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Established in 2009, *The Proceedings of GREAT Day* journal compiles and publishes promising student work presented at SUNY Geneseo's GREAT Day symposium. The projects, presentations and research included here represent the academic rigor, multidisciplinary study, and unique creativity of the students taking part in the SUNY Geneseo GREAT Day symposium.

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Lenin's Life After Death: An Analysis of the Politics Surrounding the Lenin Mausoleum as a Symbol of Power Throughout History

Marty Rogachefsky

ABSTRACT

This essay will cover the history of politics surrounding the Mausoleum of Vladimir Lenin, which sits below the Kremlin wall in the Red Square of Moscow, Russia. In it, I explore the question of whether Lenin's death, embalming, and placement within the mausoleum was used for political gain by leaders in the Soviet and post-Soviet era of Russian history. I also note that the mausoleum started as and continues to be seen as a symbol of power in accordance with Marxist-Leninist ideology and the Soviet Union as a whole. The paper covers contemporary debates about Lenin's final burial as well.

INTRODUCTION

Vladimir Illich Ulyanov was born on April 22, 1870 into a well-educated family, which helped him to excel in school, where he eventually went on to study law. In 1891, he was expelled from his university for revolutionary thinking and later exiled to Siberia, where he adopted the pseudonym "Lenin." During World War One, Lenin led a successful *coup d'état* with the Bolshevik Party in 1917, which came to be known as the October Revolution. After the Revolution, he helped to form the Union of Soviet Socialist Republics (USSR) under the banner of communism and worked to transform Russia into a socialist state. Lenin died on January 24, 1924, reportedly of complications from a stroke he suffered two years earlier.¹

His body now rests in a mausoleum made of black and red high-polished stone in Moscow's Red Square. The body is open for viewing by the public, but heavily guarded by Kremlin security. When tourists enter the dark and cold crypt, they risk be-

ing hushed when speaking too loudly or shoved on by the guards when walking too slowly. Lenin lies in a small room, under a glass case, lit only by a red light in the center. About.com guide and travel expert Kerry Kubilius describes the body as, "a poor substitution for Sleeping Beauty, appearing less real and more like a wax-cast replica."² Nevertheless, thousands of tourists and Lenin enthusiasts visit the tomb each day to pay their respects to the founder of the Soviet Union.

As a symbol of power, the mausoleum is a vivid representation of the wistfulness Russians continue to feel for the days of the USSR. The mausoleum's location in Red Square, the heart and center of Moscow, symbolizes the importance of Lenin to the Russian people. In addition, directly underneath the Kremlin is a sign that the current Russian government endorses Lenin's ideas and reveres him as a national hero. *Washington Times* writer Jeffrey Kuhner describes Lenin's embalmed body as "the shining symbol of Soviet communism—a martyr to the utopian cause of the socialist revolution." He goes on to write, "Lenin's tomb has become a shrine for many Russians still nostalgic about the Soviet empire."³

The shrine stands today as an epitome of Lenin's cult of personality. During the troubled times of the early Soviet period, Russians needed a leader to turn to. They needed someone who was looking out for their well-being.

Slobodan Stankovic writes in *Pravda* that Lenin was responsible for elevating himself to the level of demigod. He served to attach a face to an ideology that was so new and confusing to the Russian people. Without Lenin, chaos would ensue. Stankovic writes,

In such a country, with no revolutionary cadres available to construct socialism after the successful Bolshevik, it was the ‘system of command’ and ‘unconditional obedience’ which were extolled as the characters of a socialist country.⁴ Lenin’s cult of personality and precedent for an orderly society served as a source of stability in a country torn by ideological and political disarray. His mausoleum served as a source of stability for subsequent Soviet leaders and a reassurance that they were fulfilling the ideals of Lenin. Today, the mausoleum not only remains as a symbol of power for those who are sympathetic to Lenin and nostalgic of the communist era, but it is also a relic of the past that gives modern-day communist sympathizers hope for the future.

THE DECISION TO EMBALM LENIN’S BODY

On December 20, 1923, Lenin fell severely sick from complications with his stroke. Joseph Stalin unofficially met with three other Politburo members, Zinoviev, Kamenev, and Bukharin, to decide what should be done when the leader of the revolution passed away. Stalin suggested that Lenin’s body be embalmed under the banner of Russian tradition. The other three members objected to the idea however, saying the only tradition they had heard of that bore a slight resemblance to this was worship of the skeletal remains of saints in the Russian Orthodox Church. Stalin was attempting to draw on the religious zeal still embedded within the Russian people in order to perpetuate Lenin’s cult of personality.⁵

On the day of his death, Lenin fetched his cook and wrote her a note, reading, “Gavrilushka, I have been poisoned...Go fetch Nadia [Krupskaya] at once...Tell Trotsky...Tell everyone you can.”⁶ An embalming process would rid Lenin’s body of any signs of poison if an autopsy should occur, which may have been one of the reasons that Stalin was so eager to preserve the leader’s remains.

Embalming of Lenin was also popular among the Russian people. More than 1,000 telegrams and

letters came from people all over the USSR asking for Lenin’s body to be preserved. Historian Christopher Binns recalls the, “unending crowds waiting in the bitter cold” to get a glimpse of Lenin’s coffin during his funeral.⁷ By following through with the people’s requests, the new leadership would not only be seen as subscribing to Lenin’s ideas, but would appear democratic and responsive to the citizenry. They would be assured greater legitimacy at a time when the Soviet Union was in search of a legitimate successor.

As previously mentioned, the people’s inclination to stick with Russian Orthodox traditions also played a role in the decision to embalm Lenin’s body. Natural mummification was considered proof of sainthood. Russians believed that a divine body would not deteriorate. In effect, the formaldehyde preservative served as a coding of sainthood that could win over those who were unsympathetic to the Bolshevik attack on religion.⁸

Lenin’s embalming was also a symbol of Russia’s oriental tendencies. The embalming process was modeled off Egyptian mummification, which was considered repugnant to the West. In addition, mummification indicated that Lenin was an otherworldly leader (similar to the pharaohs) and that the Soviet Union was an empire that could compete with the greatness of the ancient Egyptians. The construction of the mausoleum also came at a time when the Russian capital was being moved from St. Petersburg back to Moscow, indicating a physical retreat from the West.⁹

Lastly, many believed that science would one day be able to return people from the dead. By preserving Lenin’s body, it was rumored that he would be able to once again serve the Soviet Union if only scientists could figure out how to revive him. This belief gives truth to the rallying cry, “Lenin lived, Lenin lives, Lenin will live!”¹⁰ In fact, Foreign Trade Minister Leonid Krasin was a follower of Moscow philosopher Nikolai Fyodorov, who was convinced that science would one day conquer death. Krasin argued for Lenin to be preserved for science in the state-run Izvestia newspaper, in which he said that workers of the world “would not be reconciled” and would not rest until Soviet scientists resurrected Lenin.¹¹

Those against embalming Lenin and placing his body in a mausoleum included his family and close friends. After his death, Lenin's wife, Nadya Krups-kaya, told the Russian people,

Do not allow your mourning for Ilich to take the form of external reverence for his person. Do not raise memorials to him, name places after him...¹²

Leon Trotsky was also opposed to the idea of raising a mausoleum to Lenin fearing "that the plan was simply an attempt to pander to the religious sensibilities of the peasantry, replacing the relics of saints with those of Lenin."¹³ Lenin himself reportedly wished to be buried in St. Petersburg alongside his mother; however, Lenin's niece has since come out with public statements saying this rumor was a bold-faced lie.¹⁴

Despite the requests of friends and family members, the mausoleum was eventually constructed on a proposal by a special session of the Second Congress of the Soviets. Among other proposals such as changing the name of Petrograd to Leningrad and building monuments to Lenin in the principal cities of the USSR, the directive ordered that Lenin's body be preserved and a mausoleum be constructed under the Kremlin wall. A temporary crypt was constructed on January 27, 1924 for Lenin's funeral and was replaced by a wooden mausoleum in 1930.¹⁵

POLITICAL HISTORY OF THE LENIN MAUSOLEUM IN THE COMMUNIST ERA

No other leader politicized Lenin's death and the subsequent mausoleum more than Joseph Stalin. Stalin saw the mausoleum as a means of gaining popularity and legitimacy among the Russian populace. It was a symbol of connection between himself and Lenin. Upon Lenin's death, Stalin used the funeral to fulfill his own political aims by producing an "Oath to Lenin." He announced five commandments that he swore Lenin would have wanted to see fulfilled. These included party unity, the dictatorship of the proletariat, the alliance of the workers and peasants, the maintenance of the USSR, and the continuation of the Communist International principles.¹⁶ In other words, Stalin wanted to use Lenin's death to maintain stability after the

founder of the revolution was removed from the picture. It was clear that after Lenin's death, Leninism needed an interpreter that was to be found in Stalin. According to historian Nina Tumarkin, the ruling troika in the Politburo (Stalin included), "acted consciously at the time to create a cult of Lenin" which was intended to:

prevent civil war...keep intact the power structure...and individually to assure for themselves the measure of power and influence they each sought to attain.¹⁷

The mausoleum was meant to be a symbol of Stalin's adherence to and continuation of Leninist principles. He wanted to convey that he was the mouthpiece for Lenin's dissected brain and embalming his body was intended to show that Lenin's soul was still alive within the Communist Party.

Even the competition to find the best design for the mausoleum was highly politicized. Stalin used the contest as a means of getting artists thinking about ideas for communist art and architecture that would serve the state in the future. Evidence of this came in the fact that all 117 entries for the mausoleum were rejected in the end and a government commission invited AV Shchusev to recast the wooden mausoleum in stone under his own blueprint in 1939.¹⁸ Tumarkin writes:

There is reason to suspect that the well-publicized competitive process...was intended chiefly, or even solely, as a *campaign* to politicize artists and architects by encouraging them to participate in the design of Lenin's monumental tomb.⁹

The final design of the mausoleum was symmetrical, vastly different than the constructivist architecture of the past. It represented a greater centralization of power, an emphasis on stability, and the willpower to last an eternity. As Moscow State University Professor Olga Zinovieva contends, the beginning of classical style architecture began with the building of Lenin's tomb.²⁰ Stalin had effectively broken from the Leninist idea of power, while making it appear as if the Stalinist style of government and urban development had the Lenin stamp of approval by constructing his tomb in the same manner in which he built all of his other buildings. In short, Stalin

used Lenin's mausoleum to begin the shift to imperial classical architecture. While Zinovieva believes that the tomb was built like an Egyptian pyramid²¹ and Brooke says that it is more "reminiscent of Aztec tombs in Mexico," there is little doubt that Stalin intended to mimic the architecture of the great empires to send the message that the Soviet Union could stand amongst their ranks.²² The mausoleum was the initial spark that set off the rest of Stalin's urban propaganda.

Stalin also began the tradition of giving speeches, greeting military parades, and observing civilian demonstrations from on top of Lenin's mausoleum. During World War II, Lenin's body was moved due to German advancement on Moscow. His body was placed on a train to the Siberian city of Tyumen on July 3, 1941, where it was stored for four years until Moscow was secured in March 1945.²³ Most notably, Stalin stood atop the mausoleum on May 9, 1945 to greet Russian soldiers and celebrate the Soviet victory in World War II, symbolically showing the defeat of Nazi ideology by Marxism-Leninism.²⁴ This was a tactic picked up by Stalin's successors to make a public display of their adherence to Leninist principles and show their progress in fulfilling the goals of the revolution.

Year after year, many of those within Stalin's inner circle who were eventually murdered on his orders were cremated and placed in an urn next to Lenin's mausoleum. In the case of Vyacheslav Menzhinsky, for example, the curtains of his office were sprayed with mercury and acid for two weeks before his eventual death on May 10, 1934. His urn was placed next to the mausoleum after his cremation. The urns of Ordzhonikidze and Kirov, two Soviet higher-ups whom Stalin had murdered were also placed next to the mausoleum along the Kremlin wall.²⁵ Assuming the rumors of Lenin being poisoned by Stalin were true, the mausoleum and the surrounding area can be seen as Stalin's public showcase of those who crossed his path. It is a demonstration of his political victims and an eerie message to supporters not to overstep their boundaries.

On March 5, 1953, Stalin was pronounced dead. His body was embalmed and placed in the Hall of Columns, where Lenin's funeral was held three decades earlier.²⁶ Four days later, Stalin's body was taken

to Lenin's tomb in Red Square and placed next to Lenin.²⁷ The decision to place Lenin and Stalin side-by-side and make their bodies available for public scrutiny was a political one. Even in death, Stalin wanted to ensure that his greatness was equal to, if not greater than that of Lenin. To tie his legacy to Lenin's was to make himself a cofounder of the revolution. It was a political act to ensure that subsequent leaders of the USSR would devote themselves to the continuation of Stalinist policies as he had supposedly devoted himself to those of Lenin.

Stalin was to be disappointed in this goal. When Nikita Khrushchev took the reins of the USSR and delivered his Secret Speech in 1956, he denounced Stalin's policies by invoking the words of Lenin. He reminded the Twentieth Party Congress of Lenin saying,

Stalin is excessively rude, and this defect...becomes a defect which cannot be tolerated in one holding the position of Secretary General.

Krushchev came to the conclusion that: "Lenin's fears were justified" and, "the negative characteristics of Stalin...transformed themselves during the last years into a grave abuse of power."²⁸

With the increasing trend towards de-Stalinization came the desire to have Stalin's body removed from the Lenin's mausoleum. Khrushchev considered Stalin's burial next to Lenin as a breach of Lenin's sanctity. In a special decree to the Twenty-Second Party Congress in October of 1961, Khrushchev stated:

The further retention in the mausoleum of the sarcophagus with the bier of J.V. Stalin shall be recognized as inappropriate since the serious violations by Stalin of Lenin's precepts, abuse of power, mass repressions against honorable Soviet people...make it impossible to leave the bier with his body in the mausoleum of V.I. Lenin.²⁹

Shortly following the speech, Khrushchev had Stalin's body quietly removed from the mausoleum and buried near the Kremlin wall on October 31st of that year.³⁰ Khrushchev had effectively used the cult of

Lenin to further his own agenda of the de-Stalinization campaign.

The mausoleum remained relatively uncontroversial until the beginning of perestroika. While general secretaries continued to stand atop the mausoleum during parades and public events, there was little left to politicize about an issue that had been so widely abused in the past for political gain. Stalin had soaked clean the idea of attaching himself to Lenin to ensure stability, while Khrushchev had wiped the surface clean by using Lenin to denounce Stalin. Leonid Brezhnev appeared atop the mausoleum to celebrate Soviet astronauts accomplishing the task of being the first to circle the earth in a multi-seat spacecraft; however, this was merely out of tradition rather than an attempt to manipulate Lenin's legacy for his own gain.³¹

The Gorbachev years gave rise to a greater period of politicizing Lenin and the mausoleum. Mikhail Gorbachev was attracted to the flexibility and progressiveness of Lenin's policies, but also knew that associating himself with Lenin could mean that his liberalizing policies would be more likely to win support among party stalwarts and the Russian people as a whole. Historian Archie Brown noted the now-common tactic, writing "Until very late, indeed, in the Soviet era, the way in which to legitimize concepts and policies was to invoke Lenin."³² Gorbachev frequently cited Lenin in speeches and talks in order to give an ideological basis to his shift in governing. He effectively used Stalin's strategy to dismantle his policies. Brown writes:

Gorbachev's frequent citations of Lenin were partly to legitimize innovation which was deviating sharply from past Soviet theory and practice.³³

Gorbachev used the contemporary political debates surrounding Lenin's mausoleum to attach himself with Lenin and Leninist ideology as well. With the beginning of perestroika came a more open call to remove Lenin from the mausoleum and have him buried. Gorbachev spoke out publicly against burying Lenin when he was general secretary. A *Baltimore Sun* article described Gorbachev as viewing the mausoleum as a "sacred site" and seeing it as "blasphemous to close it."³⁴ In addition, he recycled the tactics of Stalin and Brezhnev by hosting funerals for

high-ranking communists atop Lenin's tomb. From the mausoleum, Gorbachev watched the annual May Day celebration with the Soviet elite even as he was booed for changing parade rules to allow political activists and non-governmental organizations to march.³⁵

Russians became more skeptical of the politicization of Lenin at the same time that Gorbachev started to separate himself from the tactics of the past. Standing on top of the mausoleum was a symbolic gesture of unity with Marxist-Leninist ideology; however, it made Gorbachev a target of assassins. On November 8, 1990, a man fired two shots at the Politburo as they stood with Gorbachev atop the mausoleum during the Moscow Parade. Afterwards, Gorbachev broke with tradition and marched with President Yeltsin in the parade, showing the rift between old politics and new.³⁶ Liberalizers within the Communist Party were also getting antsy for reform. The Congress of People's Deputies first proposed the idea of burying Lenin. In September 1991, Lenigrad Mayor Anatoly Sobchack told the Congress, "that we fulfill the last wish of Vladimir Ilyich Lenin and bury him according to religious and national customs."³⁷ Although Gorbachev eventually tabled the touchy subject, he would ultimately come out with statements that struck a similar tone after the political pressure of being general secretary was no longer on him.

HISTORY OF POLITICS AFTER THE FALL OF THE SOVIET UNION

The fall of the Soviet Union brought upon itself increasing criticism of Lenin's legacy as well as a greater demand to have Lenin buried to symbolize the end of the communist era. Boris Yeltsin, the first president of the Russian Federation, wanted to do the deed once and for all, but could not find the political will to do so. Instead, he took marginal steps as part of a balanced approach to governing. On October 7, 1993, Yeltsin ordered that Post No. 1, the guard responsible for protecting the Lenin Mausoleum, be canceled. This occurred immediately following the quelling of an uprising by militants intent on restoring the communist empire. The changing of the guard had been a major tourist destination and symbolized state support of Leninist principles.³⁸ Yeltsin

had this post removed in order to show an end to government backing of communism and Leninism as an ideology. It was meant to destroy the hope of those who wanted to rewind the clock back to the USSR days. *The New York Times* described the event as follows: “But instead of smartly goose-stepping off to the Spassky Gates as guards had done for 69 years, the two guards today quietly walked into the mausoleum—and into history.”³⁹ In a further slam to the communist bloc, Yeltsin restored the post of Honor Guard No. 1 on December 12, 1997, but this time to the tomb of the unknown soldier of the Great Patriotic War. This came on the anniversary of the adoption of the 1993 Russian constitution, an indication that Yeltsin was moving to a less ideological form of government that reinforced state authority.⁴⁰ At the same time he had the guard removed, Yeltsin closed the Lenin Museum across the square to the North, forcing officials to move the world’s largest collection of Lenin artifacts.⁴¹ The movement to bury Lenin was gaining steam in Russian politics. Anti-communist Moscow Mayor Yuri Luzhkov proposed burying Lenin next to his mother’s grave in St. Petersburg and restoring Red Square to its pre-revolutionary appearance in 1993. The Russian Orthodox Church also came out at the same time, saying that they would favor a “Christian” burial for Lenin.⁴² By the end of the decade, 43% of Russians said they would like to see the leader removed from his mausoleum and buried with full honors.⁴³

Despite the mounting support for the burial, Yeltsin ultimately failed to deliver choosing instead to veer to the center as part of his campaign to win reelection. In April 1995, Yeltsin pandered to tradition and greeted the crowd who came to see the World War II Veterans parade from atop the mausoleum just like the Soviet leaders before him. Yeltsin faced several critics in the Kremlin, who said that he was standing on the symbol of tyranny of the old regime; however, the president wanted to win the votes of communist sympathizers in the upcoming presidential election a year later.⁴⁴

It was not until after the election and at the end of his second term that Yeltsin publicly declared that he wished for Lenin to be buried. While Yeltsin had always wanted to bury Lenin, his government did not yet have enough political will to convert thoughts

into actions. A burial of Lenin would mean a symbolic end to the Soviet era, a truth that many Russians were not prepared to swallow. But with little time left in his presidency, Yeltsin finally told newspaper reporters in August of 1999 that he would bury Lenin at long last.⁴⁵ In an interview with *Pravda*, Yeltsin’s Chief of Staff mentioned that Lenin’s remains will be “definitely removed” and buried, and reassured his interviewer that there would not be a public protest in response.⁴⁶

In hindsight, this promise proved empty. This begs the question: Why did Yeltsin not set out to bury Lenin sooner, when the dust had first settled after the collapse of the USSR? According to Andrew Ryvkin, political commentator for *The Guardian*,

In the mid-90’s, when Yeltsin met fierce opposition from the Communist party... it was decided that tampering with such a key symbol of the Soviet past might [radicalize] the anti-Yeltsin sentiment in Russia. Burying Lenin would spark protests, which [...] could have seriously harmed Yeltsin’s 1996 presidential campaign and his administration’s ability to push its agenda through the Russian parliament, in which the communists were a major force.⁴⁷

The decision proved too politically hazardous for Yeltsin to make. In 1996, Yeltsin beat his Communist Party opponent Gennadii Zyuganov by a margin of only 3.3% in the first round of voting.⁴⁸ This slim victory may not have been possible if Yeltsin had alienated Communist Party sympathizers by having Lenin’s body removed. “If they forcibly accelerate the burial of Lenin,” said Grigory Pushkov of the Mnenie (Opinion) polling firm in December of 1993, “a significant portion of the population will be offended.”⁴⁹ At that time, the public opinion regarding the issue was split relatively evenly.⁵⁰ Literally putting the nail in the coffin of the foundations of the Soviet Union was a political gamble that Yeltsin was not prepared to take.

