooping up sediment with a gallon sized bucket and pouring it into a labeled Ziploc bag.

Figure 1. Three pond sampling locations (the Bobo Road pond, the Bailey Chapel pond, and the Dutch Run pond) for collecting sediment core samples to analyze for enriched uranium were located within 2 miles of the Portsmouth Gaseous Diffusion Plant, the location of uranium enrichment activities for several decades[7].

The Bailey Chapel pond was the second sampling location. Samples were collected closer to the edge of this pond due to lower accessibility caused by cattails, weeds, and fencing. This lower accessibility resulted in a surface sediment grab sample using the gallon bucket method not being collected at this location. However, the sampling team successful in extracting two sediment core samples (named Lam0101 and Lam0102) using the copper piping method.

The final sampling location was the Dutch Run pond. Barriers such as plants and fencing did not cause sample collection issues at this pond like they had at the previous location. However, this pond was more stagnant than the others and had some algae on its surface, though any changes in water chemistry caused by these algae would likely have no impact on any uranium present in sediments. Two sediment core samples (named Lam0103 and Lam0105) were collected via the copper piping method and one surface sediment grab sample (named Lam0104) was collected via the gallon bucket method.

Two months after the sample collection was completed and samples were certain to be well-contained with no leaks, Mrs. Elizabeth Lamerson shipped all 8 collected samples as well as one empty copper pipe as a blank sample from Piketon, OH to the University of Denver (DU) in Denver, CO (Figure 2). The samples were mailed out on December 27, 2019 and were received by Dr. Michael Ketterer at DU on January 3, 2020. After the samples were unpacked, lab processing and analysis of samples were performed by the student researcher.

In the DU Department of Chemistry and Biochemistry Majestic Lab, the copper pipes containing the sediment cores were each measured and marked with a Sharpie marker at 3cm depth intervals and cut at these

Uranium Deposition

Figure 2. Piketon, OH pond sediment samples from October 2019 collection were mailed to the University of Denver in the wintertime. These samples included 6 sediment cores in copper pipes, 2 surface sediment grab samples in Ziploc bags, and 1 blank in a copper pipe to be analyzed for evidence of enriched uranium contamination.

intervals using a handheld pipe cutter. Each 3cm sample was transferred to a glass vial and labeled according to the core it came from and its depth range. The two surface sediment grab samples were transferred from their plastic bags to glass beakers and labeled according to sample number. Core and surface sediment grab samples were then heated at 85°C in a small Sargent-Welch S-63995 oven for several days to evaporate all water content.

After initial sample drying, sediment samples were ground one by one using a mortar and pestle and placed back into their corresponding vial or beaker. Approximately 0.5g of each sample was then weighed and placed into a smaller labeled glass vial, producing 66 samples. Also included in the set of small glass vials with individual samples were 10 random duplicates of the samples, 5 known control samples and duplicates for each, and 5 blanks. This produced a total of 91 samples, which were dry ashed in a furnace that could maintain steady high temperatures for extended periods of time at 600°C for three hours. Following the dry ashing, 3mL of 2M nitric acid (HNO_3) was added to each sample to leach them. The 91 sample bottles with the nitric acid were left overnight in the Sargent-Welch S-63995 oven at 80°C and were pulled out and shaken approximately every few hours when personnel were available to come into the lab.

Due to the onset of the COVID-19 pandemic and restrictions of student access to labs, the following steps were performed by Dr. Michael Ketterer instead of the student researcher. Using a 7mL Globe Scientific column pipet with a cotton plug, the samples were filtered and 2.0-2.2mL of each sample solution was recovered. Next, 50mg of UTEVA resin was added to each sample; it was pipetted in the form of a concentrated aqueous slurry. In this step, the UTEVA resin polymeric beads were used in solid-phase extraction in which the uranium was purified (separated from the nitric acid) by binding to polymeric beads[8]. The UTEVA resin-sample mix was transferred to a 7mL Globe Scientific column pipette with a cotton plug for filtration, and the pass-through solution was discarded. Each column was then rinsed twice with 1mL of 2M HNO_3 to remove un-retained components of the solution, while U remained bound to the resin column, and the rinse solution was discarded. The U was eluted with a sequence of the following: 0.5mL of H_2O, 0.5mL of 0.05 M aqueous ammonium oxalate, and 0.5mL of H_2O. The eluted samples were collected in the same 10mL tube which was used to collect the filtered sample leach solution.

At Northern Arizona University, a Thermo X2 quadrupole inductively coupled plasma mass spectrometer (ICPMS) instrument was used by Dr. Ketterer to determine the relative abundances of ^{234}U, ^{235}U, ^{236}U, and ^{238}U in each sample. The instrument was equipped with an APEX HF high efficiency desolvating sample introduction system[9]. The ICPMS instrument converts the uranium present in the sample extract into gas phase ions (i.e., U^+ (g)) and then sorts the ions in a quadrupole mass analyzer according to their mass[10]. This instrument records counts of the levels of each uranium isotope in a sample because different isotopes have different masses. To run the UTEVA-prepared samples through the ICPMS, the samples' ammonium oxalate fractions from the UTEVA columns were diluted to yield approximately 1 million cps (counts per second) at m/z 238 with 1% HNO_3, so that relatively consistent signal levels were recorded for all samples. This obviates several possible sources of systematic error such as "detector dead time."

The ICPMS analyzed each sample with either 3 or 5 runs with 46 second acquisitions, 10 seconds per mass, and a 10 ms dwell and 1000 sweeps. A control sample of naturally occurring U, derived from IRMM-056 (a uranium standard solution that can be used as a control for naturally occurring uranium) was diluted to give 10^6 cps at ^{238}U and run first as a control; the IRMM-056 solution was analyzed again in the middle and at the end of the analytical session.

The raw ICPMS data were transferred from Dr. Ketterer to the student researcher for analysis. Data were put into Microsoft Excel to run calculations that produced uranium isotope ratio values for every sample ($^{234}U/^{238}U$, $^{235}U/^{238}U$, and $^{236}U/^{238}U$). First, calculations were performed on the 4 blank samples that were run through the ICPMS. The average concentration of each uranium isotope (^{234}U, ^{235}U, ^{236}U, and ^{238}U) was calculated from these 4 blanks to be subtracted from the isotope signals of the rest of the data from the ICPMS to improve accuracy. For each isotope value for each run in the ICPMS (either 3 or 5 runs per sample), the average blank value for the corresponding isotope was

subtracted. Next, isotopic ratios were calculated for each run by dividing the ^{234}U, ^{235}U, and ^{236}U values, respectively, by the ^{238}U value that were made from blank subtraction. ^{238}U was used as the denominator in the ratios because it is naturally the most abundant uranium isotope and will therefore have the most counts per second in each ICPMS run. The average of each $^{234}U/^{238}U$, $^{235}U/^{238}U$, and $^{236}U/^{238}U$ ratio was then calculated for each sample, and one standard deviation for each ratio was calculated as well. For statistical analysis of these data, single factor ANOVA tests were performed in Microsoft Excel for each sediment core sample.

3 RESULTS

Naturally occurring ratios for $^{234}U/^{238}U$, $^{235}U/^{238}U$, and $^{236}U/^{238}U$ in nature, respectively, are 5.5E-5, 0.00725, and 0, and ICPMS results were compared to these thresholds. The natural value for $^{235}U/^{238}U$ is the primary ratio of focus in this study as enriched ^{235}U is radioactive and was likely emitted during the operation of the Portsmouth Gaseous Diffusion facility. This natural $^{235}U/^{238}U$ ratio of 0.00725 is relatively stable in nature; however, anthropogenic activities such as uranium enrichment for nuclear weapons can create large variations in this ratio[11]. Calculated $^{235}U/^{238}U$ ratios that are significantly greater than this natural ratio indicate higher levels of enriched ^{235}U from anthropogenic sources. Across all sediment core and surface sediment grab samples, above-natural ratios of $^{235}U/^{238}U$ were observed at different intensities, and these intensities varied with depth for the core samples. Depth variations correspond to variations in time due to the deepest layers of sediment being the oldest and the surface levels of sediment having been recently deposited. Out of 66 sediment samples (representing the sectioned sediment cores or surface sediment grab samples), only two samples did not have $^{235}U/^{238}U$ ratios that exceeded the naturally occurring value (the 22.5*cm* depth sample from Lam0099 and the 52.5*cm* depth sample from Lam0101). When one standard deviation below the calculated $^{235}U/^{238}U$ ratio was computed, again only the same two out of the 66 samples had $^{235}U/^{238}U$ ratios that were less than the naturally occurring value.

