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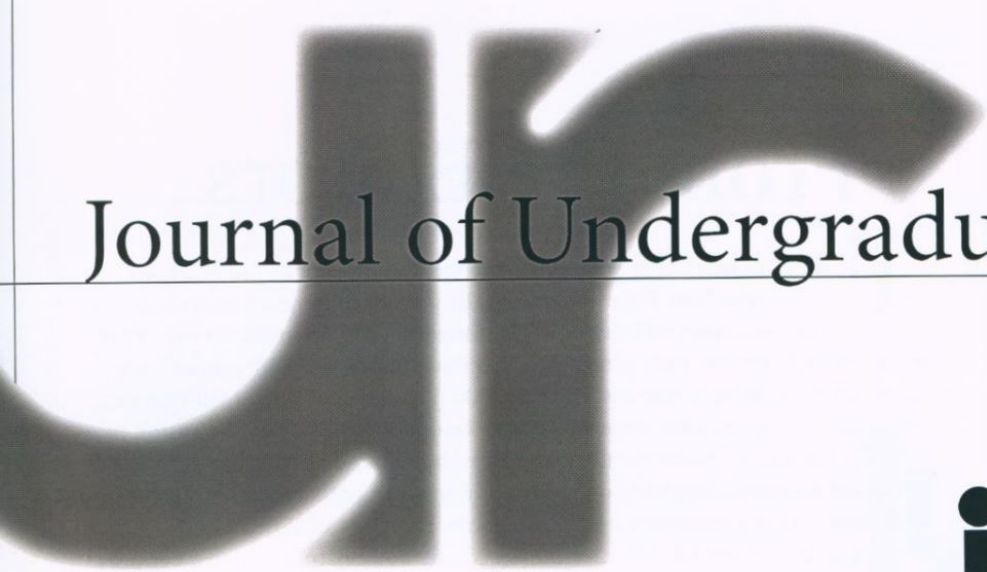
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# Journal of Undergraduate Research

**jur**

Volume Eleven  
Issue One, Fall 2012

## University of Rochester

The Journal of Undergraduate Research (jur) is dedicated to providing the student body with intellectual perspectives from various academic disciplines. jur serves as a forum for the presentation of original research thereby encouraging the pursuit of significant scholarly endeavors.



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# From the Editors

**F**all 2012 marks yet another milestone in the history of Journal of Undergraduate Research and in the state of undergraduate research at the University of Rochester. Although the journal organization has existed in its present form for only nine years, this issue marks our 10th anniversary since the publishing of our first issue in 2002 (available for download on our webpage). In the premier issue, our predecessors stated that their intention in creating the journal was to “foster a culture of research and academic exchange by reading about the accomplishments of our peers, and inspiring others to continue or begin their own.” As our interview in this issue with Professor of Physics and Office of Undergraduate Research Director Steven Manly demonstrates, such a culture at Rochester and research universities across the country is thriving and evolving beyond the orthodox confines of what constitutes ‘research.’

Looking back to the table of contents of that inaugural issue, it is clear that at one point in time (2002), the prevailing channel for undergraduate research existed in a laboratory setting. For the first time in an issue of our journal, none of our contributing articles were based on research conducted in a formal laboratory environment. Instead, our authors have eschewed a traditional laboratory of machines, chemical compounds, and computers for a laboratory of the mind. This semester features articles with findings in medieval literature, number theory, public health efforts in India, domestic politics, and African theology. Most significantly, these articles indicate that undergraduates are capable of making contributions to their respective field with only paper and pen (or word processor), a little help from their adviser(s), and analytical thinking. Though we hope that laboratory science continues to produce stellar undergraduate research going forward, the aforementioned phenomenon deserves special recognition, and we can only expect the quality of all future submissions to improve as a result.

We would like to take this opportunity to extend our sincerest thanks to all those who have worked to grow Journal of Undergraduate Research into what it is today a decade following its original circulation. This of course includes the Office of Undergraduate Research and the University of Rochester for its commitment to undergraduate research, but also all journal editorial and layout staff of past and present, faculty advisers, and referees, as well as our highly accomplished contributors and faithful readers. We hope that our efforts in this year's issues will continue to encourage future class years to share their research with our readership and the larger academic community.

Sincerely,  
Cameron LaPoint and Anil Taibjee

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# Journal of Undergraduate Research

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## About the Journal

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## Professor Interview

# Steve Manly, Ph.D.

## Professor of Physics



*jur:* Can you briefly describe your current research interests and any ongoing projects you might have?

*Manly:* I'm a particle physicist, so I study the nature of matter and the forces that are out there. Currently my primary area of research is in neutrino physics, and I'm involved in an experiment at Fermi National Acceleratory Laboratory outside Chicago as well as an experiment in Japan where we're studying the basic nature of neutrinos. Neutrinos are odd particles that seldom interact with matter, actually, but they turn out to be very important. Ultimately, one of the things we're looking for is whether or not neutrinos hold the key as to why the universe is matter instead of antimatter or a mixture of the two — as there is some reason to believe there may be a matter/anti-matter asymmetry that's buried in the neutrino sector. I dabble in some other projects but the study of neutrinos is my main thing these days.

*jur:* What has been your experience working with undergraduates in Physics research in the past?

*Manly:* It's usually a very good experience if I have the time to devote to it if I am working on a project where I have a post-doc or a grad student who's heavily involved. Undergraduates require a lot of work initially because you have to train them; they're every bit as bright as the post-docs or the graduate students and they may not have had as much coursework, but the kinds of things that you're doing often aren't taught in the classroom. So the problem is that there's always a learning curve and you have to get them started. That's a time-intensive thing. So when I'm doing something and I have time to devote to it in order to stay ahead of the student to make sure that the project is continuing well, or if I have a grad student or a post-doc that I can hand them off to so that all their technical questions get answered in a timely fashion — then it can work really well. Where I find I have problems is if I have to travel too much, and/or I don't have that supporting infrastructure. Then it's not a great experience. It is not generally a weakness in the student, but more that I didn't anticipate the volume of my travel for that period. With this in mind, I've learned is to not take on undergraduates when I'm traveling unless I have a grad student or a post-doc who can basically keep the project moving when I'm out of own.

*jur:* How has undergraduate research changed since you started

teaching at the University of Rochester?

*Manly:* In some ways it hasn't changed at all. It's always been a thing between the undergrad and the mentor or the group with which they are working. It's a personal thing. I think most of us in academics have always known that research is a great way to mentor, learn, and teach. We've been doing it, probably as long as we've been doing research. I did research in an NSF-supported REU program when I was an undergraduate (way back when), and it was a great learning experience. When I started as a faculty member, our research group commonly took on some undergraduates. We continue to do so. Part of it was they can help you with the work, but part of it is that it's just what we do — we're in the education business, and undergraduate research is one of the very best ways to teach and mentor future students who can then move on to other things, whether it's in your area or not. I've had some fabulous REU students — serious physics majors who are thinking about research careers — I've worked with some who have gone on to do software in industry or teaching at a high school; I've worked with some who have moved into particle or heavy ion physics; I had one who became a solid state theorist — even though he wasn't doing solid state theory with me. They move on to do different and exciting things. How has it really changed? I would say that the perception that undergraduate research is a worthwhile thing to do is perhaps more widely held and accepted now in the community and within the student body. I think a higher fraction of the students are realizing that this is an important thing for them to do. Also the administration seems to know more about it and care more about it. Generically, there seems to be much more buzz about it than in the past. I think that trend will continue because we have to make our case for survival — why should you pay the tuition to come here when you could sit at home and watch lectures online? The answer to that is that we're much more than just lectures being thrown at students. There's an intellectual community, and there's the opportunity to do research and interact with people, and that's a very valuable experience, so I think undergraduate research is one of the things that will set a brick and mortar research university like ours apart, even in a world where the information is freely available. We are about education and thinking. That goes way beyond the passive learning model people often have in mind when they consider a university.



*jur:* What are the most common mistakes students make in trying to start a research project or in seeking research opportunities?

*Manly:* I think in terms of seeking out research opportunities a common mistake that students make is failing to put themselves in the faculty member's shoes. Depending on your disciplinary area, you have to understand enough about how things operate in the discipline. It's usually a mistake to think of it as just a job that you need to do for experience — that's not really what it's about. Generally, faculty tend to be unabashed, talented nerds and they're passionate about the things that they do. So a student resonates much more with a faculty member when they come in excited to be learning about those things. What does not impress most faculty members is receiving an email that basically has the tone of "oh I'm looking for research this summer. Here's my CV." That just doesn't speak to us. I mean a professor might look at the email and perhaps the CV is a fit to something they want, but they really want to see more. Often they're more interested in students that are passionate. Perhaps the professor already knows them or the passion for learning comes out in an early meeting. The approach is better done getting to know the faculty member — asking to learn more about what they do before discussing the possibility of working with them. It's better to find out if it's interesting to you and ask questions. It's better if it's more of a shared passion. And that of course makes the job of finding a match much harder. I think one of the biggest mistakes is to look at it as if there ought to be just a simple job listing. We try to encourage faculty to create listings and we have a place to do that on the UR undergrad research website. That said, it seldom works that way.

*jur:* How does the University of Rochester compare in its commitment to undergraduate research and in the opportunities it provides to undergraduate students?

*Manly:* Well I think we are an ideal place for research and I think we are about as good as any Tier 1 research university that's out there. We are a small and a friendly place; we have a big medical center; and the faculty members are approachable. One of the things that has happened in the last few years is that the administration has put programs in place that have strengthened the undergraduate research enterprise at the University of Rochester. A prime example is the Research and Innovation Grant (RIG) program. As far as I know, it is unique. In this program, selected prospective students are offered \$3000-\$4500 grants to spend on research during their time at UR. The RIG program has grown in the last 5 or 6 years from about 30 students per year to about 100 to 150 students per year. I believe this program has increased the number of opportunities and the buzz about research on campus. The administration has been interested, in part, because they are thinking forward as to how to position us in the day and age when you can download lectures from anywhere at any give time. You want to be able to argue about the added value of the brick and mortar research university. I've already mentioned this, I think. We have the intellectual community as part of our added value. The experiential learning is also a big part of what we offer now and will offer in the future. That means undergraduate research among other things. We are on the threshold — I hope it happens this summer — of creating a new UR grant program for current students with the aim of increasing the opportunities for and quality of undergraduate research at the University of Rochester. The draft idea is to start with a pot of \$50,000 and use this money to support student research projects,

encourage faculty to work on research with an undergraduate, and so forth. The current idea is that the grants will be competitive and awarded on an ongoing basis through the year.

*jur:* What future role do you see for undergraduate research journals, such as JUR, in encouraging and showcasing undergraduate research?

*Manly:* I think that they have already played an important role in allowing students to showcase their research. This importance will only grow as we increase the opportunities for undergraduate research and as the experiential learning aspect, including undergraduate research, becomes more dominant in how we perceive ourselves as a learning institution. The experiential learning part of our product will be more of what we market in the future. Knowledge is becoming a more of a commodity. I think most of us in this business have never thought that giving lectures to a room of students is really the core of what we do. That's part of what we do. But it is the intellectual community and the research and the arguing and processing that happens outside of class—these are where most of the learning happens. In a sense, I don't think we are changing much of how we do things; but there are some subtle shifts in how we need to market ourselves. Some people outside of the University community often don't understand how we work — they sort of think of university as more of an extension of high school. People come and, well, you know, and we "profess" — we're professors right? We "profess"—we open heads and pour knowledge in. Most professors I know, and most students I know, realize that that's not really where much of the learning is done. Lecture can be fun, and professors can help things make sense, but students learn when they figure it out for themselves. A good college course has within it pieces where students can learn more experientially — so the workshop system in physics and chemistry and biology that we have here is aimed towards that. Some of the projects and papers and things that you write in the humanities are aimed toward that. I do believe, in the future, we will be marketing ourselves more in terms of the offering of amazing experiential learning opportunities. As this happens, the places where we can showcase it become more important. When I first took started as Director of Undergraduate Research at UR, I hadn't really thought much about this stuff before. I really didn't know what to think about the National Conference in Undergraduate Research (NCUR). I didn't really know what to think about JUR. I mean on some level they were always irrelevant to me because I wanted to publish my research in Physical Review Letters. That was my goal, and I was never, as an academic in particle physics, going to pick up a JUR or go look at a paper from NCUR. But now that I've gone to NCUR and I've spent some time looking at JUR, and I've worked with students who are doing these things, I realize they serve a wonderful purpose in providing students the opportunity to showcase great work. The students really do good work. They do nice presentations. They go through the whole process of cleaning things up and summarizing it for others. Going through that experience helps students figure where their interests lie and it provides a capstone for their time at UR. It's a nice way to bring closure to a project and a college career. At NCUR they're able to interact with many students from all over, and I think it's always nice to realize that you're not alone in this world. There's a big community of researchers and research opportunities out there. To summarize, as we put more emphasis on the experiential learning aspect of what we do as an educational institution, journals like JUR will play an increasingly



important role.

m a n l y



# The Rich and their “Culture War?”

## Debunking the Myths of Wealth and Ideological Differences in America

Bennet Skupp, 2013

Adviser: Richard Niemi, Ph.D., Department of Political Science

**S**cholars in modern America have debated a purported increase in political polarization. A large base of literature has developed supporting the validity of this “mass polarization theory.” The primary impetus for this increase in political polarization has been recognized as the emergence of salient social issues on the American political landscape. It has been argued that this “culture war,” if it exists, boils down to ideological differences between rich citizens. Similarly, it has been claimed that as American citizens become wealthier they become more polarized on social issues. In this study I begin to fully explore these claims regarding wealth and ideological differences. I argue that there is clear uncertainty as to whether the culture war is primarily based on ideological differences between rich citizens in partisan states. I also argue that as citizens become wealthier they don't appear to demonstrate more polarized social ideological positions.

Over the past half century, and, more specifically, over the past twenty years, political polarization has increased significantly in the United States (Abramowitz 2013, chap. 3; Gelman, Park, and Shor 2008, chap. 8; McCarty, Poole, and Rosenthal, 2006, chap. 3). While in the past party identification in America has been based on membership in certain social groups, party identification is now based largely on political ideology (Abramowitz 2013, 39). Democrats, most notably their active supporters and party elites, have shifted continuously to the ideological left. Republicans, most notably their active supporters and party elites, have shifted continuously to the ideological right. As such, political polarization has rapidly emerged within the modern, American political landscape. The emergence of salient social issues over the past four decades has been identified as the primary impetus for the present reality of political polarization (Abramowitz 2013, 68-74). Social issues, such as gay marriage and abortion rights, have formed the basis for what many have come to call the culture war that divides the American electorate.

It has been recognized that the political gap in America is greatest among those who actively participate in politics (Abramowitz 2013, 43-4). On this point, it has been found that rich Americans have significantly higher voter turnout rates than other Americans and are twice as likely to participate in activities outside of voting, such as working on a campaign or participating in a protest (Gelman et al. 2008, 143-4). Additionally, rich Americans make up a significant portion of the donor base for both parties (Gelman et al. 2008, 144). Connecting these

points on political participation and wealth, Gelman et al. (91-3) argue that the culture war boils down to differences among wealthy citizens. According to this theory, the distinct cultural differences that seem to appear between “Red” and “Blue” states are primarily due to differences in social ideology between rich citizens in these states. Gelman et al. come to these conclusions through an analysis of voting patterns. Yet, although party identification is now based largely on political ideology, using an analysis of voting patterns to make inferences regarding political ideology is a dangerous game. The authors themselves recognize that correlations between voting and political ideology are not high (Gelman et al. 2008, 127-8). A more intricate analysis needs to be performed to test whether social ideological differences are more pronounced among rich citizens.

Using an analysis of political ideology related to hot-button social issues, I will show that the culture war, if it truly exists, is not definitively more pronounced among the rich as compared to any other citizens. I will also show that, in opposition to the inferences made by Gelman et al., the American public does not appear more polarized on social issues as they become wealthier. These findings will aid our understanding of the ideological differences between rich Americans, who are more active in politics, and all other citizens. Based on my results, it appears uncertain as to whether the rich are more polarized than any other Americans.

### DOES THE “CULTURE WAR” ACTUALLY EXIST?

The existence of a culture war in itself has been extensively debated over the past decade. A primary illustration of this debate has been the work of Fiorina et al. (2011) and the response by Abramowitz (2013). Fiorina et al. (chap. 3) claim that there is no culture war in modern America and that the public is no more polarized today than it was three decades ago. They argue that contributing factors, such as the media and the “abnormality” of party activists, have aided to falsely indoctrinate the public that America is more polarized now more than ever (16-25). They introduce and support DiMaggio, Evans, and Bryson's (1996) finding that polarization has increased among self-classified partisans over the past three decades (61-3). In accordance with this theory, self-classified partisans such as party activists, political professionals, and elected officials have become more divided on issues and more politically polarized than their predecessors (66-7). Using an analysis of political and social attitudes and party thermometers, Fiorina et al. (61-2) argue that



although partisan polarization has increased over the past half century, polarization of the public has not. Even though they reject this “mass polarization theory,” Fiorina et al. (61-70) hypothesize that the American public has become better “sorted” into the parties in accordance with their ideological preferences. Liberals are now more likely to be Democrats while conservatives are now more likely to be Republicans, although the distribution of ideological beliefs within the public has not changed.

Unlike Fiorina et al., Abramowitz (2013, chap. 3) argues in favor of “mass polarization theory” and presents findings that directly conflict with the claims of Fiorina et al. According to Abramowitz (chap. 1), the American public, as a whole, has become significantly more polarized over the past half century. He argues that the phenomena of sorting and polarization have occurred concurrently over the past four decades (48). He argues that while sorting involves an increase in the distance between the mean locations of Democrats and Republicans on an ideology scale, polarization involves a change in shape of the distribution of the public on this ideology scale. This shape change would be a movement from a unimodal distribution, clustered near the middle or moderate ideology, to a bimodal distribution with two clusters, one close to the liberal and conservative ideologies, respectively. This change in shape would manifest as an increase in the standard deviation of the scale itself (45). Using a seven-point ideological identification scale from American National Election Study (ANES) surveys, Abramowitz (48) finds that both sorting and polarization have increased over the past four decades. Between 1978 and 2008 the gap between the average voter of the two parties increased by 127 percent and the standard deviation of the ideology scale increased by 24 percent. The correlation coefficient between the two is a strong 0.94. Although this correlation cannot prove that one causes the other, sorting and polarization have a strong relationship and have increased simultaneously over the past four decades. This finding comes into direct conflict with Fiorina et al.’s claim that, while sorting has increased, polarization has not.

In their argument against mass polarization theory and the reality of a culture war, Fiorina et al. (25-32) argue that what appears to be a polarized public and increased ideological division in America is simply a reflection of the polarized choices the parties are presenting to the public. They claim that a root cause of the illusion of a culture war is that the parties themselves, through the actions of party elites, have taken ownership of positions on salient issues (25-32). They argue that it has not been the public’s positions that have become polarized but the choices the public faces (26). Yet, Abramowitz (57) discounts their claim, reasoning that a polarized “stimulus” alone cannot produce a polarized response by the public. He argues that under Fiorina et al.’s theory, the 2004 presidential election, which presented the choice of two “polarized candidates,” George W. Bush and John Kerry, should have been met with a neutral response from the “centrist” public (57). Yet, the response to these choices was highly polarized. Using ANES feeling thermometer data, the 2004 presidential election had the largest percentage of voters expressing a “strong” preference for their candidate since the feeling thermometer scale was introduced in 1968 (57).<sup>1</sup> While it may seem, as Fiorina et al. present, that the large majority of the American public currently falls in the middle of the ideological spectrum while the parties themselves are on the fringes, Abramowitz (57-60) discounts this claim. Placing the Republican-leaning and Democratic-leaning respondents into the category of the party they lean towards, as opposed to the independent category, it becomes clear that Americans have been moving from more moderate ideological positions to more polarized positions over the past four decades (57-9). Over the past decade, the Democratic elector-

ate and the Republican electorate have both placed themselves and their party at the same average ideological position, discounting the claim that the parties are on the fringes while the electorate is at the center (60).

While the existence of a modern American culture war is still debated, Abramowitz makes a compelling case for its existence. While some may object to the term “culture war” as hyperbolic, based on the evidence presented by Abramowitz, mass polarization theory has grounding in reality. While the reality of mass polarization may suggest an ideological divide amongst all political issues, Abramowitz claims that salient social issues (such as gay marriage and abortion rights) are the principal sphere through which the American public is divided (68-74). While the primary objective of this paper is not to prove or disprove the reality of the culture war, the analysis presented here rests on its existence. The analysis I present rests on the existence of American “mass polarization” caused by the emergence of salient social issues. Based on the findings of Abramowitz, this does appear to be the case.