After his reelection, Yeltsin became too weak—physically and politically—to bury Lenin. The economic recovery from shock therapy, which was tepid at best, as well as charges of corruption for selling public industries to his friends in the loans-

for-shares program did not help to improve Yeltsin's political maneuverability. Although Yeltsin promised to bury Lenin in August of 1999, he was no longer really in charge. Yeltsin fell more and more ill by the end of his second term, leaving "The Family," the name for his bureaucratic clique, to take charge of politics.⁵¹ Even if Yeltsin really wanted to have Lenin buried, he could not do it. He simply did not have enough power to do so, because he was not actually making the decisions. As Mel Huang, a blogger on the Central Europe Review, puts it, "After those erratic episodes attributed to drink several years ago, it appeared that Yeltsin became more of a *kukla* (puppet) for the real people in power in the shadows."⁵² Due to a loss of political and physical strength, Yeltsin resigned in December 1999, four months after vowing to do away with the mausoleum. His promise remains unfulfilled.

Until recently, Yeltin's successor, Vladimir Putin, has dodged the issue of closing the Lenin mausoleum and burying the body. In a public statement on the issue in February 2006 he said, "I wish to find solutions, which would enjoy support by the majority of citizens and promote reconciliation and unity of the nation rather than a split."⁵³ By choosing to stay away from the touchy subject, Putin was electing to appeal to his base of moderate voters who were concerned more about political stability than ideological purity. For the first time in Russian history, Lenin's mausoleum was seen as a source of instability rather than one of solidarity. Putin stayed away from the hot-button issue to win support rather than tamper with underlying animosities and nostalgia. His focus was on the economy and governing Russia instead of on petty topics that would court votes in the short-term, but divide the country in the long run. He was following through on the prevailing issues of the time: economic growth and jobs. Lenin was not so much on the minds of voters as was financial insecurity.

Dmitry Medvedev took a similar stance to Putin, but public sentiment was mounting for burial. A public opinion poll conducted in February 2011 found that 60% were in favor of burial, while 30% were against it.⁵⁴ At the same time, members of United Russia Party began bringing up the topic again to give themselves greater public appeal during parliamentary elections.⁵⁵ The Orthodox Church also be-

gan to back off of statements made in the 1990's and began to advise refraining from hasty decision-making. "It is obvious that the condition of Lenin's body does not fit into Russia's cultural tradition," said Archbishop Vsevolod Chaplin, "but we should take into account the opinions of various social groups and avoid making decisions that entail social upheavals."⁵⁶

The next month, a Kremlin rights council recommended to Medvedev that he bury Lenin's body among a list of steps to distance Russia from its communist past. "We are not a country of Lenin and Stalin but the country and people of Pushkin, Gogol, Tolstoy and Pasternak," the document said.⁵⁷ However, Medvedev stayed above the fray, choosing not to respond to the council's recommendations. During the annual May 9th Victory Day parade, Medvedev and Putin elected to metaphorically separate themselves from the issue by standing on a podium in front of the mausoleum rather than on the mausoleum itself as in years past.⁵⁸

Since the Medvedev years, the issue has been placed back in the spotlight, forcing Putin and United Russia to speak on it. Putin has attempted to remain neutral on the issue, saying in July 2012 that the "people should decide."⁵⁹ However, the pro-Putin party, United Russia, has been more vocal than Putin himself on the issue. United Russia continually affirms support for a bill that would require Lenin's burial in St. Petersburg.⁶⁰ Even Gorbachev has been leaning towards the burial option now that he is out of politics, saying that "I think we will come to this point at some stage," when asked about removing the body from its mausoleum.⁶¹ Putin-appointed Culture Minister Vladimir Medinsky has also suggested that Lenin's body be buried with full military honors in June 2012, saying that the mausoleum should be turned into a museum "with expensive tickets."⁶²

Putin's appointment of Medinsky may be an underlying indication that he wishes for Lenin to be buried, but does not want to risk the political fallout from the still powerful communist bloc. Medinsky has co-founded and long belonged to an organization that tries to rename Soviet-era monuments.⁶³ Putin almost certainly knew of this and wished for him to reignite public debate on the issue to get a

sense of the public sentiment. An online poll hosted by United Russia found that 74% of voters wanted Lenin to be buried in January 2011.⁶⁴ United Russia had long touted the results of this poll as reason to bury Lenin; however, it should be noted that the poll was offered on a website called “goodbyelenin.ru” and that the webpage reminds voters that Lenin and his family never wanted a mausoleum erected in his name, while mentioning that, “the Communists did not care for [the] desire of the leader and his relatives.”⁶⁵ This has led to charges of “grave digging” by members of the Communist Party, who also criticized the poll for being skewed.⁶⁶ Now that Medinsky has floated the test balloon, those against Lenin’s burial have weighed in on the website, bringing the total down to 60.5% for and 39.5% against burying the body.⁶⁷ While this poll is unscientific and biased, it remains the most up-to-date way of gauging the Russian people’s sentiment on what has now become a national debate.

CONCLUSION

The politicization of Lenin’s tomb can be summarized in the often-told story of “Clever Lenin” recounted by Nina Tumarkin in *Lenin Lives*:

One day, two, a week, and then a month passed [after Lenin’s funeral] and Lenin grew tired of lying under the glass. One night he slipped out the back door of the mausoleum and went to the Kremlin, where the commissars met. He entered just after meeting and asked two janitors, who had been listening through the door, what they had heard. ‘Did they mention Lenin?’ he queried. ‘What a question.’ ‘Look,’ they say, ‘Lenin died but we now have almost twice as many communists. Now let the Entente dare to make a peep.’ Lenin returned to the mausoleum and lay down under the glass feeling satisfied.⁶⁸

The mausoleum has been used to both make the cult of Lenin possible and win support for not only the current leader during and after the Soviet Union, but also for the Communist Party as a whole. It can be stated that the decision to go against his family’s wishes and embalm Lenin was political at best and

manipulative at worst. The leader who most actively used Lenin’s death and subsequent embalming for political fulfillment was Joseph Stalin, but this does not exclude more liberal politicians, Gorbachev and Yeltsin in particular, from cynically attaching or detaching themselves from the mausoleum to win support for their policies. In short, the mausoleum was a source of power throughout Russian history, because it could be used as a means to win public support and create a more stable political climate as a whole.

However, in contemporary Russian politics the opposite has been true. Both Putin and Medvedev have seen the mausoleum as something that divides rather than unites the country. In a political climate that emphasizes personality over ideology, the mausoleum has been associated with ideological purity. On the other hand, contemporary political parties have been much more vocal on the subject mostly because they are ideologically driven. On June 14, 2012, three major Duma factions, Liberal Democrats, United Russia, and Just Russia, announced support of Medinsky’s plan to bury Lenin. Only the Communist Party is left to voice support.⁶⁹ As public opinion mounts in favor of burial, it can soon be expected that Lenin will be put to rest once and for all; however, this will only occur once Russians are willing to let go of their Soviet past. But for now, as long as Lenin remains in his mausoleum, he will remain a symbol of a past political era over which Russians remain very divided.

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Influential Figures of Dance: Loïe Fuller and Isadora Duncan

Stephanie Willmarth

As dancers and people who study the artistry of movement, we need to take time to reflect upon where we would be in dance without the brave and creative souls who helped develop the art. Dance is an art form that originated centuries ago, but has evolved, developed, and expanded across the world. Beginning as a classical, codified set of movements, dance is now a complex art and an expression of emotion. Reaching their full potential and influence on the world of dance in the late 1800s and early 1900s were Loïe Fuller and Isadora Duncan. While Fuller focused on elaborate lighting, the use of costume, and the revolution of classical dance, Duncan developed a modernized form of movement that was natural and heartfelt. The effects of Fuller's and Duncan's artistic additions to dance are still present in classes and on stages all around the world.

Before discussing the impact of Fuller and Duncan, it is important to understand the new era in dance that was beginning to unfold during their breakthroughs. Just at the turn of the century in 1898, Bernarr Macfadden formed the beginnings of the Physical Culture Movement (Lancos). Outlining the path to a good life, Macfadden stressed the importance of exercise, natural food, fresh-air, sunshine, and a quiet mind (Lancos). The American public tested Macfadden's theories of a healthy lifestyle and realized the benefits of following the steps to a "good life." Paired with the theories of art nouveau, dance became a popular pastime and source of entertainment for Americans of all ages. Art nouveau was a development of the oriental design elements and woodcut prints, ukiyo-e (Lancos). Sinuous curves, linear pattern, opposition, contrast, and asymmetry were design elements of art nouveau that fascinated the public. Between the movement aspects of the Physical Culture Movement and the

design elements of art nouveau, the late 1800s and early 1900s called for a revolution in dance.

Loïe Fuller, born in 1862 in Fullersberg, Illinois, was a sensation to the world of dance, finding her peak at a time that called for change in the art of motion (Brown, Mindlin, and Woodford 11). Marie Louise Fuller, originally a child actress, found her passion in skirt dancing. "Skirt dancing consisted of graceful, somewhat balletic steps," in which voluminous skirts enhanced movement (Kraus, Hilsendager, and Dixon 116). After realizing that she could not appeal to the American audience, Fuller traveled to Europe in an attempt to make a career of her passion. In 1892, Fuller took the stage at the Folies-Bergère in Paris (Brown, Mindlin, and Woodford 11). Unlike Fuller's countrymen, the Parisians greatly appreciated her innovative style and expressivity. Fuller, nicknamed "La Loïe" by the French, became an overnight sensation (Lancos). The European audience looked past Fuller's mediocre technique, her less than refined skill, and her full-figured body; they saw harmony between movement, light, and material. Fuller shared her fascination of the play between light and cloth with audiences, expanding the art of dance beyond movement.

"Often characterized as the embodiment of the Art Nouveau movement," Fuller embraced the ideals of creativity, design, and expressivity (Chitwood 64). What Fuller did for the dance and theater world reaches far beyond what many of the other notable dancers have contributed. Fuller had the courage to oppose the accepted classical technique of dance, adding artistry and lighting effects. Imagine a dancer who is wrapped in 100 yards of beautiful fabric, surrounded by darkness yet illuminated by only a few colorful lights (Kraus, Hilsendager, and Dixon 116). Her maneuvering of the cloth with long bamboo sticks extending from her arms is natural,

playful, and simply artistic. The light reflects upon the material, and highlights the brilliance of dance. By incorporating these technical and design elements into performances, Fuller left audience members awestruck. As dancers and theater-goers, we still see the long lasting effects of Fuller. Modern dance done today is often natural, just as Fuller's dancing was. All stage performances use brilliant lighting and costuming to complement movement; this was the exact goal of Fuller as an artist and dancer. Some say "her legacy is ascending," as technology is changing and Fuller's theories are becoming more relevant (Chitwood 66). From codified to natural, from plain to complex, and from dark to illuminated, there is no doubt that Loïe Fuller had a significant impact on dance.

In addition to revolutionizing dance as an art, Fuller influenced other legendary figures, like Isadora Duncan. Like Fuller, Duncan sought to oppose the accepted technique of dance in the 1800s. Born in 1877 in San Francisco, California, Duncan began studying classical ballet at a young age (Kraus, Hilsendager, and Dixon 116). Finding that ballet did not satisfy her needs as an artist, and realizing that classical dance seems to "separate the gymnastic movements of the body completely from the mind," Duncan sought to develop a self-expressive form of dance (Kraus, Hilsendager, and Dixon 116). Dancing in concerts and revealing her true self in New York and Chicago, Duncan found that she could not appeal to the American audience. Like Fuller, Duncan traveled to Europe in search of inspiration and an appreciative audience. Duncan continued to develop her own personal expressive form of movement, and was particularly inspired by her travel to Greece in 1899 (Lancos). Inspiration finally came to Duncan while observing the natural movement of waves on the beaches of Greece. The natural lightness, forward-backward motion, and flow of water brought a new image around which Duncan could formulate movement. Duncan's European performances became light-hearted and natural; her hair was let loose, she wore draping fabrics, and she danced with emotion and artistry. Soon a popular and appreciated dancer, Duncan performed in Budapest, Berlin, Italy, Greece, and Russia in front of audiences who were captivated by Duncan's innovative style of dance (Kraus,

Hilsendager, and Dixon 117). Duncan "liberated the spirit of dancing," and enlivened movement ("Trailblazers").

Today people can observe the significant impacts that Duncan had on the world of dance. Prior to Duncan, classical technique seemed to be the basis of all dance that captivated audiences in America. Duncan broke away from codified, disciplined dance and developed four movement theories. First, she believed that all movement originated in the solar plexus, the spiritual center of the body (Lancos). Frederick Ashton portrays Duncan's movement style in "Five Brahms Waltzes in the Manner of Isadora Duncan." By watching Ashton's piece, one can observe the importance of the solar plexus in Duncan's movements, as seen by a constant uplift in the chest and rising of the arms ("Trailblazers"). The second movement theory of Duncan's is breath rhythm, coinciding with the third theory of wave rhythm. Finally, Duncan theorized sequential movement, and emphasized flowing from one movement to another (Lancos). Although these four movement theories have allowed dance to evolve into art, the most lasting effect Duncan had is incorporating emotion, passion, and inspiration into dance. Where would we be today without artistic expression in dance? Modern dance, contemporary ballet, social dance, and artistic dance would not have evolved without Duncan's bravery to oppose tradition. By setting the theatricality of dance aside and emphasizing creativity, emotion, and expression, Duncan opened a new opportunity to dance.

Dance is complex and full of history. Today it is a recognized art form that has numerous branches, forms, and styles. Unafraid and firm in their beliefs, Loïe Fuller and Isadora Duncan expanded dance beyond the accepted codified traditional movement. Fuller introduced the power of lighting and supported the design elements of art nouveau. Duncan contributed natural, flowing movement that was inspired by emotion and the environment. Both legendary dancers and choreographers propelled dance in a new direction. Because of Fuller and Duncan's influences on dance, movement has become a complex art full of meaning and creativity.

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The Oppressive Institution of Victorian Sexual Morality as Represented By the Women of Wildean and Shawian Drama

Emily Webb

Through their various portrayals of women in late nineteenth-century drama, Oscar Wilde and George Bernard Shaw demonstrate disparate approaches towards the dispute against Victorian sexual morality as informed by their respective views of contemporary social convention. In the wake of the social purity movement that strove to outlaw male lust, Wilde explores the sexual politics in the seduction of his female protagonists—specifically Mrs. Arbuthnot in *A Woman of No Importance* (1893) and Lady Windermere in *Lady Windermere's Fan* (1892)—in such a way that suggests the futility of an ethical hierarchy which condones the sexual transgressions of men at the expense of feminine purity. As a major proponent of the Fabian socialist movement, Shaw was an advocate of women's rights; an influence causing him to further denounce this degradation of women under corrupt patriarchal authority through the development of his authoritative female characters, such as Vivie Warren in *Mrs. Warren's Profession* (1893) and Gloria Clandon in *You Never Can Tell* (1897). Both characters claim dominance over men in both the domestic and public spheres. While Wilde merely exposes the double standard of sexual morality as his female protagonists risk public shame for their susceptibility to male vice, Shaw actively condemns oppressive notions of proper womanhood to promote sexual tolerance in Victorian society through various representations of the self-respecting woman.

Without compromising his reputation as a notoriously extravagant dandy whose penchant for hedonistic pleasures was tolerated in nineteenth-century high society, Wilde tested the hypocritical moral hierarchy that social purists strove to reform through his own transgressive behavior. Though Wilde refused to support a movement that outlawed the sex-

ual crimes of men, British journalist and renowned social activist W.T. Stead observed how the criminal charges against the playwright for his acts of gross indecency exposed the discriminatory moral values that are promoted in Victorian society (Foldy 129–130). When reflecting on the public conviction of Wilde in 1895 for his crimes of sodomy, Stead tries to rationalize Wilde's lewd homosexual exploits and argues that:

If the promptings of our animal nature are to be the only guide, the punishment of Oscar Wilde would savour of persecution, and he might fairly claim our sympathy as the champion of individualism against the tyranny of an intolerant majority...If Oscar Wilde, instead of indulging in dirty tricks of indecent familiarity with boys and men, had ruined the lives of half a dozen innocent simpletons of girls, or had broken up the home of his friend by corrupting his friend's wife, no one could have laid a finger upon him. The male is sacro-sanct: the female is fair game. (Stead 491-2)

Although he regards Wilde's homosexual transgressions as abnormal conduct, Stead asserts that the social persecution of such deviant behavior ultimately sheds light on the accepted standards of Victorian morality that tolerate the equally lecherous crimes of heterosexual men. Indicating the oppressive demands for female purity within patriarchal society, Stead claims that the established hierarchy of sexual morality would typically overlook similar acts of sexual deviance that are committed by men and rather exploit women. As he inadvertently called into question this double standard of Victorian

sexual morality through his criminal acts of homosexual lust, Wilde further evaluated the need for a universal code of ethics in contemporary society in the dramatic action of his societal comedies. This code unfolds through the discourse of his morally dubious characters that uphold arbitrary decorum among the privileged class.

Translating this marginal evaluation of the hypocritical hierarchy of Victorian ethics into the sexual politics between the men and women of his modern plays, Wilde constructs brief moral conflicts for his female protagonists that merely assess the oppressive demands for female purity under depraved patriarchal authority. While examining the evolution of his righteous female characters, Gregory Mackie claims that Wilde portrays the dramatic action of his plays only to analyze the moral outlooks of these women. Mackie further states that,

The process of moral evaluation, however, is limited by its being confined to a field of binaries and dualistic terms, and character development in these comedies is ultimately subject to a relatively firm ethical. (and verbal) typology.
(Mackie 157)

As the playwright assesses the moral position of his female protagonists, Mackie argues that Wilde limits the development of these characters within a binary code of ethics in such a way that refrains from obstructing the hypocritical hierarchy of sexual morality. In exploring the perspective of a victim of male vice through the scorned Mrs. Arbuthnot's social struggles in his play *A Woman of No Importance* (1893), Wilde restricts her bout of moral enlightenment to the dualistic expectations of female purity and male depravity as she endures public condemnation for her weakness in the face of seduction. When she confronts her depraved seducer, Lord Illingsworth, after experiencing years of public shame, Arbuthnot pleads that he leave their love child in her custody and bemoans that,

I have had twenty years of sorrow, and I have only had one thing to love me, only one thing to love. You have had a life of joy, and pleasure, and success. You have been quite happy, you have never thought of us. (Wilde 139)

As she tries to inform Illingsworth about the repercussions of his lecherous actions that defamed her reputation, Mrs. Arbuthnot notes how the depraved dandy continues to thrive in high society despite his similar sexual transgressions. Establishing her status as a tragic character, Mrs. Arbuthnot acknowledges the paradoxical hierarchy of moral values, which denounce her submission to male vice while condoning such acts of impurity among men, as she laments her ostracism from society. Though she first mourns her scorned existence outside of high society, Mrs. Arbuthnot refuses her son's plea to marry her vindictive seducer for the sake of salvaging her reputation and insists that,

I am disgraced; he is not. That is all. It is the usual history of a man and a woman as it usually happens, as it always happens. And the ending is the ordinary ending. The woman suffers. The man goes free. (Wilde 161)

While providing keen insight into the discriminatory code of ethics imposed upon men and women, Mrs. Arbuthnot seems to come to terms with her status as a "fallen woman" who exists outside of this paradoxical moral hierarchy when she rejects social expectations of convenient marriage to reclaim her purity. Despite the fact that her enlightened character chooses to preserve her dignity over her social reputation, Arbuthnot ultimately evades taking an active stance against the degradation of women at the hands of patriarchal sexuality and allows acts of male vice to persist through the social construct of sexual morality. Thus, Wilde refrains from disturbing the rigid social structure, which perpetuates these discriminatory standards of feminine purity, through the fleeting moral conflict of his female protagonists and, in turn, only exposes the sexual double standard in Victorian society.

