FURJ

The Fordham Undergraduate Research Journal

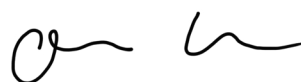# Letter from the Editor

Dear Fordham Community,

It is with great pleasure that I present Issue I of Volume IX of the Fordham Undergraduate Research Journal. This Issue is the first of two to be published in print for Volume IX. This is the first year that FURJ will be putting out two print issues with the hopes of showcasing even more outstanding original research conducted by undergraduate students than ever before. The research presented in this journal showcases various disciples including economics, history, literature, sociology, anthropology, and computer engineering. Fordham holds a tradition of academia and encourages students to be fierce in their pursuit of knowledge. FURJ aims to present the incredible research that is conducted on our campuses on an expressive platform.

The publishing of this issue would not have been possible without the tireless efforts of our talented Editorial-Board and their staff members, encompassing our double-blind peer review process, several rounds of copy editing, multiple interviews with our news staff, and artistic vision of our design team. In addition to the students involved in all aspects of putting this issue together, I would like to express my immense gratitude for the Faculty Advisory Board and faculty members who volunteered their time to review articles and share their expertise. Our faculty and peer reviewers ensure our submissions are held to the highest standards.

Lastly, the Fordham Undergraduate Research Journal would not be possible without the continued support and guidance of Dean Annunziato from Fordham College Rose Hill and Dean Gregoire from Fordham College Lincoln Center.

Pro Scientia Atque Sapientia. FURJ hopes to continue its tradition of excellence and continue to capture our students' zest for knowledge and wisdom. I urge students to become comfortable with being uncomfortable, to question the world around them, to engage in interdisciplinary discourse, and to not only participate in research, but to also share their findings with the world. This may be through a poster or oral presentation, or through publication in a journal like FURJ.

Yours Truly,

Onjona Hossain
Editor-in-Chief

A 15-Minute Journey Beyond Atoms

By Angie Kawanishi, *FCLC '21*

Dr. Efthimiades explaining one of the concepts he covers in his books.

Atoms, the basic entities that build up our world, were believed to be indivisible until the beginning of the 20th century. In fact, the name itself is derived from the Greek word "atomo," which means "without cut." Linked by the same root in their country of origin, Greece, is FCLC physics professor Spyros Efthimiades, who shares his passion for the world beyond atoms in his new book, *Quantum Mechanics in 15 Minutes*.

"Physics is based on just a few properties and principles through which we explain the simplest and the most complex phenomena," states Dr. Efthimiades. In the macroscopic world, or, the world that is visible to our naked eyes, two quantities determine the outcome of any physical event: mass and force. It was later discovered that electric charges and forces dominate the microscopic world, the world of atoms that is too small to observe with our bare eyes. Just when scientists thought they had explained everything around the end of the 19th century, from how electric forces bind atoms to how electric and magnetic phenomena are interrelated, a few discoveries at the beginning of a new century shook the core of classical physics.

It all began with the discoveries that light consists of particles called photons (1905) and that atoms are composite particles made of negatively charged electrons moving around much heavier positive atomic nuclei (1911). This meant that atoms were not only not the smallest piece of matter

and inseparable as people thought they were, but they also consisted of smaller components that function in a strange and utterly unanticipated way. According to Dr. Efthimiades, these discoveries led to the realization that the truth of the universe is hidden below the macroscopic and microscopic world and beyond the scale of individual atoms. So, we have entered a new phase of scientific exploration, the description of the fundamental particle-scale phenomena through quantum mechanics, which is what Dr. Efthimiades' book investigates.

Dr. Efthimiades has been fascinated by this subject all his life. After completing his education in physics at the Aristotelian University of Thessaloniki in Greece, he moved to New York and received a Ph.D. in physics and an MA degree in computers from the City University of New York. His research includes quantum electrodynamics as well as the derivation of the Schrodinger equation, both of which are defining parts of quantum mechanics. Having just received the honor of Bene Merenti medal from Fordham University last year, he marked his 40th year of teaching at Fordham. His passion for physics and promoting a better understanding of quantum mechanics extends beyond the classrooms, which evidently served as his motivation for writing this book.

Quantum mechanics is about looking at the world from the perspectives of the smallest quantities and understanding the most fundamental origin of physical phenomena on the parti-

cle scale, "Like how electrons 'move' around the nuclei, the way photons reflect off the atoms of a mirror, and many other phenomena, almost everything... that could not be explained with classical physics." Dr. Efthimiades continues. "From the times of ancient Greece, it was realized that nature hides its secrets. This turned out to be more so regarding how particles interact. However, nature is open to questions. In particular, every time we conduct an experiment, we ask nature a question. The result of the experiment is nature's answer."

In his book, Dr. Efthimiades aims to provide an up-to-date and comprehensive overview of our understanding of the theory of quantum mechanics. Starting with the wave properties of particles, the concept that builds the foundation of quantum theory, *Quantum Mechanics in 15 Minutes* covers the unique characteristics of photons, electrons, and nuclei, and presents groundbreaking scientific questions and experiments that have pushed forward the development of quantum mechanics along the way. "For example, in the first chapter of the book, by looking at the outcome of a simple experiment we realize that, at small scales, particles exhibit wave properties. Our interpretation of the wave properties of particles becomes the fundamental principle of quantum mechanics through which in the rest of the book we apply to explain a series of outstanding quantum phenomena."

"You see, different physical phe-

nomena have different dominant characteristics and are described in different ways at different physical scales. Take light for example," Dr. Efthimiades says. "Light is described by light rays on the macroscopic scale, by light waves on the microscopic scale, and by particles (photons) that have wave properties on the particle scale." The unveiling of light's wave-particle duality is what became the inspiration for quantum mechanics, because up to 1905 A.D., scientists believed that light is a wave phenomenon. "They should have known better," Dr. Efthimiades jokingly remarks, "because photography had been used since the 1820s. If they were careful, they would have noticed that photographs consist of little dots, and with a little experimentation, they would have confirmed that light is carried by particles very early on. Instead, it took a very long and torturous theoretical road to discover that at the beginning of the 20th century."

Probability, another immensely intriguing concept in quantum mechanics, is also addressed in the book. In opposition to knowledge prior to quantum theory, which assumed that electrons revolved around the nuclei as planets revolve around the sun, each electron actually forms an "electron cloud" which describes the probability that the electron will be found at any one location. As stated by Dr. Efthimiades, one of the most significant distinctions between quantum mechanics and classical physics is that while in classical physics processes (e.g., the trajectory of a falling body), there is only one definite outcome, in the quantum world, however, alternative outcomes may happen with specific probabilities, which makes the detecting and studying of subatomic particles like electrons more complicated but more compelling at the same time.

The effect of quantum mechanics can be seen in our everyday lives. We are in constant interaction with the quantum world without realizing. "Have you ever wondered, why do we only see one reflection when we look into the mirror while there could be millions of alternate paths the photon waves could have taken? Why do we observe the whole spectrum of colors reflecting on the surface of a CD disk? Or simply why doesn't an atom collapse?" Dr. Efthimiades promises that this book will give an answer to all those questions. "We will explain

why photons reflect only at equal angles (which is why we see ourselves in a mirror), why radioactive decays happen with specific probabilities, as well as how the electron produces the "electron cloud" around the nucleus. Furthermore, we will see that the electric forces arise from the exchanges of transient photons produced with borrowed energy."

Dr. Efthimiades' statement that physics is based on only a few principles applies to quantum mechanics as well. Looking at the particle scale of physical phenomena, it is truly remarkable what quantum mechanics suggests about the nature of human existence, Dr. Efthimiades says, "Light in the form of transient photons is the glue that holds matter together. We are made of electrons, nuclei, and light!" Quantum mechanics is a complex subject, but it doesn't change Dr. Efthimiades' incredible passion and optimism about the future of this field. He believes that as people in the past three centuries through classical mechanics and the theory of electromagnetism realized that the physical world is not a pattern but a dynamic arena of interacting bodies, in our time people will undoubtedly achieve a deeper understanding of physical reality through the theory of quantum mechanics. "Any phenomenon that looks mysterious to us is because we have not found the missing links, the missing properties and principles which matter at its scale. We have to look at the particle scale without preconceived notions and discover the missing keys. And it is not all that difficult."

"One of the goals of my book is to make the fundamental principle of quantum mechanics familiar to the readers through different examples. And once we get familiar with it, we will not only understand how successful, exact, and understandable quantum mechanics is, but it will also shift our perception and attitude toward the nature of physical reality. After all, the origin of physical phenomena, is quantum."

Dr. Efthimiades' book uses descriptions rather than mathematics to elucidate the principles of quantum mechanics. He wants to put the emphasis not on calculations, but on understanding the fundamental concepts and the way they can be applied and give answers to scientific questions. As suggested by its name, *Quantum Mechanics in 15 Minutes* is a short book. Nevertheless, Dr. Efthimiades

believes its topics and explanation may stay with the reader for a long time due to the questions, the answers and curiosity it will inspire within the reader. This book succeeds in managing to maximize the effectiveness and conciseness of every single sentence and description with its short length. Since the introduction of quantum theory, countless studies have been done on the subject. The biggest challenge of writing this book, according to Dr. Efthimiades, was compressing the knowledge we gained over the last one hundred years, extracting the essence of it, and formulating it into a book that can be read in about 15 minutes. Unlike many other books of similar titles that claim to be a brief introduction to complex scientific theories, only to overwhelm the readers with either wordiness or oversimplification, Dr. Efthimiades emphasizes that his book will keep the promise of its title without downplaying the depth and intricacy of this fascinating subject.

In the last page of the book *Quantum Mechanics in 15 Minutes*, the readers will find a suggested further reading: *Quantum Mechanics in 30 Minutes*, which leads to *Quantum Mechanics in 60 Minutes*. Written by Dr. Efthimiades over the course of last five years, this series of books offers an introduction and overview of this subject in different scopes and depth, but they all share the effectiveness, captivation, and excitement about quantum mechanics. Both *Quantum Mechanics in 15 Minutes* and *Quantum Mechanics in 30 Minutes* can be found and downloaded from iBooks. The reader can also contact the author at sefthimiades@fordham.edu.

One thing that could not be represented in the books is Dr. Efthimiades' sense of humor, which is well known among his students. When asked how would he summarize his approach to writing these books, Dr. Efthimiades quotes an unofficial saying by Einstein: "If you cannot explain something in simple terms, then you have not understood it well enough," and laughs.

Filming through Forty U.S. Public Lands with a Conservation Lens

By Elizabeth Carr, *FCRH '19*   *Photos by Emily Argiro*

Black Hills, South Dakota was one of the many stops on Fenter's tour of the United States.

Left Joshua Tree National Park .

Below Fenter preparing to hit the road again outside the Grand Canyon.

Numerous studies have discussed that 97 percent of climate scientists agree that human activity is the most likely cause of climate warming trends. Further data shows that a warming climate means inevitable effects on weather patterns, global health, the economy, and of course, the natural environment of our planet. Numerous organizations and individuals alike are working to combat these issues through conservation efforts such as switching to clean energy when possible, eliminating single-use plastics, and reducing meat consumption.

It is no secret that New Yorkers are not often exposed to the natural environment which our planet has to offer - it is known, after all, as the "concrete jungle." This is why, with an environmentally-friendly mission in mind,

FCLC senior Audrey Fenter took off during June 2018 on a national parks road trip to document lands protected by the U.S. government across the country. Visiting a total of forty protected public lands over a month long period, Fenter "wanted to capture the natural landscape on film to give people in NYC a portal into places different than here in hopes to show why conservation is important, in hopes to inspire them."

The project, titled "Natural Runaways," doubles as her senior thesis, which will be on display in May 2019. It consists of a documentary film and photographs taken by her and her team, including post-trip interviews of numerous New Yorkers' thoughts on sustainability. Her videography success is the result of her former

road-trip travels, where she consistently created short films documenting her journeys. With the passion for film and environmental conservation, Fenter applied for and received two grants from Fordham for her project: the Dean's Undergraduate Research grant and the Lipani Grant, a grant specifically for Visual Arts students. With these grants, former road trip experience, and her goal of sharing some of our country's most beautiful landscapes, she was able to make "Natural Runaways" come to life. Fenter notes that she could not have had such success without her team of three friends: Emily, who handled photography for the trip, Chris, who served as assistant director for the film, and Ben, who handled the logistics along the way.

Coming to Fordham as a Humani-

tarian Studies major, Fenter has always had an interest in social justice and the world around her. Yet simultaneously, she's always been interested in the arts, taking film classes while pursuing humanitarian studies. "Arts have always been embedded in me," she explained, noting that she was involved in the arts throughout high school as well. Later in her Fordham career, she decided to change her major to Visual Arts with a concentration in Film and Video. "Natural Runaways" acts as clear evidence of her tying the two fields together.

While receiving funding to go on national park road trip seems like anyone's dream, Audrey explained how difficult it was to focus on conservation during her travels. She noted that the relationship between her goal of sharing her artistic vision while remaining environmentally conscious was complex, and harder than she had imagined. "It was especially important for us to consider the environment because there is a base level of hypocrisy that comes from emitting thousands of dollars of gas into the atmosphere, whilst also visiting conservation areas." She also discussed the struggles of creating as little waste as possible – noting the wastefulness of staying in hotels, where towels are washed every day, and how she and her team avoided eating out or buying foods packaged in plastic. Even simple efforts, such as having reusable cups, proved inefficient when they lacked a place to wash them out. "Going strawless is easy, until you're trying to drink on a bumpy road. Little things like that, things you would never think of.

> "...we can't just be spectators of the world and parks. We have to be active participants in its conservation and move forward ethically, if we want these places to last.

Again, if you visit these places, you fall in love with them. It is unavoidable to feel connected to their salvation, because you want to keep going back. Maybe it's a selfish motivation, but the visitors will reap the benefits if we all change our habits sooner, rather than later." Whether it's for selfish motivations or not, studies have shown that Audrey is correct – the time has come

to keep our landscapes from changing in the near future; it is on everyone to alter the way we live now in order to mitigate the negative effects of our habits as much as possible."As much fun as the trip was, it was also motivated by the a serious issue. It's important to recognize that we can't just be spectators of the world and parks. We have to be active participants in its conservation and move forward ethically, if we want these places to last."

To learn more about Fenter's project and process, visit NaturalRunaways.com. "Natural Runaways" will be on display at Fordhams Undergraduate Research Symposium on April 10th, as well as May 1st through May 11th at the Butler Gallery at Fordham's Lincoln Center campus.

Becoming an Agent for Positive Change:
Youth Development of Self Efficacy and Agency through Social and Emotional Dance Education In Aguas Frías, Colombia

By Caroline Shriver, Department, *Department of Latin American and Latino Studies and Department of Dance*

Around the world, young people seek confidence, relationship and leadership skills, and the self-efficacy necessary to gain personal and cultural agency in their communities and beyond. In under-resourced, post-conflict communities, a young person's fight for agency, both personal and cultural, is all the more challenging. Colombia offers a powerful example of this challenge. The nation's history of violence, political division, distrust, and poverty pervades Colombia's identity and social order. Consequently, Colombia is welcoming creative strategies for providing young people with the opportunity to achieve the personal and cultural agency necessary to break down these historic barriers.

In this paper, I seek to demonstrate how Colombia's tumultuous history and identity of conflict affect the country's youth today, and therefore demand an emphasis on social and emotional learning. This came to light during my travels to the rural community of Aguas Frías, in the Andes Mountains surrounding Medellín, Colombia. After teaching dance-based social and emotional learning classes in Aguas Frías, I found that a physicalized form of social and emotional learning gave students the opportunity to develop a degree of self-efficacy. By employing my own research in Aguas Frias and that of others in the field, I draw two conclusions on the positive effects of physicalized social and emotional learning. Physicalized social and emotional learning offers an effective strategy to combat Colombia's social order of conflict and provides a vehicle for young people to develop personal and cultural agency.

History of Conflict and Its Resonance Today

To understand the need to transform aspects of Colombia's current social order, it is necessary first to understand Colombia's history and how it affects the country today. Robert A. Karl, a Latin American historian, de-

Students preparing to perform their final piece in front of peers, friends, and family.

scribes Colombia as "famed for its revolutions and dictatorships," with "violence as an unyielding constant" in the nation's political and social progression.[1] In a detailed analysis of the life of Colombian political figure Alberto Camargo Lleras (1906-1990), Karl unveils "inherited hatreds" between liberals and conservatives, a division now engrained in the "parties' identities."[2]

While Karl illustrates divisions from the past, Santiago Villaveces-Izquierdo highlights the presence of Colombia's violent history in the mindset of Colombians today. Izquierdo notes that "our [Colombians] heaviest burden, but also our major constructor of national identity" is "a legacy of violence" based in division.[3] This identity of violence is evident in the recent murders of social leaders in Colombia. In a July 2018 *Colombia Reports* article,[4] Adriaan Alsema mourns the assassinations of 311 human rights activists that have taken place since the "the government signed peace with FARC guerrillas" in 2016.[5] While there is inconclusive evidence as to who is murdering these individuals, after speaking with various Colombians, I found

that there is enormous division in people's perceptions of the murders. Some place blame upon Álvaro Uribe and Iván Duque Márquez, the past and current Colombian presidents, respectively, while others accuse FARC or the 2018 liberal presidential candidate, Gustavo Petro Urrego. Evidently, the violence and division that coursed through Colombia's history remains a factor in the current social order, a social order in desperate need of innovative social and emotional learning projects to break down the culture of violence in Colombia.