#### RICH CITIZENS, ACTIVE PARTICIPATION, AND POLARIZATION

Wealth has increasingly become an important cause of political cleavage in America. In the post-WWII era of the 1950s and 60s, partisanship, measured in terms of Republican versus Democratic voting, was not centered on the lines of wealth. Yet, in the twenty years since the 1992 presidential election, wealth has become a source of significant political cleavage, evidenced by the stratification of voting patterns among rich and poor voters (McCarty et al. 2006, 73-4). It has been found that the United States is one of the most polarized countries in the world in terms of voting differences between rich and poor citizens (Gelman et al. 2008, 102). In more concrete terms, since the establishment of valid survey data in the 1940s, it has been shown that Americans with high incomes have voted Republican more than Americans with low incomes (Dionne 2006, 191-8; Erikson and Tedin 2011, chap. 7; Fried 2008, chap. 1; Gelman et al. 2008, chap. 4; McCarty et al. 2006, chap. 3). This rich-poor voter dichotomy has become significantly more salient over the past two decades. Gelman et al. (chap. 5) develop a connection between increased political polarization and the stratification in voting patterns among rich and poor voters. Through their analysis of voting and income based on ANES data, they conclude that (1) voters in rich states (states with higher per capita income) tend to vote Democratic although within any state, rich voters (voters with high income) tend to vote Republican; (2) rich voters from Red states tend to vote Republican significantly more than rich voters from Blue states; and (3) these trends have developed to a significant extent over the past two decades (chap. 5).<sup>2</sup> This “rich state-rich voter dichotomy” characterizes the distinction between the generalized finding that rich citizens tend to vote Republican and Gelman et al.’s findings regarding income-voting patterns at the state level.

Moving from the analysis of state wealth and voter wealth, Gelman et al. (chap. 6.) make the case that the issue of religion has played an integral role in the polarization of the American political landscape. They describe how the correlation between religiosity and Republican voting, which has developed largely over the past two decades, has occurred simultaneously with a decrease in the religiosity of the American public (79-80).<sup>3</sup> Through their analysis of religiosity using ANES data related to religion and voting, they conclude that (1) Red states are, on average, more religious than Blue states; (2) the correlation between income and religiosity is positive in Red states but negative in Blue states; and (3) religious Americans are much more likely to vote Republican than non-religious Americans and this difference is much greater among rich voters (81-88).

Matching these findings with an understanding of the strong relationship



between religiosity and social ideology, Gelman et al. infer that social issues such as gay marriage and abortion rights are highly polarizing issues among the rich, specifically (91-3). They introduce the claim by Ronald Inglehart and other post-materialist scholars that social and cultural issues become more salient as one becomes wealthier (91). Accordingly, the culture war in modern America is primarily a reflection of social ideological differences between the rich in Red versus Blue states. Although Abramowitz (2013, 43-4) definitively finds that polarization has been increasing within the American public as a whole, he finds that polarization is sharpest among those who actively participate in politics. A high proportion of these active participants are rich citizens. Rich Americans have significantly higher voter turnout rates than other Americans and are twice as likely to participate in activities outside of voting, such as working on a campaign, participating in a protest, or contacting a public official (Gelman et al. 2008, 143-4). With few exceptions, those Americans that go past just active participation are almost always the rich. Rich Americans make up a significant portion of the donor base for both parties and constitute a large portion of both the Republican and Democratic party elites (Gelman et al. 2008, 144).

The findings of Abramowitz and Gelman et al. are consistent. Although mass polarization is present across the American electorate, the culture war in America is primarily a culture war among those who actively participate in politics. These active participants are rich citizens. Yet, a specific concern stemming from this analysis is that using perceived voting patterns to make inferences regarding political ideology is a potentially invalid practice. Gelman et al. (127-8) recognize that although party identification is now based largely on political ideology, correlations between voting and political ideology have historically not been high. In fact, all of the findings presented thus far have been derived primarily from an analysis of voting patterns. As the culture war principally stems from social ideological differences within the electorate, a more detailed analysis must be completed looking specifically at social ideologies, not voting patterns. Only through this analysis can the inferences made by Gelman et al. be validated.

#### HYPOTHESES

I will test two specific hypotheses to analyze the validity of the claims presented by Gelman et al. My first hypothesis relates to the claimed importance of rich citizens within the culture war. Instead of looking at perceived voting patterns, I will analyze social ideological differences between citizens. The first hypothesis is:

H1: The culture war in modern America is primarily based on ideological differences between rich citizens in Red versus Blue states.

The second hypothesis relates specifically to the claims presented by Gelman et al. regarding Ronald Inglehart and post-materialist thought and their connection to the supposed increase in polarization among the politically active rich. I will analyze the continuous effects of wealth in order to analyze the prominence of polarized social ideologies. The second hypothesis is:

H2: As American citizens become wealthier, they demonstrate more polarized, social ideological positions.

#### METHODS

To test the two hypotheses, I use a series of multiple linear regressions based on data from the 2008 ANES Time-Series Study.<sup>4</sup> To analyze social ideology among citizens, four specific dependent variables are chosen, reflecting salient social issues that pervade the modern, American political

landscape: Abortion Rights<sup>5</sup>, Gay Marriage<sup>6</sup>, Capital Punishment<sup>7</sup>, and Illegal Immigration.<sup>8</sup> Within each of the four dependent variables, a higher value is associated with a more liberal ideological position.

#### Testing Hypothesis 1

To test Hypothesis 1, for each given dependent variable, rich citizens in Blue states are compared to rich citizens in Red states and all other citizens in Blue states are compared to all other citizens in Red states.<sup>9</sup> I use the same income distinction used by Gelman et al. (198), which divides household income of the respondents by thirds.<sup>10</sup> All respondents in the top-third of household income are defined as rich citizens, all respondents in the middle-third of household income are defined as middle-income citizens, and all respondents in the bottom-third of household income are defined as poor citizens. The ANES data set variable V083248 divides respondents household income into twenty-five discrete variables ranging from 1 (household income less than \$2,999) to 25 (household income of \$150,000 or greater). The approximate top-third of household income is values 19-25, equating to household income of \$75,000 or greater. The approximate middle-third of household income is values 14-18, equating to household income between \$35,000 and \$74,999. The approximate bottom-third of household income is values 1-13, equating to household income between \$0 and \$34,999. To properly compare citizens in Blue states to citizens in Red states, a state dummy variable is used in which Red states are coded as 1 and Blue states are coded as 0. To properly compare rich citizens between the states and all other citizens between the states, an income dummy variable is used in which rich citizens are coded as 1 and middle-income and poor citizens ("all other citizens") are coded as 0.

For each dependent variable, I compare rich citizens in Blue states to rich citizens in Red states.<sup>11</sup> The independent variable of interest is the state dummy variable. The independent variables of Education<sup>12</sup>, Religiosity<sup>13</sup>, Age<sup>14</sup>, Gender<sup>15</sup>, Race<sup>16</sup>, and Latino Status<sup>17</sup> are included as controls. The coefficient to compare rich citizens in Blue states to rich citizens in Red states is found in Tables 1 through 4 as the value under the independent variable of "States (Red=1, Blue=0)" within the "Rich Citizens" column. For each dependent variable, I compare all other citizens in Blue states to all other citizens in Red states.<sup>18</sup> The independent variable of interest is the state dummy variable. The same independent variables of Education, Religiosity, Age, Gender, Race, and Latino Status are included as controls. The coefficient to compare all other citizens in Blue states to all other citizens in Red states is found in Tables 1 through 4 as the value under the independent variable of "States (Red=1, Blue=0)" within the "All Other Citizens" column.

#### Testing Hypothesis 2

To test Hypothesis 2, the income variable is not set as a categorical dummy variable, but as the discrete household income variable. For each dependent variable, the independent variable of interest is this income variable. The same independent variables of Education, Religiosity, Age, Gender, Race, and Latino Status are included as controls. To analyze social ideology within Red and Blue states, two regression analyses are completed for each dependent variable. In one of the analyses, only data for Blue states is included.<sup>19</sup> The coefficient of interest is the value under the independent variable of "Income" for each dependent variable in Table 5. In the other analysis, only data for Red states is included.<sup>20</sup> The coefficient of interest is the value under the independent variable of "Income" for each dependent variable in Table 6.

#### FINDINGS

The findings, based on these sets of multiple linear regression analyses,



**Table 1. Abortion Ideology Comparison Within Income Levels**

| Independent Variables  | Rich Citizens    | All Other Citizens |
|------------------------|------------------|--------------------|
|                        | Coefficient (se) | Coefficient (se)   |
| States (Red=1, Blue=0) | -.180 (.183)     | -.163 (.107)       |
| Education              | .220* (.058)     | .180* (.035)       |
| Religiosity            | -.117* (.051)    | -.168* (.027)      |
| Age                    | -.007 (.007)     | -.004 (.003)       |
| Gender                 | .144 (.181)      | .142 (.103)        |
| Race                   | .287 (.226)      | .233 (.124)        |
| Latino Status          | -.319 (.256)     | -.081 (.129)       |
| Constant               | 2.466* (.483)    | 2.754* (.243)      |
| Adj. R <sup>2</sup>    | .157             | .161               |
| N                      | 131              | 453                |

\*p<0.05

are inconclusive with regard to Hypothesis 1 and are inconsistent with Hypothesis 2.

**Hypothesis 1 - Findings**

The results regarding the analysis of Hypothesis 1 are presented in Tables 1 through 4. We will first look at the relationship between rich citizens in Blue states as compared to rich citizens in Red states. For the dependent variables of Abortion (Table 1) and Illegal Immigration (Table 4), the coefficients of the state dummy variables are not statistically significant. The coefficient under "Rich Citizens (Abortion)" is -.180. The relationship describes that rich citizens in Red states have an average ideological value that is .180 lower than that of rich citizens in Blue states. This lower average ideological value corresponds to a more conservative position, yet the coefficient is not statistically significant. The coefficient under "Rich Citizens (Illegal Immigration)" is -.143. The relationship describes that rich citizens in Red states have an average ideological value that is .143 lower than that of rich citizens in Blue states. This lower average ideological value corresponds to a more conservative position, yet, just as with the issue of abortion, the coefficient is not statistically significant. We cannot conclude that there is a relationship between the type of state a rich citizen hails from and their social ideology on these issues. As the coefficient of the state dummy variable is not statistically significant for the dependent variables of Abortion or Illegal Immigration, we cannot conclude that rich citizens in Red states are more conservative on these social issues than rich citizens in Blue states. Yet, for the dependent variables of Gay Marriage (Table 2) and Capital Punishment

(Table 3), the coefficients of the state dummy variables are statistically significant. The coefficient under "Rich Citizens (Gay Marriage)" is -.756. The relationship describes that rich citizens in Red states have an average ideological value that is .756 lower than that of rich citizens in Blue states. This lower average ideological value corresponds to a more conservative position, and the coefficient is statistically significant. The coefficient under "Rich Citizens (Capital Punishment)" is -.747. The relationship describes that rich citizens in Red states have an average ideological value that is .747 lower than that of rich citizens in Blue states. This lower average ideological value corresponds to a more conservative position, and, just as with the issue of gay marriage, the coefficient is statistically significant. We can conclude that there is a relationship between the type of state a rich citizen hails from and their social ideology on these issues. As the coefficient of the state dummy variable is statistically significant for the dependent variable of Gay Marriage and Capital Punishment, we can conclude that rich citizens in Red states are more conservative on these social issues than rich citizens in Blue states.

To fully evaluate if rich citizens are more polarized in terms of social ideology than all other citizens, we now turn to test the relationship between all other citizens in Blue states as compared to all other citizens in Red states. For the dependent variables of Abortion (Table 1) and Illegal Immigration (Table 4), the coefficients of the state dummy variables are not statistically significant. The coefficient under "All Other

**Table 2. Gay Marriage Ideology Comparison Within Income Levels**

| Independent Variables  | Rich Citizens    | All Other Citizens |
|------------------------|------------------|--------------------|
|                        | Coefficient (se) | Coefficient (se)   |
| States (Red=1, Blue=0) | -.756* (.181)    | -.259* (.107)      |
| Education              | .149* (.059)     | .120* (.036)       |
| Religiosity            | -.203* (.047)    | -.265* (.027)      |
| Age                    | -.022* (.007)    | -.020* (.003)      |
| Gender                 | .264 (.178)      | .282* (.103)       |
| Race                   | -.610* (.238)    | -.345* (.126)      |
| Latino Status          | .114 (.245)      | .217 (.126)        |
| Constant               | 4.437* (.473)    | 4.177* (.245)      |
| Adj. R <sup>2</sup>    | .202             | .199               |
| N                      | 291              | 986                |

\*p<0.05



**Table 3. Capital Punishment Ideology Comparison Within Income Levels**

| Independent Variables  | Rich Citizens    | All Other Citizens |
|------------------------|------------------|--------------------|
|                        | Coefficient (se) | Coefficient (se)   |
| States (Red=1, Blue=0) | -.747* (.194)    | -.385* (.116)      |
| Education              | .063 (.063)      | -.017 (.038)       |
| Religiosity            | .054 (.050)      | .050 (.029)        |
| Age                    | .005 (.007)      | -.007* (.003)      |
| Gender                 | .583* (.189)     | .313* (.111)       |
| Race                   | 1.116* (.253)    | .910* (.138)       |
| Latino Status          | .111 (.266)      | .402* (.136)       |
| Constant               | 1.630* (.500)    | 2.513* (.264)      |
| Adj. R <sup>2</sup>    | .131             | .070               |
| N                      | 278              | 959                |

\*p<0.05

Citizens (Abortion)" is -.163. The relationship describes that all other citizens in Red states have an average ideological value that is .163 lower than that of all other citizens in Blue states. This lower average ideological value corresponds to a more conservative position, yet the coefficient is not statistically significant. The coefficient under "All Other Citizens (Illegal Immigration)" is -.181. The relationship describes that all other citizens in Red states have an average ideological value that is .181 lower than that of all other citizens in Blue states. This lower average ideological value corresponds to a more conservative position, yet, just as with the issue of abortion, the coefficient is not statistically significant. We cannot conclude that there is a relationship between the type of state a poor or middle-income citizen hails from and their social ideology on these issues. As the coefficient of the state dummy variable is not statistically significant for the dependent variable of Abortion or Illegal Immigration, we cannot conclude that all other citizens in Red states are more conservative on these social issues than all other citizens in Blue states. Yet, for the dependent variables of Gay Marriage (Table 2) and Capital Punishment (Table 3), the coefficients of the state dummy variables are statistically significant. The coefficient under "Rich Citizens (Gay Marriage)" is -.259. The relationship describes that all other citizens in Red states have an average ideological value that is .259 lower than that of all other citizens in Blue states. This lower average ideological value corresponds to a more conservative position, and the coefficient is statistically significant. The coefficient under "Rich Citizens (Capital Punishment)" is -.385. The

relationship describes that all other citizens in Red states have an average ideological value that is .385 lower than that of all other citizens in Blue states. This lower average ideological value corresponds to a more conservative position, and, just as with the issue of gay marriage, the coefficient is statistically significant. We can conclude that there is a relationship between the type of state a poor or middle-income citizen hails from and their social ideology on these issues. As the coefficient of the state dummy variable is statistically significant for the dependent variable of Gay Marriage and Capital Punishment, we can conclude that all other citizens in Red states are more conservative on these social issues than all other citizens in Blue states.

When evaluating the social ideology of these issues, we find mixed results. For the issues of abortion rights (Table 1) and illegal immigration (Table 4), we cannot conclude that rich citizens in Red states are more conservative than rich citizens in Blue states or that all other citizens in Red states are more conservative than all other citizens in Blue states. On these two issues, the coefficients for both rich citizens and all other citizens lack statistical significance and are of quite similar magnitudes (-.180 and -.163 respectively for abortion, -.143 and -.181 respectively for illegal immigration). Yet, for the issues of gay marriage (Table 2) and capital punishment (Table 3), the results are more inconclusive.

**Table 4. Illegal Immigration Ideology Comparison Within Income Levels**

| Independent Variables  | Rich Citizens    | All Other Citizens |
|------------------------|------------------|--------------------|
|                        | Coefficient (se) | Coefficient (se)   |
| States (Red=1, Blue=0) | -.143 (.391)     | -.181 (.211)       |
| Education              | .532* (.132)     | .125* (.068)       |
| Religiosity            | -.124 (.096)     | .069 (.052)        |
| Age                    | -.009 (.016)     | -.008 (.006)       |
| Gender                 | .082 (.378)      | -.404* (.201)      |
| Race                   | .295 (.584)      | .054 (.244)        |
| Latino Status          | 1.531* (.523)    | 1.076* (.242)      |
| Constant               | 2.370* (1.018)   | 4.234* (.478)      |
| Adj. R <sup>2</sup>    | .104             | .053               |
| N                      | 145              | 519                |

\*p<0.05



While the coefficients are all statistically significant, the coefficients for rich citizens are of a higher magnitude than those for all other citizens (-.756 as compared to -.259 for gay marriage, -.747 as compared to -.385 for capital punishment). The relatively larger coefficients point to rich citizens being more ideologically polarized on these issues. Therefore, although we can conclude on these two issues both that rich citizens in Red states are more conservative than rich citizens in Blue states and that other citizens in Red states are more conservative than all other citizens in Blue states, the results appear to have consistency with the idea that rich citizens are more ideologically polarized.

Based on these findings, Hypothesis 1 is neither supported nor denied. Using this analysis of the issues of abortion rights, gay marriage, capital punishment, and illegal immigration, rich Americans appear to be more polarized than all other Americans on certain issues, and no more polarized than all other Americans on other pertinent issues. If a culture war does exist in America, it is inconclusive as to whether it is based on ideological differences between rich citizens in Red versus Blue states.

#### Hypothesis 2 - Findings

The results regarding the analysis of Hypothesis 2 are presented in Tables 5 and 6. We will first look at the relationship between income and social ideology in Blue states (Table 5).

The coefficients of the independent variable of Income for the dependent variables of Abortion (-.014), Gay Marriage (.027), Capital Punishment (-.017), and Illegal Immigration (-.023) are not statistically significant. As the coefficient of the independent variable of Income is not statistically significant for any of the dependent variables, we cannot conclude that there is a relationship between income and polarized social ideological positions on these issues in Blue states. We now turn to analyze the relationship between income and social ideology in Red states (Table 6). The coefficients of the independent variable of Income for the dependent variables of Abortion (-.020), Gay Marriage (.003), and Illegal Immigration (-.034) are not statistically significant. As the coefficient of the independent variable of Income is not statistically significant for any of the dependent variables, we cannot conclude that there is a relationship between income and polarized, social ideological positions on these issues in Red states. Yet, the coefficient of the independent variable of Income for the dependent variable of Capital Punishment (-.046) is statistically significant. The relationship describes that a one level increase on the discrete income scale is associated with a .046 value drop on the capital punishment ideological scale. This .046 value drop is a movement towards a more conservative position. As the coefficient of the independent variable of Income is statistically significant for the dependent variable of Capital Punishment, we can conclude that there is a relationship between income and polarized, social ideological positions on this issue in Red states.

Based on these findings, Hypothesis 2 does not hold. For three of the four social issues (abortion rights, gay marriage, and illegal immigration) we cannot conclude that there is a relationship between income and polarized ideological positions on these issues in either Red or Blue states. For only one of the social issues, capital punishment, we can conclude that there is a relationship between income and polarized, ideological positions on this issue. Yet, this relationship is only present in Red states, not Blue states. The large majority of the findings within this analysis are not consistent with Hypothesis 2. As American citizens become wealthier they don't appear to demonstrate more polarized social ideological positions.

When examining the culture war and mass polarization based on an analysis of social ideological differences, a clearer picture emerges. Regarding the claims made by Gelman et al., the culture war in modern America does not appear to be definitively based on ideological differences between rich citizens in Red versus Blue states. Similarly, based on my findings, as American citizens become wealthier they do not appear to demonstrate more polarized social ideological positions. If the culture war does exist, it appears uncertain as to whether the wealthy are leading the charge any more than other citizens.

Although my analysis is not meant to specifically examine whether the culture war in fact exists, my findings may have important implications for that question. I examine four social issues that both proponents and detractors agree would, at least partly, constitute the lines of the culture war, if it does exist. When looking at these issues, I find that for only two of them there are statistically significant ideological differences between Red and Blue states. Yet, these ideological differences have a degree of consistency for both rich citizens and other citizens between Red and Blue states. As my analysis is not definitive on the question of the culture war, or even fully robust on the hypotheses I test, a more detailed analysis is in order. The social issues examined could be widened to include issues such as gun rights, censorship, drug laws, and the like. Specifically regarding questions related to the role of rich Americans in the culture war, a different approach might be useful. There is the possibility that the "rich" citizens whom Gelman et al. describe in theory not be the group at the top third of the income distribution. The most polarized Americans may in fact be the "super rich" — citizens with incomes in the hundreds of thousands of dollars or greater.

In terms of future analysis, both proponents and detractors agree that if the modern American culture war does exist, it is fueled on the lines of social ideological differences. Therefore, as my findings show, an analysis of perceived voting patterns is not sufficient. We will only begin to develop definitive answers related to the culture war if we move to an analysis of social ideological differences with the public. If the culture war does exist, the cleavage stems from social ideological polarization.

#### Footnotes

<sup>1</sup>"Strong" preference is defined as the respondent rating their preferred candidate at least 50 feeling thermometer degrees higher than the opposing candidate.