In order to maintain this arbitrary decorum within high society, Wilde further evaluates the paradoxical nature of contemporary moral values through the witty discourse of his male and female characters that provokes the vexing moral dilemma of his female protagonists. Analyzing the stylistic function of the playwright's dramatic language, Mackie deconstructs the epigrammatic dialogue shared between his male and female characters and asserts that:

The structure of the epigrams that appear in both dramatic dialogue and lists of maxims is a matter of balance and hierarchy, of setting contrasting terms such as goodness and badness, virtue and vice, truth and lies, in opposition to one another, while maintaining the structure of an ethical hierarchy that gives such oppositions their meaning. (Mackie 156)

While juxtaposing the notions of good and bad through the epigrammatic language of his morally dubious characters, Mackie claims that Wilde establishes equilibrium among such disparate concepts in this lexical opposition in an attempt to affirm the presence of a hypocritical moral hierarchy in Victorian society. In his first play *Lady Windermere's Fan* (1892), Wilde exemplifies this balanced contrast through the clever exchange between the morally upright Lady Windermere and the seemingly nefarious dandy, Lord Darlington, prompting the moral conflict of his female protagonist and testing the paradoxical expectations of sexual purity. When Lady Windermere expresses her belief in a universal standard of moral conduct for a presumably hypothetical case of male infidelity, Lord Darlington contests the absolute division between purity and depravity in society and jokes that, "It is absurd to divide people into good and bad. People are either charming or tedious" (Wilde 43). As he mocks the institution of Victorian morality through his witty discourse with Lady Windermere, Lord Darlington undermines contemporary moral values through the dual disparity between ethical behavior and social bearing that is posited in these epigrams and suggests the futile existence of this moral binary. Once Lady Windermere must choose between the forbidden love of Lord Darlington and her duty to her allegedly adulterous husband, she finds herself caught in this discrepancy of proper moral conduct and soon begins to question social demands for female purity as she laments,

And yet which is the worst, I wonder, to be at the mercy of a man who loves one, or the wife of a man who in one's own house dishonours one? What woman knows? What woman in the whole world? (Wilde 73)

While her righteous character struggles to commit her own sexual transgressions against her husband for fear of social condemnation, Lady Windermere internalizes this lexical opposition between the polarized concepts of virtue and etiquette and further perpetuates Darlington's notion of the worthless ethical hierarchy that condones male depravity. Although she moves to disrupt this moral double standard that often admonishes the sexual deviance of women rather than men, Lady Windermere refrains from challenging its oppressive structure in patriarchal society by reassessing her personal code of ethics once the play's dramatic action reaches its abrupt resolution (Wilde 88). Through the marginal development of his female protagonists' moral conflict as represented in the epigrammatic dialogue of his male and female characters, Wilde preserves the arbitrary decorum within Victorian high society that upholds this hypocritical hierarchy of sexual morality.

While Wilde merely tested the paradoxical construct of nineteenth-century Victorian morality through his own criminal acts of sexual deviance, George Bernard Shaw worked to overturn oppressive demands of ideal womanhood that derived from this binary code of ethics as a result of his social activism. As a major proponent of the Fabian Socialist movement, Shaw expounded his belief that the element of humanity molds both men and women into functioning members of society who make equal contributions to its development. While the playwright believed in the human potential of both men and women in improving society, Sally Peters states that Shaw urged for the establishment of equal rights among the sexes and explains that,

[Shaw] asserted that 'the denial of any fundamental rights' to a woman is really 'a violation of the soul' [...] He saw his work as that of guiding the Fabians toward a new society to benefit both men and women. (Peters 19)

In his public advocacy of such feminist principles, Shaw denounced the lack of female involvement in the public sphere at the expense of social reform and, in turn, worked to subvert patriarchal edicts of ideal domesticity and sexual purity that were inflicted upon women. Demonstrating his adherence

to Fabian Socialist doctrine, Shaw promoted the gradual reform of social demands for proper womanhood through his many works of modern drama, which scrutinized such discriminatory standards of Victorian morality in support of his campaign for sexual equality.

In the development of his provocative “discussion plays,” Shaw openly condemns social conventions of ideal womanliness through the final resolution of their dramatic action that spawns from the moral conflict of his defiant, authoritative female characters. As expressed in his essay, “The Womanly Woman,” Shaw argues that patriarchal expectations of female responsibility within the domestic and public spheres deprive women of their individual rights as equal members of society and maintains that,

Therefore Woman has to repudiate duty altogether. In that repudiation lies her freedom; for it is false to say that Woman is now directly the slave of Man; she is the immediate slave of duty. (Shaw 44)

By urging Victorian women to renounce their sense of noble, self-sacrificing duty and assert their own independence under patriarchal authority, Shaw fosters the concept of an empowered, self-reliant woman who thrives in contemporary society. He further illustrates this concept through the strong-willed female characters in his plays who thwart standards of proper womanhood. In attributing typical masculine traits to the determined character of Vivie Warren in his play *Mrs. Warren's Profession* (1893), Shaw constructs the image of his autonomous female protagonist as she establishes her position within the patriarchal public sphere in such a way that undermines expectations of her rightful duty to the household. After the influential Sir George Crofts offers her financial stability and high social standing through marriage, Vivie declines his proposal along with the extravagant leisure of privileged high society when she states,

I am much obliged to you for being so definite and business-like. I quite appreciate the offer: the money, the position, Lady Crofts, and so on. But I think I will say no, if you don't mind. I'd rather not. (Shaw 74)

Though the insincere gentleman tries to appeal to her pragmatic personality with his forthright terms of a marriage of convenience, Vivie rejects this call to her feminine duty of submissive domesticity so that she may focus on advancing within the working world and achieve her own economic means among her male counterparts. When she later faces much scrutiny from Praed and Frank Gardener for her austere, unromantic character, Vivie dismisses their insistence on her necessary sentimentality and domesticated nature as a woman and asserts that,

You are welcome to any illusions you may have left on these subjects: I have none. If we three are to remain friends, I must be treated as a woman of business, permanently single [to Frank] and permanently unromantic [to Praed] (Shaw 86)

Resisting the male influences that intrude upon her space within the public sphere, Vivie discredits their expectations of her responsibilities as a pious, delicate woman and a doting wife by upholding her proclivity for self-reliance in such a way that contests Victorian standards of love and marriage. She may not seem to triumph over patriarchal authority as she continues to fulfill her noble duty as a businesswoman under the dominant males of the working world. However, unlike her mother, who engaged in sordid business after enduring the oppressive demands for proper womanhood, Vivie still asserts her independence so that she may achieve her own respectable means for economic success. Rather than limit the development of his female protagonists to the binary of Victorian morality as illustrated in Wilde's plays, Shaw fully explores their moral conflict to the point where their characters subvert the social construct of ideal womanliness and claim dominance within patriarchal society.

Despite the fact that he portrays several of his female protagonists in a conventional domestic role as they fulfill their supposedly feminine duties of self-sacrificing love and sexual purity, Shaw manages to permute his conception of the independent, authoritative women through the dramatic action that unfolds within the domestic sphere in order to closely scrutinize and subvert such patriarchal standards of ideal femininity. When he considers the helpless circumstances of ideal Victorian wives within the

household, Shaw upholds that these women must assume a matriarchal position over their domestic domain in order to reclaim their dignity and reasons that, “The self-respect she has lost as a wife she regains as a mother; in which capacity her use and importance to the community compare favourably with those of most men of business” (Shaw 40). By attaining authority within a household that thrives on their self-sacrificing duty, Shaw argues that women can undermine the oppressive standards of ideal domesticity that demean their natural womanhood and regain a sense of autonomy and self-worth through their dominance. In the development of his female protagonist Gloria Clandon in his comedic play *You Never Can Tell* (1897), Shaw illustrates this notion of female empowerment through domestic duty while her strong-minded character works to elicit her command over the institution of Victorian marriage. As she struggles to protect her strong convictions against the affection of the lustful bachelor, Mr. Valentine, Gloria laments her lack of moral strength after she kisses him and admits that, “I am one of those weak creatures born to be mastered by the first man whose eye is caught by them; and I must fulfil my destiny, I suppose” (Shaw 86). By conceding to her presumably natural sentimentality as a woman overcome by passion, Gloria appears to revoke her self-reliant feminine identity and succumb to patriarchal expectations of passive womanhood as she reluctantly pursues this love affair with her male counterpart. Once she learns that Valentine earns meager wages as a dentist, Gloria aggressively embraces her suitor and takes it upon herself to propose marriage when she declares, “Now let us have no false delicacy. Tell my mother that we have agreed to marry one another” (Shaw 122). Knowing that the irresistible bachelor actually holds weak economic standing, Gloria moves to acquire control over Valentine through marriage so that she may reclaim her self-respect as a morally upright, autonomous wife within their household. Although she seems to compromise her self-reliant character in assuming the oppressive domestic duty imposed upon women, Gloria ultimately redeems the weakness of her own principles as she gains dominance over this financially unstable patriarch and asserts her independence. Thus, Shaw resolves the moral struggles of his authoritative albeit conflicted female protagonists who face oppressive demands for ideal

womanliness in such a way that suggests the rightful independence of women through their matriarchal authority acquired through domestic duty.

Though both playwrights illustrate patriarchal demands for proper womanhood that are upheld within Victorian society, Oscar Wilde and George Bernard Shaw convey their divergent perspectives on the social construct of sexual morality through the different magnitudes of dramatic action that develop the female protagonists in their respective works. Considering his own immoral behavior as a sexually deviant dandy within high society during the late nineteenth-century, Wilde restrains the moral conflict of the righteous women in his plays—specifically Mrs. Arbuthnot of *A Woman of No Importance* (1893) and Lady Windermere in *Lady Windermere's Fan* (1892). He maintains arbitrary decorum in the paradoxical hierarchy of ethics that condones male depravity and merely exposes the double standard of Victorian sexual morality. Conversely, Shaw fully explores the social struggles of his strong-willed, autonomous female characters, such as Vivie Warren in *Mrs. Warren's Profession* (1893) and Gloria Clandon in *You Never Can Tell* (1897), to subvert discriminatory expectations of ideal womanliness and further encourage social reform for women's rights. While Wilde eludes a disruption of the established ethical hierarchy—which would overlook his crimes of gross indecency in a heterosexual context—by confining the development of his female protagonists within the oppressive binary of sexual morality, Shaw actively thwarts patriarchal demands for feminine purity and noble domestic duty in developing various portrayals of authoritative women who gain dominance in the domestic and public spheres in order to promote equality among the sexes.

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Feminism and Social Media: The Dilemma of Pro-Ana Websites

Saskia Talay

I. INTRODUCTION

My project evolved a lot over this semester—from the start, I knew I wanted to talk about cyberfeminism in the 1990s and how the reality of online feminist communities today has both differed and followed in the path of those women. Researching online female-run communities brought me to the troubling topic of pro-ana groups (roughly standing for pro-anorexia), which soon became my main focus. I looked at different communities run by women online—both feminist and otherwise, and examined the elements that structure them.

Because I focus on pro-ana groups online, discussion of eating disorders clearly factors in to my work. It is therefore important for me to acknowledge that while eating disorders affect both men and women, my discussion will focus on women's response through the mostly women-run sites and the women who visit these sites.

Briefly, here are some important terms that arise in this paper. *Cyberfeminism* is a facet of feminism that focuses on women's issues in a modern context, often centered on the virtual reality of the online space. *Social Media sites* are web based virtual communities driven by virtual interaction, while *user-generated sites* are sites like YouTube and Tumblr, which are made up entirely of content created by the users themselves. *Pro-ana sites* are sites and blogs sometimes found on those user-generated sites, which advocate for anorexia as a “lifestyle,” and at its core, celebrate eating disorders and are run by women who do not intend to fight their disorders. I do not have a solution to the problematic pro-ana community—but what I do provide is a layer of understanding about how and why we cannot vilify the adolescent and teenage women who create and join these sites

based on the factors that push them and the history of feminism online that precede them.

II. HISTORY AND REVIEW OF CYBERFEMINISM

FEMINISM AND THE ONLINE SPHERE

Cyberfeminism, much like the wider concept of feminism, is difficult to summarize and define. Cyberfeminism is a facet of feminism that focuses on women's issues in a modern context, often centered on the virtual reality of the online space. As Susan Luckman notes:

cyberfeminist activity is frequently utopian in its outlook; draws heavily on postmodernism and psychoanalysis, and is commonly technologically deterministic, uncritically supporting the contention that technology can save the world.
(Luckman 1999)

Technology sits at the core of cyberfeminism, whose main question becomes: *How can feminists use our modern technologies, which are now available, as a way to rework and improve community building and activism?* Cyberfeminism uses technology to exemplify the type of communication specific to modern feminist practice:

... the language of the Internet and the metaphorical geographies employed to describe it make possible technologic rhetorics of the type of networking Third Wave feminists engage in. (Garrison 2000)

In other words, the Internet allows for a type of communication especially relevant to Third Wave

feminist communities and the activism they engage in.

The cyberfeminists of the 90s were then, on the whole, rather optimistic about the implications of the Internet for feminism in a new age:

an optimistic—almost utopian—vision of the electronic community as foreshadowing the ‘good society’ is ... characteristic of cyberfeminism. (Wajcman 63)

Many of these hopes hinged on something as simple as access. Some saw the Internet as a place of infinite possibility, where women who ordinarily would have very little contact with feminism or even access to supportive groups of women focused on women’s issues could find such things virtually. Online, no matter where women are physically, they “can share their experiences and knowledge, reinforce their common beliefs or collective identities, and ultimately implement their transformative actions,” thereby creating and reinforcing a feminist community (Chen and Vogt 371). One of the early ways this was accomplished in the 90s was through hypertext listserv emails, in which many saw great potential as a tool to create community (Engel and Fisher 1998). Greater and easier communication provides the basis of many early cyberfeminist predictions, and feminist listserv emails provided the necessary process by which women could introduce and discuss issues, thus building community and creating spaces for women online. There was a strong belief that “electronic networks [...] create new forms of sociability that will result in enhanced communities and greater world harmony,” and that women would be the ones to harness this power of creation (Wajcman 59). This key aspect of the cyberspace “has the potential to be egalitarian, to bring everyone into a network arrangement. It has the capacity to create community; to provide untold opportunities” (Luckman 1999).

This capacity, as well as its easy access, is precisely why online spaces continue to be so important to an evolving feminism for new generations.

Though optimism runs throughout early cyberfeminist literature, many writers didn’t ignore the potential pitfalls—and, more precisely, that various forms

of communication, in and of themselves, are not value neutral—and sexism can’t automatically be transcended by technology. Although it is seemingly gender neutral, men control the Internet, and access and acceptance of women is limited. The Internet was acknowledged as an environment,

traditionally hostile to feminist viewpoints and [cyberfeminist actions] respond to the male domination of information technologies. Computer-mediated communication, where male users traditionally outnumber women, facilitates forms of sexism and misogyny which can be far more prevalent online than in the physical world. (Luckman 1999)

Early feminist communities had to find a way to navigate and rework an online space to move from the traditionally patriarchal setting to one that can be used to facilitate feminist change. In fact, some argued, the cyberfeminist critique and use of the Internet then becomes a critical *responsibility* because the Internet is a gendered, male dominated space that might push women out of important advances and information of the modern age (Luckman 1999).

At their most optimistic, cyberfeminists believed that the Internet would become a blank space within which the roles and stereotypes could fall away, the ultimate feminist space for learning and communication. As Susan Luckman notes, many early cyberfeminists hoped that the online space would become one where gender could be shed, and all users would exist within the Internet unhindered by the dichotomous nature of gender (1999). However, as evidenced by the harassment women often experience online, this has not come to be. Although users may choose not to disclose their gender and do not always know the genders of others, the patriarchal values and ideas their physical bodies exist within translates into and affects the virtual world regardless:

“the cyber-body retains, for example, characteristics of race and gender *because* both are a social configuration. The body circulating through cyberspace does not obviate the body at the keyboard”. (Gillis 190)

The historical and cultural context of the world that created the Internet is not separate from the online sphere; indeed, in recent years, we have seen that:

hyper-technology is the modern manifestation of an intermingling of science, technology, capital and power. Its historical location dictates its authority and reflects the sexist, racist, homophobic environment in which it was ‘bred’ and many interactions online reflect this. (McNutt 2003)

Technology does not exist outside of the context, conditions, and individuals that created it, and the power that informed the Internet’s beginning continues to dictate its existence today. Recent cyberfeminism, however, has focused on feminism’s ability to claim and change online space, to have:

an emphasis on the contingency and heterogeneity of technological change [that] helps to locate its possibilities in wider social networks. Such an analysis introduces space for women’s agency in transforming technologies. (Wajcman 7)

Online culture has steadily and significantly evolved since the cyberfeminist writings in the 90s, and feminist online culture has expanded with it. The Internet itself has expanded, as have the number and types of users. Most notably, online culture has seeped into the culture of the real world, until the two are continuously intertwined in the daily life of many in the Western world. Indeed, this complete immersion in technology was predicted by cyberfeminists: ten years ago, Ednie Kaeh Garrison wrote,

the feminist praxis we comprehend increasingly references technological rhetorics as well. I find this to be especially true among younger folks who have grown up in the webs of computers and the Internet. (Garrison 2000)

Feminism and online culture, much like general society and the Internet, have become critically entangled and mutually involved with one another.

As early cyberfeminists predicted, communication became key to online feminism, although the earliest tactics, like listserv emails, gave way mainly to blogs

and their commenting sections. Blog moderators write posts that introduce topics and provide information with commentary, while members of online communities further discussions via comments. The communication potential and importance on the Internet, then, hasn’t changed, but rather been re-worked and updated. This aspect of feminist blogs is vital to a furthering of feminism that has been traditionally entrenched in discussion and interaction between women. Interaction, too, becomes significant in the makeup of pro-ana blogs, which I will discuss in my examination of the foundation of the sites later on.

Today, feminist communities are centered in feminist blogs, which create community through the communication long deemed vital by cyberfeminists. The blogs themselves differ from traditional scholarly feminist work in that those who can easily access them might not be familiar with scholarly language, but are now able to contribute and further discussions from perspectives scholarly feminist work might otherwise lack. The belief that technology would bring feminism to those who ordinarily wouldn’t have exposure to it has also remained strong. Danielle Maestretti writes,

Most young people will have their first experiences with feminism online, and when they do, it won’t be difficult for them to find those perspectives that are often overlooked in the women’s studies classroom: those of people of color, people with disabilities, people who are not heterosexual. (Maestretti 2008)

Indeed, feminism of every variety can easily be found online, and blogs are focused on many different “minifeminisms,” making it easy for a user’s first experience with feminism to be tailored to their interests (Maestretti 2008).

III. THE EVOLUTION OF ONLINE FEMINIST ACTIVISM

As early cyberfeminists predicted, the Internet and its use has become incredibly important in modern feminism. The ways in which online spaces—and, specifically, feminist online spaces—has both remained true to and strayed from the expectations of

cyberfeminists can be seen in the way feminist activism has changed with the use of online resources. Feminist blogs make it easier for people to interact with feminism; people who never would have otherwise had firsthand connection with feminist thought. However, the Internet has not only changed how people experience and come into contact with feminism, but it also has changed how feminist activism is done today. The Internet allows information to be spread much more quickly than ever before, an important element necessary for organizing people, and it also maintains a “relatively low expense to the user and to the groups disseminating large volumes of information (compared to faxes or mail),” and so becoming an activist no longer requires large amounts of capital, key to the accessibility the internet allows feminist activism (Vogt and Chen 2001). If, as I have discussed above, communication is key to building an effective feminist community, then the Internet is the perfect tool for feminist activism—it’s a quick, cheap form of communication that has a potentially unlimited reach. With this development have come targeted acts of protest and activism that are begun and spread online, rather than through word of mouth in the physical world. These acts tend to focus on particular issues, and as a result, today “there is no single type of feminist or feminism, and this shows in the plethora of websites hosted over the Internet,” allowing feminist activists to focus on the issues they find pressing (Vogt and Chen 2011). In this way, online users may come to feminism through the certain issue they are interested in, and feminism may seem more accessible to those who might otherwise feel daunted by rhetoric or subjects they do not yet know or understand.

Often, online resources are used by feminist activists to bring attention to a troubling issue and to consolidate voices with the goal of achieving the notice of corporations or government—an online protest. While this strategy is obviously not new, the creative and pervasive use of online resources to achieve the goal certainly is. Attaining reproductive rights is a very old and important fight in feminist circles, and with new online resources, new processes to fight for reproductive rights have emerged. For example, when the Susan G. Komen foundation briefly removed their monetary support of Planned Parenthood in February of 2012, the on-

line backlash spurred by feminist activists worked to change Komen’s decision, and the activists quickly succeeded. Pro-choice advocates and feminists went online in droves, using Facebook, Twitter, and blogs to speak out against the decision, and not only did they get the foundation to reverse their decision, but they raised \$3 million in donations for Planned Parenthood over the short time the Susan G. Komen foundation pulled support (Kelley 2012).