In addition to political conflict, Colombia's violent social order is characterized by a machismo culture and gender violence. In her Vanity Fair article,[6] Maureen Orth interviews a female FARC commander and exposes the extreme cases of gender violence in FARC, a guerilla group that fought in the Colombian Civil War and prided itself on equality. "There was a toxic double standard," says FARC commander Elda Neyis Mosquera, or "Karina." FARC established a system of "misogynistic abuse" with "rapes, forced abortions, and the execution of women judged to be promiscuous."[7]

While FARC has been disbanded and the civil war has ended, Colombia's violent machismo culture is still engrained in Colombia's social order. In their *World Policy* article, Sara Lisa Orstavik and Andrés Lizcano note that "Colombia ranks 91 out of 186 countries in gender equity, which puts it below the Latin American and Caribbean regional average."[8] While this article dates back to 2013, the more recent 2015 United Nations Gender Inequality Index rates Colombia at 95 out of 188, highlighting a lack of progress.[9] While I did not witness extreme gender violence while in Colombia, I was exposed to the clear divide between men and women and adherence to restrictive gender roles. During my first week in Medellin, my host father told me that he was incredibly ashamed to be a stay-at-home dad while his wife worked in an office from 8 to 8. I found that this male shame is common and carries long-term consequences. In her article, "Colombia's 'New Men' Confront Machismo and Gender Violence," Anastasia Moloney notes that in Colombia, there is "pressure to conform to macho ideals" in which the man is the "breadwinner who imposes his will." This "macho ideal" is characterized as "the bully," who uses women to prove his dominance in society and is feared by many.[10] Evidently, the macho culture not only encourages violence against women, but also enforces a social order that praises dominance, power, and violence.

How can Colombia combat these destructive social orders and cultural norms of violence, gender equality, and division? I believe Colombia needs a new generation of confident, empathetic unifiers with a developed sense of personal and cultural agency who can lead the country out of conflict.

What Does It Mean to Have Personal and Cultural Agency?

Psychologists Barry J. Zimmerman and Timothy J. Cleary define personal agency as "one's ability to act independently," which can be determined or limited by gender, race, and class customs and norms.[11] One's personal agency, therefore, is informed by one's self-efficacy, or one's confidence in one's abilities. In *Wiggle Room*, Doris Sommer defines cultural agency as "a range of social contributions through the creative process."[12] According to Sommer, while the structures with-

in certain cultures can limit agency, culture can also serve as a "vehicle for agency."[13] While personal agency refers to a theoretical ability, cultural agency goes a step further, identifying a physical "public action" or "social contribution."[14] Ultimately, both personal and cultural agency are needed to affect positive change for oneself and for one's community.

How and Why Do We Develop Agency?

In *Wiggle Room*, Sommer describes various examples of cultural norms, values, and structures and explains how they can impact communities in both positive and negative ways. "The area in which humanist values are created and established" is Sommer's description of culture. She goes on to illustrate the ways in which humanist cultures can include the promotion of change-making as a value but can also thwart it.[15] In cultures where the value of change-making and the agency required for it are not promoted, interventions are necessary both to empower individuals and to change destructive social orders.[16] Therefore, according to Sommer, the development of a culture with values that promote positive change-making is the vehicle for the development of cultural agency.[17]

Through my dance-based social and emotional learning project as well as my review of research on studies similar to mine, I found that engaging young people in various social and emotional learning experiences that focused on confidence and self-efficacy develops the cultural agency necessary for change.[18] Social and emotional learning can take many forms, and a physicalized social and emotional learning program can offer a potentially powerful strategy, because as Sommer notes, "reason is not enough" to affect change.[19] I further conclude that the creative energy developed in specific examples of physicalized social and emotional learning can not only shift personal experiences, but also social norms. In order to bring young people into a culture of empowered change-making that is oriented towards peace, gender equality and self-efficacy, I chose a physicalized social and emotional learning intervention designed to achieve those outcomes.

Examples of Physicalized Social and Emotional Learning

The positive impacts of physicalized social and emotional education and its ability to contribute to the development of agency are evident in the following examples of youth development programs both within and outside of Colombia. These examples employ Sommer's approach to developing cultural agency: building a community based in a specific culture with specific goals.[20]

At the Escola de Dança in the poor Afro-Brazilian community in Bahía, Brazil, Lucia M. Suarez brings to light how high-level dance training serves as a form of cultural agency while simultaneously offering students the facilities needed to develop cultural agency. The school prides itself on its development of technically trained dancers, but also socially and emotionally educated young people who are "intellectually prepared to play a sensitive and conscious role in society."[21] Although Brazil holds a different history and identity than Colombia, Brazil has suffered and continues to suffer from violence, poverty, and corruption, such as the military dictatorship that lasted from 1964 to 1985.[22] Within Bahía, "there is no shortage of social biases and fears," which demonstrates a need for young people with personal and cultural agency who can break down the destructive social orders.[23] Escola de Dança combats the social order embedded in poverty and offers students a multitude of skills through dance-based physicalized social and emotional education. Suarez hones in on one all-encompassing tool for the development of agency: the idea of "social citizenship." In this dance school, students are offered a sense of "belonging," which is a frequent reminder that "they are human" above all.[24] Following Sommer's model, this dance school develops specific "humanist values,"[25] nurturing students' self-efficacy and confidence. The school develops a culture where young people can develop agency and provides a social and emotional education that goes beyond "reason," employing the mind and the body. Suarez concludes that while the school has not broken the cycle of poverty in Bahia, it has created an institution that "facilitates [students'] ability to question and alter the status quo."[26] This newfound agency allows students to develop "cultural practic-

es that constitute vehicles for change."[27] Suarez sheds light on the experience of one dance teacher at the school who discovered "dance as a language that has allowed her to become an individual who can assert her political presence and participation."[28] Through this example, one can observe that physicalized social and emotional education facilitates personal and social empowerment.

While Suarez analyzes how high-leel dance education uses the body to develop agency, the Men and Masculinity Collective (MMC) serves in poor communities throughout Colombia and combines role play, body painting, camping, dance, and theater to combat gender violence. As mentioned earlier, machismo culture continues to plague Colombian society.[29] However, using these various forms of physicalized social and emotional education, the MMC has changed the lives of young people, offering them a new sense of non-violent personal and cultural agency in their community. While the MMC does not use the term 'agency' in the direct sense as Sommer and Zimmerman do, it is evident that the MMC works directly to develop agency, both personal and cultural.

This development can be seen through the life of Camilo Bohorquez, who once perfectly embodied machismo culture. After witnessing gender violence at home and attempting suicide multiple times, Bohorquez joined the Collective and now, at age 22, helps lead workshops and continue the movement. In his interview with Anastasia Moloney, Bohorquez notes that "changing machismo starts with your body…it's about giving someone permission to touch your body with respect." While it is important to use words and logic to combat destructive social order, "reason is not enough"[30] to effect change in a society with an engrained machismo culture. Bohorquez tells Moloney that bodily practices of the MMC enabled him to become "a new man," who can cry, show emotion, and acknowledge the humanity of women and men. He told his mother to "be courageous and value [her]self," giving her the strength to stand up to her abusive father and change the lives of herself and her family.[31] It is challenging to gauge how a specific program or school can generate personal and cultural agents who can improve destructive social orders on a national scale. However, Bohorquez offers a clear illustration

of how the MMC was able to use the body as a vehicle for social and emotional learning, resulting in positive personal change.

My Research

Both the dance school and the MMC are long-term programs that work with young people and demonstrate how physicalized social and emotional learning can offer young people a unique set of skills from which they can develop personal and cultural agency. Because my dance-based classes in Aguas Frías lasted only one month, it is difficult to expect significant impact on young people's sense of personal and cultural agency. Nonetheless, I designed three specific exercises to create gateway experiences for my students to develop the skills that research suggests will lead to agency, specifically a sense of belonging, self-efficacy, and respect.

First, throughout my teaching, I began each class with the Welcome Circle. In the Welcome Circle, each student and I shared our names paired with a simple movement which was then repeated by the whole class. While students were hesitant and seemingly unwilling at first, over time both younger and older students began to say their names and execute a movement with more confidence and conviction. The Welcome Circle allowed students to link their voices with their bodies while acknowledging their peers. As I noted previously, Sommer writes that "culture is a vehicle for agency."[32] As with the MMC and the Escola Dança Escolar, my dance class strove to develop a culture with a "confer[ed] a sense of belonging"[33] that was designed to offer the development of agency. The Welcome Circle served as a way for students to recognize and solidify the community present for that particular dance class, and reminded students that they were entering a new space with unique and specific goals and values.[34] Furthermore, as I was a part of the Welcome Circle, it reminded students that I was part of their class, that I was learning alongside them, and that I was open to growing and learning just as they were. In offering them experiences of each other's humanity, I hoped they would internalize this value and, using their personal and cultural agency, spread it as a means of combatting violence, conflict, and division.

Second, in the Movement Inven-

tion portion of class, I continued to use physicalized social and emotional education to instill agency. In this section, students developed a single move that they each taught to the rest of the class. Each student's movement built upon the previous movement to generate a short dance, choreographed entirely by the students themselves. While Movement Invention's main goal was to foster creativity, it also worked indirectly to foster self-efficacy and agency by reinforcing my class as a culture in itself with specific values, goals, and expectations.[35] In challenging their creative abilities, students practiced "acting independently,"[36] honing their self-efficacy and personal agency. Furthermore, by learning to teach, lead, and respect their peers, students were reminded of the specific values present in the class community and culture, and that they were strong enough to lead the class, putting their personal agency into action.

Third, in the Partnering section, which began after the second week because it required a basis of trust and community, students learned to say "tengo confianza en ti" ("I trust you") prior to any physical contact. Paired with other physical trust exercises, this use of words as a reminder of trust prior to touch enforced the value that trust and respect are needed for people to have healthy interactions. Just as Bohorquez says his MMC classes offered an opportunity for "someone to touch your body with respect,"[37] this exercise served to strengthen the value of respect present in my dance classes and therefore the culture that my students could use to develop their personal and cultural agency.

Results

To evaluate the effectiveness of my class, I chose to conduct group interviews at the midpoint and conclusion of my project. All in all, approximately 60 students participated in the classes but only nine students, ages 8-14, participated in the interviews. Of the students interviewed, two were males and seven were females. I taught a total of 18 classes and all nine students interviewed missed two or fewer of the classes and participated in the final show. Because of the unstructured and voluntary nature of participation, I chose to capture the data from the interviews using qualitative methods. The questions in the interviews centered on exploring students' de-

velopment of three distinct skills and attributes of the class culture: a sense of belonging, self-efficacy, and respect, which research suggests leads to the development of personal and cultural agency.

Eight students articulated the development of a sense of belonging. Four noted that they "lov[ed]" being with or dancing with me, their teacher. One eighth grade boy noted that he "doesn't get along well" with most of his teachers and that he enjoyed being in class because "Caroline helped me with the steps […] she is a good example to follow." Because I was both the teacher and the investigator, students' comments about my role could be considered biased. Nonetheless, I share these findings because they were given unprompted, and I believe are evidence of a power of a strong teacher-student relationship. These comments suggest the central role that connecting with the teacher plays in developing a community of belonging. Furthermore, this sense of a community and belonging was identified by one elementary school girl who noted that she enjoyed class because it allowed her "to be with [her] friends who [she] love[s] so much," while an older student described how the class offered her a new, unexpected community: "I thought I already knew the people in the class really well…but I didn't realize how much love the other students had and how much love I would have for them."

My interviews also explored the second theme of the class: self-efficacy. In the interviews, students' comments illustrated that, more than any other skill, the class effectively developed self-efficacy, due to a clear link between physical mastery and feelings of positive self-image. While eight of the nine students described a new-found mastery over movement, seven students described the development of positive feelings, and five students linked their mastery of movement to their positive feelings. Students illustrated a sense of mastery: "I" learned to "motivate and drive myself," "I can move my body in certain ways," "I learned a lot of steps…and to express myself with my body," "I doubted myself a lot at first…but I was able to learn," "we were able to dance by ourselves" (without my direction). Students linked this sense of mastery to improved self-efficacy using the following words: "confident," "calm," "tranquility," "happy," "rejuvenat-

ed," "more free," "believe in myself," and "fun." Evidently, there is a clear correlation between the mastery of a physical skill and a heightened emotional states and self-efficacy. Furthermore, two students noted a link between executing the dance or specific exercises on their own and a greater sense of confidence in their own abilities. From this, I speculate that the ability to execute a skill independently offers young people a clear sense of confidence in their own abilities, and in turn, a sense of personal agency.

Finally, my own participant observation during classes suggests that students began to develop a heightened sense of respect for their peers. The interviews produced little evidence of students' development of respect for the physical dignity of others beyond the developments mentioned above. However, in sections of the class such as Movement Invention and Partnering, students' ability to work with others and learn the movements that others had created changed significantly throughout the four weeks. At the start of the program, in the Movement Invention section of class, students did not take seriously the movements of their peers and refused to learn them. However, by the last week, students remained engaged during this section of class, seeming to understand that their peers deserved the same respect as any teacher and as themselves. Furthermore, when I incorporated the Partnering section into class, students initially showed discomfort in touching one another and in saying "tengo confianza en ti" (I trust you) to their peers. However, after just one week, students seemed to execute both exercises with no discomfort. By the final classes they showed excitement for the Partnering section, asking me what time it was, and when they would get to partner dance with their friends. Based on the personal developments articulated in their interviews as well as my class observations, students seemed to develop a greater understanding of their own bodies and in turn, a respect for themselves and others.

Conclusion

In conclusion, participation in physicalized social and emotional learning classes can offer students the potential to develop agency and combat destructive social orders. Just as I participated in the Welcome Circle, I also

participated in the Movement Invention exercise as well as in the Partnering section. One of my most powerful learning experiences in Colombia took place when I participated in the Partnering section. I looked straight into a student's eyes, told him that I trusted him, and had him say it back with a smile before we danced with each other. After speaking with students about this part of class, I learned that they similarly felt the energy shift when those words were exchanged. Just as being a part of the Welcome Circle reminded students that I was part of the dance class community, my participation in the Partnering section established an even more powerful sense of community among my students. This community was built on a culture with a collective set of values. Sommer writes that "Culture is a vehicle for agency."[38] With these students, I found a culture of unity, respect, and passion for movement. I now realize that I personally developed a new and unparalleled sense of confidence, and self-efficacy. Evidently, being both a student and a teacher offers its own set of skills and paves the way for a profoundly strong personal and cultural agency. In communities, countries, and a world that seems entrenched in conflict, a young person's fight for a strong sense of self-efficacy and agency is at risk. This paper seeks to demonstrate how creative solutions, such as physicalized social and emotional learning, can offer young people the necessary skills to break the constructs of negative social orders.

Notes

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Jane Jacobs saves Washington Square Park: Activism and Postwar Womanhood

By Emma Quinn, *Department of History, Fordham University, New York, NY.*

Jane Jacobs claimed that she once overheard Robert Moses complain, "There is nobody against this … but a bunch of, a bunch of MOTHERS."[1] Moses was allegedly referring to the activist movements that were fighting against the development of Washington Square Park into a throughway that would extend Fifth Avenue further downtown. A monolithic and controversial presence, Moses fundamentally restructured New York and its public spaces in the mid-twentieth century. Traditionally, the 1950s and early 1960s are seen as a dark age of feminism in the United States, as women fled to the suburbs to become ideal housewives. However, Jane Jacobs and activists like Shirley Hayes played a fundamental role in preventing Moses' developmental spree from extending into Greenwich Village, which would change the neighborhood permanently. In particular, the fight to save Washington Square Park illustrates the strategies that women used to remain politically active in the hostile environment of the 1950s. These women strategically used language and institutions that emphasized their roles as mothers to persuade people of the validity of their cause. A comparison of letters sent by men and women to oppose the possible changes to Washington Square Park proves that women stressed the importance of their children's safety in their rhetoric, while men were more likely to draw from a wider range of arguments that represented their personal priorities. By working within the traditional role of a mother, Jacobs and women like her were able to foment political change without entirely stepping outside of their gender roles.