The sediment samples from the Bobo Road pond (cores Lam0098 and Lam0099 and surface sediment grab sample Lam0100) all exhibited elevated levels of enriched ^{235}U (Figures 3 and 4). The shortest sediment core, Lam0098, did not show as high of ^{235}U contamination as Lam0099, which was approximately 9*cm* longer. The peak $^{235}U/^{238}U$ value for Lam0098 was 0.00739, which occurred both at average depths of 1.5*cm* and 13.5*cm*. The peak $^{235}U/^{238}U$ value for Lam0099 occurred at an average depth of 4.5*cm* and was 0.00853.

Sediment samples collected from the Bailey Chapel pond (core samples Lam0101 and Lam0102) showed elevated levels of $^{235}U/^{238}U$ (Figure 3). These isotope ratios fluctuated over depth and therefore time significantly more than the samples from the other locations. The peak $^{235}U/^{238}U$ value for Lam0101 was 0.00761 at 31.5*cm*, and the peak value for Lam0102 was 0.00763 at 28.5*cm*.

Sediment Core Sample	Minimum $^{235}U/^{238}U$	Maximum $^{235}U/^{238}U$
Lam0098	0.00730	0.00739
Lam0099	0.00725	0.00853
Lam0101	0.00723	0.00761
Lam0102	0.00735	0.00763
Lam0103	0.00736	0.00934
Lam0105	0.00739	0.00941

Table 1 Maximum and minimum $^{235}U/^{238}U$ values for all 6 sediment core samples collected from three different ponds in Piketon, OH within the vicinity of the Portsmouth Gaseous Diffusion Plant. Each value is for a different average core depth; during lab processing, each sediment core was cut into 3*cm* depth intervals where each depth interval was analyzed to produce uranium isotope concentration data.

The sediment samples from the final location, Dutch Run pond, (core samples Lam0103 and Lam0105 and surface sediment grab sample Lam0104) exhibited the highest levels of enriched uranium (Figures 3 and 4). The peak $^{235}U/^{238}U$ value was 0.00934 at an average depth of 16.5*cm* for Lam0103 and was 0.00941 at an average depth of 13.5*cm* for Lam0105.

To statistically analyze the results from the sediment core samples, ANOVA single factor tests were performed in Microsoft Excel. A test was executed for each of the 6 core samples with an alpha value of 0.05 using the calculated $^{235}U/^{238}U$ values (one value per 3*cm* depth interval) and the naturally occurring $^{235}U/^{238}U$ value. Only one of the 6 samples returned a *p*-value greater than 0.05 (sediment core Lam0099; Table 2).

Isotopic ratios of all samples were also graphically compared to one another. The $^{235}U/^{238}U$ values were plotted against both the $^{236}U/^{238}U$ and the $^{234}U/^{238}U$ values. Both graphs showed a positive correlation where as ^{235}U increased, so did ^{234}U and ^{236}U. However, the correlation was much stronger for $^{235}U/^{238}U$ vs. $^{236}U/^{238}U$ than for $^{235}U/^{238}U$ vs. $^{234}U/^{238}U$ (Figures 5 and 6).

Uranium Deposition

Sediment Core	df Between	df Within	F	F Critical Value	*p*-Value
Lam0098	1	8	26.789	5.3177	0.0085
Lam0099	1	14	4.1572	4.6001	0.06080
Lam0101	1	34	85.222	4.1300	868E-11
Lam0102	1	30	113.98	4.1709	9.76E-12
Lam0103	1	18	18.086	4.4139	0.00048
Lam0105	1	12	12.765	4.7472	0.00383

Table 2 ANOVA single factor test results for all 6 sediment core samples extracted from three ponds in Piketon, OH within the vicinity of the Portsmouth Gaseous Diffusion Plant, which historically enriched uranium. An ANOVA test was run for each sediment core using the $^{235}U/^{238}U$ values (one value per 3*cm* depth interval) and the naturally occurring $^{235}U/^{238}U$ value.

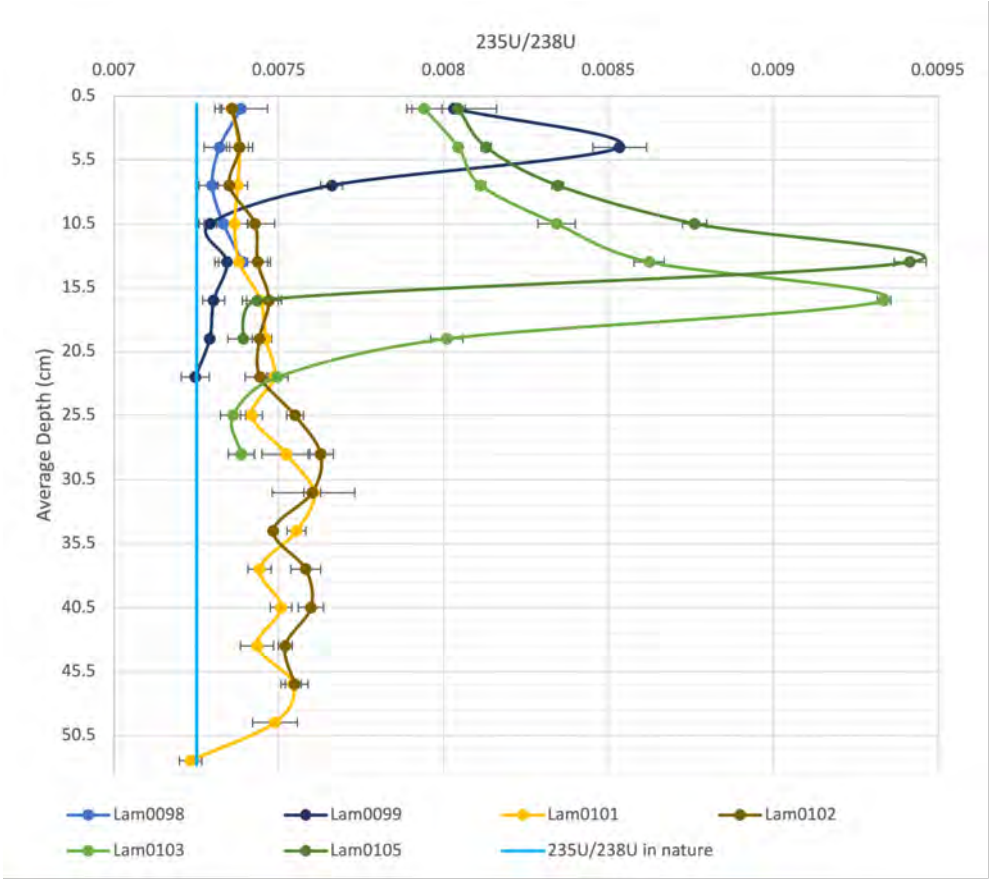

Figure 3. Uranium 235/238 ratios in 6 sediment core samples collected from 3 different ponds versus the naturally occurring uranium 235/238 ratio. Error bars are one standard deviation of the $^{235}U/^{238}U$ values. Sediment cores Lam0098 and Lam0099 were extracted from the Bobo Road pond, cores Lam0101 and Lam0102 were extracted from the Bailey Chapel pond, and cores Lam0103 and Lam0105 were extracted from the Dutch Run pond. All ponds are located in Piketon, OH within the vicinity of the Portsmouth Gaseous Diffusion Plant, which historically enriched uranium, and analyzed in a lab by depth intervals using an ICPMS instrument to produce uranium isotope concentration data.