Table 5. Effect of Demographic Characteristics on Social Issues, within Blue States

| Independent Variables | Abortion         | Gay Marriage     | Capital Punishment | Illegal Immigration |
|-----------------------|------------------|------------------|--------------------|---------------------|
|                       | Coefficient (se) | Coefficient (se) | Coefficient (se)   | Coefficient (se)    |
| Income                | -.014 (.018)     | .027 (.016)      | -.017 (.510)       | -.023 (.033)        |
| Education             | .205* (.063)     | .184* (.059)     | .169* (.067)       | .183 (.117)         |
| Religiosity           | -.195* (.050)    | -.211* (.045)    | -.015 (.052)       | -.076 (.089)        |
| Age                   | -.001 (.006)     | -.027* (.006)    | .000 (.007)        | -.005 (.011)        |
| Gender                | .073 (.193)      | .456* (.170)     | .361 (.194)        | -.326 (.334)        |
| Race                  | .492* (.240)     | -.266 (.215)     | 1.207* (.251)      | .213 (.435)         |
| Latino Status         | -.221 (.237)     | -.391 (.167)     | .633* (.253)       | 1.479* (.452)       |
| Constant              | 2.771* (.519)    | 3.708* (.453)    | 1.738* (.510)      | 4.350* (.889)       |
| Adj. R <sup>2</sup>   | .169             | .217             | .084               | .043                |
| N                     | 225              | 501              | 476                | 261                 |

\*p<0.05

#### CONCLUSION



**Table 6. Effect of Demographic Characteristics on Social Issues, within Red States**

| Independent Variables | Abortion         | Gay Marriage     | Capital Punishment | Illegal Immigration |
|-----------------------|------------------|------------------|--------------------|---------------------|
|                       | Coefficient (se) | Coefficient (se) | Coefficient (se)   | Coefficient (se)    |
| Income                | -.020 (.016)     | .003 (.015)      | -.046* (.015)      | -.034 (.028)        |
| Education             | .208* (.053)     | .109 (.056)      | -.038 (.057)       | -.344* (.111)       |
| Religiosity           | -.133* (.040)    | -.253* (.040)    | .129* (.040)       | .029 (.075)         |
| Age                   | -.007 (.005)     | -.020* (.005)    | -.001 (.005)       | -.001 (.010)        |
| Gender                | .089 (.149)      | .011 (.150)      | .261 (.152)        | -.140 (.289)        |
| Race                  | -.015 (.197)     | -.155 (.198)     | .695* (.202)       | .335 (.380)         |
| Latino Status         | -.264 (.176)     | .385* (.175)     | .306 (.177)        | 1.787* (.342)       |
| Constant              | 2.964* (.397)    | 3.895* (.385)    | 2.447* (.391)      | 3.083* (.754)       |
| Adj. R <sup>2</sup>   | .126             | .144             | .099               | .097                |
| N                     | 363              | 776              | 761                | 403                 |

\*p<0.05

<sup>2</sup> Gelman et al. define a Red state as any state where George W. Bush won more than 55% of the vote in both the 2000 and 2004 elections. They define a Blue state as any state where George W. Bush won less than 45% of the vote in both elections.

<sup>3</sup> Within Gelman et al.'s analysis religiosity is quantified by religious services attendance.

<sup>4</sup> The 2008 ANES Time Series Study was divided into two waves: pre-election interviews and post-election re-interviews. In total 2,323 pre-election interviews were completed and 2,102 post-election re-interviews were completed. The pre-election interviews were completed during the two months preceding Election Day (November 4, 2008), while the post-election re-interviews were completed in the two months following Election Day. The

population sampled was U.S. citizens aged 18 or older as of October 31, 2008. The interviews were conducted face-to-face using laptops and, in an attempt to avoid self-selection bias, respondents were not told that they were being interviewed for the "National Election Study". The interviewers offered cash incentives to boost response rates. The pre-election interviews averaged around 72 minutes in length, while post-election re-interviews averaged around 91 minutes. The variables I use in my analysis derive from questions that included a multiple choice or drop-down menu response design.

<sup>5</sup> The Abortion rights variable is coded using the V085086 variable from the post-election re-interviews. There are four valid codes: 1, 2, 3, and 4. These range from 1 ("By law abortion should never be permitted.") to 4 ("By law, a woman should always be able to obtain an abortion as a matter of personal choice.").

<sup>6</sup> The Gay Marriage variable is recoded using the V083214 variable from the pre-election interviews. There are three valid codes: 1, 3, and 5. These range from 1 (Gay marriage: "should not be allowed") to 5 (Gay marriage: "should be allowed").

<sup>7</sup> The Capital Punishment variable is coded using the V083163x variable from the pre-election interviews. There are four valid codes: 1, 2, 4, and 5. These range from 1 (Death penalty: "Favor strongly") to 5 (Death penalty: "Oppose strongly").

<sup>8</sup> The Illegal Immigration variable is recoded using the V083133x variable from the pre-election interviews. There are seven valid codes: 1, 2, 3, 4, 5, 6, and 7. These range from 1 (Illegal Immigrant citizenship process: "Oppose a great deal") to 7 (Illegal Immigrant citizenship process: "Favor a great deal").

<sup>9</sup> I employ Gelman et al.'s distinction between Blue and Red states. A Red state is coded as any state where George W. Bush won more than 55% of the vote in both the 2000 and 2004 elections. A Blue state is coded as any state where George W. Bush won less than 45% of the vote in both elections. All other states are coded as Battleground states.

<sup>10</sup> Similar to other studies, Gelman et al. use income as the chief indicator of wealth in America. I continue this trend in my analysis.

<sup>11</sup> A filter is used to include only data for rich citizens (filter set to income dummy variable = 1) and Red and Blue states (filter set to state classification = 'Red' or 'Blue').

<sup>12</sup> The educational attainment variable presented as "Education" is coded using the V083218x variable from the pre-election interviews. There are seven valid codes: 1, 2, 3, 4, 5, 6 and 7. These range from 1 (no high school diploma and highest grade of school completed between 0 and 8) to 7 (coded as attainment of an advanced degree, such as a Ph.D.).

<sup>13</sup> I measure religiosity by using variables of religious attendance, which Fiorina (2011, 139-43) claims to be the best measure of religiosity within the ANES. The Religiosity variable is recoded using the V083186 and V083186a variables from the pre-election interviews. There are six valid codes: 0, 1, 2, 3, 4, and 5. These range from 0 ("Never" attend religious services) to 5 (Attend religious services "every week").

<sup>14</sup> The Age variable is coded using the V081104 variable from the pre-election interviews. There are around seventy valid codes. These range from 17 (17 years of age) to 90 (90 years of age or older).

<sup>15</sup> The Gender variable is a dummy variable recoded using the V081101 variable from the pre-election interviews. There are two valid codes: 1 and 0. Females are coded as 1 and males are coded as 0.

<sup>16</sup> The Race variable is a dummy variable recoded using the V081102 variable from the pre-election interviews. There are two valid codes: 1 and 0. Black/African-American respondents are coded as 1 and all other races are coded as 0.

<sup>17</sup> The Latino Status variable is a dummy variable recoded using the V081103 variable from the pre-election interviews. There are two valid codes: 1 and 0. Latinos are coded as 1 and non-Latinos are coded as 0.

<sup>18</sup> A filter is used to include data only for all other citizens (filter set to income dummy variable = 0) and Red and Blue states (filter set to state classification = 'Red' or 'Blue').

<sup>19</sup> A filter is used to include data only for Blue states (filter set to state classification = 'Blue').

<sup>20</sup> A filter is used to include data only for Red states (filter set to state classification = 'Red').

References

Abramowitz, Alan I. 2013. *The Polarized Public? Why American Government is so Dysfunctional*. Upper Saddle River, NJ: Pearson.

Dionne Jr., E.J. 2006 "Polarized by God? American Politics and the Religious Divide." In *Red and Blue Nation?: Characteristics and Causes of America's Polarized Politics*, eds. David W. Brady and Pietro S. Nivola. Washington, D.C.: Brookings Institution.

Erikson, Robert S., and Kent L. Tedin. 2011. *American Public Opinion*. 8th ed. Boston: Longman.

Fiorina, Morris P., Samuel J. Abrams and Jeremy Pope. 2011. *Culture War?: The Myth of a Polarized America*. Boston: Longman.

Fried, Joseph. 2008. *Democrats and Republicans - Rhetoric and Reality: Comparing the Voters in Statistics and Anecdotes*. New York: Algora.

Gelman, Andrew, David Park, and Boris Shor. 2008. *Red State, Blue State, Rich State, Poor State: Why Americans Vote the Way They Do*. Princeton: Princeton University Press.

McCarty, Nolan, Keith T. Poole, and Howard Rosenthal. 2006. *Polarized America: The Dance of Ideology and Unequal Riches*. Cambridge, MA: MIT Press.

S k u p p





# Convergence and Generalization of a Recursion Equation for Primes

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There is no known "nice" function which produces the prime numbers. However, there are formulas from which, given the first few primes, one can obtain the remaining primes. In a paper by Keller [1], the following recursion equation is given:

$$p_{n+1} = \lim_{s \rightarrow +\infty} \left[ \sum_{j=1}^{2p_n-1} j^{-s} - \prod_{k=1}^n (1 - p_k^{-s})^{-1} \right]^{-1/s}$$

where  $p_1, p_2, \dots, p_n$  are the first  $n$  primes. This formula is proven using the Riemann zeta function. The primary result demonstrated in this paper is that a similar formula is true for Dirichlet L-functions. To state our result precisely, we need to define a Dirichlet character.

A Dirichlet character  $\chi: \mathbb{Z} \rightarrow \mathbb{C}$  is a multiplicative function that has an associated modulo, say  $k$ . The function is periodic with  $\chi(n) = \chi(n + mk)$  for any integer  $m$ , and  $\chi(n) = 0$  if and only if  $\gcd(n, k) > 1$ . An example of a Dirichlet character is given in Fig. 1.

Theorem 1: Let  $p_1, p_2, \dots, p_n$  be the first  $n$  prime numbers and let  $\chi$  be a Dirichlet character. Then:

$$p_{n+1} = \lim_{s \rightarrow +\infty} \left[ \sum_{j=1}^{2p_n-1} \frac{\chi(j)}{j^s} - \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s})^{-1} \right]^{-1/s} \quad (1)$$

Note that Keller's result is the case when  $\chi$  is the trivial character with  $\chi(n) = 1$  for all  $n$ . This suggests a comparison of the convergence of various  $\chi$  to see which converge to  $p_{n+1}$  faster. We do this in Section 4 by examining the error function:

$$D_n(s, \chi) := \left| p_{n+1} - \left[ \sum_{j=1}^{2p_n-1} j^{-s} - \prod_{k=1}^n (1 - p_k^{-s})^{-1} \right]^{-1/s} \right| - \left| p_{n+1} - \left[ \sum_{j=1}^{2p_n-1} \frac{\chi(j)}{j^s} - \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s})^{-1} \right]^{-1/s} \right|$$

Our numerical experiments indicate that certain  $\chi$  cause the formula to converge faster, while the trivial character converges faster than other  $\chi$ .

In Section 3 we observe the convergence of Keller's formula by studying the error function:

$$E_n(s) := \left| p_{n+1} - \left[ \sum_{j=1}^{2p_n-1} j^{-s} - \prod_{k=1}^n (1 - p_k^{-s})^{-1} \right]^{-1/s} \right|$$

and find that

$$-\log E_n(s) \approx as + b$$

for some  $a$  and  $b$ . A similar observation is made when we use a nontrivial  $\chi$  and examine  $E_n(s; \chi)$ .

Generalization of Keller's equation

In this section we will prove Theorem 1. First note that:

$$\prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s}) \cdot \sum_{j=1}^{\infty} \frac{\chi(j)}{j^s} = \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s}) \cdot \prod_{j=1}^{\infty} (1 - \frac{\chi(p_j)}{p_j^s})^{-1} = \prod_{j=n+1}^{\infty} (1 - \frac{\chi(p_j)}{p_j^s})^{-1} = \dots = \prod_{j=n+1}^{\infty} (1 + \frac{\chi(p_j)}{p_j^s} + \frac{\chi(p_j)^2}{p_j^{2s}} + \dots) \quad (2)$$

The final product in (2) is asymptotic to  $1 + \frac{\chi(p_{n+1})}{(p_{n+1})^s}$  as  $s \rightarrow \infty$ , since its expansion is the sum of  $1 + \frac{\chi(p_{n+1})}{(p_{n+1})^s}$  and a series of terms whose denominators are primes raised to powers that are increasing multiples of  $s$ . So we have:

$$\lim_{s \rightarrow \infty} \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s}) \cdot \sum_{j=1}^{\infty} \frac{\chi(j)}{j^s} = \lim_{s \rightarrow \infty} 1 + \frac{\chi(p_{n+1})}{(p_{n+1})^s}$$

which implies that:

$$p_{n+1}^{-s} \sim \left[ \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s}) \sum_{j=1}^{\infty} \frac{\chi(j)}{j^s} - 1 \right] [\chi(p_{n+1})]^{-1} \quad (3)$$

as  $s \rightarrow \infty$ . (Note that  $\chi(p_{n+1}) = 0$  if and only if  $p_{n+1}$  divides the modulo of  $\chi$ , so one can choose a modulo such that there is no division by zero.) Then, taking the  $-1/s$  power of (3), we obtain:

$$p_{n+1} = \lim_{s \rightarrow \infty} p_{n+1} = \lim_{s \rightarrow \infty} \left[ \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s}) \sum_{j=1}^{\infty} \frac{\chi(j)}{j^s} - 1 \right]^{-1/s} |\chi(p_{n+1})|^{1/s} \quad (4)$$

But  $|\chi(p_{n+1})|^{1/s} = (1)^{1/s} = 1$ , so (4) yields

$$p_{n+1} = \lim_{s \rightarrow \infty} \left[ \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s}) \sum_{j=1}^{\infty} \frac{\chi(j)}{j^s} - 1 \right]^{-1/s} \quad (5)$$

We can factor (5) to obtain:

$$\left[ \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s}) \sum_{j=1}^{\infty} \frac{\chi(j)}{j^s} - 1 \right]^{-1/s} = \left[ \sum_{j=1}^{\infty} \frac{\chi(j)}{j^s} - \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s})^{-1} \right]^{-1/s} \left[ \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s}) \right]^{-1/s} \quad (6)$$

and  $\left[ \prod_{k=1}^n (1 - \frac{\chi(p_k)}{p_k^s}) \right]^{-1/s}$  is asymptotic to 1 as  $s \rightarrow \infty$ . Then (6) implies:



$$p_{n+1} = \lim_{s \rightarrow \infty} \left[ \sum_{j=1}^{\infty} \frac{\chi(j)}{j^s} - \prod_{k=1}^n \left(1 - \frac{\chi(p_k)}{p_k^s}\right)^{-1} \right]^{-1/s} \quad (7)$$

The sum in (7) can be made finite to obtain Theorem 1. Consider:

$$\sum_{j=1}^{2p_n-1} \frac{\chi(j)}{j^s} - \prod_{k=1}^n \left(1 - \frac{\chi(p_k)}{p_k^s}\right)^{-1} = \dots \quad (8)$$

$$= \sum_{j=1}^{2p_n-1} \frac{\chi(j)}{j^s} - \prod_{k=1}^n \left(1 + \frac{\chi(p_k)}{p_k^s} + \frac{\chi(p_k^2)}{p_k^{2s}} + \frac{\chi(p_k^3)}{p_k^{3s}} + \dots\right) \quad (9)$$

$$= \sum_{\substack{j>1 \\ p_i | j}}^{2p_n-1} \frac{\chi(j)}{j^s} - \sum_M \frac{c_M}{M^s} \quad (10)$$

for  $i = 1, 2, \dots, n$ , where each  $M$  is a multiple of some  $p_i$  with  $M \geq 2p_n$  and  $c_M = \dots$ . In the final difference (10), the smallest term of the first sum is  $\frac{\chi(2)}{2^{2p_n}}$ , and the smallest term of the second sum is  $\frac{\chi(2)}{(2p_n)^s}$ . Since  $2p_n < 2p_n$ , the difference will converge to  $\frac{\chi(2)}{2^{2p_n}}$  as  $s \rightarrow \infty$ , and Theorem 1 follows.

$$p_{n+1} = \lim_{s \rightarrow +\infty} \left[ \sum_{j=1}^{2p_n-1} j^{-s} - \prod_{k=1}^n (1 - p_k^{-s})^{-1} \right]^{-1/s}$$

where  $p_1, p_2, \dots, p_n$  are the first  $n$  prime numbers. A natural question that arises from this formula is how quickly does it converge? For a given  $s$  and a given  $n$ , consider the error value:

$$E_n(s) := \left| p_{n+1} - \left[ \sum_{j=1}^{2p_n-1} j^{-s} - \prod_{k=1}^n (1 - p_k^{-s})^{-1} \right]^{-1/s} \right|$$

Keller's result says that  $E_n(s) \sim 0$  as  $s \rightarrow \infty$ . The error values decrease at a highly regular rate, exhibiting a negative exponential pattern. Plotting  $-\log(E_n(s))$ , with  $\log$  denoting the natural logarithm, for  $20 \leq s \leq 500$ , we obtain a series of points that appear to be arranged linearly (see Fig. 2). The slope of the best-fit line of these points was approximately .2, indicating that each successive  $s$  yields an estimate roughly 20% closer to the actual prime than the previous  $s$ . Thus for each fixed  $n$ , it seems that,  $-\log E_n(s) \approx as + b$

for some constants  $a$  and  $b$  which depend on  $n$ . In later work, we expect to determine the constants  $a$  and  $b$ .

The linear model was not perfect. There were some anomalies for  $s < 20$  that seem to be the result of taking the negative logarithm of a large error value. Additionally, data was only collected for  $1 \leq s \leq 500$ , as larger  $s$  took too long to compute. There was no indication that  $s > 500$  would produce different results.

The pattern appeared for  $n = 2, 3, \dots, 20$ . For each such  $n$  and  $s \in \mathbb{Z}$ ,  $1 \leq s \leq 150$ ,  $-\log E_n(s)$  had a correlation coefficient greater than .99. When the slopes of the best fit lines were plotted, they formed a vaguely negative exponential band (see Fig. 3). This indicates that, for larger primes, each successive  $s$ -value improves the accuracy of the Keller limit less than each successive  $s$ -value does for smaller primes. This is somewhat expected; however, there is some oscillation within the band, so this does not hold absolutely.

The same linearity was found when we took the negative logarithm of:

$$E_n(s; \chi) := \left| p_{n+1} - \left[ \sum_{j=1}^{2p_n-1} \frac{\chi(j)}{j^s} - \prod_{k=1}^n \left(1 - \frac{\chi(p_k)}{p_k^s}\right)^{-1} \right]^{-1/s} \right|,$$

the error values for the new version of the equation. It should be noted that there were some disturbances in the linearity for  $s > 300$  for certain  $x$ , probably arising from the inability of the program to efficiently compute complex absolute values and  $s^{\text{th}}$ -roots for large  $s$ .

#### COMPARING CONVERGENCE OF THE TWO EQUATIONS

It is also natural to study the convergence of the different forms of the equations. We examined the error differences, where:

$$D_n(s, \chi) := \left| p_{n+1} - \left[ \sum_{j=1}^{2p_n-1} j^{-s} - \prod_{k=1}^n (1 - p_k^{-s})^{-1} \right]^{-1/s} \right| - \left| p_{n+1} - \left[ \sum_{j=1}^{2p_n-1} \frac{\chi(j)}{j^s} - \prod_{k=1}^n \left(1 - \frac{\chi(p_k)}{p_k^s}\right)^{-1} \right]^{-1/s} \right|$$

Fixing  $s = 50$  (somewhat arbitrarily - large enough to produce accurate results but small enough for fast computations), we evaluated  $D_n(s, x)$  for  $n = 3, 4, 5, 6, 7, 8$  and for all  $x$  modulo 4, 5, or 8 and those  $x$  modulo 9 with complex values (see Fig. 4). All error differences were very small, indicating that both equations converge similarly. The error differences were both positive and negative, so neither equation consistently converges faster. Some  $x$  yielded the same error differences as other  $x$ . In most cases, this was the result of each such  $x$  being equivalent. There were some  $x$ , such as  $x_2$  and  $x_4$  modulo 5, that were different functions, but yielded the same error differences. However, their outputs had the same complex absolute value, which would explain why the difference errors were the same. With modulo 4, 5, and 8, the  $D_3(50, x)$  were equal for each  $x$ , and  $D_3(50, x)$  were half that value for each  $x$  tested with modulo 9. It is unclear why this occurred.

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#### REFERENCES

- [1] Keller, Joseph B. "A recursion equation for prime numbers." arXiv: 0711.3940v2. 5 October 2008.