Similarly, feminist groups mobilize online to get certain products removed from stores—again a common goal, but with new tools to achieve it. For example, in 2011, Abercrombie Kids began selling a padded push up bikini top for young girls (figure 1). Sites like Sociological Images brought the issue to the attention of their readers, who mobilized through social media avenues, eventually resulting in Abercrombie re-categorizing the swimsuit and issuing a short apology (Wade and Sharp 2012). While many of the issues online feminist activists work with are certainly not new to feminism, the Internet has created new processes by which to protest, organize, and act—new, effective ways to be an activist in a modern world.

IV. FEMINISM AND ANOREXIA

Just as over-sexualization of young girls and funding for groups like Planned Parenthood are not new to receiving feminist attention, neither is the subject of eating disorders and anorexia’s relationship to how women are treated culturally. There is no question that anorexia and other eating disorders have become frighteningly prevalent in the modern age. According to the National Institute of Mental Health, the lifetime prevalence of anorexia is 0.6% of the adult population in the United States. The numbers differ from men to women; 0.3% of adult men will suffer from anorexia, while 0.9% of women will experience the same (nimh.nih.gov).

Worryingly, the National Association of Anorexia Nervosa and Associated Disorders report that only 1 in 10 men and women with eating disorders receive treatment (anad.org). With so few people receiving official treatment, it is probable that some turn to other resources, such as the ones found online, for help or support, making the prevalence of both on-

line support options and pro-ana groups important to consider.

Problems associated with body image are not limited to adults. Collins found that 42% of 1st to 3rd grade girls wanted to be thinner (Collins 1991). Considering this rising trend of body perception issues among adolescents, groups found by preteens and teens online can have a major influence on body image. Especially in the trying years during puberty when young women are trying to understand the changes to their bodies, the sites they find online can greatly shape their self-image.

Feminist views of anorexia and other eating disorders are linked to how society paints the roles of men and women, and how media representation of women affects how women see themselves. Susan Bordo looks at the issue of anorexia through social theories, and connects the issue with the desire to control one's body and deal with the dualistic way the body is seen in culture—as at once separate and a part of the self. For women, Bordo insists, this dualism means being constantly connected to that which society sexualizes and blames—the female form (1993). Bordo writes that anorexia nervosa:

can be seen at least in part a defense against the ‘femaleness’ of the body and a punishment of its desires. These desires [...] have frequently been culturally represented through the metaphor of female appetite. The extremes to which the anorectic takes the denial of appetite. (that is, to the point of starvation) suggest the dualistic nature of her construction of reality: either she transcends body totally, becoming pure ‘male’ will, or she capitulates utterly to the degraded female body and its disgusting hungers. She sees no other possibilities, no middle ground. (Bordo 8)

Anorexia in today's patriarchy is a result then, of a society that devalues both the female body and the female spirit. It is this that we will see the pro-ana users fighting against. Later, citing Susie Orbach, Bordo writes,

“anorexia represents one extreme on a continuum on which all women today

find themselves, insofar as they are vulnerable, to one degree or another, to the requirements of the cultural construction of femininity,” further addressing the way in which women are forced onto the strict boundaries of femininity and how they are expected to act in society. (Bordo 47)

Thus, women are not given agency or leniency over their own bodies, and exist, as Bordo writes, on a continuum over which they have little to no control.

Feminists also stress the link between the mainstream media's representation of women and anorexia. Women in advertisements and magazines that women of all ages are exposed to every day provide an unattainable ideal of beauty that is based on unrealistic thinness that is enhanced—even exaggerated—through digital tools. This constant barrage of idealized thinness sends the message to women that the thinner your body is, the more you will be valued. This not only sets an unreachable and dangerous beauty goal, but it further perpetuates the idea that a woman's worth is tied entirely to her body. Eating disorders occur much more frequently in men than before, and are now impacting women at younger ages, and media influence is a major factor (Hesse-Biber et al. 2006). Indeed, this influence gives rise to the increasing influences of industries ranging from the exercise to the cosmetic surgery industry, all of which perpetuate the “cult of thinness” ideal forced upon women (Hesse-Biber et al. 2006).

In this light, the “solution” to the culture that creates eating disorders is obvious—extremely difficult, yes, but clear. If we attack that culture, if we continue to challenge beauty norms and expectations, encourage women to seek help, and make sure affordable treatment options exist and are easily available, we can work to fight the culture that supports disordered eating. But now we must consider how adding online communities and social media changes the modes of attack and how effective they might be. This brings us to the pro-ana sites and blogs themselves.

V. INTERNET: FREE OR REGULATED?

SITE POLICIES

In nearly all of the studies used in this paper, the pro-ana sites that were observed were shut down by the time the study was published. The sites tend to have a very quick turnover because of Internet site hosting companies' policies against harmful content (Dias 2003). Pro-ana sites get placed under this umbrella term—the content posted on these blogs is seen as examples of and promoting self harm.

In publicly announced policy changes, user-generated sites Tumblr, Instagram, and Pinterest prohibit content that creates a risk of harm to the poster or to another person, under which they say pro-ana content falls, and Tumblr explicitly no longer allows content that promotes eating disorders or self harm (Gregoire 2012). However, often the blogs and content fall through the cracks, and it is not difficult to find “thinspiration” on any of the sites. The number of blogs on sites like Tumblr are so vast, and the regulation so weak, often thinspirational content is left up. When searching the tag ‘thinspiration’ on Tumblr, a disclaimer saying the following comes up

If you or someone you know is dealing with an eating disorder, self harm issues, or suicidal thoughts, please visit our Counseling & Prevention Resources page for a list of services that may be able to help.

This disclaimer might be helpful to struggling Tumblr users—after all, it places an obstacle between the viewer and the content—but the posts tagged ‘thinspiration’ still come up, millimeters below the easily ignored disclaimer—which has an option for users to take it away. With the move of pro-ana communities from their own sites to user-generated sites like these, the policies of sites like Facebook, Tumblr, Pinterest, and Instagram are key, as they seem to control at least one aspect of the visibility of pro-ana sites.

There is significant disagreement as to whether sites or bloggers have the right to promote or say whatever they want without fear of being shut down, with some saying that shutting down the sites restricts users' First Amendment right to free speech or pres-

sures them to further isolate themselves from possible help. The argument that the sites are harmful, however, are much more pervasive both by feminists and by mainstream media, which has taken a very strong (and slightly morally panicked) stance against the pro-ana community. Those who argue that pro-ana sites should be protected by the First Amendment seem to be only made up of those involved in the communities themselves and a few unrelated outliers. The strength of anorexia and eating disorder awareness groups and their stance against the sites wipe out most other critics against their shutdown.

VI. PRO-ANA SITES

I. WHAT THEY LOOK LIKE

On User-generated sites, ‘thinspiration’ and more explicitly pro-ana blogs often post and repost photos of extremely thin women, diary entries of the bloggers (mostly featured on Tumblr), and quotes (figure 4) to motivate them to lose weight, while the standalone sites that are pro-ana themselves, heavily feature forums and weight loss tips and tips to stave off hunger. Users of both types of sites also include multiple personal stats, such as their starting and current weight, their highest or lowest weight and their ultimate goal weight (Boero and Pascoe 2009). This presentation of personal weights works to promote solidarity between users, and as a motivator for the user him/herself to attain their goal weight, to achieve personal “perfection.” Rather than creating the disembodied spaces cyberfeminists in the 90s hoped for, this reiteration of the physical body of online users creates a contradiction “that online spaces are fundamentally disembodied ones” and further ties the user’s worth to her body (Boero and Pascoe 2009).

Because the main focus of the pro-ana “lifestyle” is the physical body, Natalie Boero and C.J. Pascoe point out that users must work to reproduce their bodies online to maintain this focus (Boero and Pascoe 2009). Users post photos of themselves in forums and on personal blogs, participate in group weight loss “boot camps” together, and keep one another updated on their weight goals; these actions can be seen as ways of “performing embodiment”

(Boero and Pascoe 2009). The participants in pro-ana communities “are not going online to avoid corporeality but rather to engage with others about their bodies via text and image in ways that make them feel in control of those bodies” (Daniels 113). In this way, the pro-ana groups actively work against the ideal disembodied online space that cyberfeminists aspired to, by creating activity that purposefully brings the body into the online sphere. Because these activities form the basis of the pro-ana community, the very foundation of the groups lies in creating the body online.

Another important element that different pro-ana sites and blogs share is a common language. “Pro-ana” and ‘thinspiration’ (or the related ‘thinspo’) being the most used examples, the creation of a community is partly based on an understood set of created words that mark users as members of the community, and work to shut out those who might not understand them. More obscure are words like “wannarexics” or simply “wanas,” people who try to join the community who are seen as lying about their eating disorders and do not correctly follow the “lifestyle” of pro-ana: “The wannarexic treats anorexia as a fad, something that can be adopted and discarded at will” (Boero and Pascoe 2009). Though these terms are not universally prevalent, one standalone site heavily relied on this term to keep the community guarded and separate from outsiders (proanaonline.com, wana.orana.us). The latter site, one that publicizes comments of “wanas,” often gives the label to people on social networking sites like Twitter who tell pro-ana users that their content is harmful. Keeping others out creates a stronger community feel for those who are allowed in. Much like the purposeful exclusion of bisexual individuals by a gay and lesbian activist group to reinforce the definition of being queer, policing the boundaries of the pro-ana groups helps to define and affirm what the group is about to begin with. While this allows the women involved to create stronger support systems, it seems to be support in the wrong direction. Even if the support *was* helpful, despite the possible harm, keeping those who read out separate works to isolate and “other” certain people, is problematic, as well as promotes harmful behavior.

Thinspiration content relies on the fetishization and dehumanization of women’s bodies. Mostly involv-

ing pictures of extremely skinny women and quotes designed to discourage eating, the pictures themselves often cut women off at the neck, deleting the women’s personality and personhood, focusing only on their bodies (figures 2 and 3). Since the pictures are being shown without their heads, the women accessing these sites find even more evidence that their only worth is in their bodies, not in their personalities or minds—the women they are told to idolize are literally reduced only to what is below the neck.

The values of the content seen in thinspiration posts are clearly internalized by pro-ana users. In an email to a reporter, one blogger on Tumblr wrote,

I like images that show skinny, happy girls. They look so confident and we can see their bones through their skin. It's the most beautiful thing ever. (Gregoire 2012)

This imagery is common among thinspo blogs, and the women in the photos are upheld by members of the community as the pinnacle of beauty, ignoring the possible threat that attempting to look like them poses.

On the user-generated sites, pro-ana communities often see overlap with their ‘thinspo’ and fitness blogs’ ‘fitspo,’ and thus serve as a reminder that pro-ana groups aren’t exceptional or pathological but merely part of the continuum of body policing done to all women. The photos seen on fitness blogs can be extremely similar to those on pro-ana blogs; women in skimpy clothing and with their heads cropped out. Though the women in thinspo photos are often much skinnier and less muscular, the similarity is worth noting. Both feature the elements that reduce women to just what their bodies look like—perhaps fitspo might not be as directly harmful as thinspo, but the social ramifications are extremely important.

Interestingly, at the same time that the sites and blogs rebel against the labels they are given by others—whether anonymously online or by their doctors—they reinforce the gender norms of what it means to be and act like a woman. They post photos that embrace the ‘beauty’ of the ideal thin female body, reinforcing the idea that women who are not the ideal level of skinny are worth less than those

who are. This effectively hurts all women—the unattainable ideal body pushes against the sense of self and body for women of all shapes and sizes, as examined by Bordo's work—both within and outside of the pro-anorexia communities (Bordo 1993). At the same time, they are reclaiming their bodies from those who would define them, and turn their disease into a source of power—if the women were talking about a different disease, such speech would be celebrated. They express themselves with powerful prose like:

If we ever completely tapped that potential in our midst, and applied it to other areas outside eating habits and body sculpting, the fact is, we could change the world. Completely. Maybe even rule it” and “A true ‘pro-anorexia’ is not a ‘victim’ in any sense. Some of us may be ‘survivors’ of various traumas and unpleasantries in our lives, from which our endurance and survival have contributed to finding our way to this path. Beyond this, however, we are more than mere ‘survivors.’ We are ‘thrivers!’ We thrive upon challenge, upon competition, upon the raw stimulation of life, keenness of our senses, strength and artistry in our bodies, alertness and clarity in our minds. (Roberts Strife and Rickard 215)

To the women who wrote these statements, being pro-anorexia is a source and focus of a power they find within themselves and the community, which is very different from the traditional meek feminine ideal.

Ultimately however, though the sites become a source of control and power for the users, they do not have total control, as evidenced by the frequent shutdown of pro-anorexia groups' sites (Dias 2003). Indeed, though the users promote their own control, that control is problematic when it is used just as strictly over the self as the control others had that they rebel against:

the themes of self-control, self-discipline and self-surveillance, often in line with culturally dominant ideals of femininity [...] and patriarchal constructions of female bodies and desires as requiring control. (Day 201, 245)

The powerful prose that would be so strong if discussing living with breast cancer is overtly allowing and encouraging self-harm, and this cannot be ignored.

The users are not ignorant of the harm they might be doing to themselves or others, however, as one Tumblr blogger says,

Most days I feel like what I'm doing could be way too much. I know that if I stay on a very dangerous path, that it could kill me within a year easily, if not sooner. But at the same time, I feel like if I set a goal, I have to reach it. I'm pretty torn about it most days, but I've never really felt bad enough that I wanted to stop. (Gregoire 2012)

In addition to this attitude, many of the blogs—both on sites like Tumblr and on separate sites of their own—have disclaimers acknowledging the potential harm that the content they post might have. If the users know of the harm involved with the pro-anorexia “lifestyle” and intentionally ignore it, we must consider why they are willing to put themselves and others in this position; what are they getting in return from pro-anorexia groups that is so worth the danger? Are these women so isolated in their experience living with anorexia that they are willing to risk their lives promoting the disease just to talk to others who understand without doctors who they say demean them or to get some control over their lives themselves? We cannot ignore what their knowledge of the risks means— how it tells us about what they need and for what they risk their well-being.

II. MOVE TO USER GENERATED

Though the pro-anorexia community primarily began on sites specifically dedicated to and created by these women, there has been a large resurgence of late bringing the communities to user-generated sites like Tumblr, YouTube and Instagram. Perhaps because of the separate sites often being closed down, these sites are often much harder to regulate despite the hosting user-generated sites having policies dealing with pro-anorexia content. ‘Thinspiration’ content seems to be the most common on these sites, and blogs that have this kind of content are very image heavy,

focusing on the bodies of thin women. While self-hosted sites still exist, blogs on user-generated sites are much easier to find and open to outside eyes. Tumblr, for example, creates an anonymous space that allows people to be heard in ways they might not otherwise be brave enough to try to do, and so these blogs are:

ideal for giving expression to both inspirational and aspirational content [...] Tumblr-based thinspo blogs are a sort of pro-ana 2.0, forgoing chat rooms and message boards in favor of eerily elegant images, sophisticated design, pop-culture references, private messaging, and street-style sensibility. (Gregoire 2012)

The pro-ana community seems to have created a new generation of blogs that post content that used to be on other sites, which were at times barred with restrictive access, content that is now promoted in a style tailor-made for a new generation of users who grew up in the time of Facebook. Its relatively recent character means that there is little scholarly research done on these types of blogs in particular, and so I have been focusing on them in my research.

III. PROBLEMS WITH RESEARCH WITHOUT UNDERSTANDING

Though, predictably, participants in these communities are likely to:

view their bodies more negatively, and have lower body self esteem than those who do not visit them [...] the link between these sites and increased levels of eating disorders is not inevitable”, overall, the idea that these sites might “turn” healthy young girls into anorexics is rooted in moral panic, incited by media that vilifies the users. (Pollack 2003)

Indeed, as seen by the term “wannarexic,” some groups actively try to avoid and keep out those who do not already prescribe to the “lifestyle choice” of pro-ana (Boero and Pascoe 2009). However, some studies have suggested that viewing the content on pro-ana sites can negatively affect women’s caloric intake, at times even without them realizing it (Jett,

et al. 2010). Despite this possibility, vilifying the creators and participants of these sites is certainly not the solution to the problem of pro-ana sites. One pro-ana contributor to a blog writes:

We can’t go ask for safe advice from non-EDs without a risk of being hospitalized or shunned. Pro-ED to me means understanding that there’s no shame in how we are, and acceptance that this is how we will continue to be for an indefinite period of time. (Dias 38)

Their concerns and rejection of the labels associated with disordered eating that are thrust upon them reveal a problem with the way the medical system and society itself handles people suffering with eating disorders. Of course, there exist many good treatment programs and psychologists that deal with eating disorders. However these young women are simply a symptom of something deeply wrong in our culture—in them, we can see the effects of our expectations of women and beauty.

It is also important to note that there is considerable variation throughout various pro-ana groups. Some promote the medical definition of anorexia, and tend to be a part of pro-ana groups in order to be a part of a community of people also dealing with anorexia, and do not seek recovery because they see the lack of success as inevitable (Roberts Strife and Rickard 2011). Others, more prominent on user-generated sites, see anorexia as a “lifestyle,” and tend to not seek treatment because of the power they find in the community and the disorder.

Many of those who struggled with eating disorders also struggle with feelings of loneliness in their experience with the disease. Claire Mysko, who works with the National Eating Disorders Association, has said that they are:

generally plagued with insecurity and feeling very isolated, so this world of pro-ana provides a community and a sense of belonging, and validates their experiences. (Gregoire 2012)

One user wrote:

It’s actually nice to read. It makes me feel like I’m not alone, like other people are

going through these things and people understand. (McColl 2013)

The pro-ana community offers these young people a kind of support they often find nowhere else, as well as support from people who experience the same loneliness and feelings that they themselves do. The Internet has allowed young people struggling with anorexia and other eating disorders to meet and connect with others their age also struggling with the same problems, whereas before they would only meet others in treatment programs (Boero and Pascoe 2009). However, with this sense of belonging in a community that supports behavior comes also the danger that it can at times threaten the lives of those they support—and even those providing the support. When considering why the users participate it is important to remember that,

because identity construction is vital to feminist action, and it is important that we as feminist scholars and researchers discuss these multiple site positions that foreground the experiences of many young women. (Dower et al. 88-89)

When dealing with these communities, it is important to consider the reasons young people turn to them for support, rather than to their friends, family, or doctors—it is clear that the pro-ana groups offer a type of support they have found nowhere else. Unfortunately, this connection is fueled by shame or hatred of participant's bodies, and can lead to further harm that the girls would have done themselves without the community.

IV. CYBERFEMINISM, FEMINIST ONLINE COMMUNITIES, AND PRO-ANA

Cyberfeminists saw the possibility of the Internet to become a space away from the hegemonic patriarchy within which women could build their own realities and communities. In a way, pro-ana groups are the direct result of such a wish. Judged by others whom they perceive as not understanding their experience, young women dealing with anorexia can retreat to these online communities where they can talk to other women with similar experiences and find support. Karen Dias writes,

Since the public realm is regulated by banishing from sight behaviors that are considered abnormal, repugnant or deviant, cyberspace can provide a space to escape the scrutiny of others. (though perhaps not self-scrutiny), as well as the opportunity to interact with others struggling with eating disorders. This could be helpful since the early stages of anorexia are usually marked by extreme isolation. (31)

Stripping away content and ultimate messages, pro-ana groups, feminist blogs and sites can be viewed as having essentially the same foundation—at their core, both are women talking to and supporting one another in a safe space, a community in which they can discuss issues uniquely important to them.

Jessie Daniels writes that,

foregrounding women and girls' engagement with Internet technologies suggests that there is something innately feminist in such practices. Wilding and other cyberfeminists [...] have warned that the valorization of women's cyber practices without an accompanying feminist critique is problematic,

which forms the center of the difference between feminist online communities and pro-ana groups—even if the two share a foundation, pro-ana groups do not maintain a feminist critique of their own actions and the actions of those they turn away (Daniels 112). Though pro-ana groups purportedly have the same core as feminist groups, their problematic message and values cannot be seen as feminist, and the potential for harm cannot be ignored.

VII. CONCLUSION

Vilifying the creators and participants of these sites is obviously not the solution to the pro-ana problematic. If we try to alienate rather than understand why the women involved in the pro-ana community think the way they do, we will only be working to further isolate them from potential help, as many of those who struggle with eating disorders also strug-

gle with feelings of loneliness in their experience with the disease.