During World War II, women entered the workforce in unprecedented numbers. After the war, however, there was pressure for women to leave the workforce so that returning veterans could take their jobs.[2] Although the amount of women in the workforce remained slightly higher than prior to the war, millions of wartime female workers left the workforce.[3] The onset of the Cold War also led to
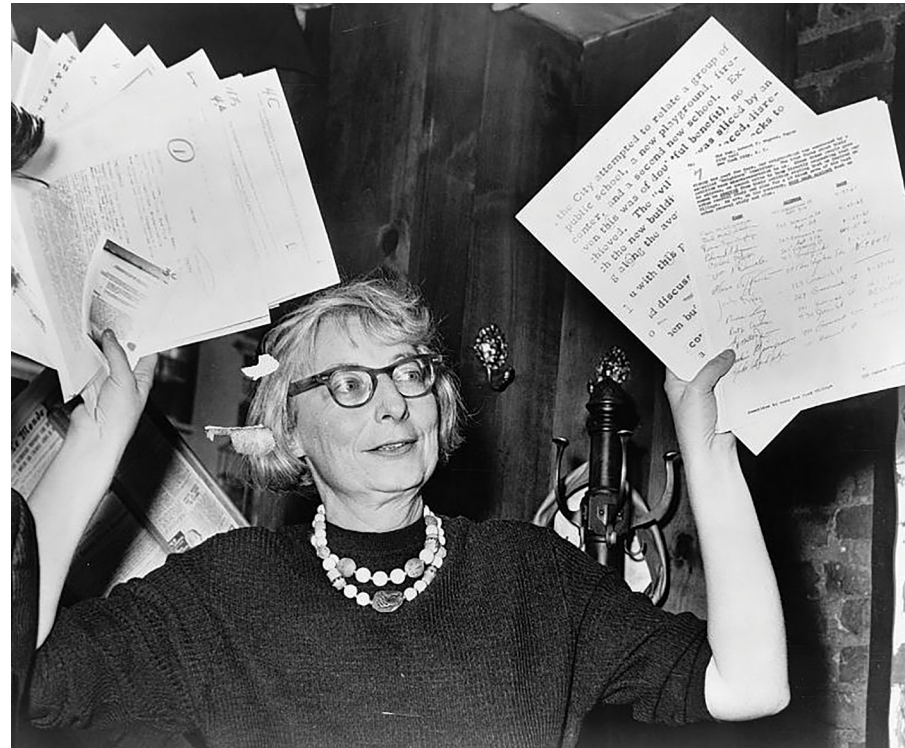
Jane Jacobs lived from May 4th, 1916 to April 25, 2006.

the fear of any kind of leftist radicalism, prompting a retreat into private life and away from political activism.[4] The restoration of the idea of female domesticity is made evident through Marynia Farnham and Ferdinand Lundberg's "Modern Woman: The Lost Sex," published in 1947. Farnham and Lundberg argue that regardless of how committed a woman is to her career, "her basic needs make themselves felt and she finds herself facing her fundamental role as wife and mother with a divided mind."[5] They, along with many other Americans, were concerned that women in the workplace were contradicting their natural inclinations to be housewives and mothers. Sara Evans argues that the deep anxieties caused by the Cold War created a strong movement towards strict gender norms. An *Atlantic Monthly* article declared that "It is for woman as mother… to restore security in our insecure world."[6] The strong reimposition of gender roles in this period made it difficult for activism to

flourish.

In spite of the restrictions that attempted to keep women in the domestic sphere, women remained vital members of their communities throughout the 1950s. In particular, they played large roles in organizations like parent-teacher associations that connected to their roles as mothers and wives.[7] These community organizations often became important resources to rally support for local initiatives. For example, in 1949, *parlor groups* of women in Queens were able to gather 5,000 signatures on a petition that fought against increasing gas prices.[8] While housewives usually did not play leadership roles in regional or national political organizations, they utilized the power of local networks to generate change in their own communities. These community networks were used by the women who fought to save Washington Square Park.

The women who fought to save Washington Square Park used their status as mothers to fight for change,

like many generations of women before. For example, the temperance movements of the latter half of the nineteenth century, spearheaded by the Women's Christian Temperance Union, denounced the legality of alcohol. Thousands of women involved across the country argued that alcoholism, primarily seen as a male character flaw, led to domestic violence, poverty, immorality, and even desertion. Their grievances were heard at the federal level in 1919, when the 18th Amendment was ratified, making the sale of alcoholic beverages illegal. By framing the issue of alcoholism as a threat to the American family, the WCTU and temperance activists were able to create change on a constitutional level. Jane Jacobs, Shirley Hayes, and the other women who fought against Moses' plan for Washington Square Park were not the first generation of women to use their status as women as a political bargaining chip.

The triumph of Hayes, Jacobs, and many other women from Greenwich Village over Robert Moses points to the power that largely female-led community networks can generate, even in opposition to men with enormous power and resource. Moses' plan was first announced to the public in February of 1952. While the park was already open to traffic, the new plan would remove the fountain in the center of the park and replace it with two fast-moving, one-way streets. A new playground would be built in between the two roads, just south of the Washington Arch. Moses hoped that having dedicated northbound and southbound roads would remedy the heavy traffic.[10] For Moses, this project was the next step in a series of infrastructure developments that he masterminded throughout New York City. The battle over Washington Square Park was largely fought through letters, newspapers, and petitions. These documents provide a written record of the many supporters of the Washington Square Park Committee, the group that organized resistance against Moses' proposal to extend Fifth Avenue through the park. In 1958, the Joint Emergency Committee to Close Washington Square Park to Traffic replaced the former organization and advanced a more radical agenda: to prevent cars from entering the park entirely.[11] Both men and women wrote to the Joint Emergency Committee to voice rea-

sons for their opposition to Moses' plan for Washington Square Park. Analyzing what these women wrote illustrates the correlation between their arguments in support of the park and their roles as mothers.

Women writing in favor of Washington Square Park often used rhetoric that was connected to their motherly roles. Part of this likely stemmed from

Robert Moses overlooking a model plan of New York City.

the fact that many women who had the power to represent an interest did so as members of parent-teacher associations (PTA) or other groups connected to schools. For many women, parent-teacher associations were one of the only political forums to which they had access, and so it became a central location for political organization. Mina Bersoff, the president of the PTA of P.S. 41, noted in a letter that a recent meeting "was unusually well attended because this subject was on our agenda."[12] Women were aware that parent-teacher associations provided a space for political action without stepping radically outside of societal norms. Associations tied to both private and public schools near Washington Square Park wrote to city government officials in an attempt to condemn the Moses plan, and overwhelmingly used arguments that centered on ensuring the safety of children. Judith Riccoboni, the president of the PTA for P.S. 8, wrote that the "safety and convenience" of all the children living in the area "must be the outstanding consideration when any plans for recreation areas are being made."[13] Frances Waldman, the secretary of the same organization, claimed that the plan to build a highway through the park "would create a hazard to our children."[14]

Mrs. Duane McKinney, the chairman of Downtown Community School's Parent Representatives Committee, agreed with the women from P.S. 8, saying that the new road would "create an intolerable traffic hazard for the children in the community."[15] Other leaders from parents associations at Elizabeth Irwin High School and P.S. 41 also used child safety as their main critique.[16] The majority of women's voices against the Moses plan utilized the same rhetoric that emphasized the safety of their children.

While Jane Jacobs used her role as a mother in her criticism of the project, her rhetoric was not limited to just that point. Both in letters and in publications, Jacobs tended to favor a more general argument that rejected city planning altogether, a philosophy that remained central to her writing throughout her career. In her most famous work, *The Death and Life of Great American Cities*, Jacobs extols the benefits of sidewalks and mixed-use neighborhoods, arguing that "eyes upon the street" ensure that law and order is maintained more effectively than simply a police force.[17] Large highway systems, like those that would cut through Washington Square Park, emphasized the importance of travel by car over travel by foot. Therefore, Jacobs disapproved of the encroachment of roads without sidewalks because they cannot maintain safety as effectively as busy public areas, like Washington Square Park or Greenwich Village as a whole. In spite of her general focus on the power of the "daily ballet" of people that maintain order in Greenwich Village, Jacobs also did refer several times to her children as a motivation to save the park. In her book, she refers to the important role of children in this system. They play in and travel through public spaces, and thereby benefit from the system she is discussing.[18] While explaining her commitment to Greenwich Village in a letter to Mayor Robert Wagner, she emphasizes that she and her husband "are raising our three children here."[19] While this is not central to the letter in the way that children provide the moral urgency to protect the park for other women, it is still an essential component of her argument. Jacobs' writing does not focus as heavily on children directly as other women, but children are still an important part of her argument.

Jane Jacobs also spearheaded the

utilization of children as a physical symbol of the movement. Children were often used to collect signatures for petitions. One reporter for the *New York Herald Tribune* wrote that people "couldn't go two steps without children appearing with handfuls of signed petitions."[20] Children became the public face of the battle against Robert Moses, and Jacobs herself would bring children to Washington Square Park on the weekends to collect signatures. Her son, Ned Jacobs, who participated as a child, believed that the use of children encouraged people to participate in spite of the lingering fears of the Red Scare. "I would go up to them and ask, 'Will you help save our park?'" he recalled, and "their hearts would melt, and they would sign."[21] Children became a symbol through which women were able to be politically active without arousing controversy from the conformist 1950s. They were able to escape extreme scrutiny from fears of communism by utilizing the values of the family that were heavily present at the time.

It is important to note that by living in a neighborhood like Greenwich Village in a major city, Jacobs was subverting the ideal of a suburban, middle class family. She, along with thousands of other women at this time, raised children in urban New York City, an environment that was clearly distinct from the suburban ideal. Jacobs, aside from her political activism, also worked outside of the home as a journalist and author. In doing so, she rejected the idea that Farnham and Lundberg had asserted. However, she still justified her political activism against Moses' project in part through her status as a mother. Although Jacobs did not entirely align herself with the American ideal of womanhood, she still used it as a rhetorical tool in her activism.

While some men also argued on behalf of children against the Moses, men were more likely to focus on other objections, including property values and traffic issues. The men who opted to focus on the safety of children usually worked with the children and were typically writing on behalf of a school. For example, Paul C. Weed Jr., the vicar of St. Luke's School, wrote to Shirley Hayes that "it would seem to be poor policy to increase the danger for the children." Other men, however, opposed the Moses plan for a variety of reasons. Many com-

plained that adding a popular road to the area would increase ambient noise and traffic to a largely residential area. Norman C. Strong wrote in a letter to Mayor Wagner that the Moses plan "would completely ruin the quiet residential aspect of this old neighborhood."[23] Others claimed their status as taxpayers or property owners to emphasize the importance of their opinion.[24] Another group argued that this development would result in a booming population that could damage the community of Greenwich Village.[25] In general, men were more likely to speak for the community as a whole, whereas women were more likely to speak as mothers on behalf of their children. This disparity further emphasizes that women used their roles as women to argue against the Moses plan, while men were able to approach the same problem from a variety of different perspectives.

In general, the correspondence examined within this paper illustrates the balance that woman activists in the 1950s had to maintain, even in New York City. Women could access few explicitly political groups without fearing backlash during this era of strict gender roles. Thus, they used their roles as mothers to enter the political arena. On the other hand, men were more easily able to independently express their opinions in their own right. Even Jane Jacobs, although she spoke independently of any organization, still ultimately tied her argument against Moses to safety and children. Regardless, the activism of Jacobs and the women of Greenwich Village defeated Robert Moses and saved Washington Square Park from being divided by a major road. Even a time when many women were restricted to domestic affairs, women like Jacobs were able to use their domestic roles to generate political change.

Notes

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16. Florence Friedman, Letter to John Bennett, October 13, 1953, and Edith Beube, Letter to John Bennett, October 13, 1953, Shirley Hayes Papers, NYHS.
17. Jane Jacobs, The Death and Life of Great American Cities, (New York: Random House, 1961), 35.
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21. Ibid., 85.
22. Paul C. Weed Jr., Letter to Shirley Hayes, March 21, 1952, Shirley Hayes Papers, NYHS.
23. Norman C. Strong, Letter to Mayor Wagner, May 16, 1955, Shirley Hayes Papers, NYHS.
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A Political, Economic, and Social Analysis of "Crisis" in the Dutch Republic of the late Sixteenth Century and Seventeenth Century

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The crisis theory of the 17th century has divided historians due to the diverse yet unstable nature of European society, the economy, and politics during the 17th century. The Dutch Republic is often used as a counterexample to the crisis theory due to the commercial success of the Republic that brought about prosperity and the Dutch "Golden Age." The Dutch Republic is analyzed here to determine whether a crisis developed in the political, economic, and/or social spheres during the middle third of the 17th century. Socially, the Dutch Republic exhibited characteristics of a crisis during this period. Although the political and economic events alone may not be considered indicative of a crisis, they contributed to this social distress found in Dutch society in this period. These findings challenge the basis of arguments against crisis theory and provide an alternative view of Dutch society in the 17th century.

Introduction

Seventeenth-century Europe is marked not only by the emergence of the nation-state and political and financial institutions that resemble those found in the modern era but by a subtle undertow constituting social, political, and economic distress that culminated in what some historians refer to as a "crisis." A crisis in this context is defined by Theodore Rabb as short-term distress, doubt, and instability featured in the economic, political, and social realm that reached its peak sometime in this middle third of the century, then de-escalated entering the eighteenth century, leaving in its wake stability (Rabb, 1975, p. 34). The crisis theory of the seventeenth century, as a relatively recent development in historiography, remains controversial yet satisfies historians' desire to give a label to this century and to describe the political chaos, intellectual turmoil, and general instability that mark this century. One region, however, confounds historians in the historiographical discussion of the existence and/or extent of the crisis theory: the Dutch Republic. The Dutch Republic endured political turmoil and economic change in the middle third of the seventeenth century that contributed to structural social instability characteristic of a crisis. The following essay will begin by presenting the past research pertaining to the Netherlands and will then discuss the political elements of crisis in the Netherlands, such as the power struggle between the regent oligarchy and House of Orange and the difficulties of achieving a balance of unity and loyalty among the sovereign and autonomous provinces of the Dutch Republic. Furthermore, the economic elements of crisis will be explained, including the price inflation of the seventeenth century and the change in structure of public finance during the century. Finally, the social elements of crisis will describe the cultural and financial frenzy of Tulipmania and the change in the baroque style of art in the middle of the century, followed by a conclusion describing the extent of the crisis in the Netherlands in the middle third of the seventeenth century.

Literature Review

The term "crisis" in the seventeenth century was first used by Eric Hobsbawm in 1954 and was quickly adopted as an umbrella term comparable to the "Enlightenment" and the "Reformation" (Rabb, 1975, p. 17). By 1975, Theodore Rabb provided a comprehensive argument for crisis theory including an explicit definition of crisis that was previously lacking in the literature (Rabb, 1975). A half century of debate regarding the definition, extent, period, or even existence of a crisis in the mid-seventeenth century has brought historians to an impasse with much agreement that the events of the seventeenth century had unique and radical qualities that lend the period some significance in the course of early modern history. One option is to investigate the Dutch Republic, which in its prosperity and relative stability seems to refute the crisis theory.

In this regard, literature concerning crisis in the Netherlands remains lacking given the propensity to use the Netherlands as a counter example to crisis theory. Yet some historians have analyzed the seventeenth-century Dutch Republic. Jan De Vries gave examples of where the Dutch Republic had some difficulties finding a market for its textiles in the late seventeenth century and experienced demographic fluctuations as the populations of maritime provinces grew but then declined after 1660 (De Vries, 2009). Maarten Prak did not contribute to the discussion of crisis theory but analyzed the political balance of the competing interests of the powerful merchants in the urban provinces and the agrarian society and nobility in the rural provinces of the Dutch Republic. He also described how a republic of sovereign provinces overcame social and demographic challenges to achieve loyalty and unity (Prak, 2008). Oscar Gelderbloom and Joost Jonker also avoided discussion of a crisis in the seventeenth century but described the transition of the public finance and debt system in the late sixteenth through seventeenth century (Gelderbloom and Jonker, 2011). Anne Goldgar provided a detailed analysis of the speculative frenzy surrounding tulips in the first third of the seventeenth century, referred to as Tulipmania, and its social implications and described the instability and doubt it wrought, though she did not reference crisis theory in her analysis (Goldgar, 2007). Some historians such as Peter Burke focused on the social aspect of crisis as it relates to the arts of the period and theorized a "crisis of representation" occurring prominently in European Art, and especially in Dutch Art (Burke, 2009). The following essay will seek to combine the observations of political, economic, and social instability from the existing literature to form an analysis of the extent of a

crisis in the Netherlands in the seventeenth century.

Political Balance and Unity for a Divided Republic

The northern provinces of the Netherlands declared themselves a Republic following the Treaty of Utrecht in 1579 and the Act of Abjuration in 1581, thus becoming a unique political confederation in comparison to the rest of Europe ("The Dutch Republic: Study Pack One"). Many historians have pointed to this unique political status as an example of the inability to categorize the Dutch in the crisis theory literature because it removed the element of a monarchy to threaten the autonomy of provinces and chartered towns that feared the imposing power of a centralizing authority (Schöffer, 1997, p. 91).

Overall, the Dutch Republic faced two unique and significant challenges in its political structure that emerged from 1581 until its recognition by Spain in 1648. Over this period, the Dutch Republic featured a power struggle between the regent oligarchy consisting of wealthy merchants and artisans who were located primarily in the urban, maritime provinces and the House of Orange-Nassau supported by the landed nobility, often found in the countryside (Rabb, 1975, p.18). The declaration of independence and the formation of the Dutch Republic only placed more emphasis on the question of power within a republic and encouraged conflicts between the growing merchant class and the established nobility. The struggle manifested itself in the political crisis between Johan and Cornelis de Witt and the *Stadholder*, William of Orange. The growing power base of republican Johan de Witt clashed with that of the nobleman William of Orange, and following Johan's fall from grace, Johan and his brother were torn limb from limb by a raging mob ("Johan and Cornelis de Witt"). This struggle between the regent oligarchy and the House of Orange was alleviated somewhat when the main contender for the House of Orange, William of Orange, accepted the English throne, becoming William III of England. The loss of a powerful head of the House of Orange lessened the authority of the nobility in the struggle, allowing the conflict to settle going into the eighteenth century.

Although the Dutch Republic pro-

claimed itself a unified Republic, the provinces and some cities remained distinctly sovereign, which posed the problem of maintaining loyalty and unity among the provinces, especially in the face of impending invasions such as those by Spain in 1621 and France in 1672. This struggle would last throughout the century, finding stability through the implementation of several measures enacted by the beginning of the eighteenth century (Prak, 2008). Firstly, Prak considered the Dutch Republic unique in its political situation given that the Dutch people had a "low cost of exit" and many "opportunities to voice their opinions" through leaving the Netherlands via easily accessible borders in protest or by mobilizing riots and creating petitions, respectively (Prak, 2008, p. 62). Therefore, it was necessary for the Republic to find an equally unique solution to gain the loyalty of the Dutch citizens. The Republic accomplished this by investing in new building projects to improve city centers, creating a formal process of citizenship that allowed for another conduit of loyalty, and establishing a welfare state that targeted the poor and middle class. Finally, the Republic resolved the tensions between the authorities and the Dutch people by improving transparency and equity in the tax system (Prak, 2008, p. 62-65).