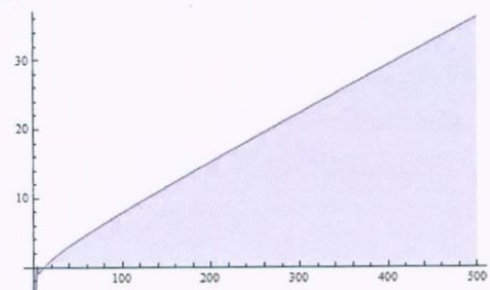
#### FIGURES

Figure 1:

| $\chi(n)$   | 0 | 1 | 2    | 3    | 4  |
|-------------|---|---|------|------|----|
| $\chi_1(n)$ | 0 | 1 | 1    | 1    | 1  |
| $\chi_2(n)$ | 0 | 1 | $i$  | $-i$ | -1 |
| $\chi_3(n)$ | 0 | 1 | -1   | -1   | 1  |
| $\chi_4(n)$ | 0 | 1 | $-i$ | $i$  | -1 |

The Dirichlet characters modulo

Figure 2:



Plotting  $-\log(E_n(s))$  with  $n$  along the horizontal axis



Figure 3:

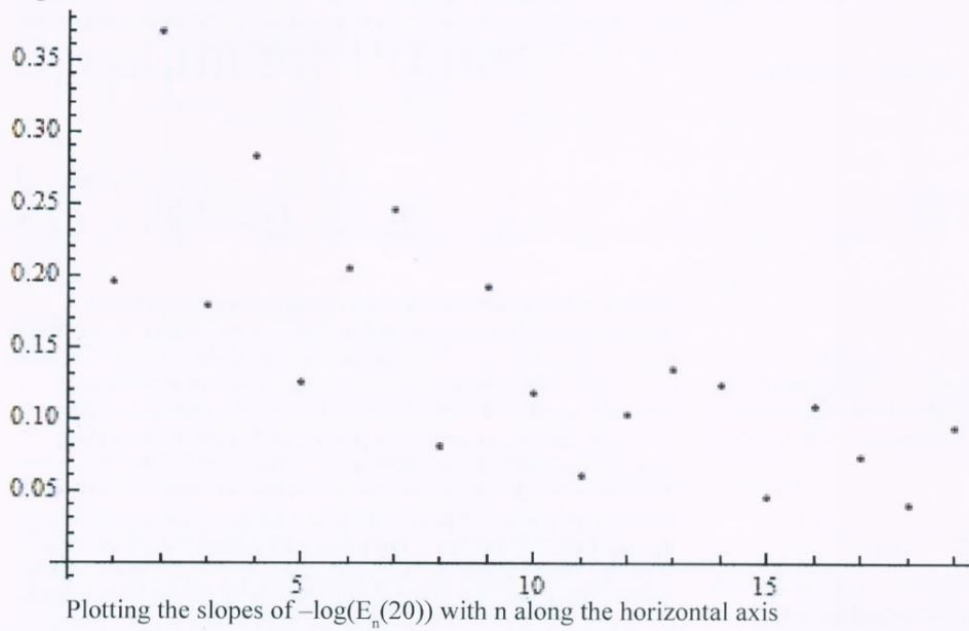


Figure 4:

| Prime:                  | 3rd                   | 4th          | 5th                                    | 6th                   | 7th                    | 8th                   |
|-------------------------|-----------------------|--------------|--|-----------------------|------------------------|-----------------------|
| $\chi_1 \text{ mod } 4$ | $2.518 \cdot 10^{-9}$ | -0.000001277 | -9.921E-13                             | -2.063E-10            | -9.287E-14             | -6.239E-12            |
| $\chi_2 \text{ mod } 4$ | $2.518 \cdot 10^{-9}$ | -0.00000137  | $2.988 \cdot 10^{-9}$                  | -0.000005125          | $4.994 \cdot 10^{-10}$ | $3.034 \cdot 10^{-7}$ |
| $\chi_1 \text{ mod } 5$ | $2.518 \cdot 10^{-9}$ | -4.049E-08   | -1.641E-15                             | -1.641E-15            | -2.063E-14             | -4.44E-13             |
| $\chi_2 \text{ mod } 5$ | $2.518 \cdot 10^{-9}$ | 0.00004926   | $0.00004926 \cdot 1.494 \cdot 10^{-9}$ | 0.001302              | 0.00002698             | $4.410 \cdot 10^{-6}$ |
| $\chi_3 \text{ mod } 5$ | $2.518 \cdot 10^{-9}$ | -0.000002607 | $2.989 \cdot 10^{-9}$                  | -0.000004939          | -1.437E-09             | -1.15E-11             |
| $\chi_4 \text{ mod } 5$ | $2.518 \cdot 10^{-9}$ | 0.00004926   | $1.494 \cdot 10^{-9}$                  | 0.001302              | 0.00002698             | $4.410 \cdot 10^{-6}$ |
| $\chi_1 \text{ mod } 8$ | $2.518 \cdot 10^{-9}$ | -0.000001277 | -9.921E-13                             | -2.063E-10            | -9.287E-14             | -6.239E-12            |
| $\chi_2 \text{ mod } 8$ | $2.518 \cdot 10^{-9}$ | -0.000001289 | -1.59E-12                              | $1.847 \cdot 10^{-7}$ | -1.954E-09             | -6.239E-12            |
| $\chi_3 \text{ mod } 8$ | $2.518 \cdot 10^{-9}$ | -0.00000137  | $2.988 \cdot 10^{-9}$                  | -0.000005125          | $4.994 \cdot 10^{-10}$ | $3.034 \cdot 10^{-7}$ |
| $\chi_4 \text{ mod } 8$ | $2.518 \cdot 10^{-9}$ | -0.000001358 | $2.987 \cdot 10^{-9}$                  | -0.000004939          | -1.455E-09             | $3.034 \cdot 10^{-7}$ |
| $\chi_2 \text{ mod } 9$ | $1.259 \cdot 10^{-9}$ | 0.00002397   | $1.966 \cdot 10^{-7}$                  | $0 \cdot 10^{-5}$     | $0 \cdot 10^{-3}$      |                       |
| $\chi_3 \text{ mod } 9$ | $1.259 \cdot 10^{-9}$ | 0.00002525   | $1.951 \cdot 10^{-7}$                  | $0 \cdot 10^{-5}$     | 0.00001349             | $2.433 \cdot 10^{-6}$ |
| $\chi_5 \text{ mod } 9$ | $1.259 \cdot 10^{-9}$ | 0.00002525   | $1.951 \cdot 10^{-7}$                  | $0 \cdot 10^{-5}$     | 0.00001349             | $2.433 \cdot 10^{-6}$ |
| $\chi_6 \text{ mod } 9$ | $1.259 \cdot 10^{-9}$ | 0.00002397   | $1.966 \cdot 10^{-7}$                  | $0 \cdot 10^{-5}$     | $0 \cdot 10^{-3}$      |                       |

$E_n(50, \chi)$  for  $n = 3, 4, 5, 6, 7, 8$  and  $\chi$  with modulo 4, 5, 8, and 9





# Water Contamination in the Soliga Tribe

Balaji Jagdish, 2015

The Biligiriranga Betta (Betta meaning "hills" in Kannada) refers to the hill range that is located in the southeastern Indian states of Karnataka and northern Tamil Nadu. The hill range, which links the Eastern and Western Ghats, serves as a major passageway for various animal migrations, especially those of elephants and tigers. In addition to this diversity, B.R. Hills is home to 2,400 inhabitants, of which 75.83% of these individuals (1,820 people) belong to the Soliga tribe, and the remaining 24.16% (580 people) to the non-tribal sector of the hill range. Twelve villages compose the B.R. Hills, which are scattered throughout the hill range. They are V.G.K.K (Vivekananda Girijana Kalyana Kendra), Yerakanagadde Colony, Yerakanagadde Podu, Sigebetta, Purani Podu, Kalyani Podu, Manjigundi Podu, B.R. Hills Podu, Bangale Podu, Hosa Podu, Muthugadde Podu and Muthugadde Colony.<sup>1</sup> Consequently, variances in demographics exist between villages as seen in Figure 1.

Despite the size and location of each individual village, all twelve villages, with the exception of Purani Podu, Kalyani Podu and Manjigundi Podu, implement the same method of obtaining water. Each of the twelve villages is equipped with bore wells, from which the village receives its water supply. However, with the exception of the three villages mentioned above, all villages have created a water system in which the water from the bore wells are used to fill the village's several water tanks. In these nine villages where such water transportation occurs, a motor is used to pump water out of the bore well and then is transferred through a system of underground steel pipes (Figure 2) to be emptied into the village's water tanks. These tanks, which can be seen in Figure 3, fill to a

maximum capacity of 10,000L. The tanks, which are continuously filled, are connected to a tap line in which village residents can then gain access to the water. In addition to these tanks, all twelve villages are equipped with closed bore well pumps (Figure 4), via which residents can pump natural unfiltered water from the Earth's underground. Yet, in Purani Podu, Kalyani Podu and Manjigundi Podu, only these types of bore wells are available for resident usage, as the terrain makes it difficult for the establishment of water tanks in the village. Hence, due to the simplicity in which water is obtained from all twelve villages, there is a lack of water sanitation since no filter system is used.

It is for such reasons that various sanitation efforts are made to purify the water that residents receive. For instance, under the management of Karuna Trust, assistant health officials are sent weekly to those villages with water tanks for chlorination of the tanks. This process is often achieved with bleaching powder such as that in Figure 5. This chlorination process disinfects and maintains the purity of the water for approximately one week – by the end of the week the process must be repeated and the 10,000L tank refilled.<sup>2</sup> Chlorination is also employed to sanitize the water obtained from closed bore wells that require extraction of water via hand pump and open bore wells in which the traditional bucket-pulley system is used to draw water. However, sanitation of both types of bore wells occurs only once every three months (with January being the first month of the cycle), unless a positive result is obtained in the weekly laboratory examination of the bacterial content of the water; in such a case, the bore well is immediately chlorinated. Despite efforts taken to purify the water directly obtained from both water tanks and bore wells, residents of all twelve villages still manage to obtain water-borne diseases due to water contamination caused by unhygienic living conditions.

In all twelve villages, there is a lack of basic hygiene, as littering and public defecation of both residents and cattle is rampant (Figure 6). For this reason, contamination of all twelve villages' water supply is common, because rainwater that often fills open bore wells first passes through debris and fecal matter before filling into these wells. This unhygienic environment also contributes to the contamination of closed bore wells, as the rainwater that the Earth's soil absorbs has also passed through pollutants and fecal matter. Furthermore, the contamination of the water supply occurs due to pipeline ruptures in which leaking water is allowed to pass through the same pollution before being absorbed by the soil or directly filling into an open bore well. Finally, because the source of water supply for village water tanks is closed bore wells, this contamination of water also indirectly affects the purity of the water found in water tanks. This contamination of water makes it inevitable that all twelve villages' water supply will be affected and that the people will suffer from water-borne diseases such as viral Hepatitis A, Hepatitis E, Poliomyelitis, infant rotavirus diarrhea, typhoid and paratyphoid fever, bacillary dysentery, E. Coli diarrhea, cholera, amoebiasis, giardiasis, roundworm infections, hydatid disease and Well's disease.<sup>2</sup>

| Name of Village      | Number of Houses | Number of Males | Number of Females | Total Population |
|----------------------|------------------|-----------------|-------------------|------------------|
| V.G.K.K              | 50               | 68              | 44                | 112              |
| Yerakanagadde Colony | 68               | 140             | 161               | 301              |
| Yerakanagadde Podu   | 31               | 62              | 62                | 124              |
| Sigebetta            | 26               | 43              | 60                | 103              |
| Purani Podu          | 74               | 183             | 170               | 353              |
| Kalyani Podu         | 11               | 28              | 30                | 58               |
| Manjigundi Podu      | 14               | 31              | 38                | 69               |
| B.R. Hills           | 125              | 254             | 291               | 545              |
| Bangale Podu         | 65               | 111             | 123               | 234              |
| Hosa Podu            | 62               | 118             | 137               | 255              |
| Muthugadde Colony    | 57               | 107             | 97                | 204              |
| Muthugadde Podu      | 13               | 22              | 20                | 42               |
| Total                | 596              | 1167            | 1233              | 2400             |

Figure 1: Data taken from the 2010-2011 Vivekananda Girijana Kalyana Kendra Census

\* These demographics account for children, infants and adults that were known to be living in each particular village during the 2010-2011 year. However, these data do not account for any unborn infants of pregnant women.





Figure 2: Underground pipes with motor that draws water from bore well



Figure 5: Bleaching powder



Figure 3: Water tank with 10,000 liter capacity



Figure 4: Closed bore well with hand pump



Figure 6: a. Picture of a clogged street gutter  
b. Picture of the rampant loitering and public defecation that lay on the side of the roads



It is this particular phenomenon of water contamination in B.R. Hills to which this observational study focuses its attention. This study examines the idea of whether an increase in water-borne diseases in patients is present during the monsoon season (which begins in May) when rainfall in B.R. Hills occurs at a higher rate. This study focuses on only two water-borne illnesses that village residents tend to commonly contract from water contamination in the B.R. Hills: diarrhea and gastritis. In this study, diarrhea not only refers to watery stools, which a patient has produced at least three to four times in one day, but also includes dysentery, in which these loose stools might have also been accompanied with mucous and/or blood. Gastritis in this study refers to patients who have inflammation of the stomach lining accompanied with burning sensations and discomfort due to the infection of the bacterium *Helicobacter pylori*. Patients of all ages were included in this study, with the youngest patient being 6 months old and the oldest patient being 80 years old. The study examines diarrhea and gastritis rates both before and at the end of the monsoon season, or from the months of March (before monsoon season) to August (end of the monsoon season) from 2008 to 2011. However, for 2012 this study only examines diarrhea and gastritis rates amongst the B.R. Hill population from March to June, as the July and August data were not yet completed during the course of the study. The data collected during these five years were taken from the O.P.D. (outpatient diary) at the Vivekananda Tribal Health Center; they include the complaint of each patient that visited the health care center each month in addition to name, age and village. For each month listed above, the number of patients with complaints of diarrhea and/or gastritis was tallied separately. Patients with complaints of both diarrhea and gastritis were counted twice—once for each group (diarrhea and gastritis)—but were only counted once for the monthly total number of patients. The O.P.D. includes residents from all twelve villages, both tribal and non-tribal members. The data from the five-year span are presented below in Figures 7, 8, 9, 10 and 11, which display the number of patients with diarrhea, number of patients with gastritis, total number of patients, percentage of patients with diarrhea, and percentage of patients with gastritis from March to August during a particular year, respectively.

Year: 2008

| Month  | Number of Patients with Diarrhea | Number of Patients with Gastritis | Total Number of Patients | Percentage of Patients with Diarrhea | Percentage of Patients with Gastritis |
|--------|----------------------------------|-----------------------------------|--------------------------|--------------------------------------|---------------------------------------|
| March  | 11                               | 16                                | 454                      | 2.42%                                | 3.52%                                 |
| April  | 14                               | 18                                | 461                      | 3.04%                                | 3.90%                                 |
| May    | 15                               | 24                                | 389                      | 3.86%                                | 6.17%                                 |
| June   | 7                                | 9                                 | 308                      | 2.27%                                | 2.92%                                 |
| July   | 5                                | 4                                 | 280                      | 1.79%                                | 1.43%                                 |
| August | 2                                | 14                                | 572                      | 0.35%                                | 2.45%                                 |

Figure 7a: A table showing the number and percentage of patients with both illnesses for the six-month period in 2008.

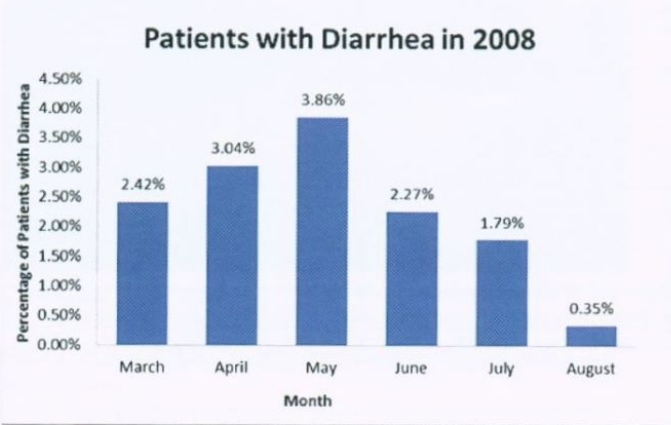


Figure 7b: A bar graph showing the percentage of patients with diarrhea for the six-month period in 2008

### Patients with Gastritis in 2008



Figure 7c: A bar graph showing the percentage of patients with gastritis for the six-month period in 2008.

Year: 2009

| Month  | Number of Patients with Diarrhea | Number of Patients with Gastritis | Total Number of Patients | Percentage of Patients with Diarrhea | Percentage of Patients with Gastritis |
|--------|----------------------------------|-----------------------------------|--------------------------|--------------------------------------|---------------------------------------|
| March  | 25                               | 15                                | 540                      | 4.63%                                | 2.78%                                 |
| April  | 30                               | 20                                | 625                      | 4.8%                                 | 3.2%                                  |
| May    | 67                               | 67                                | 1249                     | 5.36%                                | 5.36%                                 |
| June   | 104                              | 56                                | 1726                     | 6.03%                                | 3.24%                                 |
| July   | 51                               | 45                                | 1422                     | 3.59%                                | 3.16%                                 |
| August | 22                               | 33                                | 1324                     | 1.66%                                | 2.49%                                 |

Figure 8a: A table showing the number and percentage of patients with both illnesses for the six-month period in 2009

### Patients with Diarrhea in 2009



Figure 8b: A bar graph showing the percentage of patients with diarrhea for the six-month period in 2009.

### Patients with Gastritis in 2009



Figure 8c: A bar graph showing the percentage of patients with gastritis for the six-month period in 2009



| Month  | Number of Patients with Diarrhea | Number of Patients with Gastritis | Total Number of Patients | Percentage of Patients with Diarrhea | Percentage of Patients with Gastritis |
|--------|----------------------------------|-----------------------------------|--------------------------|--------------------------------------|---------------------------------------|
| March  | 22                               | 13                                | 781                      | 2.82%                                | 1.66%                                 |
| April  | 20                               | 16                                | 541                      | 3.7%                                 | 2.96%                                 |
| May    | 103                              | 40                                | 1138                     | 9.05%                                | 3.52%                                 |
| June   | 106                              | 36                                | 1030                     | 10.29%                               | 3.50%                                 |
| July   | 37                               | 17                                | 1057                     | 3.50%                                | 1.61%                                 |
| August | 30                               | 10                                | 874                      | 3.43%                                | 1.14%                                 |

Figure 9a: A table showing the number and percentage of patients with both illness for the six-month period in 2010

### Patients with Diarrhea in 2010

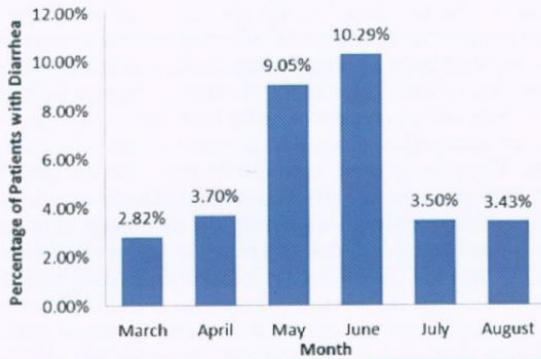


Figure 9b: A bar graph showing the percentage of patients with diarrhea for the six-month period in 2010.

### Patients with Gastritis in 2010



Figure 9c: A bar graph showing the percentage of patients with gastritis for the six-month period in 2010.

The results of this observational study indicate that from April to May for years 2008-2012, there was a rapid increase in the percentage of patients with complaints of diarrhea and gastritis. This can be seen in the above graphs for all five years (2008-2012), in which the rate of occurrence of both communicable illnesses in B.R. Hills increased from April to May. However, in June and July, this rate is shown to be variable from year to year. For instance, in 2008, 2011 and 2012, the percentage of patients with diarrhea decreased in June; however the same rate increases in 2009 and 2010. The percentage of patients with gastritis decreased in June in all five years. Although the rate of occurrence of diarrhea in June from 2008-2011 varied, in July, the rate of occurrence of diarrhea decreased for all four years (2008-2011). This decrease in percentage not only falls below the spiked percentage in May, but also that of June. The same pattern can be seen in the percentage of patients with gastritis from May to July from 2008 to 2011, in

| Month  | Number of Patients with Diarrhea | Number of Patients with Gastritis | Total Number of Patients | Percentage of Patients with Diarrhea | Percentage of Patients with Gastritis |
|--------|----------------------------------|-----------------------------------|--------------------------|--------------------------------------|---------------------------------------|
| March  | 21                               | 15                                | 737                      | 2.85%                                | 2.04%                                 |
| April  | 44                               | 26                                | 648                      | 6.79%                                | 4.01%                                 |
| May    | 62                               | 30                                | 688                      | 9.01%                                | 4.36%                                 |
| June   | 68                               | 26                                | 790                      | 8.6%                                 | 3.29%                                 |
| July   | 13                               | 7                                 | 751                      | 1.73%                                | 0.932%                                |
| August | 14                               | 10                                | 688                      | 2.03%                                | 1.45%                                 |

Figure 10a: A table showing the number and percentage of patients with both illnesses for the six-month period in 2011.

### Patients with Diarrhea in 2011



Figure 10b: A bar graph showing the percentage of patients with diarrhea for the six-month period in 2011.