4 DISCUSSION

Careful analysis of pond sediments provided clear evidence of enriched uranium in the Piketon, OH community. All 6 sediment cores and 2 surface sediment grab samples exhibited some degree of elevated $^{235}U/^{238}U$, with the overall lowest value being 0.00723 at an average depth of 52.5*cm* for Lam0101 and the overall highest

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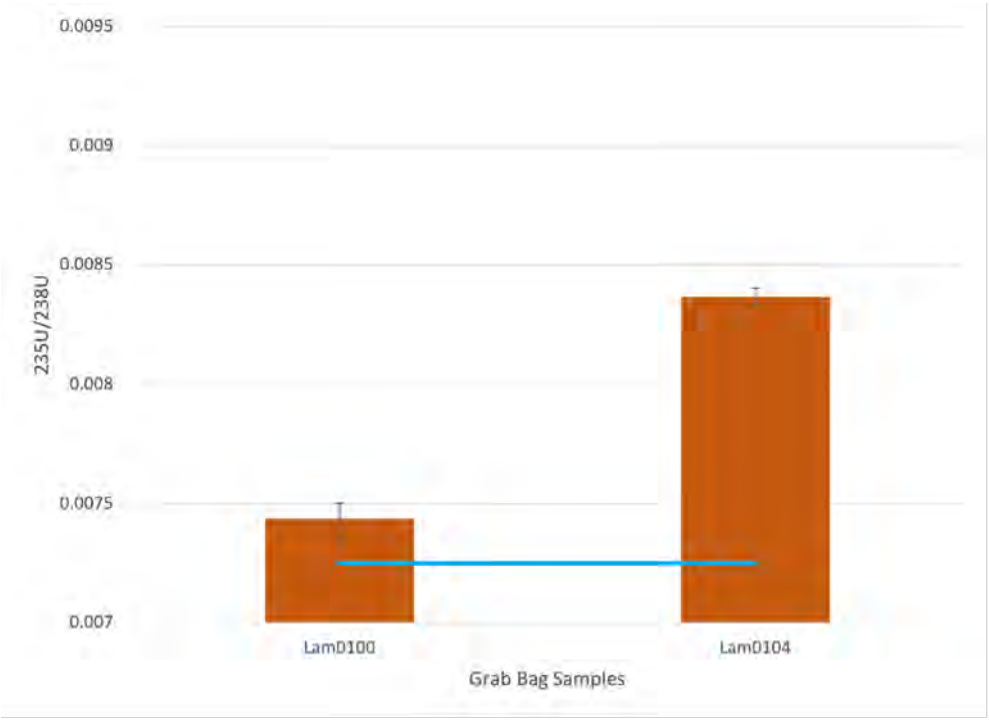

Figure 4. Uranium 235/238 ratios in the surface sediment grab samples (Lam0100 from Bobo Road pond and Lam0104 from Dutch Run pond) versus the naturally occurring uranium 235/238 ratio (seen as the blue line). Error bars are one standard deviation of the $^{235}U/^{238}U$ values. The surface sediment grab samples were collected via gallon bucket from two ponds in Piketon, OH within the vicinity of the Portsmouth Gaseous Diffusion Plant, which historically enriched uranium, and analyzed in a lab using an ICPMS instrument to produce uranium isotope concentration data.

value being 0.00941 at an average depth of 13.5*cm* for Lam0105 (Table 1, Figure 3).

The most pronounced contamination out of all of the samples was seen in the Dutch Run pond, which was the pond closest to the Portsmouth Gaseous Diffusion Plant. The two core samples from the location exhibited the highest $^{235}U/^{238}U$ ratios with 6 of 10 (Lam0103) and 5 of 7 (Lam0105) depth interval samples exceeding a ratio of 0.008 (Figure 3). The surface sediment grab sample from this location also exceeded a ratio of 0.008 with a value of 0.00836 (Lam0104; Figure 4). Out of the 5 other samples (3 from Bobo Road pond and 2 from Bailey Chapel pond) only 1 other sample, from Bobo Road pond, had any $^{235}U/^{238}U$ values exceed 0.008 (2 of 8 samples in Lam0099). These findings are statistically significant as the ANOVA test produced $F(1,18) = 18.086$, $p = 0.00048$ for Lam0103 and $F(1,12) = 12.765$, $p = 0.00383$ for Lam0105 (Table 2). This pond is also located directly east of the plant, so it is probable that the westerly winds blew the contamination from the plant in the direction of the pond. These findings indicate that the Dutch Run pond was subjected to the most enriched uranium atmospheric deposition out of the sampling locations, which makes sense due to the proximity of the plant to the pond and natural wind direction making the area more susceptible to deposition accumulation.

The Bobo Road pond displayed the second highest level of contamination, which makes sense due to it also being directly east of the plant and therefore in the direct path of westerlies blowing from the plant. The first sediment core collected from this pond (Lam0098) was also the first core collected out of all the samples, and it was the shortest (Figure 3). Less accurate sampling due to it being the first one may have an influence on this sample; this could explain the discrepancy with the second sample (Lam0099) taken from this pond, which was significantly longer and contained more enriched uranium (Figure 3). No other sets of cores taken from the same pond displayed the same discrepancy as the two taken from the Bobo Road pond, so this is likely a result of inaccuracies from attempting to perfect the sampling technique. However, the ANOVA test found that the uranium concentrations in the second of the two cores, Lam0099, were not statistically significant with $F(1,14) = 4.1572$, $p = 0.06080$ (Table 2). This was the only one out of all 6 sediment core samples where the p-value exceeded 0.05. ANOVA results for the shorter of the Bobo Road pong cores, Lam0098, were $F(1,8) = 26.789$, $p = 0.00085$, which displays a significantly different p value (Table 2). The non-statistically significant p-value for Lam0099 may be due to this being the only core where within-group variance was greater than between-group variance. The high $^{235}U/^{238}U$ variance by depth

Uranium Deposition

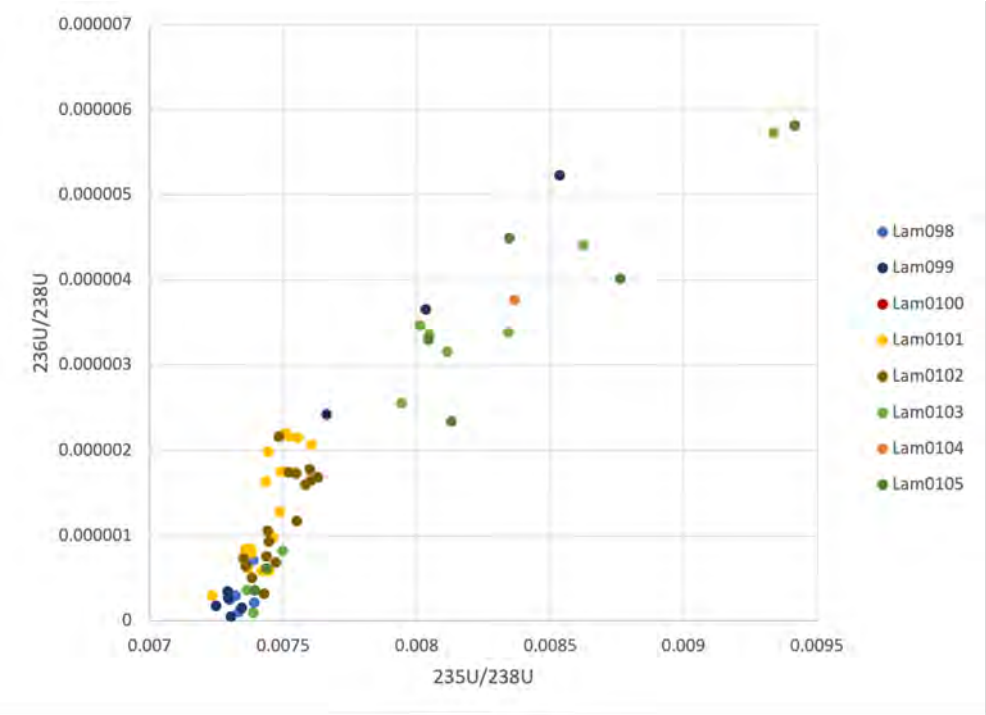

Figure 5. Uranium 235/238 ratios versus uranium 236/238 ratios for all sediment core and surface sediment grab samples, calculated from ICPMS results; a positive correlation is evident. The sediment core and surface sediment grab samples were collected from the three ponds in Piketon, OH within the vicinity of the Portsmouth Gaseous Diffusion Plant, which historically enriched uranium, and analyzed in a lab using an ICPMS instrument to produce uranium isotope concentration data. For the sediment core data, each data point on the graph is a different 3*cm* depth interval.

in the core could have resulted from a sudden and drastic increase in uranium deposition at the pond after a long period of low deposition, which may be the jump in data seen graphed from a depth of 10.5*cm* to 7.5*cm* (Figure 3).