These power struggles were concentrated from the end of the sixteenth century through the seventeenth century as the Dutch Republic first declared its independence and had to navigate its first century of independence in the face of a unique political and social structure. The Republic, though it lost economic and international power, remained politically stable in the eighteenth century or at least lacked the initial power struggle between competing factions, the regent oligarchy and the House of Orange, and the struggle to maintain loyalty among sovereign provinces and a people with means to easily exit the Netherlands in protest and voice their opinions. By the eighteenth century, the Netherlands would not face the same political struggle that is unique to a country establishing its independence, resolving conflicts from the global trade, and experiencing the increase in power of the merchants. While this transition to independence is significant and transformative for the future of the Netherlands, it is not in itself a crisis as defined by Rabb.

The political process spanned the late sixteenth through the late seventeenth century, rather than the middle third of the seventeenth century. It was not so much a violent, brief struggle or short period of unrest as it was a more subtle and long-term competition between the regent oligarchy and the House of Orange and a mutual attempt to seek the balance of unity and loyalty with the provinces of the Republic. Although the political balance of the seventeenth century in the Dutch Republic was not in itself a crisis, there were economic and social elements that resulted from this political struggle that could be defined as a crisis, as will be investigated below.

The Restructuring of Public Finance and "Recentering" of the European Economy

The economic prosperity of the sixteenth century, ushered in by increased international trade and an injection of new wealth from the Americas into the economy, was met in the early seventeenth century with price fluctuations throughout Europe, including the Netherlands. The Netherlands faced an additional challenge in the question of public finance, with the vast cost of war requiring a restructuring of finance and even government to form a more centralized authority.

The transition from the prosperity of the sixteenth century to the economic decline of the seventeenth century is often attributed to changes in prices, population, and methods of production. Jan de Vries specified the first half of the seventeenth century as being indicative of what historians often consider the period of economic crisis where "evidence reveals unmistakably a widespread and often severe setback, the reversal of a long expansionary trend" (de Vries, 2009, p.164). The "price revolution" of the sixteenth century through the first half of the seventeenth century was followed by a price decline beginning in the second half of the seventeenth through the early eighteenth century (de Vries, 2009, p. 156-157). It is still unclear if this period of rising prices indicated a crisis or whether it was a period of recession in the natural economic cycle whose severity was exaggerated due to the unusual prosperity of the previous century. Similarly, while the Dutch Republic did enjoy greater prosperity than elsewhere in Europe,

the economy faced a "slowdown in the second half of the seventeenth century" (Gelderbloom and Jonker, 2011, p.3). The resulting decline in prices in the latter half of the century contributed to uncertainty within communities as fluctuating prices affected the public directly, where a crisis may be better felt, as opposed to political struggles that had less of an impact on citizens' daily lives.

De Vries defined an economic crisis as an event that exhibits "structural features" due to changes in the economy and demography (de Vries, 2009, p. 174). Two cases can be presented: firstly, the restructuring of public finance to cope with greater public expenses due to the increased cost of war and long-term public debt, and secondly, the "recentering" of the economic world of Europe in the Netherlands.

Gelderbloom and Jonker described the restructuring of the public debt system in Holland, the most populated of Dutch provinces, in the period following the Dutch independence through the early eighteenth century. Holland experienced strong economic growth in the first half of the seventeenth century, with public revenues having increased between 1591 and 1609 from 1,685,000 guilders to 14,417,854 guilders, an incredible increase in public debt (Gelderbloom and Jonker, 2011, p. 7). The level of total debt outstanding in the seventeenth century continued to increase and even reached 101,474,529 guilders by 1641 and 193,319,000 guilders by 1700 (Gelderbloom and Jonker, 2011, p.32). To deal with the greater cost of war in the seventeenth century, public spending and debt increased to levels never seen before across Europe. This increased public debt also became a permanent fixture among states, with states maintaining high levels of debt and changing the structure of the tax system and public finance system. This represented a departure from the decentralized system of previous centuries in which landed nobles taxed their own subjects according to their needs and avoided permanent debt as a part of public finance. Therefore, it was necessary to change the way in which public debt was structured considering that by 1648, short-term bills, a short-term form of debt for the government, accounted for 60% of Holland's debt. Short-term debt was less reliable for a country in the long run and fears of a rollover crisis plagued the government (Gelderbloom and

Jonker, 2011, p.10-13). Holland attempted conversion, redemption, and consolidation in the 1650s and 1660s in response to the threat of a rollover crisis due to the short-term nature of Holland's public debt. These three policy changes were largely unsuccessful, and Gelderbloom and Jonker described Holland's situation after the attempted policy change as "trapped in a public finance system of its own making" and public finance as having reached its limits (Gelderbloom and Jonker, 2011, p. 16). War broke out in the Dutch Republic in 1672 against both France and England, and once again, Holland struggled to produce funds for the war and resorted to taking on more debt. With the outbreak of war, there was a rush to find funds, and Holland was plunged into "its deepest financial crisis since the late 16th century" (Gelderbloom and Jonker, 2011, p. 18). Therefore, the Estates took drastic measures and renewed the wealth tax ledgers and took on a liquidity squeeze that triggered the formation of a local secondary market for bills and annuities (Gelderbloom and Jonker, 2011, p. 18). Holland was able to restore its public finance system with the Peace of Nimwegen and provide funds for the later war following William of Orange's ascendancy to the English throne (Gelderbloom and Jonker, 2011, p. 20-21). By 1713, Holland's public debt system had become a more heterogeneous mix of three types of annuities and lottery loans where before 1690, the public debt consisted of life and redeemable annuities (Gelderbloom and Jonker, 2011, p. 23). This restructuring of the public debt system occurred in the 1690s so that with the permanent public debt, Holland had a more varied system of loans to allow for greater borrowing and a better long-term debt structure. This change in the structure of the public-debt system is significant as it resembles nothing of the challenges that the Hollandish government had faced before the seventeenth century in terms of public debt and created a structure to allow for a new system of permanent long-term debt and a more centralized government.

Lastly, de Vries described the theory put forth by Braudel of the "decentering and recentering" of economic power centers in Europe, the idea that the economic center of Europe shifts throughout history (de Vries, 2009, p. 175). De Vries described Amsterdam as the "center of economic life of a

European world economy" that encompassed much of the world in the seventeenth century through part of the eighteenth century when it was replaced by London (de Vries, 2009, p. 175). The recentering represented more than simply a shift in economic power; it represented the change from a Europe with multiple economic power centers to a "single-centered urban system" that expanded the European economy globally. Furthermore, de Vries considered this a critical element that distinguished Europe's economic decline as a crisis as opposed to a cyclical change. This is due to the "uncertainty" and "opportunity for new initiative" created by the recentering that offered the potential for a structural change in the European economy rather than simply a cyclical change as Amsterdam became the major economic center in the seventeenth century (de Vries, 2009, p. 176).

A "Crisis of Representation" and Speculation in Dutch Society

Socially, the best representation of crisis within society is through the change in artistic style during the mid-seventeenth century and through the frenzied speculation of Tulipmania in the Netherlands in the first half of the century. Burke distinguished two phases in the crisis theory as it pertains to art, first in the stylistic changes noted in the early seventeenth century and more relevantly, the reactions to crisis such as war and instability apparent in artwork during the political and economic distress of the middle third of the century (Burke, 2009). Tulipmania, a speculative craze boosted by the popularity of tulips and collecting as a status symbol in Dutch society, was characterized by speculation, doubt, and unease as indicative elements of social instability in the third decade of the seventeenth century.

Burke referred to art in the context of a paradigm where a style of art is formed and first "followed with enthusiasm and later rejected," leading to an artistic crisis due to the shift in style (Burke, 2009, p. 244). The shift to the baroque style, which could represent a crisis according to the paradigm model, was characterized by a change in movement and mass and a break from the rules of classicism (Burke, 2009, p. 245). Burke argued that this stylistic shift or the shift to a new paradigm first occurred in the

early seventeenth century rather than in the middle of the century, though the Netherlands may be an exception. Rembrandt, the renowned baroque, Dutch painter active in the middle third of the seventeenth century, is evidence for the "crisis" in the arts taking place in the middle third of the century (Burke, 2009, p. 246). Furthermore, Burke did consider that there was a "major change in style around the middle of the seventeenth century," and although the baroque style was present throughout this period, the style did alter in the middle of the century, which Rabb described as a shift from struggle and instability to "genteelness and calm" (Burke, 2009, p. 248). Burke described this "resolution" in art as lacking the theatricality and shock value that was present in the baroque style at the beginning of the century. Burke also proposed a "crisis of representation" and a reaction found within art to the horrors of war and the instability from political crises occurring in the middle of the seventeenth century.

The theatricality and shock-value of art in the baroque style was a response to the gap between appearance and reality brought on by the discoveries of the New World and the scientific revolution. Burke called this the "crisis of representation" in seventeenth century art where relationships between a king and his subjects, a father and his family, and "traditional views of reality" were challenged by the new discoveries of the age (Burke, 2009, p. 249-250). Even among artists, the nature of depiction was challenged with some artists considering the purpose of art to improve upon the beauty of nature whereas the admiration and collection of tulips in this period in the Netherlands emphasized the superiority of nature over art for other admirers (Goldgar, 2008, p. 98).

The military conflicts between 1618 and 1648 caused a change in the way artists depicted war and military conquest with military scenes being depicted as unheroic and bleak, such as in *Plundering Soldiers*, a painting by the Dutch painter Wouwerman (Burke, 2009, p. 251). This suggests that the crisis of representation described above was closely related to political and military events of the time (Burke, 2009, p. 252). Another image was *The Threatened Swan*, which reflected the political crisis in the Netherlands in the 1670s, the power struggle between

The Threatened Swan by Dutch paintiner Jan Asselijn.

Johan and Cornelis de Witt and William of Orange that led to a ruthless mob tearing the de Witt brothers to pieces ("Johan and Cornelis de Witt"). The painting reveals how this political crisis caused a similar rift in Dutch society, instigating doubt and unease. Conclusively, Burke considered this period in the mid-century as a moment of turbulence within art, and though the art of the 17th century may not traditionally seem to be a crisis, the change in styles is dramatically significant and reflective of contemporary Dutch society (Burke, 2009, p. 261).

Although Burke did not consider the art of the period indicative of a crisis and granted that Rabb did, the change in the style of art at the mid-century when coupled with another social phenomenon lends a stronger case for crisis in the Netherlands in the mid-seventeenth century. Tulipmania represented "a social and cultural [crisis]" and presented the cultural struggle plaguing the Netherlands, with the influx of exotic goods due to international trade, the transition to capitalism, and the problems and frenzy that these new developments caused (Goldgar, 2008, p. 7). At the beginning of the craze in the early seventeenth century, tulips were linked with collecting in the Dutch Republic, a common pastime of the

nobility who collected exotic rarities, paintings, tulips, and shells as a sign of wealth and culture. This pastime of the affluent was also used by members of the rising merchant class to assert themselves as equally powerful and wealthy despite their "common" origins. Though wealth and prosperity are often associated with peace and stability, the rapid accumulation of wealth in the Dutch Republic due to trade agitated Dutch society and brought forth this class struggle that may have otherwise been less apparent. Another element of crisis was the challenge to traditional values such as honor once the speculation resulted in a financial crash. Value itself was put into doubt as Dutch society had to reconsider how to value an object, and fears came about of social breakdown, loss of honor, confusions of status, and breaking of trust (Goldgar, 2008, p. 18). Although Tulipmania only affected a small portion of Dutch society directly, it became a cultural crisis in addition to the increased trade of the time, growing power of the merchant class, and changing values. These combined challenges threw Dutch society into a struggle to create a new framework for society. Such a cultural change was therefore structural as it created a new framework for Dutch society and values. This, coupled with the change in art styles, bleak artistic themes that

appealed to patrons, and the uneasy cultural "mood" of the period, provide a strong case for a social crisis within society influenced by economic and political events during the middle third of the seventeenth century.

Conclusion

Based on the previous analysis, the political and economic events of the seventeenth century are not crises in their own right but in conjunction with the social and cultural climate of the period, exhibiting the underlying instability and unease indicative of a crisis. Despite clear political instability having plagued the Dutch Republic from 1581 and on, this period is too long to be considered a crisis and was not so significant in comparison to the revolts and instability when the northern provinces were a part of the Spanish composite monarchy. Similarly, the economic events of the period and the restructuring of the public financial system were significant but were elements of the gradual transition of the financial system that took decades to develop and was generally undramatic besides the liquidity squeeze of 1672. Defining this one period as a crisis would detract from the significance of the economic and political transition of the Dutch Republic that took place over the entire century. Crisis is most evident in the changes in society, culture, and values during the middle third of the seventeenth century as shown through Tulipmania and its cultural effects and the change in the style of art during the middle of the period. The political and economic events of the seventeenth century contributed to this social crisis that changed the values and culture that had persisted in the Netherlands over the previous centuries. This change caused instability but was necessary to provide Dutch society with the cultural framework to cope with and adapt to the future challenges brought by capitalism and industrialization. The social crisis, fueled by the political and economic changes, brought the Dutch Republic out of the shadow of the Renaissance and Reformation and into a new era.

This research contributes an alternative perspective to the understanding of Dutch society in the seventeenth century in analyzing social instability. Many historians focus on the Dutch Republic's nominal increase in wealth

during the seventeenth century but fail to consider the social atmosphere of the region, as influenced by economic and political events, as the strongest evidence of the extent of a crisis. The view proposed in this paper should encourage more scrutiny in analyzing the experience of the Dutch citizens in this period as an indication of crisis in the Dutch Republic. Regarding crisis in Europe in the seventeenth century, historians should consider art, literature, and the experience of the European peoples and communities when studying economic or political events. This provides a more comprehensive analysis of European society and is a stronger measure of whether a crisis occurred in Europe in the seventeenth century by understanding the general climate of society in the context of political and economic change.

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Venezuela's Road to Collapse: Using Hayek's Road to Serfdom to Explain the Venezuelan Crisis

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Venezuela: A Story of Ideas and Consequences

Venezuela is in crisis. Venezuelan citizens today reside in a country severely lacking economic, individual, and political freedom. On Freedom House's seven point scale, with one being the most free and seven the least free, Venezuela is ranked 6/7 for political freedom and 5/7 for civil liberties.[1] Additionally, Heritage Foundation ranked Venezuela 179th out of the 180 countries examined in its 2018 economic freedom index.[2] Yet, the crisis in Venezuela goes beyond this loss of freedom. The Venezuelan economy is in ruin. In 2017, its GDP shrank by 13.2 percent,[3] and as of June 2018, its inflation rate reached 46,305 percent.[4] This article intends to locate the ultimate cause of this crisis. Using Friedrich Hayek's theoretical framework established in The Road to Serfdom, we locate this cause in the Venezuelan citizenry's repeated calls for a planned, socialist economy that led them to grant increasingly more power to the government.

Yet, the mainstream media has not identified this cause. Both authors of this article were witness to a segment of Last Week Tonight in which John Oliver argued that the Venezuelan situation "is not just a story about socialism…it is a story about epic mismanagement."[5] An article from The Nation extensively elucidates this point. Its author claims that over-reliance on oil, corruption, and particularly mismanagement of currency triggered the decline.[6] Going even further, it adds that economic warfare from both inside Venezuela and from the United States has exacerbated the issues Venezuela currently faces. While these analyses may accept that socialism played a role in the Venezuelan crisis, they claim that certain proximate causes are not the fault of socialism but simply mistakes in human decision-making. This unwillingness to give socialism its proper blame does not come as a surprise. As Hayek writes early in The Road to Serfdom, it is difficult to accept "that the pursuit of

our most cherished ideals has apparently produced results utterly different from those which we expected."[7] The enactment of socialist policy often comes from the pursuit of ideals such as equality and justice. It is difficult to accept that pursuit of these ideals can bring a crisis as terrible as what Venezuela is currently facing. But in order to fully understand the Venezuelan crisis and prevent it from occurring in other places in the world, we must identify its root cause.

To do this, we turn to Hayek's theoretical framework in The Road to Serfdom. This work has been criticized by scholars such as Evan Durbin, Barbara Wootton, and George Stigler for presenting an "inevitability thesis": that "once a society engages in a little planning, it is doomed to end up in a totalitarian state."[8] However, this is an incorrect reading of the work. Instead, Hayek is "offering a *logical* rather than a *historical* argument."[9] This argument contends that if the people of a certain country pursue a socialist experiment for long enough, they will eventually forfeit their freedom and their prosperity. If the people stay committed to a planned economy, they will grant a large amount of power to the government. Subsequently, if the government has unrestricted power, it will strip its citizens of economic, individual, and political freedom, as well as institute policies that will cause the economy to suffer. This is what occurred in Venezuela, where the calls for socialism began in the 1970s with the nationalization of the PDVSA oil company but grew the loudest during the reign of Hugo Chavez. With the support of the people, Chavez began to march Venezuela down the road to crisis, eventually passing the torch to Nicolas Maduro, who has brought his country right to the end of that road.[10]

It is important to note that this is not a comprehensive analysis of Hayek. It is an analysis of The Road to Serfdom and its explanation of the ultimate cause of the Venezuelan crisis. In an article of this scope, we cannot represent the entirety of Hayek's political, social, and economic theory that he

crafted in his illustrious career. This is not an article about Hayek's vast theory of the political economy. It is instead a story about ideas and consequences. The idea of socialism properly pursued brought about all other proximate causes leading to the crisis in Venezuela. We must not accept the idea that these proximate causes and not socialism led to the crisis if we hope to avoid such a disaster ever occurring in the future.