### Patients with Gastritis in 2011



Figure 10c: A bar graph showing the percentage of patients with gastritis for the six-month period in 2011.

which the percentage of patients with gastritis is lower than that of May and June (2012 is not included in this analysis because at the time of data collection, the O.P.D. registration for July 2012 had not yet been conducted).

In August, the percentage of patients with diarrhea decreased from that of July in all four years except for 2011 (once again 2012 is not included in this analysis because at the time of data collection, the O.P.D. registration for August 2012 had not yet been conducted). This general trend is also present in the percentage of patients with gastritis, as it decreased in August 2009 and 2010. However, with a few exceptions, in all four years the percentage of patients with diarrhea and gastritis in August remained less than that in May and June, which presented the greatest percentage of patients with diarrhea and gastritis during the March-August period in all four years.

Furthermore, the proportional increase in the rate of diarrhea

Public Health



Year: 2012

Data for July and August were not yet completed when this study was conducted.

| Month  | Number of Patients with Diarrhea | Number of Patients with Gastritis | Total Number of Patients | Percentage of Patients with Diarrhea | Percentage of Patients with Gastritis |
|--------|----------------------------------|-----------------------------------|--------------------------|--------------------------------------|---------------------------------------|
| March  | 21                               | 20                                | 769                      | 2.73%                                | 2.6%                                  |
| April  | 30                               | 43                                | 938                      | 3.198%                               | 4.58%                                 |
| May    | 121                              | 61                                | 1033                     | 11.71%                               | 5.90%                                 |
| June   | 49                               | 19                                | 770                      | 6.36%                                | 2.46%                                 |
| July   | -                                | -                                 | -                        | -                                    | -                                     |
| August | -                                | -                                 | -                        | -                                    | -                                     |

Figure 11a: A table showing the number and percentage of patients with both illnesses for the six-month period in 2012.

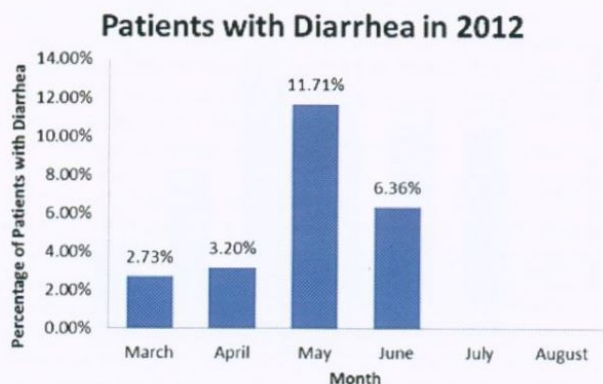


Figure 11b: A bar graph showing the percentage of patients with diarrhea for the six-month period in 2012.

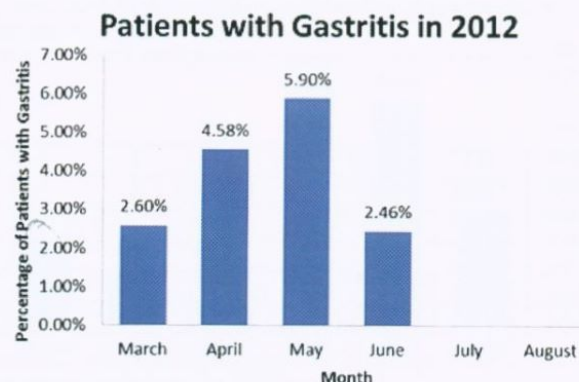


Figure 11c: A bar graph showing the percentage of patients with gastritis for the six-month period in 2012.

amongst patients from April to May is statistically significant at the significance level of 0.10 in 2010-2012 but it was not significant in 2008-2009. This can be seen in the following results of the hypothesis tests conducted for the years 2010-2012: the p-values for the years 2010-2012 are  $4.16 \times 10^{-5}$ , 0.067 and almost 0, respectively. For the years 2008-2009, the proportion of patients with diarrhea in April is equal to the proportion of patients with diarrhea in May at a significance level of 0.10. The p-values for 2008 and 2009 are 0.256 and 0.302, respectively. Similar results can be seen for patients with gastritis. For instance, the proportional increase in the rate of gastritis among patients from April to May is statistically significant at the 0.10 level in 2008, 2009 and 2012 and not significant in 2010-2011. The results of the hypothesis tests conducted for the years 2008, 2009 and 2012 are as follows: p-values for 2008, 2009 and 2012 are 0.064, 0.018 and 0.095, respectively.

For 2010-2011, the proportion of patients with gastritis in April is equal to the proportion of patients with gastritis in May at a significance level of 0.10. The p-values for 2010 and 2011 are 0.276 and 0.375, respectively.

Although for two of the five years the increase in the proportion of patients for each of the illnesses from April to May was insignificant (2008-2009 for diarrhea and 2010-2011 for gastritis), this does not necessarily mean that water-borne illness ceases to be a problem, because the majority of instances indicated that the increase was significant. Thus, the increase in the percentage of patients with diarrhea and gastritis in May is explained by the increased rainfall that occurs during that month, as May signifies the beginning of the monsoon season. The increased rainfall allows for greater contamination of the region's water supply and more rainwater passes through debris and fecal matter.

It is because the effects of this contamination only become visible during mid-May when enough residents have acquired these two illnesses and begin to visit the clinic, that the decrease in proportion of affected patients in June can be explained. After the noticeable increase in the number of complaints among patients, field workers begin to increase their sanitation efforts, chlorinating mini-tanks and bore wells more frequently. These efforts create a decrease from May to June (in a majority of the years studied) in the rate of occurrence of these two communicable diseases. This same general trend can be seen with the rates between June and July when the rate of both communicable diseases decreases (in a majority of the years studied). Finally, the percentage of patients with these two communicable diseases decreases in August when the monsoon season is ending and rainfall is at a minimum (compared to the months of May, June and July). These results correspond to Figure 12 below, which shows the monthly average rainfall from March to August of 2008-2010 for B.R. Hills (records for 2011 and 2012 were not documented by the ATREE organization).<sup>3</sup>

The general trend that exists during this six month period - the percentage of local residents acquiring these two communicable diseases peaks in May (beginning of the monsoon season) and then declines in August (end of monsoon season) - may also be attributed to the skewed data received from the water sample tests taken. For instance, weekly water samples are often taken from the same villages and water source. Often false information is given concerning the purity of the region's water supply, as the data obtained from these few villages is assumed to be representative of the whole hill range's water supply. Thus, proper sanitation efforts are not always taken. The results of the water sample tests for 2011 and 2012 for March through August can be seen in the following tables (Figure 13).

Although there was an increase in the percentage of patients with these two communicable diseases in May of 2011 and 2012, the water samples taken in May for both 2011 and 2012 were non-potable, indicating that the water supply in B.R. Hills is impure. Because field workers only chlorate bore wells (the source for water tanks) if a positive result for bacterial content is detected in the laboratory, bore wells are not chlorinated more frequently during the monsoon season. Instead, workers uphold the standard three-month interval chlorination method (as stated in the introduction of this report), which causes the earliest effort of chlorination of all bore wells to occur in the beginning of April and not in May (as April is the next month in the three month standard cycle after January). Thus, a lack of proper testing causes extra efforts of chlorination to be overlooked, allowing the already rampant contamination of the water supply due to the increase in monthly average rain to continue unabated.

This report offers two solutions to help decrease the rates of diarrhea and gastritis found among the Soliga tribe during the monsoon season. The first suggestion is that water samples be taken once a week from all water sources in all twelve villages. This will allow health officials to accurately determine the sanitation level of the sources of water and take appropriate action (i.e. extra bleaching efforts) during the monsoon season, as it is likely that more positive results will be detected in the laboratory during this time. In addition to the proper testing, extra chlorination of all the bore wells (both open and closed) and mini tanks should occur once again at the end of April (in addition to the first effort taken at the beginning of the month because of the standard three-month chlorination cycle). Under these circumstances, during the monsoon season both the contamination of the whole hill range's water supply



| Month  | Avg. Rainfall (cm) |
|--------|--------------------|
| March  | 114.2              |
| April  | 104.0              |
| May    | 120.4              |
| June   | 13.6               |
| July   | 61.6               |
| August | 12.0               |

Figure 12a: Table showing average rainfall in centimeters for the six-month period studied for 2008.

| Month  | Avg. Rainfall (cm) |
|--------|--------------------|
| March  | 28.8               |
| April  | 57.6               |
| May    | 155.0              |
| June   | 69.4               |
| July   | 34.6               |
| August | 30.0               |

Figure 12b: Table showing average rainfall in centimeters for the six-month period studied for 2009.

| Month  | Avg. Rainfall (cm) |
|--------|--------------------|
| March  | 13.6               |
| April  | 41.2               |
| May    | 103.2              |
| June   | 91.0               |
| July   | 73.8               |
| August | 50.0               |

Figure 12c: Table showing average rainfall in centimeters for the six-month period studied for 2010.

March 15, 2011

| Name of Village | Source of Water | Result of Water Sample Test |
|-----------------|-----------------|-----------------------------|
| Y. Colony       | Bore well       | Non-potable                 |
| Bangale Podu    | Mini tank       | Non-potable                 |
| Sigebetta       | Bore well       | Non-potable                 |

April 25, 2011

| Name of Village | Source of Water | Result of Water Sample Test |
|-----------------|-----------------|-----------------------------|
| V.G.K.K.        | Tap             | Non-potable                 |
| Hosa Podu       | Bore well       | Non-potable                 |
| Y. Colony       | Mini tank #1    | Non-potable                 |
| Y. Colony       | Mini tank #2    | Non-potable                 |

May 2, 2011

| Name of Village | Source of Water | Result of Water Sample Test |
|-----------------|-----------------|-----------------------------|
| Y. Colony       | Bore well       | Non-potable                 |
| Bangale Podu    | Mini tank       | Non-potable                 |
| Sigebetta       | Bore well       | Non-potable                 |

June 7, 2011

| Name         | Source of Water | Result of Water Sample Test |
|--------------|-----------------|-----------------------------|
| Y. Colony    | Tap             | Non-potable                 |
| V.G.K.K.     | Mini tank       | Non-potable                 |
| Hosa Podu    | Mini tank       | Non-potable                 |
| Bangale Podu | Mini tank       | Non-potable                 |

June 11, 2011

| Name       | Source of Water | Result of Water Sample Test |
|------------|-----------------|-----------------------------|
| B.R. Hills | Bore well       | Non-potable                 |
| B.R. Hills | Mini tank       | Non-potable                 |
| Hosa Podu  | Mini tank       | Non-potable                 |
| V.G.K.K.   | Tap             | Non-potable                 |

July 7, 2011

| Name       | Source of Water | Result of Water Sample Test |
|------------|-----------------|-----------------------------|
| Hosa Podu  | Bore well       | Non-potable                 |
| B.R. Hills | Mini tank #1    | Non-potable                 |
| B.R. Hills | Mini tank #2    | Non-potable                 |
| B.R. Hills | Bore well       | Non-potable                 |
| B.R. Hills | Tap             | Non-potable                 |
| V.G.K.K.   | Dining Hall     | Non-potable                 |

July 15, 2011

| Name            | Source of Water | Result of Water Sample Test |
|-----------------|-----------------|-----------------------------|
| Sigebetta       | Tap             | Non-potable                 |
| Y. Colony       | Tap             | Non-potable                 |
| Muthugadde Podu | Bore well       | Non-potable                 |

August 22, 2011

| Name            | Source of Water | Result of Water Sample Test |
|-----------------|-----------------|-----------------------------|
| Muthugadde Podu | Well            | Non-potable                 |
| V.G.K.K.        | Tap             | Non-potable                 |
| Hosa Podu       | Mini tank       | Non-potable                 |



March 26, 2012

| Name      | Source of Water | Result of Water Sample Test |
|-----------|-----------------|-----------------------------|
| Y. Colony | Bore well       | Non-potable                 |
| Y. Colony | Mini tank       | Non-potable                 |
| Sigebetta | Mini tank       | Non-potable                 |
| V.G.K.K.  | Mini tank       | Non-potable                 |

April 2, 2012

| Name         | Source of Water  | Result of Water Sample Test |
|--------------|------------------|-----------------------------|
| Bangale Podu | Mini tank #1     | Non-potable                 |
| Bangale Podu | Mini tank #2     | Non-potable                 |
| B.R. Hills   | Mini tank        | Non-potable                 |
| B.R. Hills   | Temple Mini tank | Non-potable                 |

April 3, 2012

| Name            | Source of Water | Result of Water Sample Test |
|-----------------|-----------------|-----------------------------|
| Kalyani Podu    | Bore well       | Non-potable                 |
| Manjigundi Podu | Bore well       | Non-potable                 |
| Muthugadde Podu | Bore well       | Non-potable                 |
| Muthugadde Podu | Well            | Non-potable                 |

May 10, 2012

| Name         | Source of Water | Result of Water Sample Test |
|--------------|-----------------|-----------------------------|
| Y. Colony    | Tap             | Non-potable                 |
| V.G.K.K.     | Dining Hall     | Non-potable                 |
| Bangale Podu | Mini tank       | Non-potable                 |
| B.R. Hills   | Tap             | Non-potable                 |

May 24, 2012

| Name            | Source of Water | Result of Water Sample Test |
|-----------------|-----------------|-----------------------------|
| Hosa Podu       | Mini tank       | Non-potable                 |
| Hosa Podu       | Bore well       | Non-potable                 |
| Muthugadde Podu | Bore well       | Non-potable                 |

June 25, 2012

| Name         | Source of Water | Result of Water Sample Test |
|--------------|-----------------|-----------------------------|
| V.G.K.K.     | Tap             | Non-potable                 |
| Hosa Podu    | Bore well       | Non-potable                 |
| Bangale Podu | Mini tank       | Non-potable                 |
| Bangale Podu | Mini tank       | Non-potable                 |

Figure 13: Tables showing date of when water samples were taken and their source in 2011 and 2012. Data prior to 2011 were not accessible. Also, data for months July and August of 2012 are missing since data for these two months were not yet compiled during the collection of data for this study.

and the high proportion of locals with these two communicable diseases will likely be reduced.

The second suggestion is to provide each household in each of the twelve villages a water filter. The water filters will not only allow residents the opportunity to further cleanse their drinking water, but also serve as a safety net; locals will still be able to purify their water even though their water supply might not have been sufficiently chlorinated. This will reduce the probability of village residents suffering from diarrhea and/or gastritis during the monsoon season and give households the opportunity to consume potable water.

Employing both solutions recommended in this study, it is probable that both the water contamination occurring during the monsoon season and the negative health effects such contamination has on the local population will decrease, saving residents from the agony of gastritis and diarrhea. However, until further research is conducted and such solutions are implemented, this report can only offer a plausible explanation for the increased proportion of patients with these two communicable ill-

nesses during May. As it is possible that other omitted variables may be contributing to the results, this study is subject to future refinements in methodology and experimental design.

#### REFERENCES

1. Vivekananda Girijana Kalyana Kendra, Population Census 2010-2011 (Biligirirangan Hills, Karnataka, India, 2010-2011).
2. K. Park, Essentials of Community Health Nursing, (Premanagar, Jabalpur: M/S Banarasisdas Bhanot Publishers, 2008), 49-59.
3. Ashoka Trust for Research in Ecology and the Environment, Rainfall Measurements (Biligirirangan Hills, Karnataka, India, 2010-2011).





# Chivalric Redemption Through Ascetic Meritorious Suffering In Imitatio Christi

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The value of meritorious suffering pervades the Western European tradition of chivalry throughout time and geographic location. Worldly asceticism, a key feature of both medieval society and this practice of meritorious suffering, figured prominently in medieval preaching, chivalric manuals, and works of literature. These types of writings drew heavily upon medieval atonement theories, specifically the "Devil's Rights" theory and the "Suffering Servant" theory espoused by Anselm, in order to invoke the glory of asceticism in knightly behavior. Thus, through their expression in both sacred and secular writings, medieval atonement theories were often manipulated to justify and even sanctify knightly violence. While, as writings for the knighthood suggested, victory could bring material honor, suffering and self-sacrifice brought their own atonement for sins and, therefore, heavenly glory<sup>1</sup>. By submitting themselves to the life of the Christos miles, the soldiers of Christ, knights committed themselves to living in imitatio Christi, or, in imitation of Christ. Living in imitation of Christ, depending on the atonement theory invoked at the moment, could mean valiant, earthly glory, extreme physical suffering, or a paradoxical combination of the two. Should this life of sacrifice lead to death, they were viewed as martyrs, and if they died defending their people or in obedience to a lord, all the better. However, medieval standards of atonement and asceticism did not necessarily require knights to die in order to achieve self-atonement or even the rank of martyr; they merely needed to suffer grievously, taking on the physical wounds and psychological distress of Christ through the violence they both endured from and inflicted upon their enemies. Through their unique path to divine forgiveness, they earned the right to share in Christ's triumph when they emerged victorious from the battle or left this world at last.

Prescriptivist writers<sup>2</sup>, however, believed that simply imitating the life of Christ through triumph and ascetic suffering did not merit salvation alone; whether or not suffering effected a knight's forgiveness from sins depended on the motivation behind his actions. Medieval writers such as Geoffroi de Charny and Bernard of Clairvaux specifically addressed the issue of violence done for the wrong reasons, explicitly stating that, in such cases, a knight's violence condemned, not saved, his soul. Furthermore, a knight must choose to suffer, willingly placing himself into dangerous and often fatal situations for the sake of imitating the life of Christ. Just as Christ, whom knights and knightly literature perceived as the ideal knight<sup>3</sup>, willingly sacrificed Himself to save His people, a knight must choose, out of free will, to sacrifice his desires and possibly his life for the sake of meritorious suffering. Alongside these issues of motivation, writers also emphasized a knight's need for fearlessness, for obedience, and, from a clerical standpoint, for confession and penance, but these issues will not be discussed in this paper.<sup>4</sup> Over a wide span of time and place, chivalric manuals, sermon exempla<sup>5</sup>, and works of literature aided in the formation and conveyance of a nuanced view of

knightly violence and its justification. Subjected to the harsh realities of the world of chivalry and knightly manipulation to validate their actions,<sup>6</sup> the prescriptivist's complex code, designed to control the knighthood, degenerated into simplistic understandings, selective hearing, and even clerical reduction in order to placate and capture the aid of the knighthood.<sup>7</sup> To knights, this complex code of behavior and atonement could be summarized as simply performing one's own penance, even without confession, through the practice of ascetic suffering. Thus, in practice if not entirely in preaching, a knight received earthly honor in victory, and, in defeat, he atoned for his sins. Knights truly had the best of both worlds.<sup>8</sup>

## ATONEMENT THEORIES

"Characteristic ideals of knighthood did not adhere to a single explanation, but drew upon both sets of major ideas for a hybrid religious ideology [...] Ideally, a chivalric career meant following a savior imaginatively transformed into one of their own, a magnificent warrior who triumphed over his dread enemies but who also suffered grievously and meritoriously in achieving his crucial victory. A potential paradox becomes a triumph of valorization."<sup>9</sup>

The prominent atonement theories of the medieval period—the "Devil's Rights" theory and the "Suffering Servant" theory, best expressed in St. Anselm's *Cur Deus Homo*?—form the theological foundation of ascetic meritorious suffering. Throughout much of the Middle Ages these theories coexisted, shaping both each other and the world from which they had sprung. Despite apparent paradoxes and contradictions between the defining characteristics and principles of these two theories, medieval Christians were able to use the strengths of each to explain the weaknesses of the others.<sup>10</sup> Therefore, the chivalric ideal of in imitatio Christi stemming from atonement theories resulted from the selection and compilation of the characteristics of each theory most supportive of knightly violence and pride in their ascetic lifestyle. From the "Devil's Rights" theory, they found glory and the heroic triumph of warfare; from Anselm's theory, they drew the value of meritorious suffering in the forgiveness of sins.

The "Devil's Rights" theory was one of the earliest theories of atonement to influence chivalry. According to this model, as a result of Adam and Eve's original sin, human beings sold their souls to Satan from birth. Because "the wages of sin is death,"<sup>11</sup> after mankind surrendered itself to sin, Satan could claim the lives of men. When the sinless Son of God became man in the form of Christ, however, Satan claimed His life also, even though he did not possess the authority to do so. As a result, according to the "Devil's Rights" theory, either through this trickery of the devil or through an extra-Biblical understanding of Christ's individual battle with Satan upon His descent into Hell, Christ redeemed the souls of mankind and released His people from the power of Satan. As portrayed in this theory, Jesus was a powerful, triumphant, heroic warrior.<sup>12</sup> Thus, warriors acting in imitatio Christi were expected to emulate His fearless



conquering of death and bold attack on spiritual evil.

As elements of this theory began to creep into literature, however, medieval writers recognized the necessity of the suffering inherent in Christ's harsh death. The Bible itself depicted Christ's fear in the face of death,<sup>13</sup> a sharp opposition to the illustration of the heroic warrior Christ in the "Devil's Rights" theory. To preserve the image of the warrior-hero Christ and His honorable valor and prowess, medieval literature conveyed the suffering aspects of Christ's sacrifice through other channels. A pre-chivalric Old English poem, "The Dream of the Rood," provides an example of medieval writers' transference of suffering to more acceptable objects. In the poem, the physical cross, not the crucified Christ, suffers the excruciating pain and humiliation of crucifixion. As the cross bemoans its inability to end the terrible pain, Christ, the "þá eong Hæleþ – þæt wæs God eall-mihtī – strang ond stīþ-mōd. e-stāg hē on ealgan hēanne, mōdi on manira e-syhþe, þáhé wolde mann-cynn líesan..."<sup>14</sup> Thus, we see an influence of the prevalent theories of atonement in depictions of the Christ-knight figure surfacing from the very seeds of medieval chivalry.