Uranium 235 concentrations in the Bailey Chapel pond fluctuated the most across depth intervals of the two core samples, Lam0101 and Lam0102 (Figure 3). This pond was close in proximity to the Portsmouth Gaseous Diffusion Plant and was located to the southeast of it. The westerlies may also play a role in the deposition that reached this pond, as not being in the direct path of the westerly winds may have reduced instances of constant pollution but fluctuations in wind patterns may have brought more sporadic pollution. This also may attribute to the overall lower $^{235}U/^{238}U$ concentrations seen in the Bailey Chapel pond samples compared to the other samples; the lowest overall value seen out of all of the samples came from the first of the two Bailey Chapel samples (Lam0101). These lower, fluctuating data however are statistically significant; ANOVA results for Lam0101 were $F(1,34) = 85.222$, $p = 8.68E\text{-}11$ and for Lam0102 were $F(1,30) = 113.98$, $p = 9.76E\text{-}12$ (Table 2).

While the numeric depth of the sediment cores is of little meaning due to the cores not having been chronologically dated, it is evident that the uranium concentrations do change with depth and therefore there is a definite timeline of enriched uranium deposition from the Portsmouth Gaseous Diffusion facility. The Dutch Run pond samples exhibit this the most clearly because the graphs of the two core samples are strikingly similar in their shapes (Figure 3). Peak $^{235}U/^{238}U$ values for these samples are very close (0.00934 for Lam0103 and 0.00941 for Lam0105) and occurred at similar average depths (16.5*cm* for Lam0103 and 13.5*cm* for Lam0105; Table 1). The peak values graphically indicate sharp increases from the $^{235}U/^{238}U$ values of the sample directly below the peak samples in core depth, which may indicate a drastic surge in uranium enrichment operations during the Cold War; Lam0103 values rose from 0.00749 to 0.00801 to 0.00941 within 6*cm* and Lam0105 values rose from 0.00743 to 0.00941 within 3*cm* (Figure 3). The faster increase seen in the latter of these samples may be a result of a slower sedimentation rate in the specific section of the pond from which it was extracted.

Beyond the $^{235}U/^{238}U$ concentrations seen in the samples, the relationship between ^{235}U concentrations and ^{234}U and ^{236}U concentrations points to anthropogenic influences on the presence of uranium. On plots comparing $^{235}U/^{238}U$ to $^{234}U/^{238}U$ or $^{234}U/^{238}U$, the cluster of samples closer to the vertex that have overall low uranium concentrations are close to naturally occurring levels, and as the samples move further away from the

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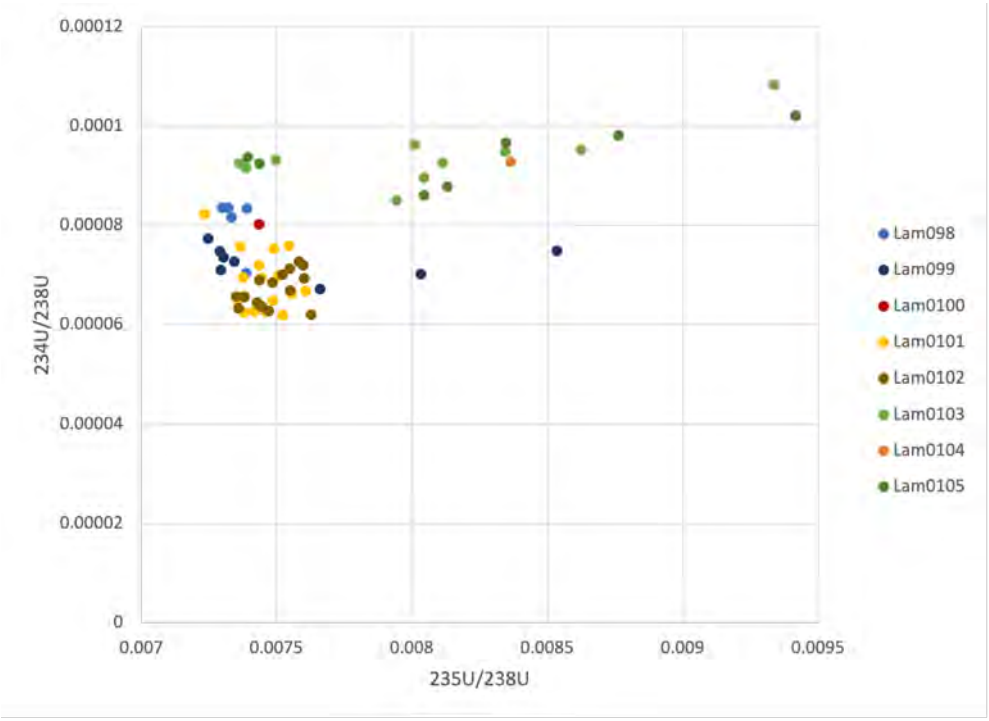

Figure 6. Uranium 235/238 ratios versus uranium 234/238 ratios for all sediment core and surface sediment grab samples, calculated from ICPMS results; a positive correlation is evident. The sediment core and surface sediment grab samples were collected from the three ponds in Piketon, OH within the vicinity of the Portsmouth Gaseous Diffusion Plant, which historically enriched uranium, and analyzed in a lab using an ICPMS instrument to produce uranium isotope concentration data. For the sediment core data, each data point on the graph is a different 3*cm* depth interval.

vertex, there is an increasing anthropogenic influence on the U concentration. Because the plots have points across this range, it is likely that the uranium observed in the samples is a mixture of naturally occurring and enriched uranium from the Portsmouth plant. When the $^{235}U/^{238}U$ values were graphed against the $^{234}U/^{238}U$ values for all samples, a positive relationship was found in that as $^{235}U/^{238}U$ values increased, so did $^{234}U/^{238}U$ values (Figure 6). However, an even stronger positive correlation was observed for the plot of $^{235}U/^{238}U$ versus $^{236}U/^{238}U$ (Figure 5). The ^{236}U isotope is mainly of synthetic origin, as it is produced by neutron irradiation of ^{235}U; uranium recovered from plutonium production reactors, referred to as "recycled uranium," is known to contain ^{236}U and this material was processed at the Portsmouth Gaseous Diffusion Plant[5]. The obvious strong correlation between elevated $^{235}U/^{238}U$ and the detection of nonzero $^{236}U/^{238}U$ ratios, with the highest values being from the Dutch Run pond, further suggest that this contamination deviates from nature and is a direct result of the activities at the Portsmouth Gaseous Diffusion Plant (Figure 5).

Several limitations are included in this study that could be alleviated with further research efforts. First and foremost, the sediment samples that were collected are arguably not of the highest quality and more accurate, extensive sediment core extraction methods popular in the soil coring field could have been employed. The ponds that were sampled also may have experienced confounding influences unknown to the researchers; local knowledge that the ponds had not been dredged since the construction of the Portsmouth Gaseous Diffusion Plant may not be entirely accurate. Despite this, the samples that were obtained produced results that tell a compelling story and clearly exhibit trends of enriched uranium pollution. Another method that would improve upon this study is establishing a chronology. Previous studies have established sediment core chronologies by measuring the 1952 appearance and 1963 peak activity of plutonium in individual sediment layers[12]. Due to plutonium being a component of open atmosphere nuclear testing during the Cold War and subsequent tropospheric fallout, low concentrations of plutonium are found non-uniformly in small quantities around the world from deposition[13]. With more time and resources, establishing a chronology via plutonium dating could greatly strengthen the findings of this study.

5 CONCLUSION

Detection of pervasive enriched uranium in sediment samples from the Piketon, OH community has shined a light on the dark truth of the pollution in the area. It

is evident that enriched uranium from the Portsmouth Gaseous Diffusion Plant has been deposited in the air, soils, and water of the surrounding community and has persisted long since the closure of the facility. The findings of this study will provide the citizens of Piketon scientific evidence that will facilitate their understanding of the uranium contamination issue in their community. Piketon locals have immense concerns about the health impacts of this uranium pollution (as seen on their CARD, or Citizens Advocating for Responsible Disposal, in Pike Facebook page), and therefore solid scientific data detailing the extent of the enriched uranium contamination will hopefully provide further insight into how pressing the health hazards are and help those in charge implement a thorough and timely plan of action for cleaning up the pollution.

6 ACKNOWLEDGEMENTS

I would like to thank Dr. Michael Ketterer and Dr. Brian Majestic for their great help and support. Without them, this project would not have been possible. Thank you to Dr. Ketterer especially for his vast assistance and immense knowledge on the project, and to Dr. Majestic for much appreciated support and use of his lab. I would also like to thank Elizabeth and Josh Lamerson for their efforts in collecting sediment samples and for their dedication to helping on this project. Also, thank you to the Northern Arizona University Department of Chemistry and Biochemistry, and Professor Jani Ingram, for use of the ICPMS instrument.