The Venezuelan Road to Crisis

Early on in The Road To Serfdom, Hayek clears up any possible confusion about the definition of socialism. Socialism, he says, "is often used to describe, merely the ideals of social justice, greater equality and security."[11] But, this is not a precise description. Instead, socialism is a method of governance that replaces businessmen with central planners.[12] These planners craft "a central direction of all economic activity according to a single plan."[13] Hayek's contention is that once a society calls for such planning, it places itself on a road toward losing economic freedom, civil liberties, and political freedom, and a ruined economy. We believe that the most important part of this road is the slow transition from democracy to increasingly authoritarian rule. To elucidate why this must occur in a state that attempts to centrally plan its economy, Hayek explains that this planning requires choosing a "unitary end" for society.[14] Choosing this unitary end requires agreement on what goals are most important.[15] But no such agreement exists. People value goods and services differently than one another. It would be impossible to create a consensus amongst them about how much of each of these resources should be produced. For that reason, planning an economy around a unitary system of ends requires more agreement than a democracy can produce.[16] Even if an entire legislative assembly agrees that the economy should be planned, it is unlikely that they will each have the same plan in mind.[17] This gridlock

breeds dissatisfaction with democratic procedure amongst the citizenry, and "the conviction grows that if efficient planning is to be done, the direction must be 'taken out of politics' and placed in the hands of experts."[18] Next, as public support for a planned economy continues, the citizenry will begin to presume that "the responsible authorities must be freed from the fetters of democratic procedure."[19] It is here, Hayek contends, that dictatorial rule will commence, and political freedom will vanish. Broadly, Hayek is arguing that the public will grant power to the government in the name of planning more efficiently, until democracy itself ceases to exist.

This is precisely what occurred in Venezuela, beginning with the election of Hugo Chavez. Promising a new political system that would break from the previous right-leaning administration and the creation of a government that would end poverty and corruption, Chavez was elected president in 1998.[20] His plan was to start the Bolivarian Revolution, described as "the gradual and peaceful conquest of political power without an immediate break with the capital order, following the legitimate path of democratic radicalization to the creation of a multiple property system with the medium long term goal of overcoming the pillars of imperialist, monopolist, and latifundista domination and exploitation."[21] Inspired by his ambitious goal of centrally planning an economy in a manner that supposedly would bring favorable results to a chaotic Venezuela, the public consistently gave Chavez progressively more power throughout his reign. Not long after his initial victory, a public referendum approved a new constitution that increased presidential term limits from five to six years and converted the legislature to a one house assembly.[22] As a result of the new constitution, a presidential election was held in 2000, which Chavez won handedly with 66 percent of the vote.[23] After several years of implementing socialist reforms, he won a recall election in 2004 and his second presidential election 2006. With public support entrenched, he began to more aggressively seize power. This process included replacing his cabinet,[24] packing the supreme court,[25] and, most crucially, getting public approval on a referendum that eliminated term limits.[26] His power would only get further cemented several years later, when the assembly granted Chavez

eight months of rule by decree, during which he could unilaterally implement his socialist vision.[27] He only left office in 2013, when he succumbed to cancer.[28]

There is nothing in that summary of Chavez's continual accumulation of power that directly explains how it resulted in the travesties Venezuela faces today. Without any outside information, it would be possible to believe that Chavez used his unilateral power to make Venezuela into a thriving state. Chavez could have been a good man that wanted power in order to fight for the greater good. But Hayek explains why a planned economy will not be run by a benevolent ruler. He argues that the "general demand for quick and determined government action" in conjunction with a "dissatisfaction with the slow and cumbersome course of democratic procedure" breeds support for a strongman ruler, who the public believes will execute the plan most efficaciously.[29] Chavez's strongman tendencies primarily manifested themselves in the execution of policies that limited economic freedom amongst his subjects. Early in his career, he nationalized much of the Venezuelan oil industry and put in place high taxes on all private oil companies, endeavoring to force them out of business.[30]

Additionally, in 2001 his Organic Law of Planning established local councils on planning and district councils that created and controlled local business organizations like banks and manufacturing corporations.[31] More high profile expropriations would occur in 2003 with Chavez's Zamora Missions, which seized farms that were deemed unproductive and redistributed the 30,000,000 acres of land to 130,000 families.[32] Over the rest of his career, he expropriated several Orinoco crude oil projects, Fertinitro, one of the world's largest nitrogen fertilizer companies, 494,000 acres of land from British meat packing company, Vetsy Foods, and eleven Oklahoma based oil rigs.[33] Additionally, he nationalized Venezuela's entire gold industry, and bought state ownership of Banco de Venezuela.[34]

Chavez also enacted some policies that limited civil liberties, primarily the freedom of the press. In 2004, he passed the Social Responsibility of Radio and Television law, which gave the government authority to control media content.[35] In 2007, he stripped the private media company RCTV of

its media license while also nationalizing Venezuela's telecommunication industries.[36] All of these policies that began to erode the economic freedom and civil liberties of the Venezuelan citizenry came as a result of their consistent willingness to grant more and more power to the strongman Chavez, whom they assumed would be the most efficient executor of socialist policy.

The invasions of economic freedom and civil liberties only worsened when Chavez's successor, Maduro, came into power. Again, the primary motivator for these invasions was a decline in democratic quality. Hayek explains that typically, as the calls for planning grow, a country will eventually elect a ruler that organizes his party "on military lines," as this ruler will be the most efficient.[37] This was precisely what happened with Maduro. Promising a continuation of Chavez's policies, Maduro was narrowly elected as president in 2013.[38] Aligning himself with the military, he would have more power to execute Chavez's vision for a planned economy and more means to limit economic freedom and civil liberties while doing so.[39] First, Maduro continued the nationalization of businesses. While the government has attempted to hide information about its assets from the public, reports show that the country owns anywhere from 500 to 1,500 companies.[41]

With this much economic power, Maduro can decide who is worthy of employment and basic resources. His coveted oil company, PDVSA, continually expands its employment rolls to support his loyalists, despite the drop in oil prices.[42] Once holding around 20,000 employees in the early 2000's the PDVSA has now inflated its employment rolls to 120,000 workers.[43] Of the hundreds of other nationally owned businesses, a majority are running at a loss, held up only by oil profits so that others can remain employed.[44]

Furthermore, Maduro has gone even farther than Chavez in attacking civil liberties to uphold his power. In 2015, he denied an opposition majority in the National Assembly by not allowing four representatives to take oath.[45] Two years later, he would use police force to suppress protesters. From April to November 2017, 5,500 protesters were detained,[46] resulting in 100 deaths, 1900 injuries, and 600 of journalists.[47] With these recent crackdowns on protests, government in-

telligence operatives even went into homes to arrest individuals identified as threats. Once detained, those arrested were subjected to torture ranging from beatings and electric shock to sexual abuse and asphyxiation.[48] Research has also shown that key officials in the administration are fully aware of these occurrences, yet they have taken no steps to limit these abuses of power, and in many cases, have only downplayed their severity. The situation has grown so dire that Attorney General and Maduro supporter Luisa Ortega Diaz became an outspoken critic of the arrests before being fired by the Constitutional Assembly, while the U.N. Human Rights Council has now made Venezuela a priority.[49] Also in 2017 year, Maduro changed the date of gubernatorial elections, moved polling stations to districts that were more likely to support his party and reportedly used vote buying and voter intimidation tactics in order to gain more political power. As of today, his personally created National Constituent Assembly is working on a new constitution that we believe will grant Maduro near-dictatorial power, the final step in Hayek's transition from democracy to dictatorship in a planned economy. The new constitution will allow him further authority to take away the freedoms of his constituents. At this point, the Venezuelan citizenry has given so much power to the government that they likely will not be able to limit it, even if public opinion moves away from support for planning, as it seemingly has. Unlike during Chavez's reign, the public will not have the power to vote on what this constitution will contain. For those who do not support the Maduro regime, there is no method to air their grievances.

From the Loss of Freedom to the Collapse of an Economy

While we have used Hayek's framework in *The Road to Serfdom* to explain why calls for socialism can lead to the demise of economic freedom, political freedom, and civil liberties, we have not yet applied the framework to demonstrate how such an attitude would lead to the economic devastation Venezuela is experiencing today. This is where the most controversy lies and where objectors claim that mismanagement and not socialism is the cause of the economic decline. However, these naysayers err in their

unwillingness to trace the mismanagement to its original cause: the power granted to the government to decide economic matters. As we have seen, calls for planning the economy as a whole causes the citizenry to relinquish power to the government. When this newly powerful government attempts to plan, it requires it have enough knowledge to understand the needs and wants of society as a whole. As Hayek notes, this is an impossible task for any central authority to accomplish, "because all the details of the changes constantly affecting the conditions of demand and supply of the different commodities can never be fully known."[50] As Economics 101 teaches us, supply and demand properly allocates resources in an economy so that at the equilibrium price and quantity, quantity supplied and quantity demanded are equal. Therefore, in a free market, there is generally no surplus or shortage of goods and services. In order to organize the economy in a way that satisfies the needs of the citizenry, planners need to know the efficient price and quantity for each good and service is impossible. Under a capitalist economy, based upon competition, the price system "enables entrepreneurs, by watching the movement of comparatively few prices, as an engineer watches the hand of a few dials, to adjust their activities to those of their fellows."[51] The price offered for a good or a service gives entrepreneurs the information they need to know how much of their product to provide. A planned economy must determine its own prices and thus, due to limited foresight, will often get these prices wrong.

Another problem a planned economy faces is that planners must have the same incentives as the citizenry. This is commonly referred to as the principal-agent problem. Hayek writes that a centrally planned body must make choices between one economic goal and another. The chosen goals will often be different from those the people hope for, because so often technical experts are "found in the front rank of the planners," and these experts have specialized visions for society that are related to their fields of expertise. [52] The reason for this is clear: each expert could achieve his ideal society if it were "made the sole aim of humanity."[53] Hayek provides the example of "the magnificent motor roads in Germany and Italy" that came about through planning.[54] As magnificent

as these roads may be, they do not demonstrate that planning is more efficient than a competitive economy. In fact, such favoring of one project over another can cause "a misdirection of resources."[55] Hayek opines that "anyone who has driven along the famous German motor roads and found the amount of traffic on them less than on many a secondary road in England can have little doubt so far as purposes are concerned, there was little justification for them."[56] By favoring the road-building project over others, Germany and Italy likely syphoned off resources that they could have diverted to more important causes. All planned economies will run into this problem, because there naturally will be some experts in charge. These experts will favor particular initiatives, which will limit the resources channeled to other, perhaps more consequential goals.

It is these two features of planning combined that led to the mismanagement that ruined the Venezuelan economy. The experts in charge of the Venezuelan economy placed their faith in revenue from the oil industry as the means of supporting the country. Chavez used the revenues from the national oil company, the PDVSA, to fund massive social programs.[57] These programs, named the Bolivarian Missions, provided adult literacy programs, free community health care, construction of low income housing, and subsidies of food and other consumer goods.[58] This strategy demonstrated a favoring of social welfare over other economic ends, one of which was controlling inflation. The reforms he implemented had much to recommend them; during Chavez's tenure, income inequality and infant mortality fell, while secondary school enrollment rose.[59] Additionally, Chavez's reforms would result in his most prominent achievement: from 2002 to 2006 the Venezuelan poverty rate would fall 18.4 percent.[60] Yet, with this honorable endeavor came an over-reliance on imports and a reduction in national savings. As a result, by the time of Chavez's death, inflation was beginning to escalate, with rates hitting 22.2 percent year on year,[61] because the government needed to print more money to pay for all the imports.[62] It is also important to analyze the limits of Chavez's supposed achievements during his early years in office. In a study conducted by university professors Kevin Grier and Norman Maynard, the two men and their

team created a synthetic model for a post 1999 capitalist Venezuela by combining economic data from regions and states similar to Venezuela.[63] The results did not bode well for Chavez. Comparing the real Venezuela to their synthetic model, the study found that if Chavez never gained power, per capita income would have risen to around $2,500 more than it did in the real Venezuela with Chavez in charge.[64] The study also concluded that Chavez's achievements regarding infant mortality and life expectancy were not so impressive, as the drop in infant mortality would have been equal and life expectancy would have actually risen one year without Chavez.[65] Finally, while the study also showed that income inequality dropped more under Chavez's reign than it would have without him, it concluded that the difference was negligible.[66] Despite the fact that improvements to social welfare are typically considered the greatest achievements of Chavez's centrally planned economy, Grier's article demonstrates that in most categories, these improvements were not as valuable as some contend.

Additionally, the spending policies Chavez allowed led to an explosion of inflation soon after Maduro took power. With the price of oil dropping from 111 dollars per barrel to 27 dollars in 2014, the government quickly found itself out of the necessary money it needed to pay for its heavy import habit.[67] Foreign investment had largely dried up after the U.S. decreased its direct investment in 2011 in reaction to Chavez's policies, while the national savings were already too depleted to fund imports. Faced with only one option, the government had to keep printing more money to pay for its spending habits.[68] This, in turn, quickly led to hyperinflation much higher than the previous 22 percent year-on-year. In a misguided attempt to work around this inflation, the Maduro government responded by tightening price ceilings for basic goods and services with its Fair Prices Act of 2014. [69] Because the government did not, and could not, have the knowledge to set the price ceilings at the efficient price, which would naturally occur in a free market, problems ensued. The price ceilings were lower than the equilibrium rate, so suppliers had little incentive to produce these basic goods. With these price controls still in place in current day Venezuela, the country continues to face massive shortages

in food, medical supplies, and basic production materials.[70] The word *continues* is paramount here because some of the most severe shortages began under Chavez's reign, especially medical supplies. At the height of prosperity during Chavez's rule, medical supplies were constantly in jeopardy because his planning of health programs, called Barrio Adentro, favored check-ups over provisions. While over 200,000 check-ups would be given in the poorest sectors,[71] there was little money left for hospitals and traditional medical practices. As a result, only 28 percent of hospital beds in the public system were suitable for use, and thus, diseases like malaria and dengue fever increased 94 percent and 203 percent respectively from 1999 to 2008.[72] Therefore, while hyperinflation is one of Venezuela's largest problems at the moment, it has not caused any real new problems. It has just exacerbated old exacerbated old ones.

Other errors from the Chavez regime have also plagued the current economic landscape of Venezuela and have contributed to the shortages. A prominent example of these errors is a still-existent 2003 law that fixed currency exchange rates.[73] Again, without the knowledge to correctly predict the equilibrium exchange rate, the government's chosen rate caused massive market distortions. The problematic outgrowths of these distortions are twofold. Firstly, favored business, military personnel, and government officials, who are provided dollars by the government, are incentivized to sell these dollars at the black market exchange rate, which is much higher than the fixed rate.[74] These officials are capable of turning a massive profit by selling these dollars on the black market. Secondly, with all these dollars diverted to the black market, less are available for people to use in order to import the basic goods that the Venezuelan economy is currently lacking.[75] Then, when oil prices fell 50 percent, the government diverted these import dollars to pay off foreign debt. Unfortunately, the government now does not have enough dollars to give to importers to buy goods, leading to a reduction of imports by 66 percent since 2014.[76] As previously stated, the most extreme problems that Venezuela faces stem from these import shortages. They were the result of misguided policies on behalf of the government. But the root of these policies was not just poor leadership, but the power

that the people gave their government to plan the economy. With this power, the government naturally implemented policies that favored certain goals over others and then attempted to fix prices without knowledge enough to bring supply and demand into equilibrium.

The results were devastating, and in tandem with the decline of democratic quality, loss of economic freedom, and infringement upon civil liberties that the Venezuelan citizenry has faced, they demonstrate the ruinous effects that public calls for a planned economy can have on a society. Hayek's argument explains why these the calls were the ultimate cause of the Venezuelan decline. While some may claim that mismanagement, the poor leadership of Maduro, and U.S. sanctions led to Venezuela's current crisis, Hayek's argument indicates otherwise. His central point is that a country committed to central planning, like the citizens of Venezuela were to socialism, will yield more and more power to a single authority. Because of the order necessary in a centrally administered economy, the people will pick a strong ruler they believe is capable of bringing about this order. This is why, as Hayek says, it is not a historical accident that "the worst get on top."[77] If the people keep this leader in place for long enough, two problems occur. The first is that upon realizing democracy is simply a blockade to planning an economy, he will eliminate it. Once this leader is unfettered from the will of the people, violations of civil liberties will ensue.

The second is that, even if this leader is well-intentioned, he will not have the knowledge to plan an economy without trouble. It will be impossible to avoid economic crises in the long-run. Both of these problems came to fruition in Venezuela. The mismanagement of the Venezuelan economy and the poor leadership of Maduro were both symptoms of these problems, which were caused by the citizens' commitment to socialism. Additionally, U.S. sanctions on Venezuela may have deepened the crisis they currently face, but they did not force currency manipulations, price fixing, and commitment to certain projects over others. These were caused by socialist leaders who lacked the knowledge or proper incentives to correctly manage an economy.