Over time, and as new theorists tackled the problem of the crucified Christ's suppressed pain, a new theory arose. This philosophy depicted Christ as filling the role of a willing servant suffering for the salvation of mankind. As this theory gained more public recognition through writings and preaching, it contributed its own characteristics to the knightly code of chivalry, as evidenced by chivalric writings of the 13th century and later. While the heroic and valiant qualities of the warrior-Christ continued to be upheld, a new virtue of meritorious suffering emerged in recognition of His painful death. St. Anselm of Canterbury, the most influential theologian promoting the soteriology<sup>15</sup> of redemption through Christ's suffering, asserted that Christ chose, out of His own free will, to take on human form and suffer the pains of human life and death.<sup>16</sup> Through his human life and death, Christ provided "an example to men that for no inconveniences which they may feel should they swerve from the righteousness which they owe to God," an example that, according to Christian theology, Christians are duty-bound to imitate out of gratefulness for their salvation.<sup>17</sup> Dying both willingly and sinless, He made satisfaction for the seemingly irreparable damage mankind's sinfulness had done to God's honor.<sup>18</sup> Christian theology asserts that men cannot fully repay the debt of honor to God because their inherent sinfulness renders them incapable of making reparations for their sin.<sup>19</sup> However, despite human inability to make the reparations He demands, God cannot simply forgive human sin because honor, especially His, must be upheld.<sup>20</sup> Yet, although Christian doctrine states that men require the sacrifice of Christ for the forgiveness of their sins and cannot win their forgiveness entirely out of their own works,<sup>21</sup> they nonetheless remain responsible for constantly attempting to make reparations to God for offending His honor. Just as in the honor-dishonor culture of the Middle Ages, knights were required to exact reparations in kind from those who diminished their honor, so too "each sinner ought to repay the honour of which he has robbed God: and this is the satisfaction which every sinner ought to make to God."<sup>22</sup> Therefore, according to Anselm's theory, men must give their material desires and earthly lives to God, because, acting in *imitatio Christi* in their ascetic suffering, this is their reparation in kind for their offense to God's honor. Anselm emphasized that, in order to be efficacious, this suffering must be done completely out of man's free will, for "either man spontaneously of his own free will yields due submission to God (whether by not sinning, or by satisfying for his sin), or God subjects him unwillingly by compulsion, and thus declares Himself to be his Lord, which no man himself refuses willingly to own. Wherein it is to be noticed that as any man by sin takes what belongs to God, so God in punishing takes away that which is man's own."<sup>23</sup> Anselm thus portrayed God as demanding from each man ascetic suffering, and eventually death, by "tak[ing] away that which is man's own,"<sup>24</sup> noting that, either from free will or God's compulsion, man must make some attempt at satisfaction. Every man, then, must choose whether his suffering would be in *imitatio Christi* (out of free will obedience) or out of the required mandate of God; the end result of suffering is the same, but suffering out of choice is more meritorious than forced, natural suffering. Medieval writers discerned this characteristic of the "Suffering Servant" theory, and its influence emerges in their works.

#### MEDIEVAL TEXTS

When these ideals were conveyed to knights through official Church teachings, sermon exempla, and preaching manuals, they manifested themselves in written chivalric codes, historical reports, and imaginative literature. From these sources, we may deduce the ways in which knights understood, justified, and sanctified their asceticism through the lens of the Church's own terms of atonement by means of meritorious suffering.<sup>25</sup> This concept of meritorious suffering for the intention of living in *imitatio Christi* may be broken into several composite themes: asceticism, the motivation behind the suffering, the definition and merits of martyrdom, the necessity of free will obedience, confession and penance, and the expression (or lack thereof) of emotion. In order to explore the manifestations of each of these themes in the selected texts, I will only address the topic of asceticism, supported by that of motivation where appropriate. The reader is invited to consider these themes, understanding that they are far more nuanced, complex, and intertwined than appears from this short discussion, and that they profoundly affected meritorious suffering and asceticism.

To explore these themes, we will draw upon various forms of literature from across time and place in medieval Western Europe. St. Anselm's *Cur Deus Homo?* explains the "Suffering Servant" atonement theory while also revealing much about the 12th century English cultural mindset that influenced the reception of these theories. Moving across the channel, but remaining within the 12th century, we will encounter Alan of Lille's *The Art of Preaching*, a French preaching manual, and Bernard of Clairvaux's *In Praise of the New Knighthood*. For the 13th century and the German understanding of the Atonement, Cacusius of Heisterbach's *Dialogue on Miracles* provides intriguing examples of sermon exempla. Entering the realm of secular application, also in France, we find *The Song of Aspremont*, a 12th century *chanson de gestes* (French epic poem), the 13th century *The Life of Saint Louis* by John of Joinville, and Geoffroi de Charny's 14th century *Book of Chivalry*, a chivalric manual. Finally, we complete our tour of the major centers of Western European thought with the 15th century history, *The Unconquered Knight: A Chronicle of the Deeds of Don Pero Niño, Count of Buelna* by Guiterre Diaz de Gamez, Pero Niño's standard bearer. The prevalence of these themes throughout a wide variety of literature, crossing both geographic and temporal boundaries, indicates an underlying understanding of these concepts in common society. Throughout, we will trace the prevalence of atonement theories and the praise given for knightly suffering and asceticism in *imitatio Christi*.

#### KNIGHTLY ASCETICISM

"Hence it should be understood that good knights may have to undergo hard trials and adventures, for it can truly be said to them that when they want to sleep, they must keep vigil, when they want to eat, they must fast, and when they are thirsty, there is often nothing to drink, and when they would rest, they have to exert themselves all through the night, and when they would be secure from danger, they will be beset by great terrors, and when they would defeat their enemies, sometimes they may be defeated or killed or captured and wounded and struggling to recover; this is not to speak of the perilous adventures they may encounter on their journeys in search of deeds of arms, such as the danger of crossing sea or river, of passing over treacherous places or bridges, of encountering riots or robbers. All these dangers must they endure and come through safely when they can and God grants them grace. And where are the orders which could suffer as much? Indeed, in this order of knighthood, one can well save the soul and bring honor to the body."<sup>26</sup>

Asceticism was an inherent feature of medieval society, and when identified with the sufferings of Christ, it became a battle of spiritual virtue, various factions seeking to outdo each other with their expressions of meritorious suffering.<sup>27</sup> Based on Christian teachings and contemporary soteriology, knights "knew that divine wrath was bought off by sacrifice and suffering, by that of his [God's] Son above all (on Calvary and repeatedly on the altar in the mass), and by the constant, mimetic suffering of all sinners in this world and in the after world. Thus any pacific meaning to the Passion of Christ is significantly and dramatically inverted."<sup>28</sup> Suffering becomes salvation; violence done in the name of an ascetic lifestyle becomes sanctified. Even as the clerics attempted to control the violence



of the knighthood, preaching the evils of violence performed for earthly gain,<sup>29</sup> "[t]he very exercise of their [the knights'] professional labor [...] helps to secure pardon for its inseparable wrongs."<sup>30</sup>

While explaining atonement in *Cur Deus Homo?*, St. Anselm of Canterbury remarked that, because man is in debt to God beyond his ability to make reparations, he should find happiness only in those activities which enable him to strive for his atonement. Denying himself the pleasures of this material world and glorying in labors and hardships through the ascetic nature of his chivalric life helped a man effect some portion of his atonement through works, Anselm encouraged.<sup>31</sup> He noted that in order to make every human effort to repair mankind's offense to God's honor, men must make amends for their wrongs,<sup>32</sup> and, as in human interactions, "the amends must be in proportion to the offence."<sup>33</sup>

In Germany, Caesarius of Heisterbach illustrated various knights engaged in acts of meritorious suffering, acts of such pious asceticism that they earned God's favor. These stories often depict knights as being wrongly disadvantaged in some way, but even minimal displays of ascetic piety win merit for their pains, regardless of violent or seemingly unethical, and therefore sinful, behavior.<sup>34</sup> A knight attempting to prove his innocence of a crime by engaging in battle is strengthened by receiving the Body and Blood of Christ.<sup>35</sup> After ordering his nephew killed for the sake of justice, a knight miraculously received communion even though the priest refused to give it to him.<sup>36</sup> Even a knight convicted of plundering who had shown some piety was granted life during hanging until a priest could hear his confession and give him the sacrament.<sup>37</sup> In all of these stories, a knight lost the support of society and suffered—a compulsory battle for an innocent man, the death of a family member and refusal to be given the sacrament, an impending death for a life of crime—but gained the support and approval of Christ through that suffering. Despite these knights performing actions clearly defined as sins by the Church, such as ordering the death penalty for a relative and living a life of manipulation and crime, they still received Christ's forgiveness through their suffering. Their pious asceticism, accepting the situation society and their own actions had presented them, all the while looking toward heaven for the glory of God, atoned for their sins and produced for them material proof of their forgiveness and favor in the eyes of God. Caesarius later explicitly states his point: "From what has been said we gather that as God punishes a sin according to kind and measure, so also He rewards a good deed, putting the mark of glory most of all on those members by which it was earned."<sup>38</sup> This idea of repayment in kind was also expressed in Anselm's command that men should suffer in kind for the damage they had done to God's honor through sin. Meritorious suffering, therefore, was a blow-for-blow method of making reparations, one that all of mankind deserved and must perform for the sake of divine honor. Fluttering alongside the obligation of suffering, however, is the hope of God's favor and of self-atonement. No matter what sins knights have committed, Caesarius' sermons expressed to his listeners and readers that actions of pious asceticism, flowing from the motivation of living in *imitatio Christi*, effect atonement and return God's favor to the suffering knight.

Likewise in France, nearly contemporaneously with Anselm, Alan of Lille asserted that men ought to despise themselves, remembering that all of life punishes man for his sin through pain and suffering<sup>39</sup> and that asceticism guards against the devil in a spiritual war.<sup>40</sup> Here, he drew upon the example of Christ as a warrior, passing the merit of suffering on to his sinful flock so that they too might achieve eternal glory. Asceticism "is men's only solace, which in the place of Christ's passion provides a remedy against sin, so that Christ is not forced to die as many times as man sinks into the abyss of sin."<sup>41</sup> Thus, as the human being suffers, incapable of living up to the perfection of Christ and attempting only to make impossible amends to damage done to God's honor, he does achieve some success. Meritorious suffering does, according to Alan, effect spiritual salvation, at least in part. Without Christ, this salvation is impossible; with Him, by living in *imitatio Christi*, men can earn remission for sins through ascetic living. This sense of asceticism was crucial to medieval culture,<sup>42</sup> and it logically follows that what affected the daily functioning of the society also affected the religious ideology in a culture where every aspect of life was bonded to the religion of the society. Knights, as imitators of Christ, must do His work in the world, glorying

in their suffering as they do so.<sup>43</sup> In this way, knights made satisfaction for their sins. Alan was careful to avoid condoning violence for its own sake,<sup>44</sup> but he recognized the value of the suffering inherent in violence, and he did condone this suffering undertaken for the service of God and one's self-atonement. Therefore, despite his heavy emphasis on "Christ the Victorious Warrior" stemming from the "Devil's Rights" theory, Alan hinted at some characteristics of the "Suffering Servant" atonement theory that defined later perceptions of meritorious suffering in *imitatio Christi*.

As Alan of Lille educated clerics on techniques of proper sermons, Bernard of Clairvaux, also in France, composed a treatise encouraging the order of knight-monks, the Knights Templar, to fight bravely in battle. He proposed to them that their violence was not only good and meritorious, but that God Himself had ordained select men to fight a spiritual war while on Earth. His perception of fighting in *imitatio Christi*, like Alan of Lille's illustration of living in this manner, draws heavily upon the "Devil's Rights" theory with elements of the recognition of Christ's suffering. He described Christ as "the leader of Knighthood himself,"<sup>45</sup> emphasizing His warrior qualities and the charge to follow His life as closely as possible, in all occupations. Bernard crosses the boundary between the Devil's Rights and Suffering Servant theories when he asserted that Christ is a model for how to live and how to die: "His life was arduous but his death was precious; but both are absolutely necessary [...] Now then, since both are equally necessary for us—living faithfully and dying trustingly—by living he taught us how to live and by dying how to die a trusting death."<sup>46</sup> The emphasis no longer rests on the victory of Christ in a triumphant battle against the forces of evil, but instead with His perfect humanity, a humanity that suffering knights are commanded to imitate for the sake of their souls.<sup>47</sup>

The concepts that influenced Alan of Lille's and Bernard of Clairvaux's writings in France continued to manifest themselves in various forms of French writings not directly focused on advice about Christian teachings and their applications to daily life. As the ideals of ascetic suffering in *imitatio Christi* crossed into the realm of more secular chivalric writings and literature, it remained a pillar of support for the violence that was depicted and glorified. In the *Song of Aspremont* of the 12th century, the Pope himself is imagined giving knights the remission of sins for their violent deeds. As they prepare for battle against the Saracens, the Pope exhorts:

You who are born in sin and wickedness,  
For which you all are damned and your souls dead,  
By striking blows with blades of steel unchecked  
Your sins will be absolved and your souls blessed;  
There is no doubt of this—you have my pledge;  
Rise up at once sweet Jesus to avenge!  
You will be saved—or may I go to Hell!<sup>48</sup>

Realistically, it is unlikely, considering Anselm<sup>49</sup> and Bernard of Clairvaux's heavy emphasis on a knight's motivation as necessary for the achievement of atonement through suffering, that the Pope would unconditionally absolve knights for the simple act of violence and suffering. However, as a work of literature stemming from the secular side of medieval society and intended to entertain, it reveals knightly perceptions of violence as they had been received from the Church's teachings. While the Church emphasized the need for one to act in *imitatio Christi*, ideas about this concept became distorted in the passing from clerical mouths to knightly minds. Expressed in the *Song of Aspremont*, knights were confident that suffering in the service of God's will meant plundering for wealth in the face of terrible odds against a pagan enemy, confident that God Himself would provide the victory because the knights are Christians.<sup>50</sup> Suffering then became efficacious not out of one's motivation or an imitation of the characteristics of the suffering Christ, but instead out of one's belief in Christ and sharing in an earthly form of His victory. When suffering did occur, knights resorted to the "Suffering Servant" understanding of Christ, but their preference was for the heroic Christ, who redeemed them for their glory and prowess more so than the pain they endured in achieving those ends. Unlike the exhortations of Anselm, writing from the Church's perspective and arguing that knights must act in *imitatio Christi* out of an eternal duty in an attempt to repay their affront to God's honor, the concept of the heroic Christ celebrates knights when they do not suffer but succeed. Even attaining earthly glory and victory



now became associated with winning one's own salvation, making both suffering and heroism virtues to seek instead of eternal duties to fulfill.

Approximately a century later, atonement theories and the Christ-Knight again appeared in French literature, this time under the guise of a history: the *Life of Saint Louis* by John of Joinville. Asserting that King Louis of France was a saint, John of Joinville tells the story of Louis' crusades with great emphasis on his Christ-like attributes—both heroic valor and meritorious suffering. According to John, Louis "loved God with all his heart and emulated his deeds; this was evident because just as God died on account of his love for his people, so did the king put his own life at risk on several occasions because of his love for his people."<sup>51</sup> Like Anselm in his *Cur Deus Homo?*, John attributes the merit of Louis's self-sacrifice to his willingness to do so. He intentionally notes that King Louis did not need to risk his life for his people, yet on numerous occasions he risked his own life for those under him—a true characteristic of acting in *imitatio Christi*.<sup>52,53</sup> When forced into dangerous situations, instead of his preferred and meritorious method of entering them willingly, Louis creates his own suffering by humbling himself. In the midst of storms at sea, for example, Louis prostrates himself before the consecrated host while wearing nothing but his bedclothes. His soldiers view this as a true demonstration of his piety, and Louis himself afterward preaches to them about the merits of suffering and the glory God gives to his humble and uncomplaining servants.<sup>54</sup> John praises Louis for his controlled and ascetic lifestyle, noting how saintly this makes his king.<sup>55</sup> At this point, Christ is understood as the head of the army without it being explicitly stated. Christ's role is primarily an overlord above all, whom only the saintly king can come near to imitating.

Yet, in the midst of the glory, the praise, and the Christ-knight comparisons John showers upon his king for Louis's great deeds, he also reveals the suffering side of knightly life. Both John and the king nearly die at various points throughout the history in which the army camp is struck with a devastating and horrific sickness, and John depicts horrendous scenes of battle along with accompanying traumatic wounds. Placed alongside the saintly descriptions of King Louis, these sufferings seem all the more glorious despite their goriness. As knights kneel to pray while the Turks shoot fire endlessly at their entrapping tower,<sup>56</sup> John takes pains to depict their faith as a heroic imitation of Christ, the victorious warrior who conquered His enemies forever, and whose knights now attempt to complete His work on the earth. There are a few outliers sprinkled throughout his history, and most may be explained by the larger atonement context.<sup>57</sup> One involves a knight who, after fighting to remove Germans from a church, "knelt before the altar and called aloud to Our Lord and said, 'Lord, I beg you to take pity on me, and remove me from these wars among Christians in which I have spent so much of my life, and grant that I may die in your service, so that I may enter your kingdom in Paradise.'" He later dies, and John attributes this to God granting his request.<sup>58</sup> At first glance, this appears to be a sign of cowardice and giving up on the calling of God to the service of knighthood, and John's approval of this knight and his prayer seems incongruous with his portrayal of brave faith in the face of death. However, remembering the importance of motivation behind knightly actions as expressed in early writings, it becomes clearer that this knight's prayer is meritorious. Many knights fought solely for plunder, and medieval writers spoke out against such behavior.<sup>59</sup> A great number of knights also fought against fellow Christians, despite medieval clerics attempting to redirect their energies toward the Saracens and other enemies of the Church.<sup>60</sup> This knight, therefore, is not demonstrating a fear of battle or death, but merely a plea for even more Christ-like living, free from what he perceives as a secularized knighthood. For his piety, he is rewarded with a valiant death, thereby bringing him at last to Christ, the ultimate joy.<sup>61</sup>

Moving forward yet another century in France, we encounter Geoffroi de Charny and his *Book of Chivalry*. His piety, devotion to the Christ-knight ideal, and uplifting of knightly suffering pervades every page of his chivalric manual. Alongside his praise of the asceticism of knightly chivalry, he sets the knighthood apart from the rest of medieval society, claiming they are a chosen group of men endowed with the marvelous gift of fighting in Christ's stead to effect their own redemption.<sup>62</sup> This unique route to salvation lies in the inherent suffering of the knightly profession, which Charny stresses is "the most rigorous order of all, especially for

those who uphold it well and conduct themselves in a manner of keeping with the purpose for which the order was established."<sup>62</sup> Because they have the power to identify most closely with the ascetic suffering of Christ himself, they are even more able to live in *imitatio Christi* than the clerics, provided that they remain pure.<sup>64</sup> Again, however, the motivation of fighting for the proper cause is crucial to effect one's salvation through suffering, whether or not one achieves earthly gains. Charny warns that "[t]here are indeed many, who can achieve much renown for physical achievement, whose souls are afterward lost; and there are others who have won little renown for these high honors while their souls have gone to their salvation in the company of Our Lord."<sup>65</sup> A knight must remain ascetic for the sole purpose of acting in *imitatio Christi*, for the violence inherent in a knightly lifestyle causes any other motivation to become exponentially more deadly for the soul than the failure to follow Christ in another profession.<sup>66</sup>

Even in 15th century Spain, the ideal of ascetic meritorious suffering in *imitatio Christi* pervades literature and, as a result of the sharing of literature in society, knightly thought. Guterre Diaz de Gamez's *The Unconquered Knight: A Chronicle of the Deeds of Don Pero Niño*, Count of Buelna consistently equates knighthood with suffering, and the ultimate motivation for suffering with the desire to follow and serve Christ. Especially in fighting against God's enemies, Gamez asserts, salvation comes in part from man's proper and righteous suffering.<sup>67</sup> Earthly honor is indeed a result of this suffering, as it should be. After all, "[k]nights who are at the wars eat their bread in sorrow; their ease is weariness and sweat; they have one good day after many bad; they are vowed to all manner of labour; they are for ever swallowing their fear; they expose themselves to every peril; they give up their bodies to the adventure of life in death [...] Such is their calling; a life of great fatigues, bereft of all ease [...] Great is the honour which knights deserve, and great the favour which kings should shew them, for all the reasons which I have told."<sup>68</sup> Like Geoffroi de Charny, Guterre Diaz de Gamez places much importance on ensuring that his readers understand just how much suffering knights undergo, and, therefore, how inherently meritorious their profession is. In a medieval context in which asceticism is glorified as a route to salvation,<sup>69</sup> knighthood could achieve legitimacy for even its most violent manifestations by calling on the religious ideals expressed in the Christ-Knight.<sup>70</sup> Gamez uses examples of extreme asceticism to indicate the favor of God. Pero Niño, having received a terrible leg wound, cauterizes it himself using white-hot irons, suffering the pain without making a sound. In return for his uncomplaining asceticism, God rewards him with the healing of the wound.<sup>71</sup> Later, Pero Niño is engaged in fighting the Moors and "[i]n this hour he had to pass through perils and labours so great that no other knight in the world has ever had to face more in the same length of time; for the Moors had seized him by the legs, striving to drag him from his horse, and tore off the sheath of his sword and dagger; but with the help of God he freed himself from them all in fine fashion."<sup>72</sup> God rewards his suffering with His favor, for, like Christ, Pero Niño willingly puts himself in the hands of his enemies for the furtherance of God's kingdom. Fighting bravely and fearlessly, he earns both temporal salvation from his physical peril and, as later discussion of knightly violence tells us, "[t]he very exercise of [his] professional labor thus helps to secure pardon for its inseparable wrongs."<sup>73</sup>

#### CONCLUSION

Meritorious suffering is thus a knightly path to divine forgiveness and favor, provided the motivation is pious and not material. Whether it is in the form of an earthly victory over enemies, or a spiritual victory over death, one achieves salvation of some type through the practice of meritorious suffering. This example is presented to knights through medieval atonement theories, which seem to stand in paradoxical opposition. The "Devil's Rights" explanation, promoting the fearless, heroic Christ, exuding prowess as He leaps upon the cross and boldly challenges the devil in single-handed combat, contrasts sharply with the "Suffering Servant" philosophy, in which His willing death makes meek but effectual reparations to God's honor, which mankind had offended through sin beyond the point of human abilities to make repayment in kind. Yet, these theories are reconciled in the balance of medieval understandings of meritorious suffering. A knight acts in *imitatio Christi* by suffering as He



did; a knight shares in His victory whether he lives or dies. As Bernard of Clairvaux urges the Templars, "How gloriously victors return from battle! How blessedly martyrs die in battle! Rejoice, brave athlete, if you live and conquer in the Lord; but glory and exalt still more if you die and join your Lord. Life is indeed fruitful and victory glorious, but more important than either is a holy death."<sup>74</sup> Either way, the knight entered the battle, and in doing so, as medieval chivalric writers so clearly emphasized, he willingly put himself, in imitation of Christ, in mortal danger. Without the hope of salvation through suffering, just as Christ achieved salvation through suffering, their imitation of Him would simply mean risking their lives for no benefit.<sup>75</sup> Thus, as knights suffered and died on the fields of battle, they could justify their naturally ascetic lives by twisting the Church's own teachings, effectively manipulating atonement theories, as expressed to them through popular preaching and circulating literature, to serve their needs for salvation.