So what should feminists focus on and what can we do to help the women involved in these communities? The blogs are obviously harmful and negative, but what they represent is something innately harmful and negative in the patriarchy that we didn't recognize—the refusal to recognize the autonomy and power of young women and girls, and the lack of spaces for young women to support one another and use their power to connect with each other. The women in pro-ana communities resulted from this lack of space—they recognized a need, and created their own. Unfortunately, they did so in a way that promotes harmful behavior. But, as I have said, they have a solid foundation that, much like feminist online communities, leads to a strong support group. If we gave adolescent and teen female anorexics a chance to promote and strengthen their own power and support one another in a goal online, this community shows that they can be strong and self-regulated—but we need to give them the trust and resources to channel their own power into recovery—allow them to celebrate their strength *without* anorexia.

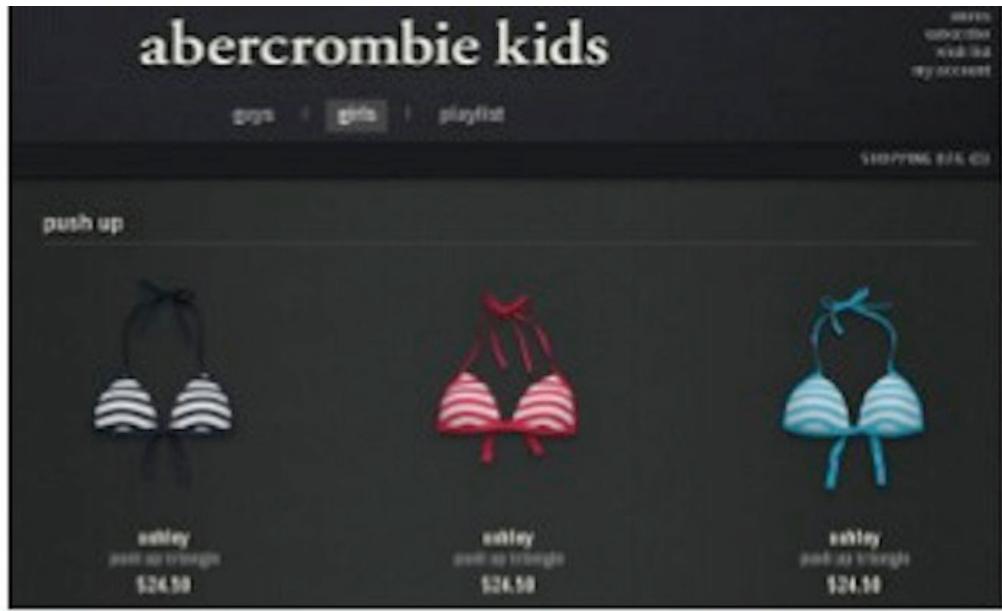


Figure 1: Abercrombie Kids Padded Bikinis



Figures 2 & 3: Typical 'thinspiration' photos



Figure 4: An example of a quote intended to encourage weight loss , combined with a “thin-spirational “photo

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Homosexual Identity Formation in a Heteronormative World

Kathryn Cardinal

ABSTRACT

In America, we live in a society where an expectation exists that a child will be attracted to members of the opposite sex until otherwise specified. This heteronormativity is guided by many collective representations and stigmas that devalue lesbian and gay identities. The social constructs of heteronormativity and devaluation makes the process of homosexual identity formation very difficult for adolescents to progress through. Interactions that reinforce positivity about being gay or lesbian and overcome its stigmatization are crucial for an adolescent to fully accept and form this part of him or herself. My experiences as an adolescent struggling to form a lesbian identity, combined with three other oral histories of the lesbian or gay identity formation process help to illustrate and evaluate the formation process, and the impact of heteronormativity each step of the way.

OVERVIEW

In each society, history, language, and the media shape the norms for sexual orientation. While American culture has advanced to bring homosexuality into the public sphere, along with it came stigmas and differentiations that make homosexuality a devalued social identity (Bruce and Ellis 2005). Heteronormativity is the presumption that every individual who grows up will have a heterosexual orientation; in the United States, it forces gays and lesbians to step outside of societal norms to accept and form their sexual identities. When adolescents are questioning their sexuality, they must come to the realization that to claim a gay or lesbian identity is to go against what has been presumed about them their entire lives. This can cause identity conflict and associated emotional distress. The differentiated collec-

tive representation of homosexuality in the United States is due to its heteronormative past and present.

While the norms that are disinclined to homosexuality have still not been changed, there has been some progress towards social acceptance in other ways. At first homosexuality only occurred in secrecy, but both key social movements and eventually legislative attempts at equality have sought to change the status of homosexuals in America. Prior to the 1960's, gay and lesbian relationships were not discussed and were instead assumed to be non-existent, even though there has been much historical evidence that these relationships did exist. The sexual revolution of the 1960's was the first attempt to bring homosexuality out of the shadows. Whether or not it was approved of, at least men and women were no longer forced to hide their feelings towards members of the same sex from public view.

Before the sexual revolution, homosexuality was so suppressed that if discovered, it was considered to be a mental disorder (it was finally declassified as such by the American Psychiatric Association in 1973) (Edwards and Brooks, 2000). Men and women could not publicly be with the person they loved if that individual belonged to the same sex; to do so was to risk being diagnosed with a mental disorder and consequentially taken into a psychiatric facility. Regardless of the cost, many people still risked same-sex relationships in private. Rupp describes this in her research on dissertations written by graduate students in Lesbian, Gay, Bisexual or Transgender, referred to as LGBT studies:

one of the first ways that the history of same-sex love transformed conceptions of heterosexuality was through the exploration of female romantic friendship, which showed us that quite a lot of love coexisted with heterosexual married life

from the late eighteenth into the early twentieth century. (Rupp 2010, 160)

The woman's role in the home, created by heterosexual standards of marriage, may have been key in allowing the opportunity for women to explore and form relationships with one another.

Although the sexual revolution helped to bring many homosexuality cases into public view, it did not create sudden social acceptance. In fact, a lot of individuals who chose to be open about their sexual orientation faced extreme prejudice and hate. While the sexual revolution is described as "a revolutionary uprooting of traditional sexual morality," the General Social Survey from 1973 to 1989 shows that the majority of Americans still regarded "sexual relations between two adults of the same sex" as always morally wrong (Smith 1990, 415, 424). So with society still regarding homosexuality as wrong and immoral, gays and lesbians turned to law in order to gain the freedom to openly love whomever they choose.

As more people became open about their homosexuality, legislative proposals for marriage and other LGBT civil rights began to crop up. The first state to legalize same sex marriage was Hawaii. Passed by the state's supreme court in 1993, this was eventually overturned by a constitutional amendment and it is still illegal in Hawaii. However since then, eight states have successfully legalized same sex marriages or civil unions (Bond and Smith 2011). Another major step in civil liberties for gays and lesbians occurred in 2003, when the court case *Lawrence v. Texas* invalidated state bans on consensual sodomy (Lawrence v. Texas 2003). Prior to this, mainly in the South, participating in sexual acts with members of the same sex was actually against the law, completely delegitimizing homosexual relationships. Historically, homosexuality has made a transition from being completely delegitimized, to being more widely socially and legally acceptable. But there is still a long way to go for homosexuals to achieve social and legal equality in the United States of America.

History is not the only tool that has shaped the way homosexuals are viewed today. Language also contributes to both the current collective identity of the LGBT community and the attitudes from other collectives towards homosexuality. Language is a device

developed for communication, but the way we communicate as a society about certain topics perpetuates the negativity that is associated with the terms themselves. There are ample derogatory slang terms that are used to slander and demean gays and lesbians, but this is the case for almost for any stigmatized group in society. It is the nature of the basic language used to define and identify homosexuals that sets them apart from the norms and standards of society. When social scientists study homosexual behavior in an attempt to look for a cause or explanation, it turns same-sex attraction into a societal abnormality. There are many theories from biological to social psychological stage theories that seek to explain how and why homosexuality develops (Edwards and Brooks 2000). These theories operate under the presumption of heteronormativity. Even science perpetuates the stigmatization of homosexual identities, but society still has the expectation that individuals who are attracted to members of the same sex should accept the identity through self-definition if they want to engage in homosexual relationships.

Defining sexual orientation perpetuates the difficulties and social stigmas attached to homosexuality. In their chapter on sexual identity, Brooks and Edwards state:

The power of language and discourse to privilege or marginalize is particularly noticeable in relation to sexual orientation because it is an otherwise invisible difference between people that is dependent on the speech act for its identification. (Edwards and Brooks 2000, 55)

The authors discuss that by labeling sexuality, we must also label the differences in individuals. In a society where these particular differences are not perceived as good, it becomes impossible to get around the stigmas associated with the very nature of one's sexual identity.

Language and history shape collective representations of certain groups in society, often via mainstream media; through recent technology, these representations have now developed the ability to spread rapidly. The news, television shows, films, and the Internet are prime sources of information to adolescents. Gay and lesbian teens are portrayed

throughout these sources as being bullied and harassed when they openly identify their sexualities. While public figures such as Ellen DeGeneres and Neil Patrick Harris have emerged as icons of the gay and lesbian community, and it is more common to see a gay or lesbian couple on a television show, these positive homosexual relationships or role models are primarily adults.

In movies about gay adolescents, characters who “come out” to the world are portrayed as rejecting the standards of society, going against their parents’ wishes, and often subjecting themselves to ridicule by their peers (Padva 2007). For example, the satire movie *But I’m a Cheerleader* is about a girl sent to heterosexual rehabilitation after her friends and family decide she is a lesbian. It may be sardonic, but it is portrayals such as these that promote heteronormativity and create the fear of rejection in adolescents who may be questioning or exploring the depths of their sexuality. These outlets of information available to adolescents about homosexuality not only encourage adolescents to suppress differences in sexual orientation, but further the impression that gays and lesbians should be stigmatized and that it is okay to treat those teens poorly.

There are online projects that attempt to help gay and lesbian adolescents who are dealing with bullying. One in particular titled the “It Gets Better Project” attempts to help through videos from famous politicians, actors, and other regular people who have dealt with bullying in the past. Each video sends the message that the homosexual teens are not alone, that things get better as you get older, and that not only is it okay to be different, but that you should be proud of your differences (Savage 2010). It is definitely beneficial to society that some people are trying to reach out to bullied teens to help pull them through the trouble, but the focus is always on embracing the differences that are highlighted through heteronormativity. Instead, the focus needs to move towards changing society’s view so that children are no longer socialized to see homosexuality as something so different from what is normal. As long as the difference between gay and straight is imprinted upon young minds as a “them” vs. “us” representation, questioning adolescents will continue to feel on the outside and struggle to accept themselves for who they are.

LITERATURE REVIEW

The assumption of heterosexuality shapes the process of sexual orientation identity formation that everyone goes through. Due to heteronormativity, homosexual identity formation is a daunting process to adolescents and teens, while heterosexual identity formation can almost go unnoticed. There are many models on minority sexual orientation identity formation, and each model stresses the importance of the individual engaging in a “realization” that they are attracted to members of the same sex and a “reflection” on what this will mean for them in the future (Floyd and Stein 2002; Galliher and Glover and Lamere 2009). As a consequence of living in a heteronormative society, American adolescents who undergo the process of self-acceptance and “coming out,” two major components in homosexual identity formation, must willingly accept a stigmatized identity as part of themselves. This creates a major strain on these adolescents’ psychosocial well-being, throughout the process and specifically during self-acceptance (Halpin and Allen 2004). Adolescents who are unable to overcome societal norms can spend years stuck in the early stages of identity formation, while engaging in a heterosexual lifestyle. However, other more fortunate adolescents, can engage in positive interactions and develop in supportive environments that will help guide them through the stress and difficulties of the identity formation process.

Crucial to each stage of this identity formation—particularly self-acceptance—is positive social feedback, or social acceptance of the individual’s homosexual identity. Adolescents commonly find ways to gain positive social feedback through various means. One way is by gaining social connections with other gays and lesbians; this includes finding gay community organizations, forming a relationship with a gay parental figure, and utilizing peer support of other gay, lesbian, and bisexual adolescents (Nesmith, Burton, and Cosgrove 1999). If this is unavailable and an individual remains entirely in heterosexual social groups, another way to gain positive social feedback is by discussing his or her sexual orientation with close members of the social group and gaining acceptance regardless. Heteronormative society creates the need for this positive social feedback in order for adolescents to be able to gain a healthy

self-acceptance of their homosexual identity, and to overcome the distress of “coming out” with a stigmatized identity.

The various models have different specifics in each stage but they can all be broken down into four stages. The first is questioning: this occurs when an individual initially recognizes attractions to members of the same sex, forcing him or her to reconsider the presumed heterosexuality (Floyd and Stein 2002). Some researchers argue that this occurs before adolescence, but it varies for each individual (Floyd and Stein 2002). The next step is exploration and recognition. In this stage the individual might begin to explore sexual relations with members of the same sex (Floyd and Stein 2002). Another study by Galliher shows that the individual will sometimes engage in heterosexual dating and relationships due to normative pressure during this stage (Galliher, Glover, and Lamere 2009). The third stage involves disclosure and reflection. This decisive stage would be the first step in the “coming out” process. During this stage the individual engages in initial interactions with others regarding his or her attraction to the same sex. If the interaction is positive this will propel the individual’s self-acceptance of the homosexual identity (Floyd and Stein, 2002). Lastly, as the individual engages in more positive interactions regarding his or her homosexuality, the final stage will be social disclosure. Stage models stress the importance of parental disclosure because it will allow the individual to form a public identity as gay or lesbian (Floyd and Stein 2002).

Heteronormativity makes this four-step process extremely fragile for individuals. Socialization creates in adolescents the need to fit in and be accepted, particularly when they hold a stigmatized identity. According to research by Halpin and Allen, during gay identity formation, there is a variance in psychosocial well being that correlates to each stage of development. The results of the study show a U-shaped curve, which indicates that individuals experience the most distress during the middle stages of tolerance and acceptance, while the primary stages of questioning, and the final stages of social disclosure are associated with less loneliness and better overall well-being (Halpin and Allen 2004). When individuals must come to terms with a stigmatized identity, they hypothesize how others might see them:

It is probably that the social environment, homophobia evident within society, and fear of rejection causes much of the distress associated within the formation of gay identity. (Halpin and Allen 2004, 124)

This reinforces the idea that supportive environments and positive interactions may ease distress by lessening the individual’s fear of rejection, which can progress the process immensely.

The pressure of going against society’s norms and the fear of rejection causes many individuals to stay stuck in the first two stages of the process for long periods of time, most of the time not even realizing that they are there. Authors Kitzinger and Wilkinson, in their quantitative study on Lesbians who came out after maintaining a heterosexual lifestyle for at least 10 years, examined the ways in which women avoided progression to the third and fourth stages of identity formation. Most women had experienced “compulsory heterosexuality,” which is where they simply didn’t know anything other than heterosexuality; “multiple oppressions,” in which women who had other stigmatized identities already simply could not contemplate adding another; and “blocking it out,” in which women “refused to allow themselves to address the question ‘Am I a lesbian?’” (Kitzinger and Wilkinson 1995, 98). The research may be specific to lesbians, but these seemingly innate and unrecognized means for resisting self-acceptance of a stigmatized identity, can be universalized for any individuals who might get stuck in the process of homosexual identity formation. This stalemate occurs from the difficulties created by heteronormativity; gaining positive social feedback can help ease these individuals into self-acceptance.

Interactions are crucial throughout the process of homosexual identity formation, especially for adolescents because the more positive support one gains, the higher the well being of the individual, which creates more fluid self-acceptance. One way that an adolescent can be guided into self-acceptance is when they are immersed in a social group that contains homosexuality. One study identifies this as one of the positive options after the individual undergoes exploration and recognition:

responses such as disclosure and social contacts with other gays, lesbians, and bisexuals help to propel the individual toward greater openness and self-acceptance, whereas other responses, such as denial or hiding lead to identity foreclosure or compartmentalization of private and public aspects of identity. (Floyd and Stein 2002, 68)

This suggests that if positive interactions do not occur to promote openness, the LGBT individual can face many identity issues.

Sometimes for gay, lesbian, and bisexual teens it can be a daunting task to surround themselves with supportive individuals to help increase positive interactions during their identity formation process. Research was done on teens that are members of a volunteer center called the Lambert House, a place filled with a community of supportive adults and youth of homosexuality, many who are gay, lesbian, and bisexual themselves. The research shows the ways in which a supportive environment of other homosexual individuals can help adolescents become comfortable with their own sexuality. Many adolescents gained support by adopting a parental figure that completely accepted their gay identity and offered support by giving advice, nurturing, or providing a role model for the youths. Other adolescents simply gained from being surrounded by peers who accepted them, as well as seeing adult examples of happy and successful minority sexuality individuals (Nesmith, Burton, and Cosgrove 1999). These ways in which adolescents might gain social support from other gays, lesbians, and bisexuals imply that not only are there many social needs during the process of homosexual identity formation that must be fulfilled, but that entering into a homosexual friendly social group can provide for many of these needs.

If the individual remains within mostly or entirely heterosexual social surroundings the acceptance of the individual's sexual orientation by close friends becomes even more important to his or her personal acceptance of the identity. The stigmatizations of gays and lesbians can be overwhelming and to have a friendship that breaks down those barriers can reassure the individual that it is possible. Results from a study on cross-sexual orientation friendships show

that the disclosure of the information followed by a positive reaction deepens the trust in the friendship (Galupo and St John 2001). The study explains the significance of that trust before the next step can begin in the process of identity formation:

friendships in adolescence become even more important to sexual minority youth because of parental rejection or fear of parental rejection related to disclosure of sexual-orientation identity. (Galupo and St John 2001, 84)

The relationships and interactions that occur during the self-acceptance stage determine the course of the rest of the process.

Interactions during adolescence help to form many parts of an individual's social identity. When an adolescent is going through the process of forming and accepting a minority sexual orientation identity, these interactions can facilitate or hinder self-acceptance. Increased immersion into social groups where gays and lesbians are already out can really ease the process and create a comfortable environment for the individual to explore and accept. If this is not available, then close friendships that break down the barriers of stigmatization are of the utmost importance to progression in the identity formation. Having any stigmatized identity is a difficult process and many of these identities are part of oneself from birth. But when it is presumed by society that one does not have this devalued identity, the process of discovery and acceptance is a difficult one that needs to be aided by positive interactions in order to help overcome the social barriers that exist and to help the individual cope with the stressors of accepting this identity for themselves.

RESEARCH DISCUSSION

Many people hold stigmatized identities that differentiate us within the surrounding society. Thousands of groups who advocate stopping various forms of discrimination argue the solution is to embrace our differences and be proud of the identity we hold. These groups attempt to inspire within society the idea that we are not all so very different, because we are all born with things that make us different in one way or another. But for homosexuals, we are not

born labeled with our differences. When it comes to sexuality, as individuals grow and develop, heteronormativity asserts that we do fit into society's description of normal. The difference between other stigmatized identities and homosexuality is that to continue to fit into the norm against the need to be true to our happiness, as individuals ridden with conflicting desires, we must come to take on and accept the differentiations that society creates. This process takes shape in homosexual identity formation.

LGBT individuals experience this unique identity formation process in various ways due to our backgrounds. Regardless of the variances, we as a collective share similar experiences and hardships due to the effect of a heteronormative society. The findings from both my personal autoethnographical account, as well as the oral histories of three other individuals, show heteronormativity's impact in every step of the homosexual identity formation process. To fully understand how social standards shape the process of a gay or lesbian individual's life, it is important to examine and discuss the similarities and differences in the experiences shared by myself and the three other individuals. Through the lens of the four-stage process I will highlight the themes that tie together the collective of the gay and lesbian community during each stage.

In the first stage, the questioning stage, an individual has the first inklings that he or she may not be solely attracted to members of the opposite sex (Floyd and Stein 2002). The data identifies that this stage can vary most in terms of what age it starts at, based on the severity to which heteronormative standards have impacted the individual's environment. An environment more exposed to, and comfortable with gays and lesbians, was linked with earlier questioning experiences, while the opposite environment involved later signs of curiosity. This is exemplified in the contrast between Sarah and Rebecca. Sarah's comfortable environment led her to start feeling attractions to members of the same sex as a child, whereas Rebecca had no idea that she might not be straight until her senior year of high school.

The town that Sarah was raised in had a general sense of social acceptance of gays and lesbians. There are openly gay members of her community, some of whom she has a relationship with. This list includes

the mayor, a few of her male friends in high school, her brother, and a lesbian couple that moved in next door to her while she was in high school.

The boys in my high school that were gay: everyone loved them, everyone wanted to go to prom with them.... The Lesbian couple [In] my community, it's actually kind of funny, they are very respected because they are very involved with the community, but if they are ever referred to—you see it—I come from a small town, so they are the token lesbians. (Sarah, May 2012)

Sarah makes it apparent there may be labeling, but there is not discrimination against these women and overall they are accepted as prominent community members.