Conclusion

Hayek warns us that blaming the wrong factors for current conditions dooms us to repeat our mistakes. No citizen of any country in the world hope to find himself in Venezuela's position today. However, if they do not realize what led Venezuela to crisis, they may see their countries slowly fall into a similar decline, unaware of the cause. To avoid this, heads of state, intellectuals, and even the layman must recognize one simple fact: Venezuela's decline followed Hayek's road to serfdom. It was the urge amongst the Venezuelan citizenry to centrally plan their economy that first put them on this road, and it was the continuation of that urge that forced them down that road and into crisis. This article may make it seem as if any country embarking on the path to socialism will end in crisis. This is not what we are contending. Instead, it is the repeated choice of the citizenry over a long period of time to demand a planned economy, that will force their country to a point of no return. Until the people have completely given up their political freedom, as we have seen occur in Venezuela, they may reverse their course by electing heads of state who favor a free market economy. Hopefully, with the root cause of the Venezuelan crisis identified, countries can begin to realize when they are marching down the road to serfdom and perhaps turn back.

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Environmental Conservation in the Era of Ineffective Governance:
How to implement environmental conservation laws in Brazil?

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ABSTRACT: How can society implement conservation laws in eras of ineffective governance? Research has often been used to support the application of environmental laws by the government. However, in eras of dysfunctional or ineffective governance, alternative perspectives on their implementation may be required. I propose new conservation approaches that are necessary for future generations to implement, strengthen, and improve conservation laws or efforts in eras of poor governance. In doing so, I suggest that good governance may be achieved through non-conventional means involving other bodies: environmental police forces, non-governmental organizations (NGOs), media, and educational and research facilities. Brazil offers a case study for the promotion, implementation and enforcement of conservation laws. This case study addresses the following questions: How does good governance protect the environmental resources of Brazilian communities, and what are its successes and failures?

Keywords: *governance, environment, environmental policy, environmental law, conservation, Brazil, resources, conservation law.*

Purpose

Ineffective governance plagues numerous countries by preventing growth and development.

I propose that good governance is required for a country's progress and success within numerous sectors. Tailored conservation approaches, conducive to good governance, are solutions to specifically remedy poor environmental conservation in areas with ineffective governance. Research on good governance and environmental conservation is the first step towards implementing Brazilian environmental policy changes. These conservation approaches can enable countries, including Brazil, to adopt sustainable policy changes that contribute to the evolution of society and future generations to come.

Brazil serves as a case study to observe the effects of good governance on environmental conservation. Brazil is beset by political corruption and social turmoil within and across different regions and municipalities. Although government policies and actions have promoted the wellbeing of Brazilians, its community sustainability efforts, conservation laws and overall sustainability tactics have not been implemented effectively. By analyzing the successes and failures of Brazilian organizations: environmental police forces, non-governmental organizations, media publicity agencies, and educational and research organizations, I suggest that the application of good governance and tailored conservation approaches, rectifying previous errors, will sustain environmental conservation in Brazil.

Good Governance

Good governance is essential to the success and prosperity of society. As Ambrogio Lorenzetti depicted in his fresco "The Allegory of Good and Bad Government," a society based on cruelty, deceit, fraud, fury, division, and war is a society that will not prosper and achieve its goals. Therefore, the proper elements of good governance are necessary for societal and human growth. According to the United Nations Development Program, several key elements are required for good governance: participation, a consensus orientation, accountability, transparency, responsiveness, effectiveness and efficiency, equity and inclusivity, and following the rules of law. Good governance can mean the following characteristics such as checks and balances, decentralization, efficiency and equitability, a free press, a fair judiciary, and a durable regulatory system. These elements of good governance can manifest societal growth. Good governance can nurture sustainability and effectiveness of the law necessary for its successful enforcement – particularly with environmental laws.

History Of Conservation Laws

From 1985 to the present, Brazil has undergone weak economic growth, ineffective state intervention, and little progress in environmental legislation. While the country has adopted numerous conservation laws intended to uphold the values of environmental sustainability and justice, these laws have not been effectively enforced. In 1997, Law 9.433 created the National Water Resources Policy which emphasized treating water as a collective good. Brazil's major executive environmental agency, the Institute of the Environment and Renewable Natural Resources (IBAMA), encouraged further environmental efforts. IBAMA's goal is to centralize the execution of environmental regulations and policies. This agency assigns roles to public authorities to maintain biological diversity and protect the national genetic heritage of the fauna, flora, and species' ecological functions. IBAMA participated in the 1992 Rio de Janiero International Convention on Biological Diversity, which established goals such as conservation of biodiversity, sustainable use of biodiversity, and fair and equitable sharing of resources.

In 1992, Brazil adopted the United Nations International Agenda 21, an international non-binding action plan. Agenda 21 established the conservation and management of resources in fragile ecosystems. Principal issues addressed desertification, drought, mountain development, conserving biological diversity and creating environmentally sound biotechnology, containing radioactive wastes, protecting the quality and supply of fresh water, and promoting sustainable

agricultural and rural development. Similarly, the National System of Conservation Units (SNUC) promotes conservation efforts and environmental law. SNUC's management conservation plan aims to preserve nature while ensuring compatibility with human use of natural resources. SNUC created a management plan with practical and implementable actions to improve the environment. SNUC considered two methods in a conservation framework: conservation of resources through management or protection. The accumulation of these organizations aided in the promotion of environmental legislation. Yet while Brazilian organizations, such as SNUC and UN Agenda 21, aim to change conservation efforts, they have not established effective means to do so. Drummond and Platiau analyze the change from effective to ineffective environmental regulation through three phases:

In 1934-1964, the first phase of Brazilian environmental law started under the aegis of strong governmental intervention in the economy, the second phase (1964-1988) marked by strong state intervention and swift economic expansion…renewed environmental regulations and policies, and the third phase (1989-present) is marked by weak economic growth or even stagnation and increasingly ineffective state intervention and expansion of environmental legislation and policies. (Drummond, J., & Barros, Platiau, A. F., 2006, p.85)

Currently, Brazil is in the third phase with a less expansive environmental legislation. Organizations have failed to create real means to implement and enforce their environmental conservation plans similar to the plans within organizations like SNUC and UN Agenda 21. While these organizations ostensibly protect the environment, Brazilian organizations have been largely ineffective at implementing their agendas. It is necessary to have effective means of governance to enforce environmental laws and policies. By analyzing the successes and failures of four organizations: environmental police forces, non-governmental organizations [NGOs], media, and educational and research facilities, which promote good governance, I propose tailored conservation approaches devised to address conservation in times of ineffective governance.

Environmental Police Agencies

The Brazilian environmental police, funded by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), has accomplished numerous successes. The environmental military has been able to accomplish its goals through good governance of participation, consensus, and accountability. For example, the environmental military has formed successful partnerships with the National Network to Combat Trafficking in Wild Animals, the USA Agency for International Development, and the World-Wide Fund for Nature. IBAMA also adopted good governance methods of accountability through systems of inspections and evaluations of measuring successes. The environmental police have goals that promote environmental oversight and prevention of environmental damage. These methods include promoting education campaigns and, "inspecting forest holdings, transporting forest products and by products, transporting and trading of fish and live plants, deforestation and burning, breeding of wild animals, and performing activities on fish farms" (Policia Militar Ambiental Brasil, n.d). Furthermore, they ensure and protect activities related to imports and exports of contaminant wastes and monitor overall consumption of ozone depleting substances that comply with the Basel Convention and Montreal Protocol.

The military police however, are also subject to failures such as corruption and bribery, bushmeat purchases, and lack of accountability. Poliana Ferreira, shows that the Brazilian environmental police perform negative actions such as 33 percent police action is violent, and 67 percent are reports of corruption (Ferreira, 2018). The environmental military are susceptible to corruption because they operate on the value of monetary surplus. The unprotected surplus of deforestation has high exchange value, hence making it profitable and appealing to environmental police. To address these problems, utilizing the framework of good governance, the environmental military should adopt practices that encourage accountability and following the rule of law. This is achievable through having a system of checks to assess their workers' performances and creating socioeconomic incentives to encourage military police to per-

form righteous environmental duties. In addition, they can find other means to attain economic gains by creating jobs in different sectors such as infrastructure or education. The environmental police advocate the actions of non-governmental organizations; however, they are unable to provide the majority of their time and services to non-governmental organizations that need their help. These issues can be solved by providing the environmental police with resources, resource allocation, and time management opportunities. These opportunities can be funded through the state, universities, foreign direct investment, and citizens.

Non-Governmental Organizations

Non-governmental organizations promote conservation efforts in the midst of bad governance. The NGO Brazilian Sea Turtle Conservation Program (TAMAR) was created in 1980 under the Chico Mendes Institute for Biodiversity Conservation. TAMAR adopts various successful good governance approaches such as participation, consensus, and inclusivity. These approaches are seen in their consensus-based partnerships with Brazilian communities and municipalities such as ICMBio, Cristal, and Itarema. TAMAR engages in good governance by providing methods of participation. They developed educational opportunities and consensus based commercial and marketing actions. For example, TAMAR has educational marine training and internship positions that allow for students to gain, apply, and spread their knowledge of environmental conservation. Students are mentored by professional biologists and environmental science professors. They also encourage participation in tourism initiatives by serving as guides in museums and public environmental settings. TAMAR has multiple partnerships with schools and neighboring organizations that advocate environmental education, environmental conservation, and tourism. TAMAR's consensus actions are depicted in their tourist-based income, by educating customers in their museums, gift shops, and species-advocacy workshops, and utilization of eco-friendly fishing and coconut plantations, which allow for the production and trade of products. TAMAR advocates inclusivity with the employ-

ment of residents, former poachers, and former anti-environmentalists to perform environmental tasks.

In their attempt to establish good governance, TAMAR's goal is to protect the natural life cycle of species through focusing their conservation on sea turtles. Karina Lanna, in the article "Ecoturismo e Projetos Ambientais Estudo de caso do Projeto Tamar," supports TAMAR's goals to spread awareness of their conservation goals; TAMAR achieves this by engaging in cross-community activities like cultural festivals, supporting healthcare facilities, and funding educational opportunities. All of these activities contribute to TAMAR's efforts to preserve sea turtle ecology and species bio- diversity, while engaging in good governance of inclusion and participation. However, Vieitas, Lopez and Marcovaldi, in the article "Local community involvement in conservation—the use of mini-guides in a programme for sea turtles in Brazil," offer a critique on TAMAR by showing its failures within its conservation approaches. The article discusses problems within the agency's organization and activities. For example, Brazilian agencies lack an established standard of legal provision and regulations. The lack of legal oversight and common or fixed methods for measuring organizational success prevents agencies from properly rectifying their failures. Another problem is communication incoherency and loose training processes. These issues plague the beneficial nature of Brazilian organizations like TAMAR.

Good governance can amend the failures within TAMAR and other Brazilian organizations. Brazilian organizations may adopt good governance characteristics such as effectiveness and better communication responsiveness to address the contention of beliefs between natives and volunteers. Teams can be mandated through an established system on management to consult and cooperate with natives before formulating and enforcing conservation approaches that go against customs, practices, or realistic norms. Team organization and communication can be influential in training future volunteers and teaching bystanders. Good governance enables individuals to create a standard of measuring success within Brazilian agencies. Local municipality agencies may provide a legal and evaluative analysis of problems encountered in

their shared regions. Local agencies' evaluations can improve the training process by creating incentivized reward systems to students, volunteers, and faculty based on their needs.

Educational And Research Organizations

Local agencies, such as The Nucleus of Research and Extension in Environmental Education (NUPEEA), can provide an evaluation of conservation laws and education. NUPEEA is another example of good governance. NUPEEA's research facility is located at the Federal University of Southern Bahia, Porto Seguro (UFSB), which supports continuing social and environmental research and training. The Federal University of Southern Bahia partnered with NUPEEA, is discussed in the article "Integrated Education Complex of Porto Seguro, a comprehensive school for ecological education," to promote the synergy between different organizations through their methods for education and policy change. NUPEEA has numerous successful practices such as establishing a bachelor's degree of natural science or agricultural environmental education; an environmental sustainability certification program, CIEPS: Integrated Complex of Education of Porto Seguro; and agroecological settlements projects at the Luiz de Queiroz College of Agriculture-USP (ESALQ) at the University of Sao Paulo. These activities are practices of good governance.

NUPEEA, promotes good governance by teaching viable economic and social alternatives to detrimental environmental practices, evident in their connection to CIEPS and The Federal University of Southern Bahia. CIEPS is divided into three educational sections: "heritage and tourism, sustainability and the environment, and food and health" (Santana, 2016). Furthermore, they spread innovation and teach young people the importance of change. Former student, Elissandro Santana, discusses the importance of CIEPS with the words: Once, in dialogue with Professor Denys Henrique Rodrigues Câmara, I asked him about the way he did social-environmental discussions in the area of foreign language and he told me that even before …Integrated Full-time education, already elaborated discussions and pedagogical struggles with regard to socio-environmental issues,

showing the importance of thinking about environmental problems in a world increasingly dominated by the logic capital, but that, in fact, with full-time school , from the projects that were implemented, it was much more feasible to discuss themes such as sustainability, for example, in a transdisciplinary way. (Santana, 2016)

NUPEEA also has successful innovations such as community involvement, environmental education activities, association development, and goals that intertwine ecological, economic, and social sustainability values.

NUPEEA's failures can be analyzed in a functionalist and good governance framework. A functionalist approach refers to a society of interconnected individuals and parts must work together to maintain a healthy state of balance and harmony. This approach can also be utilized to provide suggestions for future changes. NUPEEA lacks this functionalistic nature with detrimental elements such as non-responsiveness and ineffectiveness. This is apparent with NUPEEA's inability to encourage children to achieve higher goals within their academic and professional careers. In the lens of good governance, NUPEEA effectiveness diminishes with greater emphasis on non-environmental studies. For example, the emphasis of academic subjects that generate more income may diminish environmental studies. NUPPEA suffers from Brazilian student absence rates as well as a lack of student and facility resources and practical career opportunities. It fails to provide information and networking opportunities to Brazilians that seek careers in environmental advocacy. These concerns tend to discourage the long-term success of environmental education and conservation in Brazil. Abiding good governance approaches can change NUPEEA's effectiveness and responsiveness. Good governance solutions encourage harmonious relations through effectiveness, participation, and responsiveness. NUPEEA can promote good governance and harmonious relationships with improved relations with students and teachers, cross-organizational partnerships and fundraising, and student and parent encouragement, participation, and awareness of environmental related activities.

Media Publicity Agencies

Media publicity can promote good governance. The media has the ability to publicly uphold justice, promote civil engagement, and spread awareness. The media can advocate for environmental conservation efforts by holding individuals such as poachers accountable, encouraging unions to act, administering public pressure, and influencing judicial processes and outcomes. For example, the Rio Times published articles such as "Rio de Janeiro to Ban Plastic Bags for Businesses" and "Rio State Aims to Combat Illegal Deforestation with Drones" that accentuate the media's effects on environmental conservation through publication of common poachers, environmental disasters, and innovations in environmental security. For instance, the article pertaining to fighting deforestation with drones offers a solution at the intersectionality of technology and environmental conservation. The article mentions that, "a recent state government project, named 'Olho no Verde' (Eye on Green) has been using technology, including satellite imaging and now drones, in its fight against environmental damage" (Arnhold, 2018). The use of technology serves as an example of how media publication promotes public accountability and participation, decreases the quantity of poachers and maltreatment of wild animals, and upholds community conservation efforts by publicizing community interests and actions.

Media places public pressure on government officials by promoting good governance such as transparency and accountability. While media places pressures on governmental official they are also confronted with numerous problems. Capitalist incentives, biases, and superficial analyses of environmental problems inhibit media efficiency. Media agencies also lack effectiveness due to low literacy rates and lack of interest in environmental problems within Brazilian villages and municipalities. In order to combat these issues media must adopt of governance skills such as equitability and effectiveness to eliminate biases and encourage conservation interests. One way to achieve equitability is to accrue multiple sources of funding while minimizing capitalistic incentives for the news. Another way to encourage equitability is by developing student-run magazines that engage in spreading environmental research,

problems, and findings. Adopting these approaches of equitability and effectiveness can improve the media's good governance to sustain environmental conservation.

Discussion: Improved Conservation Approaches

Agenda Emphasis On Environmental Conservation:

When developing a holistic environmental conservation approach, it is important to emphasize the value of the environment to Brazil's GDP through agriculture, exports and imports, and health sectors. This acknowledgement leads to setting realistic annual goals by including environmental conservation as part of the overall agenda. For example, one way to include the protection of the environment and the economy in the agenda is by having an ecological added value tax. The ecological added value Brazilian tax, ICMS Ecologico, acts as a 'fiscal compensation mechanism.' It provides rewards to municipalities that have protected areas from exploitation. There are factors that determine the levels of compensation such as, territorial restriction, conservation, and quality (Ring, 2008). However, due to the high demand of municipality compensation, the compensation is selective to municipalities that not only perform ecological actions but also present high ecological quality of actions. Therefore, municipalities must show great efforts in the quality of their contemporary and future actions. In addition, the agenda must enforce a clear standard of environmental laws to better allocate rules and regulations to municipalities.