We have followed the trail of pious asceticism through a variety of medieval writings, from Old English poems, to twelfth-century atonement theories, to fourteenth-century chivalric manuals, to fifteenth-century histories. These works have spanned a vast expanse of time and covered thousands of miles. Nevertheless, the theme of pious asceticism surfaces clearly in every work. While these sources are only a minute sample of the immense survey of medieval literature spanning the pre-Norman period in England (approximately 8th century) through the fifteenth century in England, France, Spain, and Germanic nations, they provide evidence that medieval writers clearly associated knights, asceticism, and atonement. Each work presents its own nuanced interpretation of the role of asceticism and the process through which it achieves knightly salvation. Yet, despite these differences, they agree unanimously that ascetic actions performed in *imitatio Christi*, for the glory of God and not out of a sinful desire for material plunder and honor (although these worldly benefits are likely to occur from the practice of chivalry), will, in some way, make atonement for the sins of the knights.

Further research on this topic would lead to an enhanced understanding of knightly meritorious suffering and its relationship to medieval atonement theories. As expressed earlier, several mini-themes factor into the knightly understanding of ascetic suffering for the meriting of salvation: among them the concepts of motivation, martyrdom, free will, obedience, confession and penance, and emotional expression. Furthermore, research beyond the knighthood, exploring the influence of atonement theories on the inherent asceticism of other levels of medieval society, would make this work more applicable to general understanding of medieval history.

The topic of asceticism and atonement theories discussed in this paper, while incomplete in its potential scope, aids modern understandings of medieval chivalry on its own merits. Knightly life naturally contrasted the glory and honor of victory with the intense physical pain and social shame of defeat. As knights spent their lives fighting on the battlefield, jousting in tournaments, and embarking on crusades, they had to deal with the fear of God that the Christian society of western medieval Europe had instilled in them. When recognizing the potentially soul-condemning nature of their lives in their psychologically and physically weakest moments,<sup>76</sup> they found, in medieval atonement theories expressed to them through the teachings of the Church, solace in "[p]hysical suffering endured throughout a lifetime of campaign and battle for righteous causes [which] counted when souls were weighed in the balance, closely watched by demons and angels."<sup>77</sup> The literature of medieval society expressed the themes at the basis of these theories, and the paradoxes of the two provided not distress but comfort to the knighthood. Playing off the paradoxes, sifting for the most supportive aspects of each theory, knights constructed not just a justification but a sanctification for their violence through suffering, claiming that their fighting saved their souls. For knights, violent deeds and their associated suffering was not just a way of life; it was the way to life, to the eternal life with Christ that required atonement for sins, atonement that they achieved through suffering. The natural asceticism of life, projected through the lens of medieval theology, becomes holy and soul-saving. Thus, meritorious suffering in *imitatio Christi* is the ultimate knightly path of atonement to salvation and divine favor.

<sup>1</sup> Medieval society recognized that when a priest was not available, one could be saved by contrition and inward confession alone (Baldwin 1998, 202). This affected salvation, but not self-atonement for sins. This paper will argue that knightly interpretations of medieval atonement theories, as expressed in medieval literature, required pious asceticism to self-atone for sins, not merely to save one's soul in the absence of a priest on the battlefield.

<sup>2</sup> A prescriptivist writer shall be defined as an author whose writings reflected the way he felt things ought to be, as opposed to the way they actually existed in reality. In the discussion of chivalry, a prescriptivist writer discussed how knights ought to behave, indicating that their actual behavior differed greatly from the writer's description. As Dr. Kaeuper said, "There are no laws telling people to breathe. There are laws telling people not to steal."—Kaeuper, *Topics*, 2012. The presence of laws commanding people not to steal indicates that stealing does occur in a society, not that stealing never occurs. Prescriptivist literature operates in a similar manner.

<sup>3</sup> Spiritual warfare offered knights the opportunity to follow Christ's life and death as closely as possible and carry out the work of the Lord. In this way, they could achieve atonement. Christ as a model for how to live composed a major part of contemporary atonement theories, such as Anselm's. Barber 2000, 26.

<sup>4</sup> The works referenced for this paper do address each of these issues, but due to time and length constraints I am unable to address them to the extent they deserve. However, I feel it necessary to alert the reader to their presence and influence upon the perception of meritorious suffering as affected by atonement theories and portrayed in medieval chivalric writings.

<sup>5</sup> Sermon exempla are the illustrative vignettes used during medieval sermons. Books of these exempla survive to the present day.

<sup>6</sup> Kaeuper 2009, 20.

<sup>7</sup> Kaeuper 2009, 69.

<sup>8</sup> Kaeuper 2009, 166.

<sup>9</sup> Kaeuper 2009, 116.

<sup>10</sup> Kaeuper 2009, 119.

<sup>11</sup> Rom. 6:23

<sup>12</sup> Kaeuper 2009, 117.

<sup>13</sup> Mk. 14:34-36

<sup>14</sup> "young warrior-hero (that was God Almighty) strong and resolute; ascended he onto [the] cross high, brave in many's vision, when he wants mankind to ransom." "Dream of the Rood," Diamond, 140. Literal translation of lines 39-41 of "Dream of the Rood" from the original Old English is the author's.

<sup>15</sup> Soteriology is the theological study of Christian salvation. Theologians throughout the centuries have enumerated various possible explanations for the effectiveness of Christ Jesus' death in bringing about mankind's salvation; only those relating to the topic of this paper are discussed here.

<sup>16</sup> Kaeuper 2009, 117-118.

<sup>17</sup> Anselm, *Cur*, 100-101.

<sup>18</sup> Anselm, *Cur*, 10.

<sup>19</sup> Anselm, *Cur*, 56.

<sup>20</sup> Anselm, *Cur*, 25.

<sup>21</sup> Anselm, *Cur*, 56.

<sup>22</sup> Anselm, *Cur*, 24.

<sup>23</sup> Anselm, *Cur*, 29.

<sup>24</sup> Anselm, *Cur*, 29.

<sup>25</sup> The value of meritorious suffering is popularly misconceived as applying solely to crusades. It is thus important to understand that knights understood meritorious suffering as having redemptive value in and of itself, apart from specifically Church-sanctioned violence. However, the knightly mindset of crusade can be a tool for understanding how redemption through violent suffering could be perceived in a secular context, as the religious and the secular intersected in the medieval world far more so than today. Dr. Kaeuper summarizes the influence and filtering of meritorious suffering on crusade violence in his book *Holy Warriors: The Religious Ideology of Chivalry*. As he states on page 70 of that work, "knights hear—whatever was actually said—that such fighting can earn spiritual benefits often amounting to remission of sins. Specifically, they are told that the severe and trying suffering which they are to expect on



crusade is the mechanism of religious expiation and atonement."

<sup>26</sup> Geoffroi de Charny, *Chivalry*, 177.

<sup>27</sup> Kaeuper 2009, 148.

<sup>28</sup> Kaeuper 2009, 22.

<sup>29</sup> Alan of Lille, *Preaching*, 150.

<sup>30</sup> Kaeuper 2009, 48.

<sup>31</sup> Anselm, *Cur*, 48.

<sup>32</sup> Anselm, *Cur*, 45.

<sup>33</sup> Anselm, *Cur*, 47.

<sup>34</sup> Remembering that Caesarius of Heisterbach's *Dialogue on Miracles* is a collection of sermon exempla, one should note that these stories were intended to convey religious truth to the populace. With knights attending masses, as was expected of the age, these exempla were an ideal way to convey messages about proper chivalric behavior to knights, through the eyes of the Church. However much of the intended message actually was put into knightly practice is variable, and much of it, as our histories and other literary sources reveal, was twisted beyond recognition. Because knights would not accept direct commands from the Church, clerics had to engage in a sort of compromise debate, with the clerics and the knights fighting over the lowest common denominator of ideology acceptable to both groups.

<sup>35</sup> Caesarius of Heisterbach, *Miracles*, 151-153.

<sup>36</sup> Caesarius of Heisterbach, *Miracles*, 141.

<sup>37</sup> Caesarius of Heisterbach, *Miracles*, 153-154.

<sup>38</sup> Caesarius of Heisterbach, *Miracles*, 337.

<sup>39</sup> Alan of Lille, *Preaching*, 26.

<sup>40</sup> Alan of Lille, *Preaching*, 68-70.

<sup>41</sup> Alan of Lille, *Preaching*, 121.

<sup>42</sup> Kaeuper 2009, 148.

<sup>43</sup> Alan of Lille, *Preaching*, 149-151.

<sup>44</sup> Alan of Lille, *Preaching*, 147.

<sup>45</sup> Bernard of Clairvaux, *Praise*, 49.

<sup>46</sup> Bernard of Clairvaux, *Praise*, 65.

<sup>47</sup> Bernard of Clairvaux was adamant that motivation was crucial to the meritorious nature of suffering. He noted that one's soul could be either gained or lost in the course of violence; the difference depended on the knight's motivation for the perpetration of the violence. If a violent act was done in *imitatio Christi*, the knight's soul was redeemed. If it was done out of a human desire for revenge, plunder, or other worldly motivation, the soul would be lost. — Bernard of Clairvaux, *Praise*, 35.

<sup>48</sup> Michael A. Newth, trans., *Aspremont*, 23.

<sup>49</sup> Anselm does appear to contradict himself in regards to the ability of a person to achieve redemption through suffering. While he encourages men to practice asceticism and embrace suffering as their reparations to God, he also notes that human beings cannot truly repay God for their affront to His honor, and thus Christ's sacrifice was necessary. From a modern standpoint, this seems to be a paradox. However, based on contemporary writings and Catholic theology, Anselm seems to be making the point that human beings, while unable to make reparations for their state of sinfulness that condemns them, may be able to achieve various levels of atonement through suffering, and they may thus repay God a minimal amount of their debt on their own. This idea relies heavily on one's motivation for the act, as did Bernard of Clairvaux's assertions and the system of confession and penance. Alan of Lille's support for an ascetic life, discussed earlier, makes a similar claim. Therefore, the Pope's absolution of sins based on acts of violence, without taking the motivations of the knights into account, is incompatible with Catholic theology of redemption through works.

<sup>50</sup> Michael A. Newth, trans., *Aspremont*, 75.

<sup>51</sup> John of Joinville, *Louis*, 147.

<sup>52</sup> John of Joinville, *Louis*, 147.

<sup>53</sup> In fact, his portrayal of King Louis so closely resembles Anselm's descriptions of Christ that the reader must question if John had read at least some of Anselm's writings. Indeed, on page 152 of the author's selected translation, John reports King Louis as mentioning Anselm by name. Thus, it appears that, at the very least, King Louis had access to some number of Anselm's writings and conveyed these teachings and ideas to his army and advisors, such as John of Joinville. We may therefore read John of Joinville's portrayal of King Louis's life as potentially influenced

by, or even in direct imitation of, the ideas of Anselm.

<sup>54</sup> John of Joinville, *Louis*, 152.

<sup>55</sup> John of Joinville, *Louis*, 147-148.

<sup>56</sup> John of Joinville, *Louis*, 196.

<sup>57</sup> As an alternate explanation of these outliers, it may be that John of Joinville is portraying events as they actually occurred and not doctoring his history like most medieval writers. While John's account does seem to place a greater emphasis on accuracy than other medieval "histories," his nearly-perfect portrayal of King Louis raises some concerns about his accuracy. It is likely, especially in regards to his stories told about himself and other members of the army and not directly about King Louis, that John chose which events to include in his history or altered these events in order to fit his intended point. Therefore, when including his descriptions of fearful knights or moments of purely human, instead of in *imitatio Christi*, actions, it is likely that John did intend to support his main themes in a context that his contemporaries would have understood.

<sup>58</sup> John of Joinville, *Louis*, 215.

<sup>59</sup> There are many examples of this, both throughout the writings cited in this paper and others in the plethora of medieval literature. One example may be found in Alan of Lille, *Preaching*, 121.

<sup>60</sup> Kaeuper 2009, 95.

<sup>61</sup> Bernard of Clairvaux, *Praise*, 34.

<sup>62</sup> Geoffroi de Charny, *Chivalry*, 165.

<sup>63</sup> Geoffroi de Charny, *Chivalry*, 175.

<sup>64</sup> Geoffroi de Charny, *Chivalry*, 183.

<sup>65</sup> Geoffroi de Charny, *Chivalry*, 163.

<sup>66</sup> Geoffroi de Charny, *Chivalry*, 165, 167.

<sup>67</sup> Guitierre Diaz de Gamez, *Don Pero Niño*, 9.

<sup>68</sup> Guitierre Diaz de Gamez, *Don Pero Niño*, 12-13.

<sup>69</sup> Kaeuper 2009, 22.

<sup>70</sup> Kaeuper 2009, 20.

<sup>71</sup> Guitierre Diaz de Gamez, *Don Pero Niño*, 100.

<sup>72</sup> Guitierre Diaz de Gamez, *Don Pero Niño*, 195.

<sup>73</sup> Kaeuper 2009, 48.

<sup>74</sup> Bernard of Clairvaux, *Praise*, 34.

<sup>75</sup> Anselm, *Cur*, 105.

<sup>76</sup> Kaeuper 2009, 166.

<sup>77</sup> Kaeuper 2009, 193.

#### REFERENCES

- Alan of Lille. *The Art of Preaching*. trans. Gillian R. Evans. Kalamazoo: Cistercian Publications, Inc., 1981.
- Baldwin, John W. "From the Ordeal to Confession: In Search of Lay Religion in Early Thirteenth-Century France." *Handling Sin: Confession in the Middle Ages*. Ed. Peter Biller and A.J. Minnis. 191-209. York: York Medieval Press, 1998.
- Barber, Malcolm. Introduction. In *Praise of the New Knighthood*, by Bernard of Clairvaux, 9-27. Trappist, KY: Cistercian Publications, 2000.
- Bernard of Clairvaux. *In Praise of the New Knighthood*. Trans. M. Conrad Greenia oco. Trappist, KY: Cistercian Publications, 2000.
- Caesarius of Heisterbach. *The Dialogue on Miracles*. Trans. H. Von E. Scott and C.C. Swinton Bland. v. 2. London: George Routledge and Sons, Ltd, 1929.
- "Dream of the Rood." In *Old English: Grammar and Reader*, ed. Robert E. Diamond, 138-149. Detroit: Wayne State University Press, 1970.
- Geoffroi de Charny. *The Book of Chivalry*. Trans. Elsbeth Kennedy. Philadelphia: University of Pennsylvania Press, 1996.
- Guitierre Diaz de Gamez. *The Unconquered Knight: A Chronicle of the Deeds of Don Pero Niño, Count of Buelna*. Trans. Joan Evans. Rochester: The Boydell Press, 2004.
- John of Joinville. *The Life of Saint Louis*. Trans. Caroline Smith. London: Penguin Books, 2008.
- Kaeuper, Richard W., "Topics in Medieval History (HIS 350W) class discussion." University of Rochester. Jan. 24 2012.
- Kaeuper, Richard W. *Holy Warriors: The Religious Ideology of Chivalry*. Philadelphia: University of Pennsylvania Press, 2009.
- St. Anselm. *Cur Deus Homo?*. Trans. R.C. London: Griffith Farran Okeden & Welsh, n.d., ca. 1890.
- The Song of Aspremont*. Trans. Michael A. Newth. New York: Garland Publishing, Inc., 1989.



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# Babalú-Ayé: African Deity or Christian Saint?

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According to Lucumí oral tradition, Babalú-Ayé rests in the shade of the trees during the day and stalks the earth during the night, "accompanied by his dogs and the spirits of his children (Mason)." Babalú-Ayé, translated "Father, Lord of the Earth (Idowu, 95)," refers to the African Spirit who has dominion over health and sickness on earth. Lucumí elders say that he dwells deep in the forest during the rainy season, but enters the city in the dry season to bring death and devastating diseases such as bubonic plague, yellow fever, small pox, and more recently, AIDS (Mason). Babalú-Ayé's control over the health of every individual allows him to determine a person's quality of life. Ethnographer Michael Atwood Mason states that Lucumí elders say, "You can play with the other Orichas, but you cannot play with Babalú-Ayé." An Oricha is a spirit or deity in Lucumi and other African religions that serves as an intermediary between humans and the divine (Brown 268). As an Oricha, Babalú-Ayé is both feared and loved for his power over the earth and human body. In the United States and Caribbean, Babalú-Ayé is often depicted as the Catholic Saint Lazarus. A common explanation for this phenomenon is that Babalú-Ayé became St. Lazarus through the process of syncretism, meaning a merging of two religious traditions, often at the sacrifice of the "lesser" tradition to a more dominant one. Before deciding whether or not Babalú-Ayé as St. Lazarus is a case of syncretism, scholars must understand the history behind the change, as well as the living conditions of African slaves. Babalú-Ayé as St. Lazarus was means of extending and enhancing spiritual and social possibilities for the practitioners, rather than a loss of African traditions through syncretism.

According to Santeria legend, Babalú-Ayé came from the land of Dahomey, which is now known as the Republic of Benin. He originally lived with the Yoruba people, in modern day Nigeria, before he was cursed with smallpox and banished for disrespecting the elder Orichas. "Everyone despised and rejected him and threw water behind him as a sign of their contempt (González-Wippler, 53)." The deity Orunla sought out Babalú-Ayé and told him that he could once again be worshipped as an Oricha, only if he traveled to Dahomey. Before travelling to Dahomey, he had to cleanse himself with grains, beans, and corn. Babalú-Ayé also always has at least one dog by his side, given to him by his friend Eleggua. Dogs depict the most distinctive iconography connecting images Babalú-Ayé and St. Lazarus (González-Wippler, 53)

Babalú-Ayé is a disease spirit known by different names depending on culture. In fact, many African traditions have several names for Babalú-Ayé. Scholars are able to determine that the spirit being referred to is Babalú-Ayé because worship of him is always closely centered on the earth and soil. In the Lucumí Santeria tradition, Babalú-Ayé is referred to as an Oricha and publicly honored with celebrations on December 17. One characteristic of Oricha worship is that each Oricha has his or her own favorite items and foods. According to the Encyclopedia of 5,000 Spells by Judika Illes, Babalú-Ayé has very modest tastes, and luxurious offerings may offend him—he is usually portrayed dressed in burlap clothing. Rituals in Babalú-Ayé's honor typically feature the number 17 and his favorite colors: brown, black, and purple. At such rituals, Babalú-Ayé "accepts offerings of dry white wine (never water because it irritates his sores), popcorn (because the individual popped kernels resemble smallpox pustules) and/or a bowl of milk with bread soaking in it to feed his loyal companions, the dogs" (Illes). He is said to have scars covering his body as a result of his smallpox (Illes). Most images of Babalú-Ayé also include images of two dogs and crutches. While Babalú-Ayé is often associated with inflicting disease, he is also usually called upon for healing and prevention of illness.