7 EDITOR'S NOTES

This work was adapted from a senior thesis and has been condensed for publication. Contact DUURJ staff for the full publication.

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Untitled by Guillermo Pinon

Faculty Spotlight — Dr. Corinne Lengsfeld

Interviewed by Bailey McGinley[1] and Owen McKessy[1]
[1]DUURJ Staff Editors, University of Denver

1 DO YOU MIND TELLING US ABOUT YOURSELF, SUCH AS WHERE YOU WENT TO SCHOOL, HOW YOU BECAME INTERESTED IN YOUR MAJOR RESEARCH AREAS, AND HOW YOU FOUND YOUR WAY TO DU?

I'm a mechanical engineer by training. I got my degrees at the University of California, Irvine and of all things, I majored in rocket science. I worked on my postdoc at Boulder for two years, in the pharmaceutical industry in their Chemical and Biochemical Engineering Program, and re-trained myself from rocket engines into pharmaceutics. There's actually a lot of commonalities between the two fields. At the time, I was one of three mechanical engineers that were working in the pharmaceutical industry, so I was sort of crazy weird. I joined DU in 1999, as a professor in mechanical engineering, and had a blast with the students. We did all sorts of incredible things, like working for the Air Force and working for pharmaceutical companies. We were well funded and we had a great time. I really love teaching and the whole teacher scholar model here at DU.

About eight years ago, the person that was leading research at the University stepped down and accepted a dean position at another university, and she called me and suggested that I take over her position. I was hesitant at the time, because I had a big research group, and I was enjoying what I was doing. On the other hand, I also knew that DU was transforming from a school with a teaching intensive faculty to a faculty that balances their research with their teaching, and I was super interested in forging this university forward in the research sphere. It was important to me to do this in such a way that the love I had with the students would propagate forward and not be diminished by the research. So that's how I ended up heading research.

2 HOW HAS WORKING WITH INVESTIGATORS FROM DIFFERENT DISCIPLINES (YOU'RE A MECHANICAL ENGINEER BY TRADE, DR. SARAH WATAMURA A PROFESSOR OF PSYCHOLOGY, AND DR. PHIL DANIELSON A MOLECULAR BIOLOGIST) HELPED IN THE SUCCESS OF THE SPIT LAB?

Being interim provost at the start of the pandemic, I was pretty much all about COVID for four or five months. I decided to roll back to my research position, and it actually worked out really well because I had asked Sarah Watamura to help me with COVID while I was still Interim Provost and then when I rolled back to research, I helped her continue to run COVID. So, the two people that really had been running the university's response to COVID the whole time, ended up continuing together.

Sarah was a salivary scientist, she was collecting spit in kids for years and measuring their stress level. She suggested we should do COVID saliva testing and as an engineer, I understood pharmaceuticals, diagnostics, and supply chain. Then, we got Phil Danielson to join us. He's a forensic scientist, and if you're going to look for a little elusive molecule in saliva, who better than somebody that looks for all sorts of things in bodily fluids from crime scenes. The three of us just got together and dreamed up what is now the Spit Lab, which is incredible. A small team has been innovating all the way through and using every ounce of experience we

have but really just applying it in completely different spaces.

I knew we had to build all our own software, so I called over to computer science and spoke to Matt Rutherford. I said, "Do you know anybody that would help us?" He was like "Well, what do you mean?" I said, "I pretty much think we're gonna not sleep much. And we're gonna have to work really hard. And I don't even know if it's gonna work. But I think we'll save the day if we can do it." He's all, "I'm all in, it sounds perfect."

Then, Nancy (Lorenzon) was hanging out close to us one day. We were collecting saliva at the pod, and she came over and she said, "I want to help."

All of the aerosol calculations were done with Dr. Alex Hoffman in chemistry. That's how we figured out how to set up the rooms and which rooms needed extra filtration units.

Then, I spoke with Keith Miller, he's an environmental water sampler. I said, "So wastewater is kind of environmental, do you want to do this with me?" I think by September 9th we were starting to pull samples out of the sewers. It's been a lot of fun to work with so many different faculties.

3 AS PRINCIPAL INVESTIGATOR FOR DU'S SPIT LAB, WHAT ARE YOUR MAIN RESPONSIBILITIES?

There's the research side and the public health side, so let's start on the public health side. I'm ultimately responsible for the entire operation of the Spit Lab. This includes making sure Phil Danielson and his team have all the equipment they need and helping them to solve any problems or issues that they come up with. I help Nancy Lorenzon to oversee the interns and make sure they're trained and that we are living up to our CLIA lab certification. A major part of my role as PI is entering the results of tests into the system once they are sent to me from the lab, as well as clearing and posting the results in the medical records. In other words, I'm the final authority when it comes to all of the data collected by the lab. I might not do the finger work, but I will notify contact tracing of who's received a positive test and I'll have verified that the data is accurate. I also manage any questions that students or the parents may have about saliva as a new detection technique. Methods for saliva testing are wildly varying across the country, and our lab holds itself to the highest standard possible, so it's really easy to defend our results.

On the research side, I really am the only person that sees all the informed consents. For this reason, we haven't started any research studies. We've only collected public health data, but we have one of the best databases, in my opinion, that is able to tell us who has been positive, where they were living, and where they might have gone while carrying the virus. All of the people in the database have consented to be a part of the study, and as the PI, I know who's consented and what I'm allowed to do with the data. I'm ultimately responsible for assuring that people's privacy is protected. This means that when we move into the research phase and other scientists get access to the database, they will see nothing but numbers and they will never see the names associated with the data. At this point, we have used all of our data for public health initiatives to help inform our response, but we haven't begun pursuing any research yet. Before any research can start, you need to be sure there are systems in place that protect the identity of everyone that participated in the study. It's not like you can just begin research right away, and as a responsible PI, you need to make sure that all of the data is presented correctly, and there will be no room for mistakes.

4 AT THE MOMENT, SALIVA TESTING IS NOT FDA APPROVED. HOW IS THE CURRENT RESEARCH YOU ARE DOING HELPING YOU AND YOUR TEAM WORK TOWARDS GETTING THAT FDA APPROVAL?

We submitted our Emergency Use Authorization application a few months ago, maybe in January, but we submitted at a time when the federal government announced they were not going to issue any EUAs to universities. We are one of 32 universities who have pending EUA applications. We have been in constant contact with the FDA, and we know that our application is under review because they keep asking Dr. Danielson questions.

We also know that of the 32 universities that have submitted applications, we're almost the only one that uses the extraction technique. You can either process saliva as is and send it into the PCR, or you can take an extra more expensive step to extract off the virus and concentrate it and send it into the PCR. We decided to use the extraction technique because it creates a higher standard of performance and accuracy. We are very confident that we will be one of the first university labs to be approved because essentially we are replicating the techniques used in nasal swab testing and applying them to saliva. It's just they don't want to approve any universities, yet, for whatever administrative reasons. So we'll wait, and then we'll get it.

5 TESTING FOR COVID-19 HAS BEEN MADE POSSIBLE THROUGH UNDERGRADUATE INTERNS AND VOLUNTEERS, CAN YOU GO INTO A BIT MORE DETAIL ON HOW UNDERGRADUATE STUDENTS HAVE BEEN IMPORTANT IN THE UNIVERSITY'S RESPONSE TO THE VIRUS?

I'm just going to kind of rattle off some of the jobs, we have two undergraduates run all the installation of the wastewater twice a week. Dr. Miller pulls the sample with a plumber then two students actually do all the installations on Sundays and Wednesdays. We also have some students that work inside the Spit Lab doing the antigen testing, which people often forget that the Spit Lab actually does do nasal swab testing, but we do it for antigen testing in symptomatic cases.

Then, we have all the spit interns that are wonderful, and they run the collection sites. We just promoted a few of them to be paid leads and actually take on more organizational responsibility. Then we have a number of the interns who are taking leadership roles out at the vaccination clinics, who are helping manage and organize the operations of different elements of the vaccine clinics. We have two interns that are pretty amazing, John and Maya, who have taken on pretty large responsibilities at the vaccination clinics.

We've had students also help in a number of other ways. We had a vaccine call clinic, and we were like the only place in the state you could call and talk to a human. We had a 13 phone phone-bank and the students could run it from their computer. Undergraduate and graduate students helped keep that phone bank alive for almost three months, taking appointments and registering people.

Then we have a bunch of students from Professional Psychology, who are part of our student ambassador program, that are using their psychology training to reach out and connect with students in quarantine and isolation. They just connect with them, make sure they're okay. Get them resources, if they're not.