Eliminate Hard-Wired and Pork Policy Making:

In the article "On the Road to Good Governance: Recovering from Economic and Political Shocks in Brazil," Alston, Melo, Mueller and Pereira discuss the elements that are necessary for good governance and its application to enforceable laws. The article mentions four broad categories that change the policymaking game:
Stable: policies that are stable and adaptable to shocks such as, fiscal and monetary policies, *Pork*: appropriation of government spending for localized projects, Hard-Wired: policies that cannot be easily changed and are con-

sequently rigid and less susceptible to economic and political shocks and Residual: policies that are given priority only after the objectives of stable policies are secure. (Alston, 2008, emphasis mine)

In Brazil, hardwired and pork policies impede on the flexibility and dynamism of conservation laws. Pork policies permit favoritism by allowing Brazilian government officials to reward selective patronages. Pork policies allow the Brazilian Presidents to distribute selective 'geographically concentrated transfers' to legislators in favor of their policies' and in-advertently punish legislators against it. These proposed pork and hardwired categories have many shortcomings including procedural difficulties, biased legislators ruling in the preferences of their party leaders, and long-term changes that require constitutional amendments. Legislators, furthermore, prioritize stable policies that emit stark changes as opposed to, 'second round effects' policies. Second round policies enable positive externalities to reach society in the long term but not short term. Thus, there must be less hardwired and pork policies; yet, policies that exuberate change at both short term and long-term levels. In creating new conservation approaches, it is crucial to abstain from policies that focus mainly on biasness', favoritism, localization projects, and exclusively slow or long-term structural changes.

Systematization and Clarity of Existing and Pre-Existing Laws

In order to create clarity between existing and pre-existing laws, guidelines for creating laws must be established. There must be distinguishing factors that determine whether laws must be broad or specific, including an understanding of the municipalities' needs and desires. The more specific the law is, the more easily it should be accommodated and enforced. Take, for example, laws specifically related to the mandated number of flora and fauna that must be protected; the necessary levels of biodiversity per municipality and forest region such as, Amazon or Atlantic Rain Forests; land reform and property rights, and foreign direct investments divided by region, location, and their impact on bio-diversity. Lastly, in previous years there have been attempts to revise existing laws and selectively enforce them, which

has led to confusion. For example, the Brazilian conservation:

Law 9.605, issued in 1998, specifies ecological crimes, in an effort to consolidate and to add enforcement capability to previous laws, particularly the article of the 1965 Forest Code about Civil Code violations. The law created, however, a legal conflict over the matter of whether its chapter on crimes against the flora replaces or not all violations listed in the 1965 Forest Code. As the matter received a different treatment in the two legal instruments, it is not clear whether one replaces the other or not. (Drummond, J., & Barros-Platiau, 2006, p.100)

Therefore, there must be a system in which the creation of the law involves a process of public and legislative interpretation in addition to intent, flexibility, duration, and applicability of the law per municipality. These processes promote good governance by alleviating the pains that native populations undergo in the welter of existing and pre-existing laws.

Merging the Local and Federal Relationship and Political and Technological Factors

Another way to enhance environmental protection is by merging local and federal governmental relationships through creating communicative strategies such as electronic forms of accountability. For example, electronic forms of accountability can hold each municipality accountable by monitoring sustainable tactics or depletion of resources. Technology promotes municipality cooperation and communication of aspirations. It enables representatives to speak and publicize goals per municipality. Utilizing technology allows municipality to express, account, and task their actions. Media publicity agencies and other technological bodies can serve as communication facilitators for local and federal outlets.

In order to increase trust in the Brazilian government, the government can offer state programs that utilize inter-disciplinary studies that can impact both pressing and long-term environmental concerns. Furthermore, systems for testing corruption and reliability of organizations and funding resources could be established.

Horizontal Decentralization

Horizontal decentralization allows individuals to develop projects that directly help their communities by generating sources of income for families. These projects include educational efforts through tourism, museums, sustainable agriculture, and organic farming certification programs. In the article "Implementing Environmental Policies in Developing Countries Through Decentralization," Oliveira highlights horizontal decentralization and governmental conditions that push environmental concerns in their development agenda. Oliveira suggests that, "the study analyzes the two main conditions that should be in place to make development-oriented agencies to implement environmental policies adequately: the provision of incentives to the implementing agencies to do the environmental job and the existence of an independent system of checks-and-balances" (Oliveira, 2002, p.1714). Oliveira addresses further issues related to funding, political support, institutional capacity, and local cooperation.

I present that successful horizontal decentralization should proceed with strict and cautious policies to protect natural ecosystems while allowing tourists and others to learn. The negative effects of eco-tourism allow for masses of unprotected wildlife. A plausible solution is the establishment of designated areas that have active maintenance, visitor guidelines, and small selective audiences. Another alternative, synonymous to horizontal decentralization, is to allow greater command and management to employees and volunteers, which produces greater motivation and organization involvement. Also, creating communicative means can conquer native and governmental resistance. Established egalitarian communication and participation of governmental officials and native populations will allow equality of opinions about environmental protection. Also, the government struggles with balancing environmental protection and environmental quality. These struggles can be addressed by governments interweaving environmental actions within both sectors of environmental protection and quality by legislative analysis and actions of encouragement. Another issue is the submission of environmental actions through CEPRAM, the state environmental coun-

cil, that may be susceptible to subjugation of internal corruption, political biases, and economic incentives. In the face of surmounting issues of corruption and biases, environmental actions should be authorized in numerous Brazilian bodies that are measured for negative and positive factors in organization performance.

Public Participation and Harmony, Cross-Municipalities Transparency and Relations, and Networking Opportunities

Good governance can be promoted by increasing public participation through hosting cultural festivals, crime awareness meetings, and public civil action initiatives. Public harmony and relationships promote greater holistic effects within each municipality. Furthermore, to promote effective changes individuals can solidify partnerships within communities, institutions, and in other municipalities through means of public forums and meetings, flyers and surveys, festivals, luncheons, educational and research facilities, and the town hall or town square. Increasing Brazilian social and communal harmony promotes networking, transparency and relationships.

Stronger Volunteer and Employee Training Management

Stronger volunteer and employee training management is essential to accomplish an organization's goals. Oliveira mentions that one of the many problems with institutional capacity and management is the, "misallocation of personnel. IBAMA had 7,000 employees, but only 6% (437 employees) work on protected areas in mid-1990s. As a result, IBAMA has lagged in instituting many programs involving protected areas" (Oliveira, 2002, p.1718). Another instance of mismanagement of employees and resources is National Fund for the Environment (Fundo Nacional do Meio Ambiente, FNMA.) "FNMA was assigned US\$22 million for environmental protection" yet, \$1.8 million has been used because of institutional rules and regulations (Oliveira, 2002, p.1718).

Therefore, in order to improve volunteer and employee training, training must first align with the organization's goals. It should involve systematic measures for successes and failures such as, joint delegation and

mentoring that include opportunities to perform and gauge behavior in coaching and spreading knowledge. A managed list of specific employee training reform processes can be initiated weekly, monthly, or annually contingent upon the progress of the staff. Brazilian organizations often fail to spread the knowledge of employee and volunteer training within organizations, which impedes their environmental conservation success. Therefore, providing incentives for management to perform consistent checks on the company's training processes and method of employee recognition is essential. Also, establishing times of employee relaxation, free time, benefits, and awards can motivate employees and staff to cooperate better: for example, creating bonding times between employees within its organization and other organizations.

Multi-Disciplinary Governmental Actors

Multi-disciplinary governmental actors are significant if not paramount to the success of conservation. Governmental actors that have specialized in numerous fields are skilled in applying multi-disciplinary studies to solve problems. In areas specific to conflict resolution and creative policymaking, multi-disciplinary actors can produce effective policies. In comparison to expertise in specific areas, multi-disciplinary governmental actors can target issues that necessitate cross-disciplinary thinking. For example, arranging a hierarchical system that distributes tasks to governmental or non-governmental actors with studies in numerous related fields. Another solution is to provide a platform for specialized professionals and cross-disciplinary actors to cooperate together.

Analysis Of Results In Tables One And Two

I have organized, in Tables One and Two, the successes and failures of organizations in promoting better governance and productive environmental conservation.

Table 1. This table illustrates various successes and failures within Brazil's governance in protecting the environment. A comparison of the successes

and failures of governance within different Brazilian organizations can allow for an improved and tailored approach to the application of environmental conservation. The Brazilian organization's successful principles can be adopted to continue good governance practices that contribute to environmental conservation. Factors contributing to Brazilian organizations' successes include:
i. economic opportunities
ii. educational opportunities
iii. community involvement
iv. strong partnerships

Examples of economic and educational opportunities are seen with Brazilian organizations such as NUPEEA and TAMAR. TAMAR educates young students by offering internships with professors and faculty and NUPEEA offers environmental education degrees and studies. Furthermore, community involvement and strong partnerships are also exemplified with NUPEEA's partnership with the University of Southern Bahia, and TAMAR community involvement and employment of native workers. However, there are also numerous failures with-

in these organizations that prevent good governance and sustainability actions. Organizations such as TAMAR and the environmental police have poor volunteer and employee training. This is evidenced by military police corruption and TAMAR's poor volunteer and employee training. Also, NUPEEA and media publicity agencies can lack influence and funding due to discouragement, low literacy rates, and reduced participation. Societies are plagued with governmental distrust; therefore, municipalities have stark local law differences. These differences reduce municipality cooperation and trust. The culmination of new conservation approaches must address these organizational failures preventing good governance and environmental conservation.

Table 2. This table aims to resolve the problems within the application of conservation laws by suggesting eleven good governance approaches. These approaches are tailored to Brazil's governmental and societal structure and indicate how society can implement conservation laws in eras of ineffective governance.

Table One: Analysis of Successes and Failures of Governance within Brazilian Organizations

Organization Successes	Organization Failures
Economic Opportunities	Societal and Industrial Levels of Corruption and Governmental Distrust
Educational Opportunities	Lack of Influence on Systematic & Community Change Due to Poor Funding
Community Involvement	Lack of Compatibility Within Municipalities' Cultures and Practices
Strong Partnerships	Poor Volunteer /Employee Training and Hiring Processes

Table One: analysis of successes and failures of governance within brazilian organizations

Table Two: Improved Conservation Approaches Promoting Effective Governance

1. Agenda Emphasis on Environmental Conservation
2. Eliminate Hardwired and Pork Policy Making
3. System of organization and clarity between existing and pre-existing laws
4. Merging the Local and Federal Relationship
5. Horizontal Decentralization
6. Increasing Public Participation and Harmony
7. Cross Municipalities Transparency & Strong Relations
8. Networking opportunities between organizations and partnerships
9. Stronger volunteer and employee training management
10. Increase in funding and influencing with political, & technological actors
11. Multi-Disciplinary Governmental Actors

Table Two: improverd conservation approaches promoting effective governance

Conclusion

Implementing and strengthening the effectiveness of conservation laws requires good governance through means of environmental police, non-governmental organizations, educational centers, research facilities, and media outlets. The application of these eleven tailored conservation approaches, as shown in Table 2, can improve good governance while addressing Brazil's problems with corruption, governmental distrust, lack of influence and community participation on the part of citizens, municipality compatibility, and poor volunteer and employee training. The improved conservation approaches offer individuals innovative solutions that are practical for the Brazilian native population and government to follow. The knowledge of these conservation approaches allows us to significantly impact conservation actions and laws within Brazil and in other nations. Furthermore, it inspires the idea that good governance is first born from the individual and then dispersed throughout society. Good governance thus allows for better environmental conservation and an environmentally conscious nation in the midst of poor governance. These efforts bring society closer to Lorenzetti's fresco, the allegory of good governance, which is filled with figures representing peace, fortitude, prudence, magnanimity, temperance and justice.

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Evaluation of the ACQ1001-FMC Digitizer

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Abstract: The currently installed digitizer, ICS-710, used for measuring beam intensity at the National Synchrotron Light Source (NSLS-II), has reached the end of its life. As a result, we have purchased a new digitizer, ACQ1001-FMC (24-bit), and evaluated its performance in this study. Unlike the ICS-710, the ACQ1001-FMC comes with embedded EPICS (Experimental Physics and Industrial Control System) IOCs (Input/Output Controllers) which provides all the process variables (PVs). We manipulate those PVs through Control System Studio (CSS), which enables us to assess the digitizer's resolution, accuracy, and precision. Since noise and distortion adversely affect the digitizer's performance, we instead investigate it by measuring the effective number of bits (ENOB). We have accomplished this by connecting a terminator to one of the channels and using Python/NumPy to compute the ENOB. In order to evaluate the digitizer's accuracy and precision, we have also examined the voltage linearity. A precise DC calibrator provides voltages ranging from -10 to 10 volts into one of the channels. We collect the readbacks and plot them with Python's polyfit function. Throughout the study, four trials were conducted to determine the ENOB and the linearity. The measured ENOB and linearity coefficient are consistently 19.73 bits (~ 20-bit) and 0.9995 (very close to 1.0), respectively. The results of this study show that the ACQ1001-FMC digitizer is a good fit for replacing the ICS-710 because, despite the noise and distortion, it is precise, accurate, and has high resolution.

Introduction

The NSLS-II is a third-generation synchrotron facility that provides ultra-bright light with exceptional beam stability and a broad energy range (from infrared to hard x-ray). This bright light originates from the linear accelerator (linac) where the electron gun generates electrons and accelerates them to 200 MeV. The transport system then carries these electrons to the booster ring where they expedite to 3 GeV. Subsequently, the transport system sends these electrons to the storage ring where 500mA of current (at 3 GeV) circulate. Eventually, they pass through superconducting bending magnets known as undulators to produce synchrotron radiation. Ultimately, the beamlines capture this radiation and use it to image samples across different disciplines [Ablett et. al. 2006]. A schematic of the major components of the NSLS-II is shown in figure 1.

At each of the accelerators (linac, booster ring, and storage ring), sensors are placed to measure the charge and current of the electrons. The data that the sensors gather is in the form of analog signals. For the central processing unit (CPU) to interpret these signals, we need to convert them to digital data. Digitizers perform this conversion through a process called
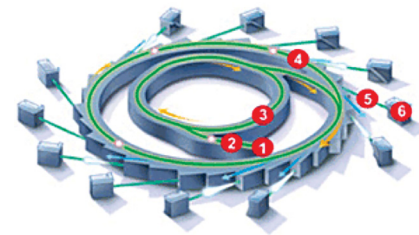
Figure 1- Major components of the NSLS-II: (1) electron gun, (2) linear accelerator, (3) booster ring, (4) storage ring (5) beamlines (6) workstation. Source: https://www.bnl.gov/nsls2/images/synchrotron.gif

pulse code modulation (PCM), as illustrated in figure 2. In this process, the signals are first sampled (based off of Nyquist's theorem), then quantized (to reduce data size), and finally encoded to binary. This conversion ultimately enables software programs such as EPICS and CSS Studio to monitor and display the conditions of the accelerators.
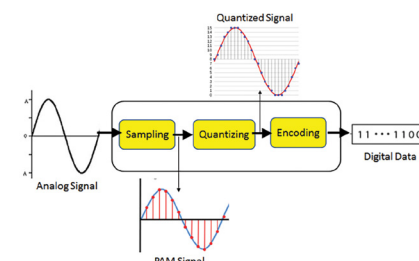
Figure 2- Pulse code modulation Source: https://blogs.synopsys.com/vip-central/files/2015/04/PCM.png

Background

From 2010 to 2011, Yong Hu, a researcher at the NSLS-II, conducted a comparative study to find a suitable digitizer for a variety of applications. These applications measure beam charge and current, beam lifetime, slow machine protection and Cerenkov beam loss monitor (CBLM). The evaluated digitizer includes the Agilent DVM3458, Highland Technology VME digitizer V450, GE ICS-710-BL, Hytec 8401, and NI PXI-4461. After a full evaluation of the hardware components, their voltage linearities, and resolutions, Hu concluded that the ICS-710 met the performance and hardware requirements necessary for the applications. He discusses that although the Agilent DVM3458 performed the best in the precision test, its major disadvantage is its hardware design. Most of the equipment at the NSLS-II connects wirelessly via ethernet, but the Agilent DVM3458 only connects through a general purpose interface bus (GPIB). Similarly, the Highland Technology VME digitizer V450, although high performing, lacks external triggering support, making it unfit for the applications. The rest of the digitizers (the GE ICS-710-BL, Hytec 8401, and NI PXI-4461) do not meet the voltage linearity and resolution requirements. In conclusion, the ICS-710 is a high performing digitizer with excellent accuracy (17 ENOB) and linearity and will be the standard for all low-speed, high resolution digitizing applications.

Materials and Methods

Hardware Specifications

In this study, we examine the ACQ1001-FMC digitizer, manufactured by D-TACQ solutions. This digitizer is made up of two parts: the ACQ1001 carrier and the ACQ430FMC analog input module. The ACQ1001 carrier is a shortbread design which compacts the digitizer circuitry into a simple rectangular box. It encompasses a single slot field programmable gate array (FPGA), Xilinx ZYNQ Soc Z-7020, which runs on Linux [Milne, 2014]. The carrier also connects to the

console, ethernet, and a 12V DC supply through the front panel. The rear panel consists of eight ACQ430FMC analog input channels that sample at a high speed of 128k bits per second (bps) [Milne, 2015]. The specification of the ACQ430FMC is shown in figure 3.

#	Parameter	Value
1	Number of Channels	8
2	Sample Rate	Per channel simultaneous
	High Speed Mode	128 kHz
	High Resolution Mode	52 kHz
3	Resolution	24 bits
4	Coupling	DC, Differential Input
5	Input Impedance	1MΩ
6	Input Voltage Range	±10 V
7	Input Voltage Withstand	±30V
8	Offset Error	0.01% FS with numerical calibration
9	Gain Error	0.01% FS with numerical calibration
10	INL	±0.002% FS
11	CMRR	>60dB FS @ 1 kHz
12	THD	-106 dB*
13	SFDR	107 dBc*
14	SNR	
	High Speed Mode	104 dB*
	High Resolution Mode	108 dB*
15	Analog Input BW	80kHz
16	Crosstalk	<90dB @ 1kHz FS Input
17	Digital Filter:Pass Band	0.453 Fsample
	Digital Filter:3dB	0.490 Fsample
	Digital Filter:Stop Band	0.547 Fsample
	Digital Filter:Attenuate	95 dB

* Typical values measured at full scale with a 9.76kHz input

Figure 3- Performance specification of the ACQ430FMC [Milne, 2015]

Additionally, the rear panel has three LEDs to indicate functionality: CLK, TRG, and ACT.
- CLK lights green to indicate the usage of a valid clock signal
- TRG lights green to indicate usage of a valid trigger signal
- ACT flashes green to indicate detection of Linux activity.