The exact origin of Babalú-Ayé as an African Spirit is difficult to determine. In general, the religions of Africa developed through generations of imagination, observations, and reflection by people that gradually built up to coherent "facts" of human existence. Babalú-Ayé has a long history in West Africa among the Yoruba, Ewe, and Fon peoples. However, different traditions recognize Babalú-Ayé by different names. The Yoruba people are one of the largest ethnic groups in West Africa and live largely in Nigeria. The Yoruba deity most closely connected with Babalú-Ayé is Shankpanna or Shakpana, the god of smallpox. The name Shakpana is likely "derived from 'shan,' to daub, smear, or plaster, which probably has reference to the pustules with which a small-pox patient is covered and 'akpania,' a man-killer" (Ellis, 60). Shakpanna is depicted as an old man who limps and uses a stick for support. According to Yoruba myth, one day during an assembly of the gods, they were all dancing and making merry, when "Shankpanna endeavored to join in the dance, but, owing to his deformity, stumbled and fell. All the gods and goddesses thereupon burst out laughing and Shankpanna, in revenge, strove to infect them



with small-pox" (Ellis, 60). Obatala, god of the earth, drove him away to the forest where he lives to this day. As a result, temples to Shankpanna are usually built in bushes outside of villages. Shankpanna is also known as "Obaluaye—the king who hurts the world—contracts the dreaded disease of smallpox" (Abodunrin, 78). Sacrifices must be appropriately and consistently offered to him to avoid sickness and wrath.

The Fon people, located primarily in Southwest Nigeria and Benin, worship Sagbatá as the god of the Earth. According to Fon legend, the people proclaim Sagbatá "is not good for the earth. Since his coming, we find nothing to eat; we find nothing to drink. We have nothing" (Herkovits, 132). Babalú-Ayé is associated with the god Sagbatá, who is also called Azo, due to his ability to control the rain and drought (Herkovits, 133). The Ewe people from Ghana and Togo call the deity who controls the land Anyigbato or Sakpata (Rosenthal, 61). Like Babalú-Ayé, Anyigbato "is a giant who is said to roam the night" (Friedson, 214). Anyigbato is closely connected with illness and can cause harm to people if disrespected (Friedson, 214).

In Lucumí Santería, Babalú-Ayé is one of the most popular Orichas, yet he is also closely associated with the Christian saint, Saint Lazarus. Those outside the tradition often believe that Babalú-Ayé is connected with Saint Lazarus of Bethany, the brother of Martha and Mary, who was raised from the dead by Jesus Christ. However, the connection between Saint Lazarus and Babalú-Ayé is based on a parable in Luke 16:19–31 (World English Bible). The parable starts by describing a rich man clothed in purple and fine linen who lives a life full of luxury without giving to others. There is also a beggar named Lazarus who "laid at his gate, full of sores, and desiring to be fed with the crumbs that fell from the rich man's table. Yes, even the dogs came and licked his sores" (Luke 16:19-31). The beggar Lazarus dies and is "carried away by the angels to Abraham's bosom (Luke 16:19-31)." Afterwards, the rich man also dies but is sent to the fires of hell. In hell, the rich man pleads for Abraham to "have mercy on me, and send Lazarus, that he may dip the tip of his finger in water, and cool my tongue! For I am in anguish in this flame" (Luke 16:19-31). Abraham does not respond to this request and the rich man is left to suffer. Furthermore, Abraham refuses to raise Lazarus from the dead so that he may testify to the rich man's five brothers to prevent them from the same fiery fate. He states, "If they don't listen to Moses and the prophets, neither will they be persuaded if one rises from the dead" (Luke 16:31). Thus, Lazarus receives eternal life in the comforts of heaven while the rich man suffers in the fires of hell.

Although people argue the connection between Saint Lazarus and Babalú-Ayé may be due to mutual association with illness, scholars believe the connections may actually be based on the visual image of Saint Lazarus from the medieval Catholic Church. The image of Saint Lazarus is that of a man suffering from starvation and leprosy. Lazarus is barely-clothed and supports himself with a walking stick while two dogs lick the sores on his legs. The critical element in the iconography of Saint Lazarus that connects him with Babalú-Ayé is the depiction of the dogs. As mentioned above, Babalú-Ayé's most faithful companions are the two dogs that tend to the sores on his legs. Worship of Babalú-Ayé as Saint Lazarus the beggar is largely concentrated in Cuban Lucumí Santería. To understand the connection between Babalú-Ayé and the Catholic Saint Lazarus, we must look at the history of how Christianity and African Religions both ended up in Cuba. Before deciding whether or not Babalú-Ayé as St. Lazarus is a case of syncretism, scholars must understand the living conditions of African

slaves when they were forced to adopt Catholic Saints into their own religious traditions.

Christopher Columbus and the Spanish landed on the island of Cuba in the late 15th century when the Taíno people inhabited the island (Gott, 12). The Taíno "had food in abundance" and grew crops including yucca root (for cassava bread), cotton, tobacco, maize, and sweet potatoes. A traveling Dominican priest named Bartolomé de las Casas estimated the population of the Taíno nation to be approximately 350,000 people. According to Las Casas, they had "everything they needed for living; they had many crops, well arranged" (Casas, 90). The Taíno people "first spotted Columbus sailing off their northern coast on 28 October, 1492, probably at Baracoa" (Gott, 13). The first attempt at Spanish settlement was in 1511 at Baracoa, but the Spanish were met with harsh resistance from the Taíno. In 1514, the first permanent Spanish settlement was established in what is today Havana. While settling the island, Spanish invaders swept across the island and massacred the indigenous people (Gott, 15).

In the 17th and 18th centuries, tobacco was Cuba's primary product. However, there was a severe labor shortage, which caused a delay in production. Spanish trade laws at the time restricted the importation of slaves, and Cuba struggled to keep up with the success of the sugar cane production of the British in Barbados and French in Saint Domingue (Haiti). Two key events that increased African slave numbers in Cuba were the Seven Year's War in 1763, when the British conquered the port of Havana and introduced thousands of slaves in ten months, and the Haitian Revolution starting in 1791 (Gott, 26). During the Haitian Revolution from 1791 to 1804, thousands of French refugees fled the slave rebellion in Saint Domingue for Cuba, bringing with them their slaves, who had expertise in sugar refining and coffee growing (Gott, 26).

The Haitian Revolution had far-reaching consequences for the Yoruba people. Hundreds of thousands of Yoruba men, women, and children were sold as slaves to work in the growing sugar mills of Cuba. Between 1821 and 1860, some 375,000 Africans were brought to Cuba (Gott, 32). The Yoruba, from Nigeria, consisted of the largest numbers. The arrival of large numbers of Yoruba in a relatively short period of time transformed Cuba's ethnic mosaic and ensured that the Yoruba were a lasting cultural presence on the island (Gott, 46).

Although the treatment of black slaves had always been harsh, the Spanish (and Portuguese) colonial system was slightly different in Cuba and Brazil because slaves were not simply categorized as "black" or "African" but were allowed to identify with a particular ancestry (Gott, 47). The Spanish colonists had a tradition of *cabildos*, or fraternal societies that were "organized on the basis of their place of origin in Spain. The blacks, certainly since the late sixteenth century were allowed to do the same" (Gott, 47). The Yoruba of Cuba were known as Lucumí, and their traditions today are still often referred to as *la regla lucumí* (the Lucumí order). The Spanish believed that these social organizations would help the different tribes of Africans to adjust to life in Cuba. The bishop of Havana, Pedro Agustín Morell de Santa Cruz, "was so impressed by the attachment of the blacks to their African *cabildos* that he granted them the Church's official recognition in 1755" (Gott, 47), because he thought it would enhance and speed up their religious instruction. The church hoped that by encouraging African ethnic organizations, it would be easier to Christianize the members.

*Cabildos* functioned in many different ways for the slaves. At the



cabildos, slaves could reunite after working in the fields and maintain their African cultures, and they were able to collect money or pool resources to assist other members. Cabildos also served a religious purpose in that they were a place where slaves could worship their deities and ancestors. The cabildo represented an "Africa abroad" where slaves could keep their faith and traditions alive. The songs, dances, and drum rhythms were played for African deities. However, in order to avoid abuse by the Spanish colonialists, the slaves accepted Christian teachings about saints. Slaves would "march in processions bearing the banners and images of their nation. But the priests had done their job, for above all the masks and rhythms were the images of their patron saints" (Murphy, 30). Cabildos made it possible to conserve many idiosyncrasies from African religion and culture while at the same time causing the creation of a completely new religion that included Christian saints (Murphy, 29).

Scholars believe that the religious traditions born out of Yoruba culture in the Cuban cabildos led to the creation of a new religion. This new religion, called "Santería," meaning "Cult of the Saints," was a mixture of African religion and the practices of the Spanish Catholic faith. Spanish colonists believed that by evangelizing and baptizing their African slaves as Catholics, they could suppress all African traditions. However, the African roots were not completely erased and instead incorporated worship of Spanish Catholic saints with understandings of their own African deities. The slaves adopted the Catholic saints that most closely resembled their own Orichas usually due to iconography, such as with Babalú-Ayé and Saint Lazarus. Each Oricha became connected with a specific Catholic Saint. Some scholars, such as Melville Herskovits, believe that, in time, the act of worshipping an African deity with the combined Catholic saint identity brought about "syncretism" or merged a tradition between Catholicism and African religions. What started as an unenthusiastic acceptance of Christian ideas ended as a union between African Gods and Catholic saints. When Spanish authorities found out that Catholic saints were identified with African gods and that the Saints were incorporated in wholly African rituals and sacred dances, they attempted to prohibit the presence of Catholic images in the cabildos (Rodríguez).

One of the most influential papers on the syncretism of African and Catholic beliefs is the 1937 article by anthropologist Melville Herskovits called "African Gods and Catholic Saints in New World Negro Belief." In the paper, Herskovits notes the similarities between Catholicism and African practices: "The Negroes profess nominal Catholicism while at the same time they belong to 'fetish cults' that are under the direction of priests whose functions are essentially African" (Herskovits, 635). He continues to note that the Negroes identify specific connections between "African gods and Catholic Saints" (Herskovits, 635). Herskovits attributes the religions produced by interactions between African Slaves and Europeans enslavers as a result of the "acculturative process" (Herskovits). By examining differences between the religious practices of slaves in Brazil, Cuba, and Haiti, he finds that the data from Haiti is strikingly familiar to the literature on Cuba and Brazil, though the names and corresponding Catholic saints are somewhat different. Due to the differences between region in which the slaves are living and identification of a specific deity with different saint, Herskovits concludes that the "syncretizations" developed independently in each region and therefore were not wholly African (Herskovits, 643).

Later conversations such as "Santa Bárbara Africana: Beyond Syncretism in Cuba" by Joseph M. Murphy discuss recent criticisms

of Herskovits' conclusion on syncretism by scholars and practitioners of the Caribbean and Afro-Latin traditions. Scholars criticize Herskovits's characterization of syncretism as "overly mechanistic, and as undervaluing individual creativity and agency in favor of larger, impersonal forces of acculturation" (Murphy, 137). Identifying one tradition as syncretistic to another implies a value judgment on the traditions. There is a notion of transition from a "primitive" African tradition to a dominant Western Christian culture. With the syncretistic model, remaining African beliefs and practices are understood as having "survived" the process of Westernization. However, syncretism fails to "recognize the retention of African traits as active resistance on the part of the enslaved, valorizing African ways of knowing as powerful weapons against the dominating culture" (Murphy, 138).

The syncretism model for the study of Afro-Latin religion can also be reductive in that it simplifies the beliefs and practices as coming from only two cultural sources, Europe and Africa. Scholars must consider the vast differences between the different cultures within Africa and Europe. For example, the Yoruba differ from the Ewe people just as Protestants differ from Catholics and Anglicans. "The preferred model therefore might be creolization repeated reintegrations of cultural traits to form new entities. Afro-Latin religions therefore are not so much syncretism of African and European elements as creole constructions of elements from overlapping constructions of the past" (Murphy, 138). With the creolization model, traditions such as Santería can be interpreted as traditions all on their own.

Beginning in the 1980s, practitioners of Afro-Latin religions have defended their traditions and objected to the use of the term syncretism, because the term is viewed as both demeaning and misleading. Many practitioners want to maintain the history and purity of their traditions, and the label "syncretistic" implies impurity and a lack of perseverance. Afro-Latin priests and priestesses believe the "purpose of the term can only be to denigrate and marginalize the traditions born in the Caribbean" (Murphy, 138). Some practitioners argue that their African traditions are not mixed, but the Christian elements, as observed by outsiders, were only used as camouflage to protect African worship from persecution during the time of slavery and even today. Therefore, the slaves were not passive converts buying into Christianity but were determined to actively preserve their African rituals despite persecution from slave owners and attempts to destroy their traditions (Murphy, 138). However, Santería tradition today still widely uses Catholic saints in worship. The fact that the Christian elements are embedded deep within the tradition and cannot be easily "taken off" indicates to scholars that the notion of using the names of saints as a "disguise" does not accurately describe the tradition. Christian saints play an integral role in the tradition and to remove them would cause extreme disruption (139, Murphy).

In order to fully understand the role of saints in Santería, scholars must look at the potential for sainthood in the Lucumí Santería tradition on its own merit and not as a borrowed custom. To do so, the differences in ritual between Babalú-Ayé worship in Africa and Cuba must be analyzed. Determining precisely what goes on during Santería rituals is difficult because the persecution by Spanish colonists forced "slaves to cloak their religion in secrecy. All rituals, especially the initiations, were conducted under stringent vows of secrecy" (González-Wippler, 167). Therefore, accounts of the rituals are limited, especially to researchers who are not part of the community. Members of the tradition do not openly report on the events of all ceremonies due to vows of secrecy. However, we can gather a limited amount of



information by what is reported and the observations of spectators.

Ethnographer Michael Atwood Mason documents many different rituals and practices surrounding Babalú-Ayé. According to his account of one Babalú-Ayé ceremony:

Some people promise to push a "carretilla," a little cart. Like the modest altar for alms, these improvised and portable points of praise usually include a statue of San Lázaro. Often he wears a cloak made of burlap and red cloth—just like the famous "miraculous image" of San Lázaro within the sanctuary. The carretillas usually include offerings of flowers, candles, and coins for alms. Sometimes you can see people offering cigar smoke to the image—just like people in the Afro-Cuban traditions blow smoke onto their altars.

Many make these acts of devotion because they made a promise and they are keeping their word to the spirit after he granted their petitions. Still others do these things as acts of prayer, compelling gestures designed to get the god's attention. Some people dress in sack cloth and carry crutches. They walk "jorobado"—hunchbacked—just like Babalú-Ayé did when he was wandering the desolate places of the Earth.

But the imitations of San Lázaro and his alter ego Babalú do not end here. At his darkest moment, Babalú was completely crippled and could not even walk. But so urgent was his journey that he kept moving forward, dragging himself along the road toward his destination, or dare I say it, his destiny. And people do just that: They lie down on the ground and drag themselves forward. Others lie on their backs and use their legs to propel themselves (Mason).

Atwood's description of Babalú-Ayé contains many elements from both the iconography of Saint Lazarus and the African legends about the deity. Another account by online blogger Felix Ricardo describes different aspects of the ceremony such as:

My father had set up that San Lazaro shrine complete with the beans, 10 candles, 4 on a white plate in the middle of it all, signifying my Father, mother, sister, and I. And a Purple & White cake in front of the shrine. And @12AM I gotta throw all those things away in a bag along with 17 pennies, as goes the custom (Ricardo).

Ricardo focuses less on the suffering part of the Babalú-Ayé ceremony and more on the birthday "celebration." Other accounts, such as the one from Sylvia Moreno of the Washington Post, show wide variation between different ceremonies depending on the community of practitioners. However, despite the variation, in Lucumí, Santería Babalú-Ayé is always worshipped as St. Lazarus.

From the limited sources available on present day worship of Babalú-Ayé in West Africa, scholars observe that the deity Babalú-Ayé is called by various names, including Shakpana by the Yoruba people (Ellis, 60), Sagbatá or Azo by the Fon people (Herkovits, 132), and Anyigbato or Sakpata by the Ewe people (Rosenthal, 61). Available literature, including print and other media sources, do not mention or portray worship of Babalú-Ayé as St. Lazarus. The lack of data that Babalú-Ayé is worshipped as St. Lazarus throughout Africa suggests that the practice is not widely spread within the culture. However, extensive fieldwork in West Africa, including throughout Nigeria, Benin, Ghana, and Togo, would be necessary to determine if St. Lazarus is worshipped at all today.

African religions have undergone continuous dynamic change motivated by political and social events in the lives of the practitioners.

"The specific social situations that slaves faced in their new environment, in a new social and ecological reality, determined the rise of some divinities not preeminent in Africa" (Fernández, 97). Babalú-Ayé became Saint Lazarus not completely by force, but the pressure put on African slaves to convert to Christianity cannot be ignored either. Anthropologists Charles Stewart and Rosalind Shaw explain that the terms syncretism and anti-syncretism are involved in the processes of identity formation and the construction of social borders. The idea behind the term syncretism is the need to create an explanatory category for studying religions, in this case the worship of Christian saints in Santería. The well-established identity of both Oricha and Catholic saints may be "a conscious, thoughtful strategy on the part of enslaved and liberated Africans in Cuba to organize their religious experiences in a meaningful way" (Murphy, 139). Rather than seeing the Oricha-to-saint correspondence as a disguise for African religions in the time of oppression, scholars must look at the ways in which the relationship extended and enhanced social and spiritual possibilities for the devotees. Babalú-Ayé as Saint Lazarus does not so much represent a loss of African tradition, but a change to fit the needs of Afro-Caribbean practitioners.

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#### REFERENCES:

- Abodunrin, Femi. *Blackness - Culture, Ideology and Discourse: A Comparative Study*. Bayreuth: Bayreuth African Studies Breiteringer, 1996. Print.
- Blackwall, Anthony. "Luke 16:19-31." *World English Bible*. [S.l.]: General, 2010. Print.
- Brandon, George. *Santería from Africa to the New World: The Dead Sell Memories*. Bloomington: Indiana UP, 1993. Print.
- Brown, David H. *Santería Enthroned: Art, Ritual, and Innovation in an Afro-Cuban Religion*. Chicago: University of Chicago, 2003. Print.
- Ellis, A. B. *The Yoruba-speaking Peoples of the Slave Coast of West Africa, Their Religion, Manners, Customs, Laws, Language, Etc.* Chicago: Benin, 1964. Print.
- Ellis, Alfred Burdon. *The Yoruba-speaking Peoples of the Slave Coast of West Africa*. [S.l.]: Chapman and Hall, 1894. Print.
- "Emancipation: The Caribbean Experience." University of Miami Libraries Digital Library. University of Miami. Web. 04 Apr. 2012. <<http://scholar.library.miami.edu/emancipation/religion1.htm>>.
- Friedson, Steven M. *Remains of Ritual: Northern Gods in a Southern Land*. Chicago: University of Chicago, 2009. Print.
- González-Wippler, Migene. *Santería: The Religion, Faith, Rites, Magic*. St. Paul, Minn., U.S.A.: Llewellyn Publications, 1994. Print.
- Herskovits, Melville J. *African Gods and Catholic Saints in New World Negro Belief*. United States: S.n., 1937. Print.
- Herskovits, Melville J. *Dahomey: An Ancient West African Kingdom*. New York: Augustin, 1938. Print.
- Idowu, Emanuel Bolaji. *Olódùmarè. God in Yoruba Belief*. London: Longmans, 1966. Print.
- Illes, Judika. "Babalú-Ayé." *Encyclopedia of 5,000 Spells*. Harper Collins, 2008. Print.
- Lindenfeld, David F., and Miles Richardson. *Beyond Conversion and Syncretism: Indigenous Encounters with Missionary Christianity, 1800-2000*. New York: Berghahn, 2012. Print.
- Mason, Michael Atwood. 2009, 2010, 2011, 2012. "Baba Who? Babalú!" Blogspot. Web. 22 Mar. 2012. <<http://baba-who-babalusanteria.blogspot.com/>>.
- Fernández, Olmos Margarite., and Lizabeth Paravisini-Gebert. *Sacred Possessions: Vodou, Santería, Obeah, and the Caribbean*. New Brunswick, NJ: Rutgers UP, 1997. Print.
- Ricardo, Felix. "Babalú Blog: Babalú Aye." Web. 03 May 2012. <<http://www.babalublog.com/>>.



archives/001249.html>.

Rodriguez, Omar. "Emancipation: The Caribbean Experience." University of Miami Libraries Digital Library. Web. 03 May 2012. <<http://scholar.library.miami.edu/emancipation/religion1.htm>>.

Rosenthal, Judy. Possession, Ecstasy, and Law in Ewe Voodoo. Charlottesville: University of Virginia, 1998. Print.



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