We've had a bunch of students that would run around delivering from time to time, picking up things people needed. In the beginning of fall, our isolation dorms and our quarantine dorm rooms didn't have all the supplies, and there were students that would go out shopping and they would bring everything back to the university so we could go out and deploy it.

Students have been involved in ways that I don't think have been recognized, but they have been involved from the very beginning and are really supporting the COVID response team. We've been terribly grateful that they've been there, and they've never asked for anything in return. They've been so great and just really dependable.

6 FROM THE OUTSIDE LOOKING IN, IT LOOKS LIKE THE SPIT LAB HAS CONSTANTLY BEEN EVOLVING AND IMPROVING. WHAT HAS BEEN THE BIGGEST CHALLENGE YOU AND YOUR TEAM HAVE FACED, AND HOW DID YOU OVERCOME IT?

So, I gotta say, there's two most difficult moments. Once we got the lab up and running, it was about December 1st. We'd run for two weeks, and had figured out what we wanted to do and wanted to start testing. And then we ran out of supplies, like we literally ran out of supplies. We had to ask National Jewish and the CDPHE to borrow some things to keep us in business, but on December 4th I had to close the lab. I didn't fire anybody or anything like that, but I said, you're not allowed to run a single sample because I needed us to open on January 4th, when the first people moved into the dorm. I only had supplies to go from January 4th to January 10th, and so on December 4th, we closed. It was a very difficult day for Phil, Sarah, and I to admit that we hadn't kept track of the supply chain enough, that we hadn't understood what it was going to be. And then what was worse is that we had to jump into a supply chain market that, you know, we're a medium sized school, like, I couldn't buy enough to become the powerhouse so we ended up getting these two people in purchasing to help us. These two staff members who just volunteered extra time and when everybody else left on December 21st, we worked every day trying to find plastics all over the world. Our goal was to get us to January 15th. And then from January 15th, could we get to January 30th. It wasn't until about January 30th that we had enough supplies to get us through winter quarter. I mean, we sweated it every day. That was really a major situation, but now that we're at about 1200 samples a day, I don't think anybody on this campus has had to manage a supply chain like that, with so many complex scientific items at that type of volume. That has been a serious challenge for us, just yesterday I was down in the warehouse myself counting pipette tips and bringing them to the lab because we thought we might be low and, nope, we had them. But you know, you've got to always keep on top of that.

The other really horrible one was when all of us went to go get vaccinated, everyone that was in the lab or those of us that were pulling wastewater samples because we were in contact with the virus all the time. We went to get vaccinated on a Wednesday, and then the lab called me Friday morning and said we got a positive test in the lab. That meant that everybody would be quarantined, and we'd have to shut down the lab. So there we were, out there in the middle of night measuring the distance between lab spaces and finding a six foot distance or not. Can you imagine, it's 12:30 at

night and you're out there with a tape measurer trying to figure out if everybody was safely distanced. Many of the interns will remember the very next Monday at a group meeting I said everybody has to be six feet apart, I don't care if you're friends, I don't care if you're roommates, but the lab they quarantined. It was a really bizarre sort of surreal 10 days in which three people had to do the work of what used to be five people. It was a strange, surreal sort of problem to live through. It was great because the virus didn't spread, and there were no connected cases, we were literally six feet apart wearing masks and it all worked. But we were really worried that it was going to be the whole lab at some point and that we didn't get vaccinated early enough. So that was another real challenge to overcome, balancing the needs of the campus with what each of those individuals needed for their own personal well being. It was just an incredibly difficult time, those early days in January. For us, you never knew if we were going to be successful or if it was going to sort of fall apart. Every night was sort of a watershed night.

7 WHAT ARE THE NEXT STEPS FOR YOU AND YOUR RESEARCH TEAM?

I think that from a public health point of view, what we really are interested in is how many people who are vaccinated have breakthrough infections? How many who have already had COVID, get COVID Again? Is it the variant? Is there a preference of the variants? We're really interested in that because that tells us what we need to do for the fall. In the wastewater, picking up the variant has been tough. So, Dr. Miller and Dr. Danielson have teamed together and really came up with some interesting ways to improve our wastewater monitoring. We used to do that all third-party, but now we do it all in house at the university to save money, but also to up our game a little bit.

I think the variants are so interesting, right? Like, I watched the variant come to campus. I remember the night we got the first variant case. And I remember Phil calling in a panic. Actually, we were on the intern call, so we finished up our meeting, and I headed down to the lab and we have two variants that might appear in there. We load the first one into the robot that processes the samples and all the equipment breaks, and it breaks in dramatic fashion all in the same night. It throws all the PCR plates against the wall, so it ruins all the samples, and then leaks all over the floor. That was a hard night, because none of us knew what the variant meant. It was in the dorms and everybody said it was so infectious and spreading. It was a difficult night. We bought dinner for all the techs because it was a 2:00 AM kind of night.

That night actually determined how we were going to quantify the variant, how we were going to definitively say, that's the variant and that's not. That science wasn't out there, Phil and I were building that science. We then were writing a small research paper and submitting it to Sarah as the peer reviewer, in sort of a mini peer review cycle. So, it was really intense, but we just leaned on our old research methods to do it once again. And then over time, we saw this sort of sweep of variant shift that is incredible to observe. Because we are able to have our own lab, we have so much more data and that has been so empowering.

Untitled by Katherine Miromonti

Undecided

by Quinn Dymalski

Undecided is a big band ballad that features the baritone saxophone. It was written by Quinn Dymalski for his senior recital at the University of Denver, and was premiered on March 2nd, 2020. While the inspiration for this work comes from the styles of modern big band artists such as Quincy Jones, the harmony displays a romantic twist; seventh chords and suspensions like that of a Chopin Nocturne appear when the saxes enter at measure thirteen. The following choral-like figures written for the brass build a dramatic intensity only for the texture to be stripped down to solo bari sax and rhythm section, returning to a more classic jazz combo feel. The title comes from the darker timbre presented in this composition and is meant to convey the feeling one has when making a difficult decision.You can find a recording of this piece on the YouTube channel "Quinn Dymalski," under the playlist "The Quinny D. Big Band."