The images of the front and rear panels are shown in figure 4.

Figure 4- View of the front panel (left) and rear panel (right) of the ACQ1001-FMC digitizer

We first establish communication to the digitizer through the console. Subsequently, the terminal emulator program, Minicom, facilitates the login to root and enables the setup of a static IP address. This IP address establishes

ing external noise.

This test is run on the CSS Studio Volts Live Plot OPI, and we collect the values with EPICS. Once the configuration is set up, the simulation is run for about ten minutes before the data
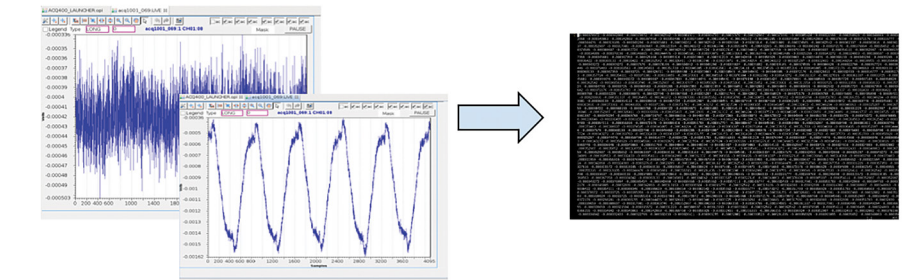

Figure 5- Schematic of how EPICS retrieves 4,096 voltage samples through the "caget" command and puts it into a text file

a transmission control protocol (TCP) allowing the exchange of data through channel access. D-TACQ solutions provide an easy method to control the digitizer. They have a repository on GitHub containing operator interfaces (OPIs) that are compatible with CSS. These OPIs connect to and graphically display all the PV values embedded in the FPGA. After running the simulation, we abstract the values of the PVs through EPICS using the "caget" command. A schematic of this process is shown in figure 5. We use this platform to perform the resolution and voltage linearity tests.

Resolution Test

The effective number of bits (ENOB) examined in the resolution test evaluates how the internal and external noise affects the digitizer's performance. We study internal noise by connecting a terminator (figure 6) to one of the channels, thereby eliminat-

condenses into a text file. We perform the tests and analyze the results across four days. Using Python, we take the values from the text file and find its standard deviation (figure 7).

$$\sigma = \sqrt{\frac{\Sigma\,(\,X - \overline{X}\,)^2}{n - 1}}$$

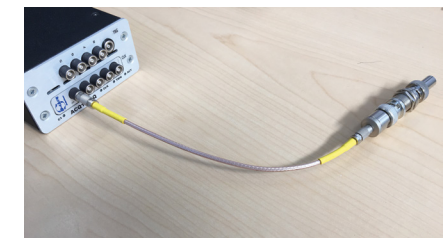Figure 7- Standard deviation formula

Figure 6- Terminator connected to channel one of the ACQ1001-FMC

We plug the standard deviation as "rms noise" into the formula, $ENOB = N - \log_2(rms\ noise/LSB)$, and compute the ENOB. To further our studies, we plot a fast Fourier transform (fft) graph with NumPy.

Accuracy and Precision Test

In the accuracy and precision test, we examine voltage linearity. A precise DC calibrator (figure 8) connects to one of the channels and feeds in voltages ranging from -10 to 10 Vs. Similar to the previous test, the simulations are run on the CSS Studio Volt Live Plot OPI. We collect the readbacks every 1 V and use EPICS to compress the data into a text file. We gather the data for four days and compute the average of each data set with Python. These averages are then put into a comma separated value (csv) file. Using the polyfit function in NumPy, we graph the line

of best fit and incorporate error bars. Finally, we abstract the linearity coefficients from the graph.

Figure 8- DC Calibrator

Discussion

Across the four days of testing, the terminator ENOB consistently reported 19.73 bits (~ 20-bit). We hypothesize that the noise and distortion come from the differences in grounding. The digitizer grounds with its 12V DC supply whereas the CPU grounds with a power outlet. These two grounds conflict because they are at different potentials, thus creating a ground loop (galvanic path). This ground loop is the probable cause of the voltage fluctuations we call noise. A schematic of this ground loop is shown in figure 18.
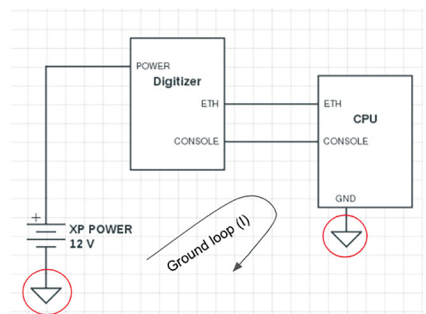
Figure 18- Ground loop between the CPU and the digitizer

On the other hand, the ENOB without a terminator varies across the four days. It is difficult to determine why we observe this variation because we did not record how loud the external background noise was. However, on July 6th, the ENOB without a terminator is the highest and the ENOB with a terminator is the lowest. On that day, we note that it was raining and the humid air could contribute to the lower terminator ENOB.

The fft plots show that the noise averages around 50-60 dB without the terminator and 10-20 dB with the terminator. Subtracting the 50-60 dB of overall noise with the 10-20 dB of internal noise, we presume that 40-50

dB of noise is external noise. Furthermore, this suggests that 10-20 dB of internal noise is the cause of the net loss of approximately 4 bits of resolution, resulting in a 20 bit ENOB.

The voltage linearity coefficients are consistently 0.9995, with one value being 0.9993 on July 6th. The reason for this could be the same reason that on

the same day we report the terminator ENOB to be lower than the rest of the days (due to humidity). Overall the coefficients across the four days show that the ACQ1001-FMC is a precise and accurate digitizer because the linearity coefficients are very close to 1.

Results

A. Effective Number of Bits

Date	June 29	July 5	July 6	July 10
With terminator	19.72671775	19.7348454	19.69047274	19.73076437
Without terminator	14.47750989	15.95844621	16.87532671	15.70751698

Figure 9- Table of the computed ENOB with and without a terminator, across four days
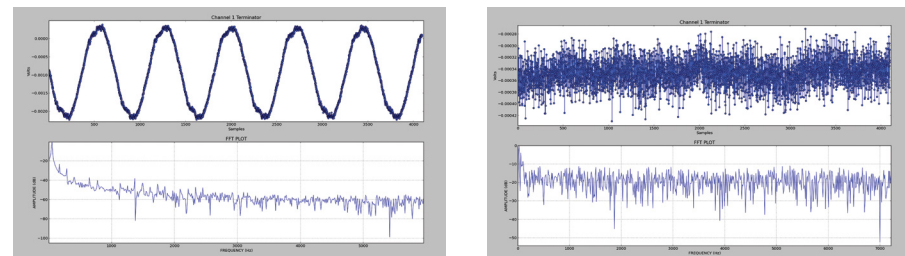
Figure 10- June 29th's fft plots without a terminator (right) and with a terminator (left)
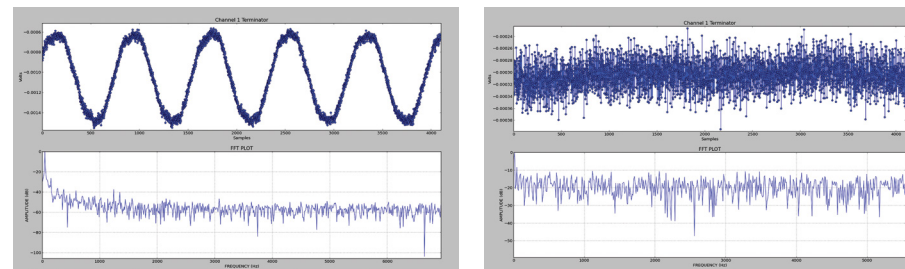
Figure 11- July 5th's fft plots without a terminator (right) and with a terminator (left)
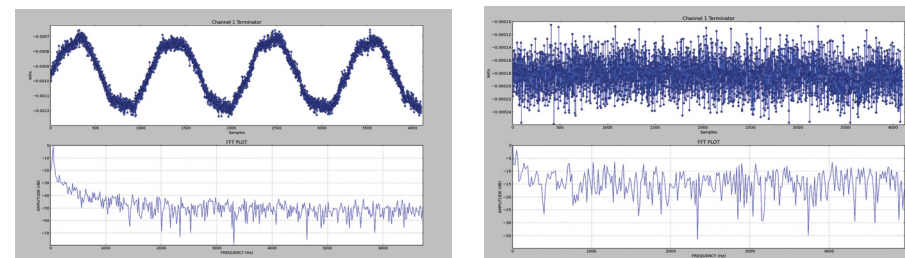
Figure 12- July 6th's fft plots without a terminator (right) and with a terminator (left)
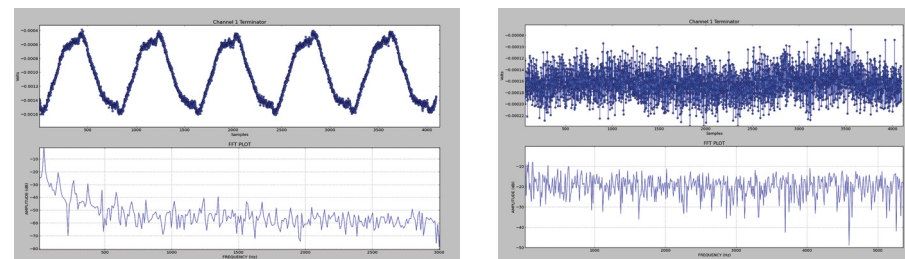
Figure 13- July 10th's fft plots without a terminator (right) and with a terminator (left)

B. Voltage Linearity
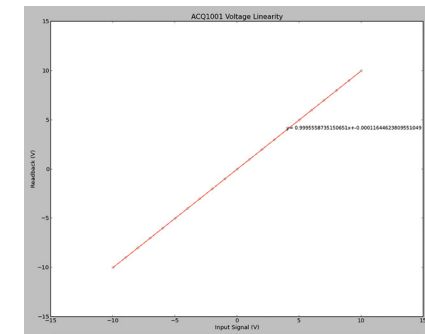
Figure 14- July 3rd's voltage linearity data
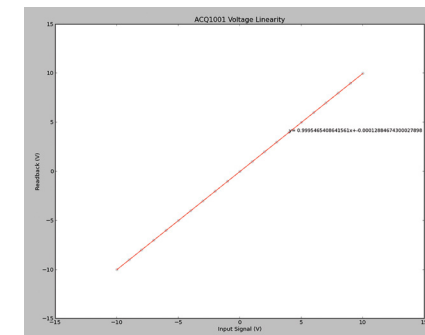
Figure 15- July 5th's voltage linearity data
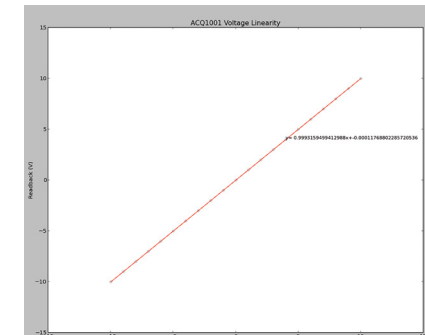
Figure 16- July 6th's voltage linearity data
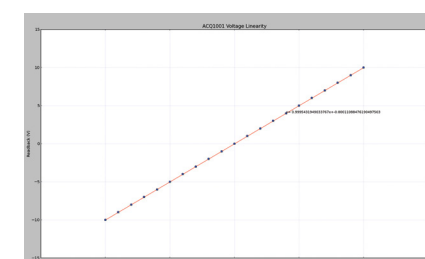
Figure 17- July 10th's voltage linearity data

Conclusion

The ENOB is very close to 20 bits, with only a loss of 4 bits due to internal noise and distortion. Additionally, we can describe the voltage linearity curve with a first-degree polynomial. These results support that the ACQ1001-FMC is a precise, accurate, and high-resolution digitizer because it exceeds the performance of the currently installed digitizer (ENOB= 17 bits). Therefore, we believe that the ACQ1001-FMC is a good fit for replacing the ICS-710.

Further Work

We could perform supplementary tests to enhance our understanding of the digitizer. One test essential to understanding the July 6th deviation would be the thermal drift test. This test would enable us to assess whether we could use the digitizer for thermal-sensitive applications or whether we need to implement temperature compensation means. Moreover, since the digitizer's function at NSLS-II is to measure beam intensity, it would be crucial to perform the beam loss monitor (BLM) stimulator test in further studies. This stimulation would allow us to assess whether the digitizer meets the resolution requirements.

Other enhancements to this study would be to continue to perform the tests for longer, allowing us to see if its performance is stable. Additionally, we could perform a comparison study to see how this digitizer's performance contrasts with others on the market.

References

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Appendix

Figure 19- Python code to calculate the standard deviation

Figure 20- Python code to compute average

Figure 21- Python code to plot the voltage linearity graph

Figure 22- Python code for the fft plot.

Fletcher, Jeannine Hill. *The Sin of White Supremacy: Christianity, Racism, and Religious Diversity in America.* Orbis Books, 2017

Reviewed By Rohini Ramabadran, *FCRH '22*

We live in a divided America. Our country's prominent racial disparity and increasingly controversial discussion of such disparity encourages Americans to consider what brought us here and what can be done to rectify the situation.

Thus, The Sin of White Supremacy: Christianity, Racism, and Religious Diversity in America, by Jeannine Hill Fletcher, comes at an appropriate time. Hill Fletcher, professor at Fordham University and constructive theologian, asserts that Christian and white supremacy have played historically fundamental roles in the creation of today's racial inequality in America. She directly asserts that Christians must reflect on their past and enact change - specifically by redefining their Christian symbolism so it is in accordance with their message of spreading Christian love. She effectively supports this claim with detailed historical and modern examples of white Christian supremacy and a discussion of true Christian values, but offers a less comprehensive discussion on how to rectify this situation through a political, rather than social, means.

Hill Fletcher effectively provides the link between white Christian supremacy and racism in America throughout her work. Her comprehensive examples coincide to create a clear narrative of a country built upon and thriving under white Christian supremacy. Two of her most effective claims discuss supremacy as a foundational pillar in the establishment of our nation, and the impact of this on today's world. She conveys that Genesis 1:28 was problematically interpreted to strip lands from natives for Christians to "fill the Earth and subdue it", leading to the country being built upon Manifest Destiny ideals rooted in spreading Christianity. This logic, however, ended up placing those who did not conform to Christianity lower in the hierarchy in which white Christians sat atop. This argu-

ment is extremely valuable because it pushes readers, especially Christian readers, to consider the dispossession that non-Christian individuals in this country have faced since the nation's birth, and to remember and account for the destruction that America stands upon.

Hill Fletcher shows that this foundational logic of supremacy today translates into inequality in many sectors of life, whether it be housing, wealth, health, education, and so on. Her argument shows that Christian symbols have been used by the white and powerful throughout history to promote inequality. This has detrimental effects for the present. For example, white Americans today own more land in general than their black counterparts, and the origins of this inequality can be traced back to the Morrill Land-Grant Act and the Homestead Act that were products of white Christian supremacy. Tracing back even further, similar disparity can be seen between white Americans and natives, as the Supreme Court case Johnson v. McIntosh legally stripped property sale rights of Native Americans, as the court claimed the United States acquired land from the British, ignoring the original "pagan" inhabitants. Although these examples carry an emotionally burdensome weight, Hill Fletcher's emphasis on human connectedness provides a hopeful outlook. In fact, it inspires Christian readers to use the ideals of Christian love perpetuated by Jesus himself to help those who have been so negatively affected by white Christian supremacy in the past.

However, while she inspires the spread of love and emphasizes human interconnectedness, Hill Fletcher only briefly alludes to how she would go about rectifying such inequality politically. Though she argues that Mexicans, black and brown Americans, Asian-Americans, and other groups adversely affected by white Christian supremacy should be recipients of

reparations rather than charity, she remains unclear on how to explicitly act from a political standpoint. Readers may be compelled to hear suggested resolutions, as she proves to have extensive knowledge on the roots and effects of racism in America. Even though Hill Fletcher does not provide a political solution, she still offers a social solution within her overall Christian framework. This viewpoint enhances Hill Fletcher's work by still providing a method to rectify some of the evils of racism. Though it is not a large scale change to the status quo, within a Christian dialogue, Hill Fletcher offers something less drastic but still necessary: a change in the way we live our lives daily. As she poignantly shows, Jesus died on the cross, but today, white Christians are crucifying the dispossessed. Thus, by calling for love at the center of life, Hill Fletcher gives her readers a potentially new mindset and a heightened sense of awareness of the world they live in.

> Jesus died on the cross, but today, white Christians are crucifying the dispossessed.

Ultimately, this book is undeniably relevant in today's era and provides useful insight for all Americans, and it is especially relevant in our devout Fordham community, as we must consider the implications of whichever faith we espouse. Hill Fletcher effectively and clearly shows how white Christian supremacy has given rise to modern-day racism in America, and inspires Christians to do their part in improving what those before had done. Despite the book's lack of proposed avenues of political reform, it is valuable in its discussion of social reform and reminding readers of what Christianity was meant to be: a faith based on love of God, self, and neighbor.