When asked what age she first realized her attraction to females, she explains how it started at quite a young age, but she was not fully aware of what the feelings meant.

I remember having this huge crush, I didn't realize my feelings were, that, until I look back on it, but I had this friend that came over. I was probably eight or nine, and I remember... I was just really attracted to her. But I was young, so it wasn't necessarily manifested in the same way, but it started pretty young. (Sarah, May 2012)

She continues to explain that she did not realize that these feelings were different from what she was supposed to feel at such a young age. Heteronormativity tells women we are to be attracted to boys, so when Sarah had feelings for a girl when she was younger, she could not recognize it as attraction, even though she grew up in a town less heterosexually dominant than most.

In the case of Rebecca, she progressed from a completely un-diverse community, to having two separate social groups, one completely accepting of homosexuality and the other obviously uncomfortable with it. She described her hometown as the second least diverse city in the United States; everyone is white, middle class, and Catholic. The overall com-

munity mood on homosexuality is apparent in her description her friend from high school who had come out:

I gave Kyle a lot of respect because he tried to start Pride at our school, because we don't have that, and he tried to start it and he was getting a lot of crap from more of the popular guys in our grade... and it was kind of just pushed under the table, everyone was like yeah we'll get to it, and then Kyle graduated so now there is like no one. (Rebecca, May 2012)

It seems that anyone who did not seek exposure to homosexuality would be completely unaware of anything other than heteronormativity. When asked if her parents ever made her aware of their feelings towards homosexuality she claimed, "My mom is really awkward about it," and "My dad would probably just ignore it." In addition to her parents, she explains her closest friends and her perceptions of their acceptance of homosexuality.

My friends from home are all gorgeous, straight, textbook perfect girls, athletes. So, I have never really had a conversation with them that would disclose if they were okay with it, but I'm pretty sure they are not like, against it. (Rebecca, May 2012)

Rebecca spent her whole life growing up in a community where heterosexuality was rarely questioned, or defied. This has clearly affected her late start to the questioning process of homosexual identity formation.

When I asked her if she ever felt an attraction to girls at a young age, she responded with a description of her lack of feelings for either sex.

I feel like I was like asexual until high school, I was just doing my own thing, playing sports. I had a boyfriend in sixth grade, maybe for a day. But I really didn't get involved... so no.

This is interesting, because instead of actively engaging in a heterosexual lifestyle, she simply chose to focus on other things, ignore any question of sexuality altogether. Rebecca had heterosexual interests as she

became older, but this became intertwined with her attraction to women. She describes the first time she ever had a flicker of questioning of her presumed attraction to males.

Before I came to college I played basketball, and not to be stereotypical but there are a lot of gay girls that play. There was this girl Joelle who played for a different basketball team and she was gay. She had a girlfriend that was on another basketball team that we played too. But someone on our team got Joelle's number and was texting Joelle... She asked her, 'Who on your team is gay?' I got a little nervous about that because I was like—I don't know I just thought the girl was going to say 'Oh yeah that Rebecca girl is gay' and I wouldn't have known what to do. So I guess I was just always kind of curious I would say... Senior year. (Rebecca, May 2012)

Rebecca never thought she might be a lesbian, until she was concerned that someone else may have seen her that way. This reflects her concern for defying the norms in her town. There must have been something to make her imagine that others would see her as gay. After this incident she continued to question her status as a heterosexual in society, but not until her environment shifted to college did she fully begin to question her capacity to be attracted to women.

These interview segments shed light on the very initial impact heteronormativity has on adolescents. To someone who may never have dealt with questioning his or her identity, this may seem arbitrary. But take into consideration Rebecca's description of feeling asexual; since straight was the only option in her town, she never let herself feel attraction to anyone. When she finally considered other options, her first experience was fear-based—that someone may have thought she was a lesbian. It seems that her environment, compared to that of Sarah's, put her on an uneven playing ground. She now has much farther and longer to go in order to understand herself and get past the image of normal embedded unconsciously into her mind by heteronormativity.

The second stage occurs when the individual takes action regarding the questions of his or her sexuality. The stage concludes with some form of self-acknowledgment of same-sex attraction, which can no longer be ignored. This stage is called exploration and recognition (Floyd and Stein 2002). Some individuals, like Sarah, move through this stage and rapidly accept their attraction to the same sex. But for others like my grandfather and myself, it can be very easy to get stuck here for far too long. One of the most direct and displeasing effects of heteronormativity is the attempt at heterosexual relationships that many men and women make before they finally discover who they will truly be happy with. It took me almost five years of actively and unhappily dating males to discover that my affection for a female was far greater than any liking previous. My grandfather, on the other hand, spent his entire life maintaining a heterosexual relationship with my grandmother, and he may never have admitted to himself his attraction to men. This disastrous effect of heteronormativity leaves so many gays and lesbians stuck in the exploration stage—attempting to explore themselves into a heterosexual and normal life. These descriptions explain the lack of satisfaction and completeness in life derived from this occurrence.

My autoethnography describes my conflicts with heterosexuality that I did not even realize existed. I was so convinced that straight was my only option, and I was destined to spend a lifetime married unhappily because I had no ability to love. Because society had me convinced homosexuality was never even an option, I placed the blame in myself. I think this is a common theme among gays and lesbians who attempt to maintain unhappy heterosexuality. Below I briefly explain my experience with this heterosexual lifestyle.

In my freshman year of college I joined women's rugby. I discovered that there were quite a few lesbians on the team, and while surprised, I ignored any curiosity I may have had in the past to assert my identity as straight. I never lacked a boyfriend and would go from one to the next, never giving myself the time to feel alone. My best friend from home, Glen, was coming up to school in the spring semester. I felt certain he would be the

boy I would finally fall in love with. I was so sick of moving from one to the next because I could not maintain any feelings for them for very long. But when he got to school, it ended in a disaster. My parents had gotten married their sophomore year in college, and my sister had met her now 8 year boyfriend her freshman year. I knew this wasn't normal, but I was starting to feel as if I was just not capable of love. But I moved on and started to date Andrew. He was the first very serious relationship I had, and we dated for seven months. I was convinced I was in love. (Kathryn, May 2012)

My final attempts to be normal did not stay that way for long. The comfort of exploration my new surroundings provided me with greatly conflicted with my deeply rooted heterosexual persistence.

About a month after being on the team I started to get a definitive friend group. In it were two out lesbians—this was a first for me. I had never before been able to say I was a close friend with a lesbian. The rest of my friends did not necessarily have a defined sexuality, except a few who were very straight. One of the lesbians was Annie, a girl who I immediately felt close with. I thought she was cute and funny, and because sexuality was so loosely defined with my friends I felt okay. (maybe a little awkward) to flirt with her. We kissed a few times, but nothing made me say I was attracted to all girls. By spring semester we joked that I was an "Annie enthusiast". (Kathryn, May 2012)

These first steps into exploring homosexuality were confusing and exciting at the same time. I was happy to suddenly have the idea that there was another option out there. But I only felt safe exploring under the cover of my strong heterosexual identity and maintenance heterosexual relationship.

This safe exploration zone came crashing down as I started to really develop an attraction to Annie. My heterosexual shield from society made me who I was

at that point, as unhappy as I may have been. But the exploration and the shield began to collide:

One night during an argument Andrew questioned me to see if I had feelings for Annie. My feelings had skyrocketed for her, and this was my chance to let it out. But I couldn't. I was determined to prove to my family, my friends, and myself that I could keep a relationship with a boy. I told him I did like her, but it was nothing and I was sure I was straight. After assuring him he had nothing to worry about I made it the last few weeks of the school year making my very best attempts to ignore my true feelings, and prove I could be a good heterosexual girlfriend. I want to say now that I regret not fixing it then, but I don't. I wasn't ready to accept my attraction to girls yet. I needed the whole summer to ignore any thoughts that I might be gay. But finally when I came back to school I realized I could not spend another year pretending to like Andrew, so I let the relationship go. (Kathryn, May 2012)

Heterosexuality may have been a very unpleasant experience for me, but when society tells you it is the way you should be, most individuals feel the need to try it out at the very least, regardless of homosexual inclinations. For me that test drive was a desperate attempt to cling to normalcy and force it to work as long as I could. Luckily five years of active attempts to conform to society's standards was not that long in the scheme of things.

My grandfather was not as lucky as I was, and roped himself into a lifetime of miserable heterosexual marriage. Due to the time period, his role as a father, and his Navy career, forming and accepting a homosexual identity would have been going against every other identity he held. My mom describes why later in his life, when he did develop feelings for a man, he did not become open about it.

At that point, he wouldn't have admitted it because of his family, he loved us. He wouldn't have left my mother because she was in her 50's and had not worked at all. It was a different time and

it wasn't as if he could just say, okay I'm gay, I'm out of here, he couldn't do that. She would have had nothing to do; she wouldn't have survived at that point. I think when he finally came to terms with it—I don't think he actually denied it to everyone else, I think he denied it to himself. (Denise, May 2012)

Not only does my mother believe that my grandpa was never able to come to self-acceptance of his identity because of the social institutions to which he belonged, but she thinks he cared too much about his family to admit to himself he could deviate from heterosexual society.

Even though my grandpa never admitted to any relationships with another male, or attraction to men, my family figured out that he was in love with one man.

I was the youngest, and after I left for college my father started traveling a lot more with his job, and his colleague that he traveled with was, Stan, and Stan became his best friend and they did everything together. Stan was gay, openly gay, and was diagnosed with AIDS and my father was his best friend. Stan came to the funeral, my dad died before him. He was in a military hospital, a veteran, a navy career, so he actually died of 'pneumonia and a brain swell', but the months before he died he lost so much weight. (Denise, May 2012)

The implications of this description by my mother are that even in death, the social institutions to which we belong put so much weight on who we can, or cannot be. If someone's other identities that revolve around heterosexuality are salient enough to who an individual feels he or she is, then they can completely shut down a new homosexual identity formation that goes against the other identities. My grandfather could not be honest even in his dying days. It was too far-gone for him to make any last attempts to be openly happy with the man he really loved.

Heteronormativity creates this second stage trap. It causes so many, like myself and my grandfather to spend various amounts of time trying to live a

lifestyle we are not meant to. If the presumption of heterosexuality were nonexistent there would be no force driving us to format ourselves to society's description of how we should be. Only stories of those who have lived the heterosexual lifestyle, and have either been exposed or given it up, can be counted. There must be many more who live an incomplete life, not understanding that it is okay to explore their sexual orientation.

If an individual can move on to the next stage, they are making progress towards self-acceptance of the homosexual identity. The third stage is the first step in the coming out process. This stage, disclosure and reflection, involves the individual's first attempt to reach out and tell someone else that they think they might be gay or lesbian. This part is so crucial because if the reaction given is not positive, it may regress them in the process for a while, until they are ready to re-evaluate and try to tell someone else. Only Rebecca and myself had moved onto this stage in the process. Our stories show similar experiences. We both depict the hesitation caused after a negative first disclosure, as well as the next, more positive feedback we get that helps to pull us through. For another issue of identity, when others disagree with your claim to it, it never changes your belief that you may have it. But with homosexuality, heteronormativity makes any claim to the identity very fragile.

For Sarah, her initial attempts to discuss her sexuality with her brother were not as successful as she had hoped.

The first person I told was my brother, I told him Chris, you know I think I might be gay, because I want to kiss this girl Chelsea. He answered, no, I don't think you're gay because it would be weird to have two gay kids in the family, it's just a phase, and it would just be weird. And then I stopped, that put me back a few steps. It was a big thing for me to tell my brother, especially someone who I thought I could—since he's gay and came out to me—I thought I could have that conversation with him, So that was a little rough. (Sarah, May 2012)

Sarah goes on to explain that it never made her question her sexuality, she was always very sure of her at-

traction to women, but even so, the insight that this sexuality may not be socially accepted caused a brief hesitation before her next attempt at disclosure, this time more successful. It is interesting that her overall environment made her comfortable in self-acceptance, because she knew and could understand that it was okay to be gay, but her individual interactions caused her to pause in the "coming out" process.

I also never completely reconsidered my sexual identity. My friends from school had always been okay with homosexuality, and it made me realize that I could be who I wanted, at least in one place. But when it came to telling my friends and family at home I was terrified. I knew that it would catch everyone completely off guard. I explain my first experience telling someone outside of my safety net at school in the following passage.

I have had several of my friends tell me that they did not think I was gay, but most of those were after I had already moved into the fourth stage, and so I did not care as much. One experience that did throw me off, though, was losing my best friend Nikky. She started to change when she went away to college, becoming more of a party girl and a little more judgmental. But she was still my best friend. She had been my first friend when I moved to New York, and we were inseparable throughout high school. She came to visit me at school last spring, I remember being so incredibly nervous for her to discover most of my friends were gay or bisexual. But one night that she was here, she saw me kiss Annie. This changed everything. While she was here she acted completely fine with it. She told me it was perfectly normal to be attracted to girls and definitely not a big deal, but I could see she was very uncomfortable. When I called her this year and told her I thought I might be gay, she just seemed very surprised, almost in disbelief. I soon had a girlfriend and she was one of the few who knew at first. She immediately could not hide her discomfort with it. She talked around the subject. When I came home

and visited her she made it a point to tell me about all the guys she likes, and if I mentioned something about my girlfriend she would just say ‘Oh’ or ‘OK.’ Unless I made plans to hang out with her, we never hung out anymore because she would not call or text me. Finally I confronted her and told her she had to stop treating me differently because I was the same person I always was. I instantly knew by her reaction that she had no desire in continuing our friendship. She told me I was imagining it and that I could talk to her again when I realized she was no different at all. So I never talked to her, and she has yet to contact me. (Kathryn, May 2012)

Since I already had a girlfriend at the time, I knew I was a lesbian. I was lucky enough to have this outlet to keep my head together during this time. But it did take me much longer after that to tell anyone else from home. I was very scared that my other friends and my family would judge me and write me off the way Nikky did. It made me feel as if I was going to have to keep my love for my girlfriend a secret forever, which seemed impossible because I wanted to share her with everyone. Having a place where heteronormativity does not matter as much kept me anchored during this difficult process.

The people whom Sarah and I both chose to first disclose to, had no idea how significant their inputs would be on us. It is so important that anyone who is this key person of disclosure to the individual allow the individual to feel comfortable and accepted. The influence that the words of those who we choose to disclose to is so strong that if Sarah or I didn’t have other outlets that let us know homosexuality was okay in some way, it could have pushed us both back in the process, taking away the small amount of self-acceptance we both felt. In stage three, the individual has already accepted homosexuality as something that will make him or her happy; it is something that is a part of who they are and want to be in life. So any hesitation from those who we disclose to makes the concept of living happily and accepted seem extremely out of reach. This is why so many individuals who do not receive positive reactions face identity crises and can blame themselves

for their lack of social acceptance when heteronormativity is the real culprit.

The fourth and final stage in the process is social disclosure (Floyd and Stein 2002). This includes telling one’s parents about their sexual orientation, and being open about it in most social situations. To understand how the individual takes the final step in accepting him or herself, we must look at what brings the individual to this place. In the description of telling our mothers, both Sarah and myself show our hesitation to bring it up with them. The matter was only discussed when we were both completely certain that our feelings for women would never go away. The similarities in our stories are fairly striking in that we both had girlfriends for a long time before our mothers finally asked us if we were gay. Our parents also fall subject to the heteronormative standard, which prevents an open line of communication between parent and child on homosexuality. A parental figure that might otherwise be very helpful in making life changes can appear off limits to the child who feels the need to figure out his or her sexuality before burdening the parent with disclosure.

The description Sarah has of the conversation with her mom highlights both her reluctance to share her sexuality with her mom, and her assurance of it prior to telling her.

I don’t fully remember the conversation with my mom, I know it was a tougher one. My parents are divorced so I told them on separate occasions, and I was dating a girl for about six months before I told my mom. She had asked me several times: ‘Are you gay?’ and I said ‘No, no, no’ and each time I said it with more conviction as to shut that down, I didn’t want it. Finally I sat her down and said ‘Mom, I have to tell you something.’ She said ‘I know... Jane’ that was the name of my girlfriend and I said ‘Ok’ and I sat there... it was very intense and dark in the room, and when I asked her if she had anything to say, she said ‘No, I don’t really care what you do with your life,’ but it was a little more abrasive than a comforting tone, so we left it at that and

I got nervous so I left, and now she is fine. (Sarah, May 2012)

With her first attempts to deny her sexual attraction to women to her mom, Sarah demonstrates that even while she had a girlfriend, she did not want to acknowledge what her mom expected. It is clear that because of the pressure from parents for their children to fit into a heteronormative lifestyle, it takes some type of realization that this is a definitive part of one's life in order for him or her to break the news to the parent that their child will not be fitting into heteronormativity.

In my experience, I was so scared of my mom's reaction that I actually felt that I had to show her I was happy with homosexuality before I felt she would believe me in any way. My lifetime of heterosexualty had led my parents to think I was very straight, but I had never specifically told them I was not gay. Heteronormativity had done that for me.

I never sat my mom down and told her I was gay. I was really against doing that. By the time I was sure enough to tell her, I already had a girlfriend and just wanted my family to accept her. Instead of having the conversation that most people do, I brought my girlfriend to Thanksgiving with the family. I introduced her as a friend, but we liked each other so much and it was very obvious. The next morning my girlfriend left and my mom approached me as I was leaving the room. She said 'is there something you want to tell me?' I asked her what she meant and she responded, 'Is Annie gay?' I told her yes. She asked if Annie was my girlfriend and I told her yes again. She then asked if that meant I was gay and I mumbled something along the lines of... umm hmm maybe. No matter how much I wanted to tell my mom I got nervous when it came time to do so. She said nothing at first, and later came into my room to tell me that she loves me no matter what. But she just wants her child to have the easiest life possible and as a lesbian I was not going to have that. Over time she has gotten

slightly better at talking about it, but according to my sister she will never fully accept me as lesbian, until I graduate college and have more straight friends. (Kathryn, May 2012)

Like most children, I have always wanted to make my mom proud of me. Heteronormativity tells me that to do this I must marry a male. This appears to be the idea that most adolescents struggle with in the final stage.

Most gay and lesbian adolescents fear that their parents will only be proud of them if they subscribe to heterosexual norms. The two experiences share this commonality through their allusion to extreme reluctance to disclose with both mothers. Personally, I have always known that my mom only wants the happiest life for me possible. But even with this knowledge I still felt as if I would be disappointing her to not fulfill her heterosexual expectations for my life. The relationships that both of us were in when we came out to our mothers has two linked implications. The first is that we needed to be very secure in our desires to live a permanent homosexual lifestyle before we would shatter their desires for us to have a socially normal life. The next is especially relevant for me; the relationship provides the evidential backing for a mother who might otherwise question the accuracy in her child's claims of being gay. No one wants to feel that by being true to themselves they might be crushing their parent's expectations. Heteronormativity creates these expectations and then forces the child to find himself or herself without the help of a parental guide, and even after being assured in one's own identity, some have to worry that their parents will not believe or accept them.

Through the discussion of the four-step process in progression towards homosexual identity formation, key similarities and differences proved significant. It is clear that the degree of exposure to homosexuality shapes development of individuals, and welcome environments can lead to much earlier questioning and acceptance. The second stage is where many individuals remain for long periods of time, usually through devotion to fitting into the norms of society. The third stage of initial disclosure can cause turmoil if it is not met with positivity, but hopefully

will only lead to temporary setbacks. The final stage can be the most strenuous for those who make it there. Parental disclosure removes all cloaks of normalcy for individuals and while an individual is typically confident in their homosexuality before telling a parent, it nonetheless completes the gap in self-acceptance. The strain and distress on homosexual individuals caused by heteronormativity is an issue that can be eased with open, positive discussion of homosexuality as an option and a movement away from being more publicly discrete in lesbian and gay relationships. With these things adolescents may come to realize that not only is it okay to be gay, but it is an actual potential option for their future.

In Halbwachs's chapter on "Social Classes in Their Traditions," he explains how traditional values are utilized in societal transformation:

A society does not proceed from one organizational structure to another through the conscious effort of its members, as if they build new institutions in order to recap actual advantages from their efforts. We might say that the new ideas became salient only after having for a long time behaved as if they were the old ones. It is upon a foundation of remembrances that contemporary institutions were constructed. For many of them it was not enough to demonstrate that they were useful to make them acceptable. They were forced to fade into the background, so to speak, in order to make apparent the traditions behind them which they aspired to replace and with which they tried in the meantime to fuse. (Halbwachs 1992, 121-126)

In this analysis of the feudal state's decline in Western Europe, Halbwachs discusses the role of particular social traditions to stay rooted throughout changing social institutions. It is within the very nature of social change to utilize certain relevant traditions to inspire the change to take place. But within the usage of these traditions—he is here referring to social hierarchy—they become a part of the new ones, causing the true attempt for reform to be overshadowed by the maintenance of the traditions. The way the society works necessitates traditions; even

if they are not right, they have worked in the past and therefore benefit enough people to ensure their maintenance.