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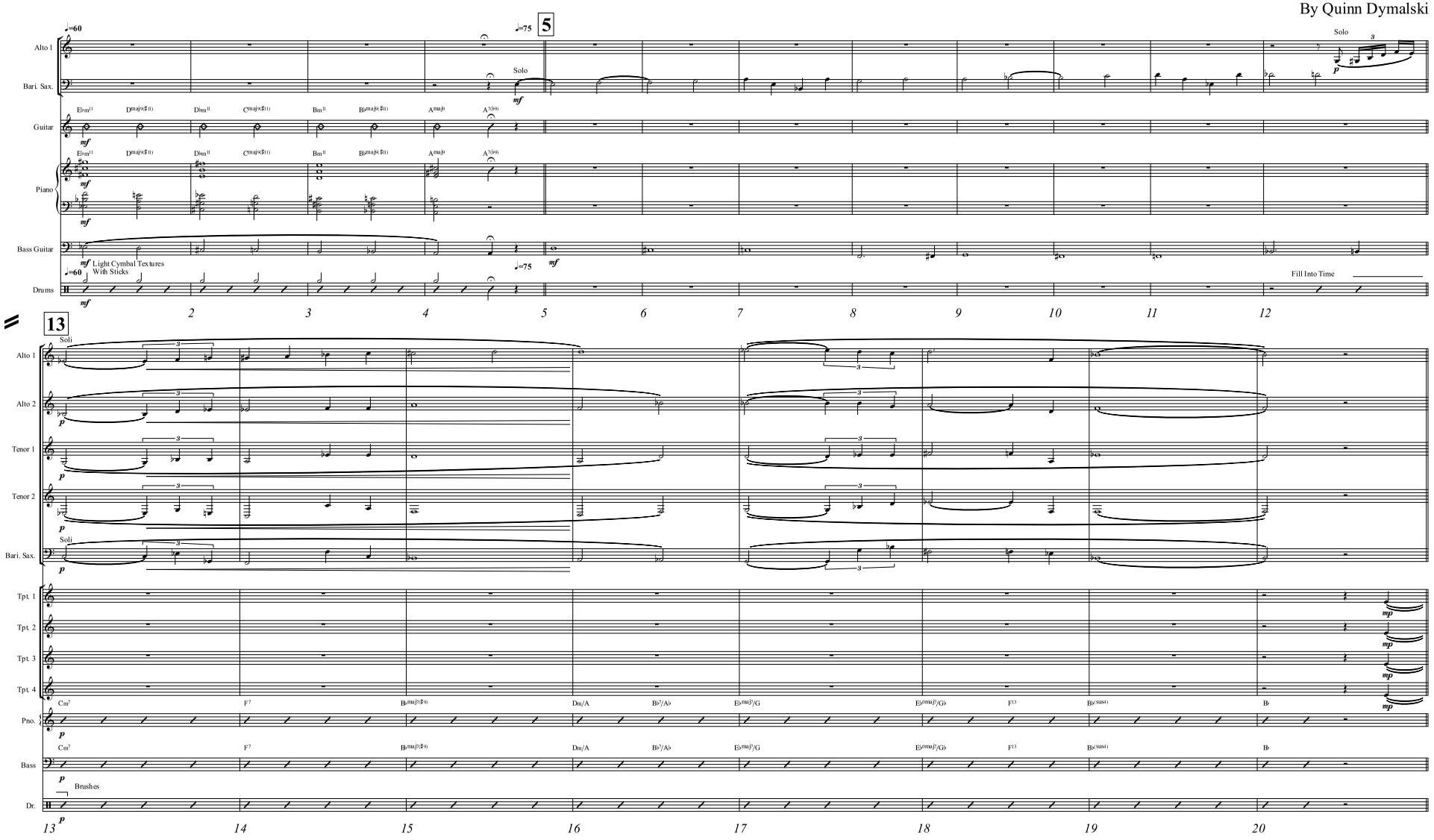
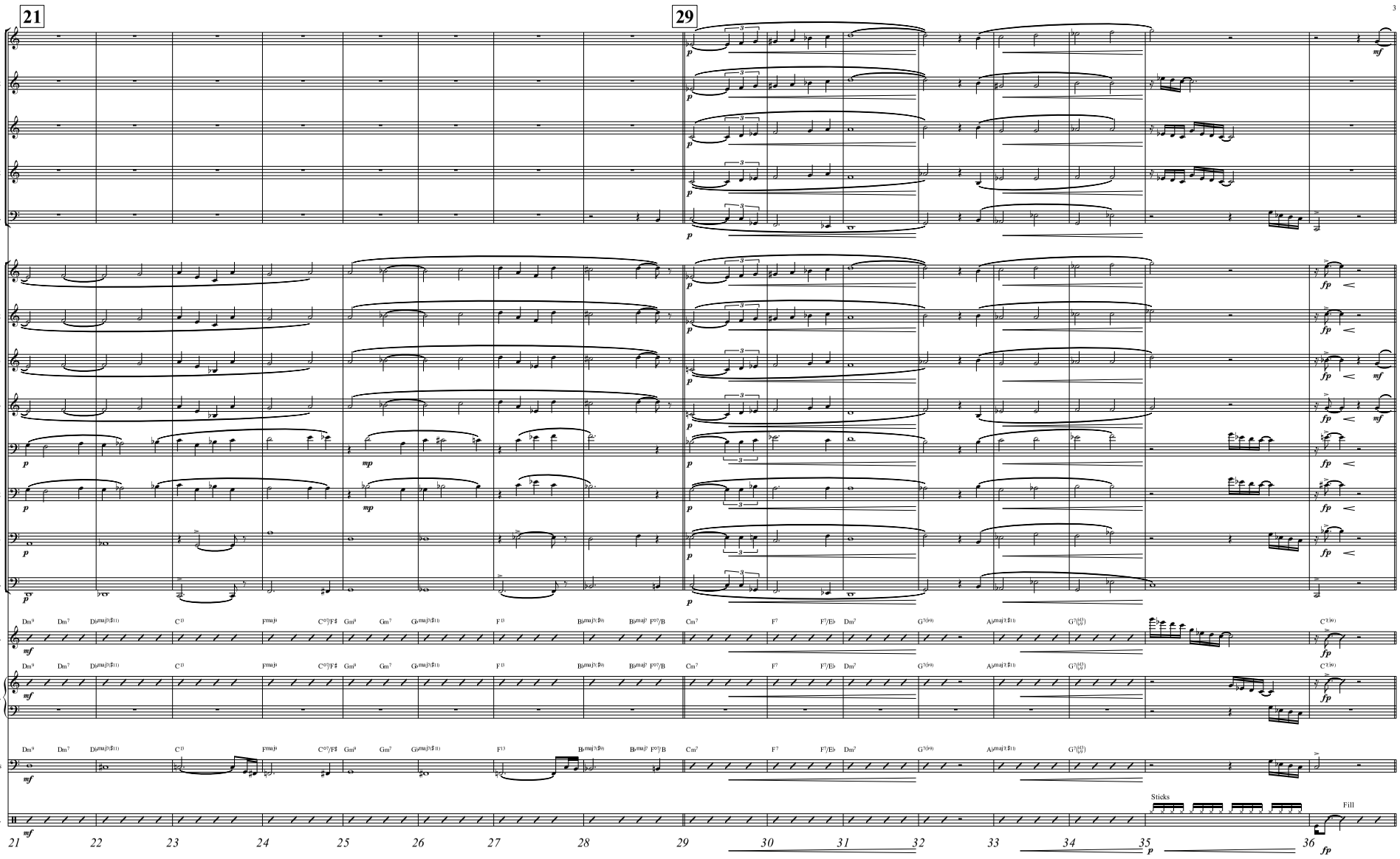
Undecided