This idea may be utilized in the text to discuss feudalism, but it is relevant to American society's inability to shift away from heteronormativity. The tradition of men and women being together is based upon reproduction, and the familial unit. But now that society has progressed to understand deeper conceptions of love, homosexuality has moved into public view. The social hierarchy, unaccustomed to including gay and lesbian individuals, placed us at the bottom. It then becomes a cycle that is very difficult to overcome. Gay and lesbian individuals are given a lower status because they deviate from the norm. But they deviate because it is based in tradition, regardless of the actualities of modern times. Even if the majority of the population today remains heterosexual, socialization based in tradition has told them to be this way. Of course so many people claim obvious attraction to the opposite sex, but with heteronormativity standing in the way, how are we to say that this is caused by anything less than our traditions?

In her chapter, "Who Owns the Past?", Margaret MacMillan describes the importance of narratives in collective memory:

Collective memory is more about the present than the past because it is integral to how a group sees itself. And what that memory is can be and often is the subject of debate and argument where, in Halbwachs' words. 'Competing narratives about central symbols in the collective past, and the collectivity's relationship to the past, are disputed and negotiated in the interest of redefining the collective present.' While collective memory is usually grounded in fact, it need not be [...] it can be dangerous to question the stories people tell about themselves because so much of our identity is both shaped by and bound up with history. (MacMillan 2008, 48-49)

The collective memories we hold are grounded in narratives that explain why we are who we are. The collective identity shaped by these memories is key

to not only how a group sees itself, but also how other groups see and identify that group. Narratives are based on historical accounts, both collective and individual, and the historical accounts are formulated in memory by identity. Therefore the inaccuracies in narratives are almost as essential to their purpose as what actually happened.

This idea explains how the collective identity of homosexuals has been formulated throughout American history. The past of homosexuality is a very recent one, and prior to the recent history, homosexuality only existed in secrecy. The lack of a collective memory until the 1960's explains why homosexuals can feel so lost while attempting to embrace a gay or lesbian identity. The narratives that do exist more recently are those of prejudice, coming out experiences (that out gay or lesbian can relate to), or the movement for legal equality and freedom. These are all based in differentiating oneself from the norms of society. Homosexual identities are rooted in heteronormativity down to their core.

CONCLUSION

Our social environments have an enormous impact on not only how others perceive us, but also how we see ourselves. The heteronormative society of America can make it difficult for individuals to see themselves as anything other than straight. The environment in which we are socialized, indicating our childhood communities, and our family values, can greatly affect self-acceptance of a homosexual identity. The process that individuals must face to fully understand who they are as a lesbian woman, or a gay man, is long and rigorous. It is the fault of heteronormativity that so many people get stuck in the stages, never understanding themselves and feeling incomplete. The variety in acceptance that every individual experiences shows that it is possible to make the process easier on adolescents. The heteronormative standards can be loosened and it is essential that at some point they be loosened in the individual's immediate environment if he or she wishes to continue the process. Through the discussions it has become very clear that at some point in the process, regardless of environment, for an individual to fully take on the homosexual identity, he or she must decide that the happiness they will de-

rive from being from the person they love, is greater than the discrimination they will face in a heteronormative society.

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* Names have been changed on the Personal Interviews to protect the confidentiality of the participants. These Interviews were conducted in face-to-face settings on the dates included. There were several consistent open-ended questions asked to the interviewees. Over the course of several hours the interviewees were invited to speak openly with the interviewer about their relevant experiences.

Eye of the Beholder

Jane McGowan

“**W**hat happened to your eye?” The little girl with blond, flowing hair stared back at me waiting for a response.

My heart skipped a beat like it has done every time for as long as I can remember being asked this question. It’s not as if I didn’t see this coming—this girl was the type of child that was always curious, incapable of standing still for even a brief moment, always bouncing. In fact, she had probably asked her mother as many questions today as she had breaths in her tiny body.

The summer of 2007, I was seventeen and just learning how to drive. I was taking a Driver’s Ed. class in a neighboring town with my twin sister and high school friend. We attended classes with a roomful of unfamiliar teenagers, letting the whir of the fan and the shuffling of worksheets capture our coveted days of warmth.

Our teacher was far from what you would expect to see at this type of school as this was where the wealthiest of our community lived. He was somewhere around his mid sixties with balding gray hair. He wasn’t particularly short or tall, but was more on the plump side. This was clearly his post-retirement job, teaching teenagers how to read road signs and putting his life in danger with someone nearly one quarter his age behind the wheel. This didn’t seem to faze him—he had probably had plenty of worse students before us. We shared our driving sessions with three other students, every once in a while, doing a Chinese fire drill so that the next person could have their turn at the next railroad track or speed bump.

It was a balmy summer and depending on where you sat in the car it could end up being very unfortunate. We would drive with the windows down and often our teacher would rest his right arm on the window of the passenger’s side. Depending on the wind conditions that day, you may or may not have gotten

a whiff of stale air sitting in the back passenger’s seat.

And so the classes dragged on, week after week. During one class we were talking about pedestrians and our teacher said, “Now remember when you’re walking you shouldn’t be listening to those things you have, what are they called...those iPads or whatever.”

The entire class burst into laughter; he had meant iPods. The iPad hadn’t been invented yet, so to us it sounded like Apple’s version of a feminine hygiene product. *Line up at your local grocery store for the new iPad, now with maximum absorption and mood swing protection like you’ve never seen before!* We never imagined it would exist one day; we just thought our teacher was coo-coo for cocoa puffs. Little did we know he was a modern day Yoda.

But what happened the day everyone rushed to the Apple store to get their brand new iPads? What did they find? A product that had virtually the same function as the iPod except with a different, decidedly sexier look. And that’s how I’ve felt my whole life, like an iPad living in a world of iPods. People don’t know that people like me exist in the world until they catch a glimpse of me on the streets, in a mall or in line at Disney World. Functionally I’m like everyone else, but on the outside I look different.

I was born with a condition called Hemifacial Microsomia, leaving the left side of my face underdeveloped. This included my jaw, eye, ear and facial muscles. I’ve had reconstructive surgery to build an ear, even out my jaw and put in a cheek implant. I have a scar that runs across my head from ear to ear where surgeons went in to adjust my eye socket. What that translates into is I can’t focus on pictures in newspapers, 3D movies only look 2D when I put the magic glasses on, I hate the game Telephone, and if you try to scream my name from across campus I won’t know from which direction you’re coming from, due to a loss of what I like to

call echolocation, which all you super humans have. And you better believe I'm not getting in a pool as soon as the name Marco Polo is mentioned. Instead of the girl with the pearl earring I'm the girl with the cool hearing aid and at the age of 23, I still don't look like an iPod.

That summer I also began to expose my grandma status to the general public by securing a job at Wegmans, a highly praised grocery store in the northeastern United States. I was looking forward to having my very own job for the first time, though I can't say I was the best person suited for cashiering. Throughout my life I had been pegged as the quiet girl, the girl who everyone thinks they can crack and bring her out of her shell. I've been jokingly called a troublemaker by teachers and students alike for so long that it falls flat like a month old two liter bottle of orange soda and I have a hard time choking it down. I'm the girl who's stuck between "Miss I-bring-all-those-boys-through-my-line-with-my-hair-flipping" and "Mr. Macho-I'm-too-cool-for-this-job" who are incessantly flirting with each other as I desperately try to lure customers into my line to stop the continuous flow of hormones that just happened to come in the form of Axe body spray that day. And then it always gets worse, either one side or the other has to bring me into the conversation to be an accomplice to the flirting.

"He's being a jerk, right Jane?"

It seems to me the general public's primary tactic to get a quiet girl to talk is to have her agree with them on whatever topic they're discussing with someone else. Don't ask her about her life or interests; just have her agree with your opinion so that you can feel like you 'included' her in the conversation. And so I defiantly respond with, "Sure." I'd follow that hair flip all the way to China before I'd get caught up in that game.

Cashiering was a difficult job in part because carts were always squeaking by, people were talking a mile a minute, and the beeps from the scanners were always in competition with each other. But it was also difficult because I felt exposed. I had to talk to numerous strangers a day letting them see for the first time something they might not have known existed.

"Were you burned?"

"Were you in a car accident?"

"What *happened?*"

"Well, let's see...I woke up this morning, brushed my teeth. OH, you're talking about my face, right."

I had to endure staring from children aging anywhere from birth to preteen years, exercising my Olympic gold medalist abilities in the art of staring contests. As ashamed as I am by this, I always breathed a sigh of relief if the child wasn't able to talk yet. All they could do was take in what they couldn't verbalize. It got me off the hook. I didn't have to explain my appearance. But even more alarming would be the adults who would avoid my gaze. Human beings long for connection and a huge part of that stems from eye contact. Being denied that basic human right is like being denied existence.

And then the small girl with the blond, flowing hair came through my line with her mother and her little sister who was sitting in the child seat in the front of the cart. They had a cartful of groceries and I estimated how quickly I could get them through my line without having "the talk". The mother, clearly exhausted, had allowed her two children to pick out a package of gum from the brightly colored display of treats present in almost every checkout line.

I scanned both packages and handed them back to each respective child and then the struggle of trying to open the layer of glossy plastic surrounding their sugary confections began. Because of the youngest child's proximity to the mother, she stuck out her hand inviting much needed help. The mother began to unravel the plastic while the older girl continued to struggle.

And so the little girl turned to me without hesitation, held up her gum and said, "Can you open this for me?"

Right away, I neglected the grocery mountain that had accumulated on the belt and turned to the girl and said my usual line, "Oh yeah, sure."

As I unwrapped the plastic covering my heart beat faster and faster, bracing for the moment that was inevitably going to come next.

Moments after I handed back the gum came the question that's been ringing in my ears since the day I was born, "What happened to your eye?"

The world froze as I tried to conjure up an epiphany response contrary to what I usually say. But nothing came and so I replied with, "Oh, I was born this way." I figure if it's good enough for Lady Gaga to write a song about, it's good enough for me. In fact, I'm pretty sure a check is on its way to me in the mail right now.

Dear Jane,

Thank you for letting me use your life motto.

Love,

Mother Monster

But it's never good enough for the children with whom everything in the universe has a reason, an explanation, a meaning. And so the girl looked up at me again and exclaimed, "But why?"

This time I didn't wait for the epiphany to come as I knew there was no easy way to explain why. What I have is not genetic, but a loss of blood flow to the left side of my face that occurred when I was in utero. Surely this was not a concept that a child could grasp. And so I responded, "I'm not sure how else to explain it other than I was born this way."

I felt my face flush as I allowed the barcodes of the Chobani yogurt glide over the scanner, unsuccessfully covering up the subpar explanation with beeps. Thankfully the mother jumped in to save me as she turned to her daughter and said, "Honey, we're all different."

The girl paused for a brief second and then turned to me and said what I hadn't known I was waiting my whole life to hear from the mouth of a child. Standing there in her tiny dress, her voice laced with conviction and love she boldly declared, "Well I still think you're pretty."

Imagine It: A Community Recycling Initiative

Nikolay Clark, Lindsay Giacalone, Saif Ratul

Rcycling is a process known to prevent waste of possibly beneficial resources such as paper, glass, plastic, metals, textiles and even various electronics. With the advancement of technology nowadays, there is a significant amount of increase in technological waste. When we receive our new and glistening technology from the store, often times we do not perceive the wasteful process behind the manufacture of that object. For example, when we view the commercial for an Apple® product, we are captivated by the sleek and shiny view of the object, rather than how that product was created in some developing country where there is little to no environmental regulations. With a little background in the effect of technology's advancement on environment Lindsay Giacalone, Nikolay Clark, and Saif Ratul understood how important it was to raise awareness in a diverse campus like SUNY Geneseo. Though all three of them have a different inspiration for taking an environmental initiative, their goal brought them together. They all wanted to utilize a local recycling business and establish it throughout the Geneseo campus, thus the *Imagine It* recycling initiative came to life.

Living on a beach her entire life, Lindsay G. has been very conscious of the trash and waste spread along the shore as well as in the water. Though various efforts have been made to expand recycling initiatives and saving shorelines, the changes have been very small and in some situations unnoticeable. Soon enough, Lindsay was made aware of a phenomenon of the Glass Beach in California, which is a beach created so people could discard their glass objects legally. This idea affected Lindsay greatly, so she decided to raise awareness of proper recycling throughout the Geneseo campus.

Growing up in the Buffalo suburbs, Nikolay C.'s experience with recycling is very different than Lindsay's. Nikolay was not very aware of recycling

until he attended Geneseo. As a Geneseo student, Nikolay has been motivated in regards to the importance of giving back to the community. Being involved in multiple organizations on campus, he has had the chance to work with multiple departments throughout campus. Observing his surroundings at each department, Nikolay noticed that many departments had their own system of recycling objects such as printer toners and electronics. Being an accounting student, Nikolay realized that these multiple processes of recycling are very inefficient to these various departments as well as the college, and sought a way to help.

Growing up in Bangladesh, a developing country, and immigrating to the United States, a well-developed nation, Saif R.'s experience with recycling is very different than both of his peers. Saif has experienced both the positivity of technological advancement and the negative impacts left by the environmental pollution from technology. Upon arriving to SUNY Geneseo, he noticed that many departments were placing their electronic objects, especially used printer toners, into trash bins. Being a tech-geek and having knowledge of electronic wastes' effect on environment, Saif started to look for an alternative. He addressed this issue to multiple departments that could help with addressing the issue; however the responses Saif received were unsatisfactory. Saif took the challenge of working through the bureaucratic system on campus to expand the existing recycling program in SUNY Geneseo.

Living in the same residence hall during their freshmen year, Lindsay, Nikolay and Saif shared their passion for recycling initiatives on the Geneseo campus. Though they all have their personal reasons for creating one recycling system at Geneseo, their overall goal was the same: *to improve recycling efforts at Geneseo by establishing a unified system of recycling*. Their focus was to create a better recycling process for electronic

objects and printer toners that is available for the whole campus. On their process of finding a solution, they found that all the Toshiba and GEO recycling boxes were individual efforts and most were not supervised properly. Collaborating with and unifying the individual efforts of recycling was the challenge that Lindsay, Nikolay and Saif came across.

Nikolay and Saif have been a part of the Chi Alpha Epsilon National Honor Society (affiliated with Access Opportunity Programs) since their sophomore year. To fundraise, the Honor Society was partnered up with a local recycling company *Imagine It* based in Rochester, New York. Although the partnership with *Imagine It* organization and Chi Alpha Epsilon Honor Society has been in place for over ten years, it was extremely limited. Lindsay, Nikolay and Saif started to work on a plan to improve the recycling efforts at SUNY Geneseo and to expand the program. They divided the tasks and responsibilities to be efficient and contacted individuals from different departments who could help their cause.

Nikolay talked to Helena Nardell, the Chapter Advisor for Chi Alpha Epsilon to get needed information on *Imagine It* representatives and how to get in contact with the company. Lindsay reached out to the office of Chuck Reyes to find a way to work with the Geneseo Institution and its sustainability initiatives. Saif discussed with Laurie Fox from Computing and Information Technology on how to implement an *Imagine It* program in building and what to do about the Toshiba and GEO boxes. To communicate with Toshiba, they approached Rebecca Anchor from Purchasing and Central services. She was working on a new contract with Toshiba at the time and said that she will enquire about Toshiba's interest in doing the recycling. Ms. Anchor reported back to us that Toshiba did not want to do the recycling and is willing to work together with Chi Alpha Epsilon on a proper recycling initiative. To do so, *Imagine It* would have to replace all Toshiba and GEO boxes on campus. Nikolay and Helena Nardell approached Jeff Brown, the campus *Imagine It* representative to increase the locations of pickup areas. Lindsay, Nikolay and Saif had to count and analyze the number of boxes that was needed in each building and department.

Once the plan was in motion, they placed *Imagine It* recycling boxes throughout campus. However, the biggest challenge they faced was distinguishing their recycling program from many other individual programs that were floating throughout campus. Along with that, many individuals did not know about their initiative and the recycling program. Lindsay, Nikolay, and Saif never foresaw these challenges, so they did not know what to do. In order to find a solution, they contacted Chuck Reyes and explained the situation to him. Chuck Reyes agreed to send emails to every department explaining the *Imagine It* program, which helped to reduce the confusion. With Chuck Reyes's help, they were able to address their recycling initiative and distinguish the program from many others on campus. It took approximate three to five months for their recycling program to make a noticeable impact. Since 2010, their recycling program has grown larger, while providing much better services. An *Imagine It* representative comes to Geneseo campus once every three weeks to pick up all the recyclable objects.

This recycling initiative helped the Chi Alpha Epsilon National Honor Society to make an impact on campus, and fulfill their 'service' pillar and promote a Geneseo motto: 'Give back to the community.' The partnership with *Imagine It* recycling program has created a stronger relationship with our local community and provided the opportunity to create a sustainable environment. This also allows Geneseo to accomplish its sustainability component of the mission statement by empowering the students with a culture of sustainable and responsible citizenship behavior. *Imagine It* has the ability to provide hard data evidence on the recycled materials and the quantities collected from SUNY Geneseo to the Environmental Health & Safety department. In order to replicate this program, one must figure out if there is any existing recycling program. If there is a program already in place, one can easily expand the program by contacting the Environmental Health and Safety department along with the organization that initiated the recycling system. If there is no other existing program, one can approach the Informational Technology department and learn about the recycling policies for that institution. Once they

figure out institutional policies, one can start looking into local organizations that specialize in recycling initiatives and reach out to them. Finding a compromise between campus policies and the policies of local organizations can be one of the most challenging aspects one might face during this process. It is difficult and time consuming to work through the bureaucracy but once the program plan is approved and organized the only thing left would be promoting it.

Lindsay, Nikolay and Saif hoped to make *Imagine It* a campus wide program before they graduated from Geneseo. Though the program is well established throughout the campus, they have not been able to reach the residence halls with their recycling initiatives. They are currently working with the Residence Life Department to expand the program even more and improve recycling efforts of electronics at SUNY Geneseo.

DATA ANALYSIS

Lindsay, Nikolay, and Saif have done an analysis of the quantity of recycled materials collected by *Imagine It* program before and after 2010. This data shows a clear point of increase in 2010 when the program was expanded campus wide. From 2010 to 2011, there was 120% increase in the collected recycled materials from SUNY Geneseo. Looking at 2011 to 2012, there was 115% increase. Over the two years, from 2010 to 2012, *Imagine It* experienced 137% increase in the collected recycled materials (see graph 1 on page 58).

They also plotted the totals and created a regression line that shows a slight increase for 2013. So far for the 1st quarter of 2013 the quantity of recycled materials is 98 items; this is an increase by two items from the 1st quarter of 2012. The trend line and their assumptions for 2013 is that there will be another increase over 100% from 2012 (see graph 2 on page 58).

The data on the following page summarizes the items that were collected from SUNY Geneseo and recycled by *Imagine It* Company. Lindsay, Nikolay, and Saif broke it down by item and company and compared it yearly to show the type of printer cartridges used over the four years on SUNY Geneseo

campus. HP Laser and Inkjet are the most predominant printer cartridges used at SUNY Geneseo (see graph 3 on page 59).