By Quinn Dymalski

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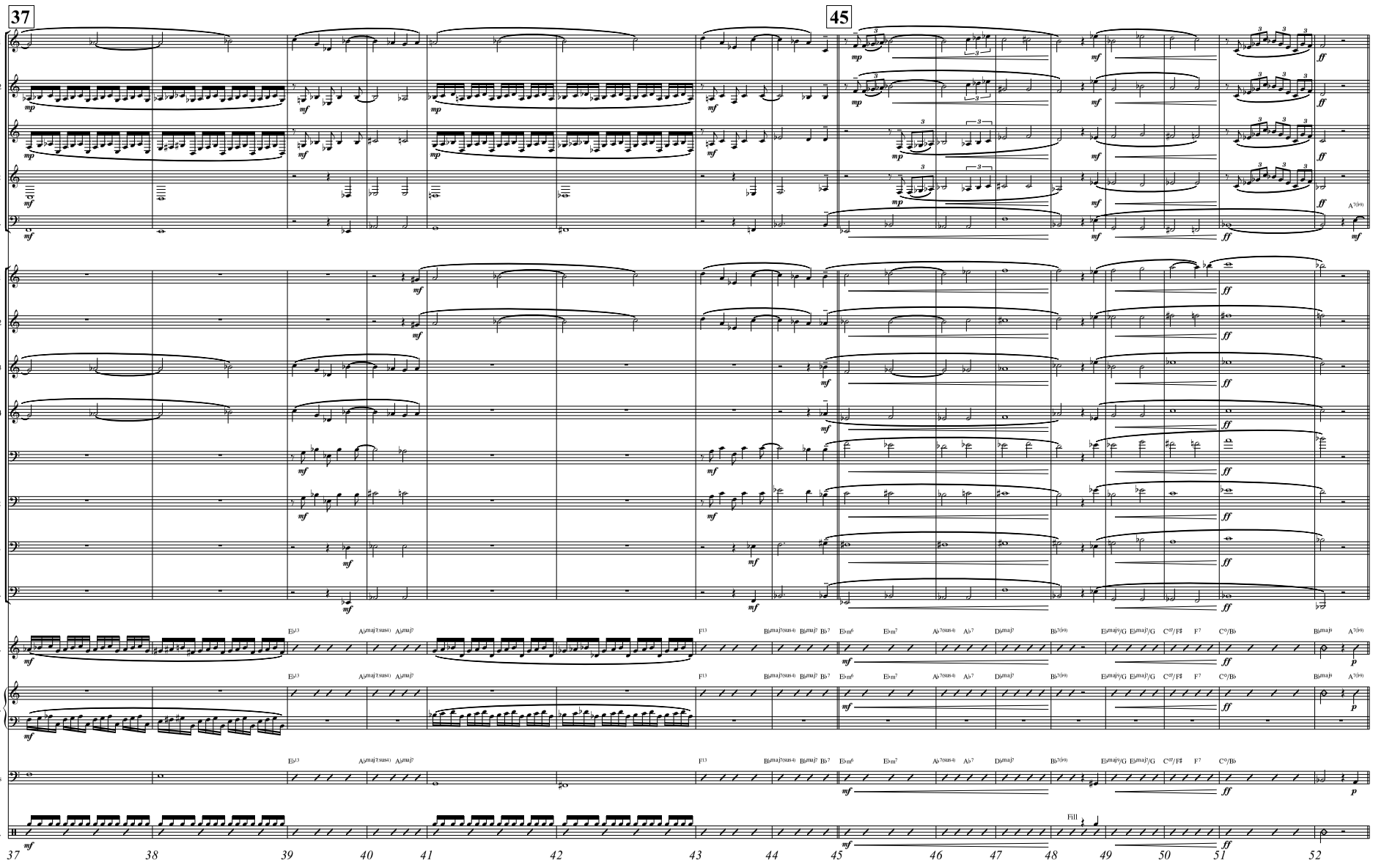
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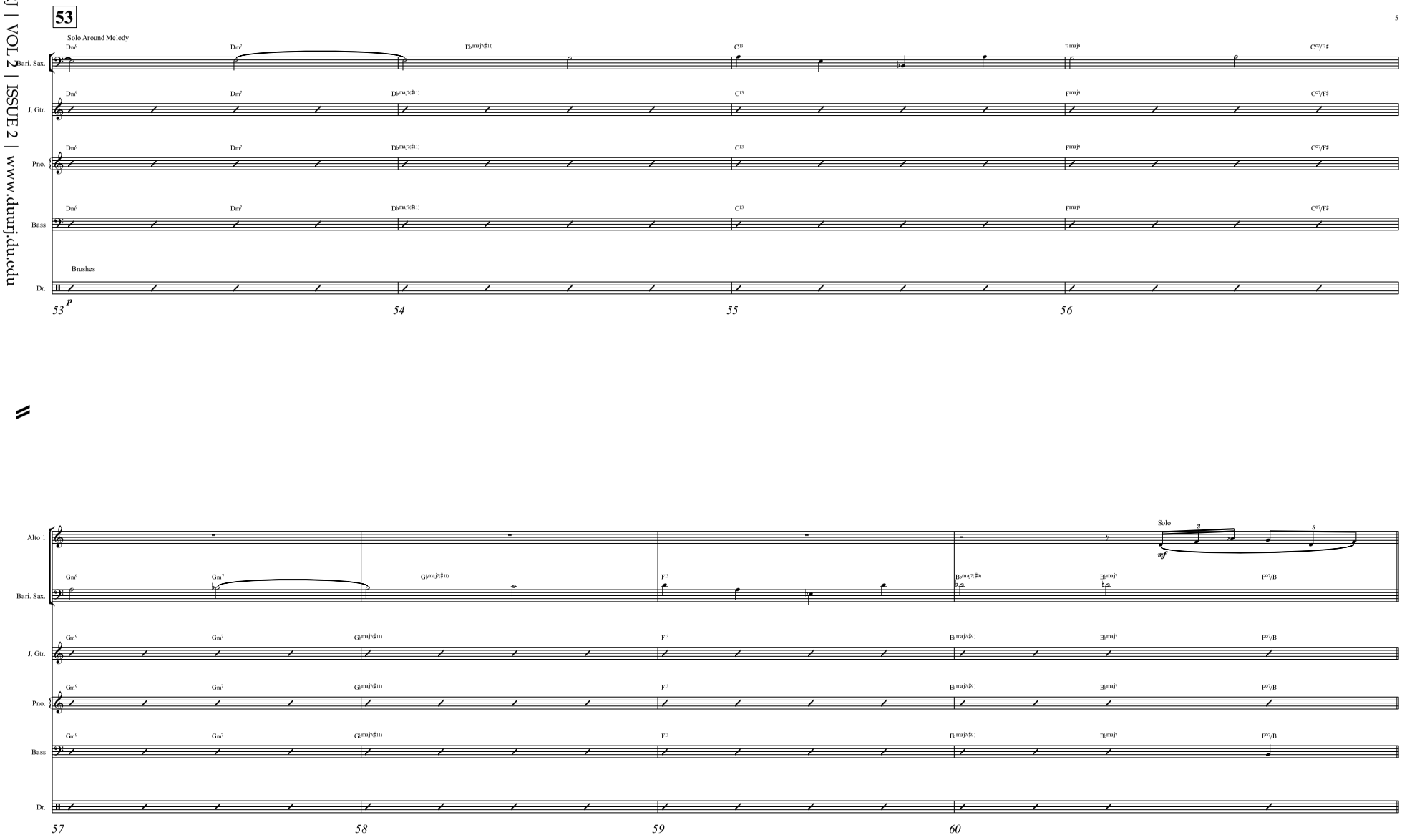
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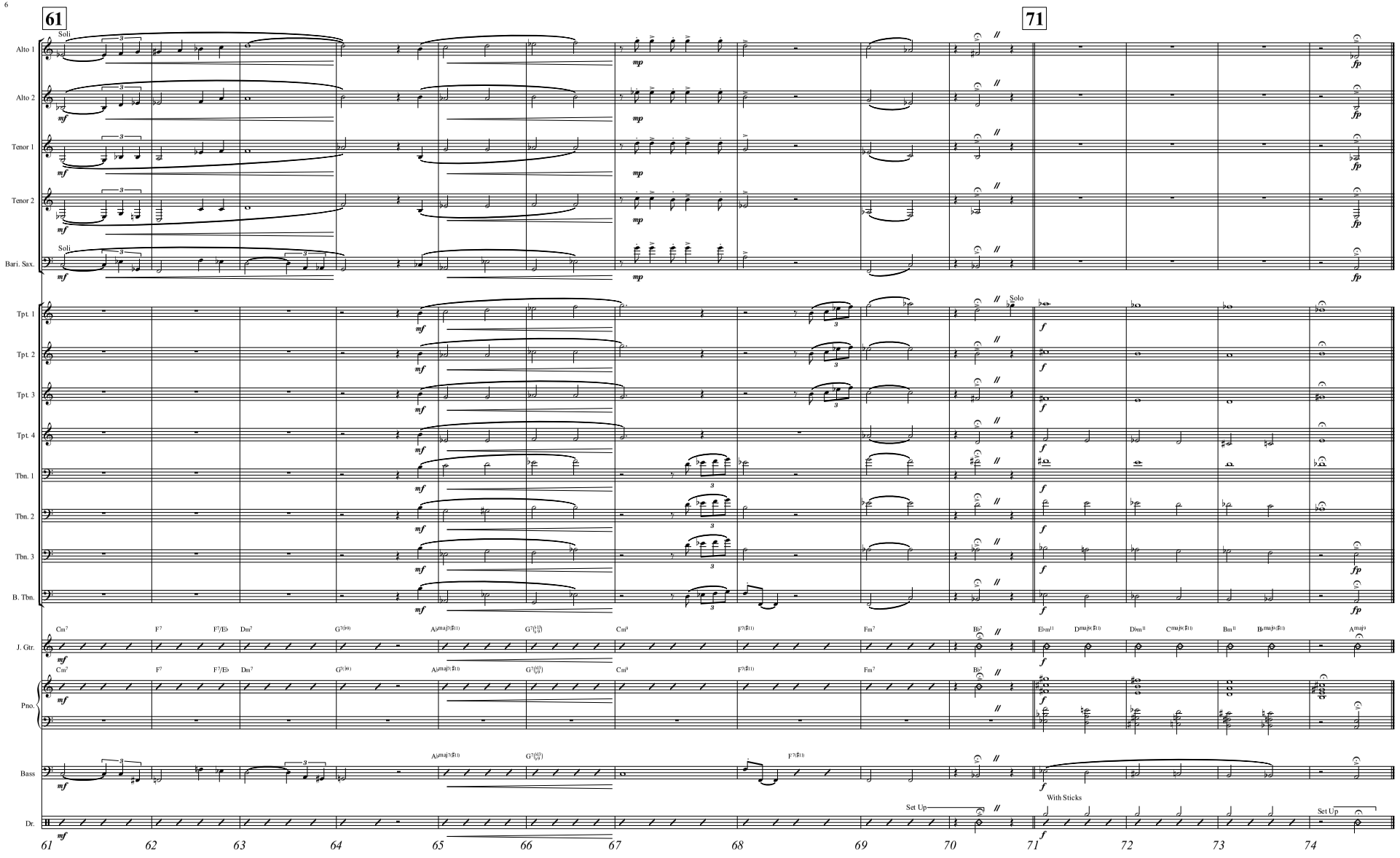
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