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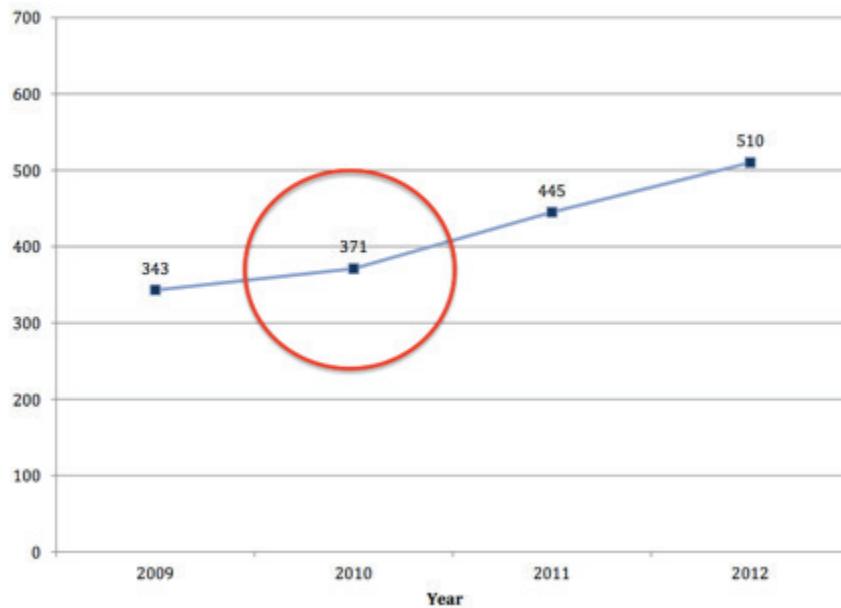
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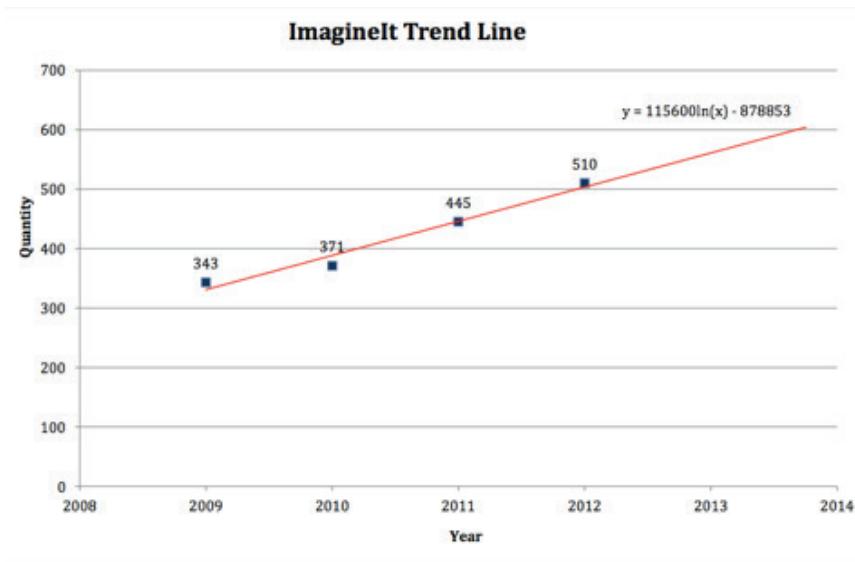
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APPENDIX

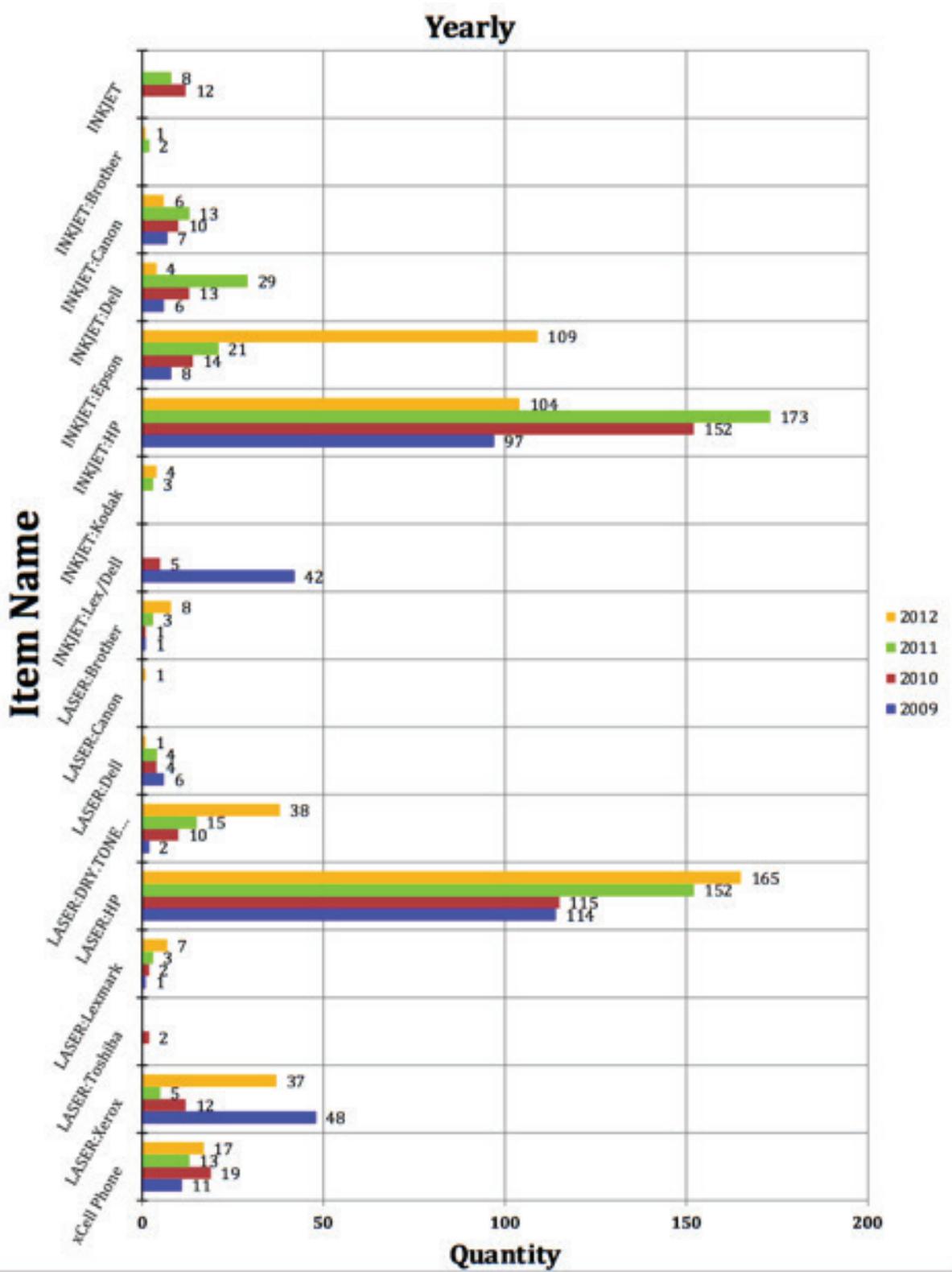
ImagineIt Recycling



Graph 1



Graph 2



Graph 3

Long-Term Sustainability of Cooperative-Wide Coffee Yields in San Miguel Escobar, Guatemala

Michael Pilosov

ABSTRACT

The overarching goal of this study was to investigate the long-term sustainability of the San Miguel Escobar coffee cooperative associated with a non-governmental organization whose name has been omitted by request. A computer simulation determined that while coffee yields are projected to increase at a positive rate during the period 2012-17, by 2020 the cooperative would see decreases of approximately 5000 lbs. per year for the following five years. Yield levels following the first decrease would rebound to near their previous highs before the cooperative will be faced with a major challenge, dealing with an overwhelmingly high proportion of trees reaching the end of their productive life cycles in the years between 2035 and 2045. The result of these natural cycles is a decrease in yield of roughly 16,000 lbs. over a period of seven years. The focus of this report will be the investigation of possible strategies aimed at mitigating the unsteady yield projections in order to ensure sustainable economic development for the coffee farmers in the cooperative.

INTRODUCTION

The cooperative is run by a non-governmental organization that works development projects focused on the economic development of rural Guatemalans. Coffee farmers that are members of the San Miguel Escobar coffee cooperative are one of the groups the NGO actively helps and are the sole focus of this study. By providing loans, planning, and invaluable marketing connections, the organization aims to orient the profits from coffee sales towards the farmers, allowing them to lift themselves out of poverty and improve opportunities for their children and themselves.

An integral part of the long-term goal of maintaining the significant progress that has already been made is to ensure that economic development (specifically in regards to coffee production) is steady and sustainable. Agricultural outputs are difficult to accurately predict—but using data collected in a 2012 survey on the land holdings of cooperative farmers, a computer simulation was programmed to incorporate tree cycles and estimates based on past years in order to forecast cooperative-wide yields well into the future. The aim was to identify the trends in cooperative-wide yields and investigate the prospect of steady growth.

The coffee farmers in the cooperative have planted four species of coffee trees, all of which have different growth and dormancy cycles.¹ The Bourbon species accounts for 55.34% of the total 218.25 cuerdas of land that is part of the cooperative, and Catuai trees account for 41.91%. With 97.25% of all trees being one of the two major species, the other two species—Catura and E14—make up 2.29% and 0.46% of the cooperative's plants, respectively. Any strategic implementations to sustain the growth of coffee yields will have to deal with either Bourbon or Catura (or both), as these represent the biggest source of the cooperative's harvests. Individual strategies for dealing with the large fluctuations in yield will be discussed in the section entitled "Strategic Planning for Future Sustainability."

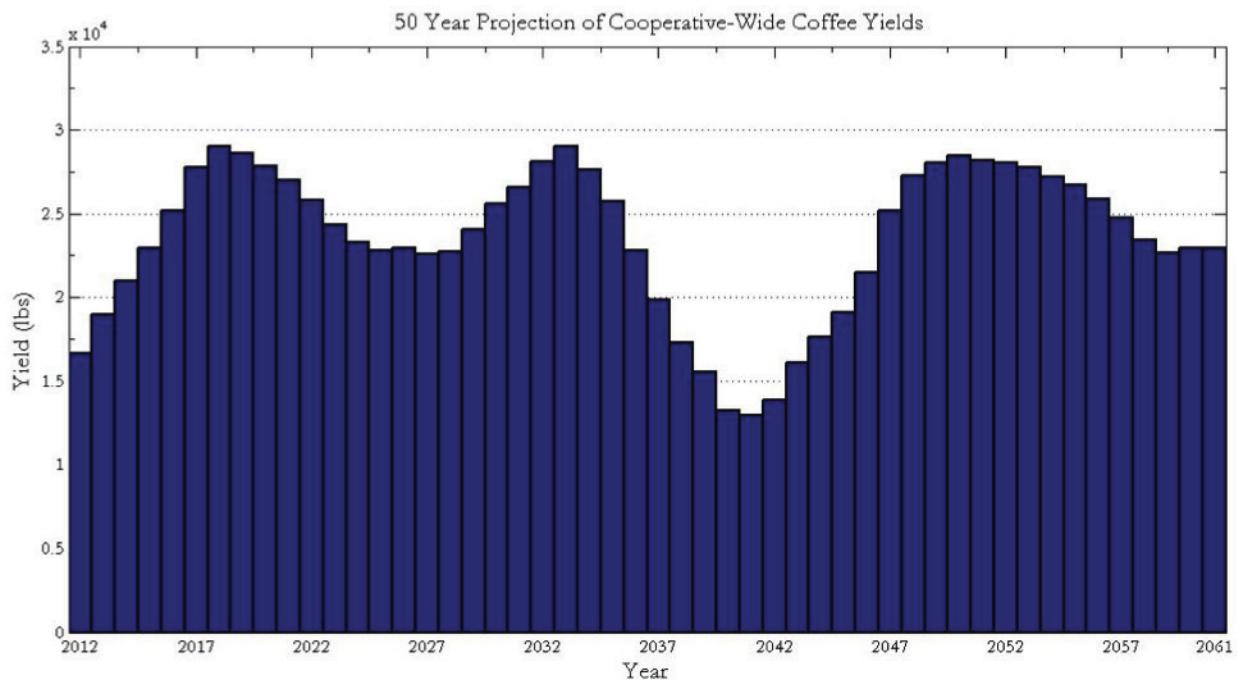
It quickly became evident that in the current state of things, the cooperative's annual yields will be subject to dramatic changes over relatively short periods of time (five to ten years). With the rapid expansion of the cooperative's size, many farmers were able

¹ A recommended discussion of tree cycles can be found in Appendix A.

to plant trees in the years between 2006 and 2012. Many of these trees will either need to be replaced or trimmed at approximately the same time, and eventually the period of dormancy that follows will affect the two major species at the same time, resulting in the massive drop-off in yield. A number of solutions are explored: purchasing more land, intercropping towards the end of a tree's life—perhaps switching species when doing so—and early pruning are investigated and discussed.

SIMULATION AND RESULTS

A simulation written in the linear programming language MATLAB was used to forecast future cooperative-wide coffee yields of green coffee that has been stripped of its fruit and dried, ready for roasting. Using available data on the number of cuerdas² held by each farmer in the cooperative, the type of coffee trees planted, and conservative estimates of likely yield per cuerda for each species, the simulation was able to project yields for each plot of land, sum the result, and plot the annual yield for any number of years (specified by the user).³ Originally, the projection was run for only ten years, but upon seeing the decline at the end of the decade, it became evident that a longer-term projection was necessary to visualize the interaction of harvesting cycles. The result of the fifty year simulation should things remain as they are now is shown below. Henceforth, for future comparative graphs in this report, pairs of best-fit line will be used for ease of comparison. The solid curve will represent the bar graph below and a dotted one will represent the hypothetical change being investigated.



One can observe where the dips occur and their relative severity. The simulation's projections make it inherently clear that something must be done if the health of the cooperative is to be maintained. The costs of such drastic decreases in yield will compound quickly with further capital expenditures on things like purchasing coffee from other cooperatives/farmers in order to fill existing product demand. Bulk purchases of new trees in a short time frame and the time necessary to plant them will also factor into losses of capital and productivity. If measures can be taken sooner to mitigate the damage, large losses can be avoided and planned for accordingly.

² A cuerda is a local unit of measurement for land, roughly equivalent to a third of an acre.

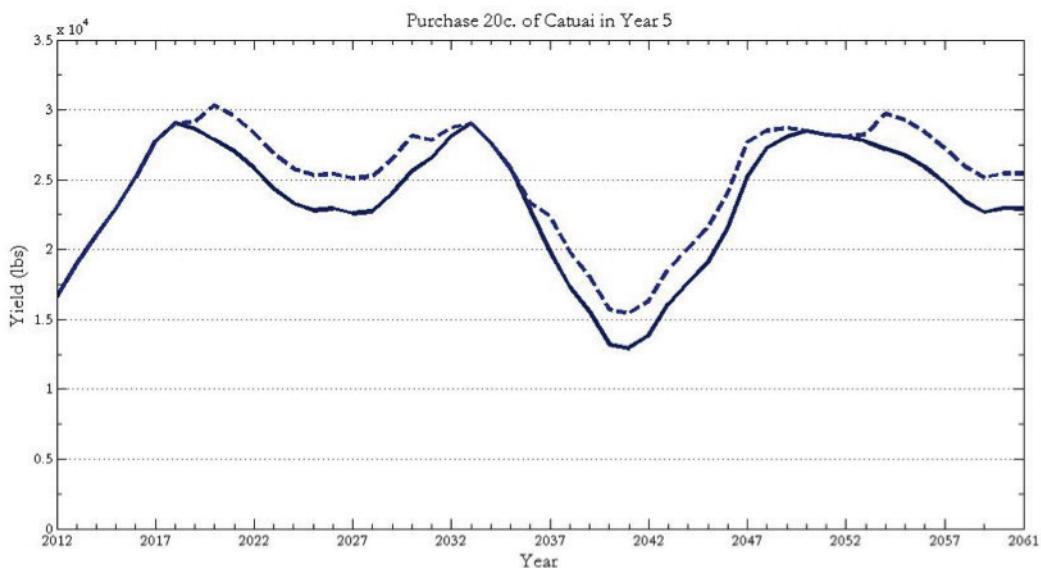
³ Refer to Appendix A for more details about the simulation and the assumptions used.

STRATEGIC PLANNING FOR FUTURE SUSTAINABILITY

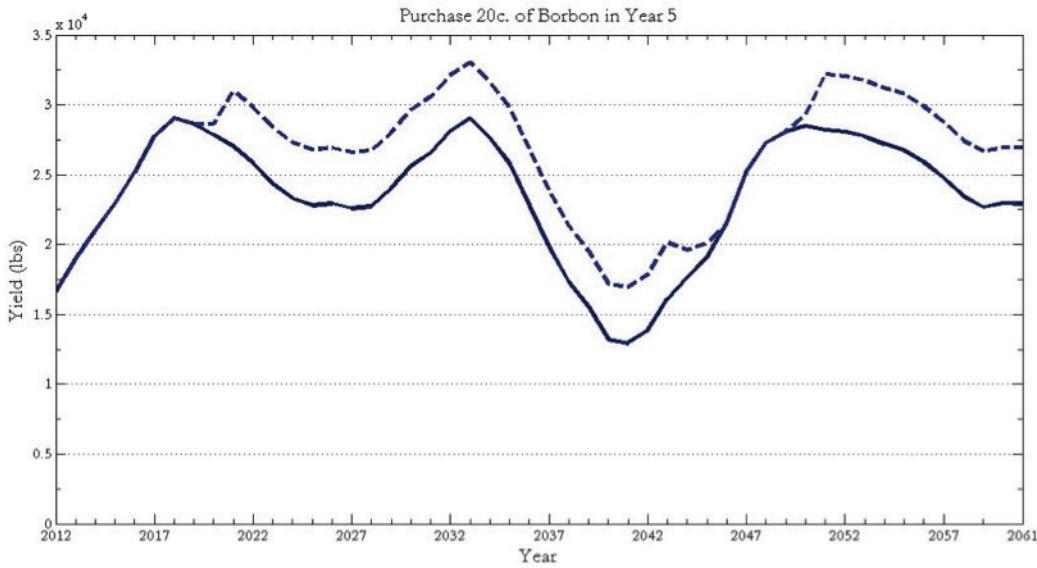
PURCHASING LAND

The most direct and intuitive solution—though certainly the most expensive—would be to purchase more land to even out the inconsistencies. However, the problem with purchasing more land is that doing so will increase peak yields, and might very well result in steeper drops unless the time of purchase correctly coincides with the decline of other crops. A shortage of over 10,000 lbs. would require at least 500 cuerdas of land to be purchased, which is not necessarily realistic given the current land holdings of the cooperative; additionally, it would triple current levels of production and compromise sustainable growth. Thus, it is important to investigate when the optimal time would be to buy a more reasonable quantity of land. The purchase of land alone will not solve the problem, but it can certainly be useful in helping ease the strain of crop shortage. Assuming twenty cuerdas of land is a reasonable purchase cooperative-wide; the graphs that follow demonstrate the effect of purchasing and planting one of the two major species at an optimal time.⁴

From an analysis of different periods of time, the simulation demonstrated that a short-term strategy of buying land was most effective when made in five years (2017). A purchase in ten or twenty years had a similar effect on the larger yield shortage. In addition to the data justifying a purchase sooner rather than later, the fact that land prices are rising also provides an added benefit. For the purposes of analysis, the simulation ran with a hypothetical purchase of twenty cuerdas made at once. The relative benefit of which species to plant is easily demonstrated by comparison:

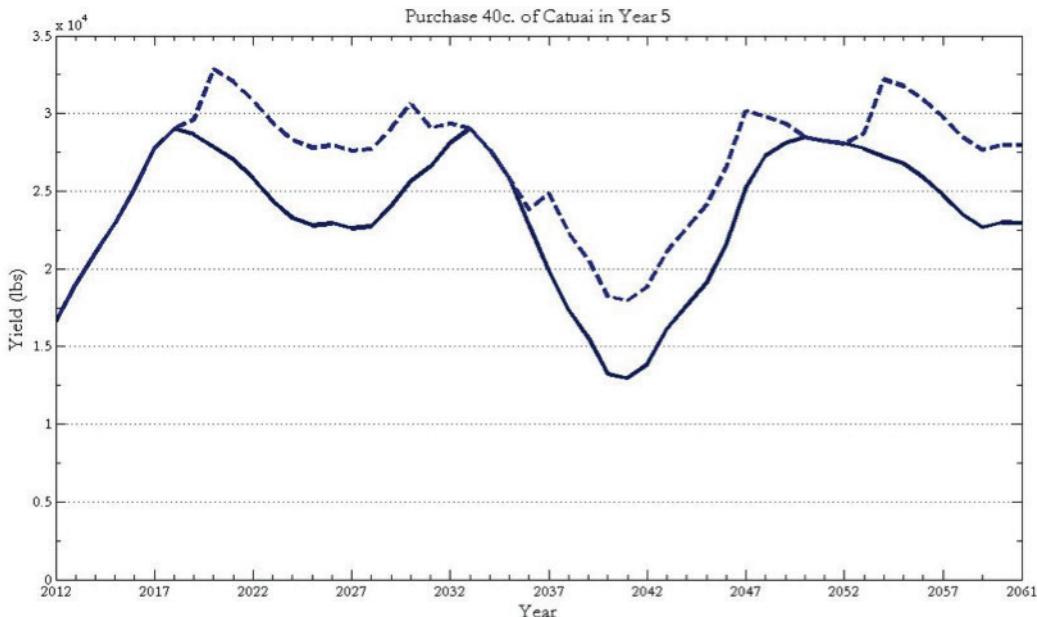


⁴ For a discussion of relative benefits of purchasing at different times, consult Appendix B. One's instinct might suggest that purchasing land shortly prior to the large dip would work, but that is not the case.



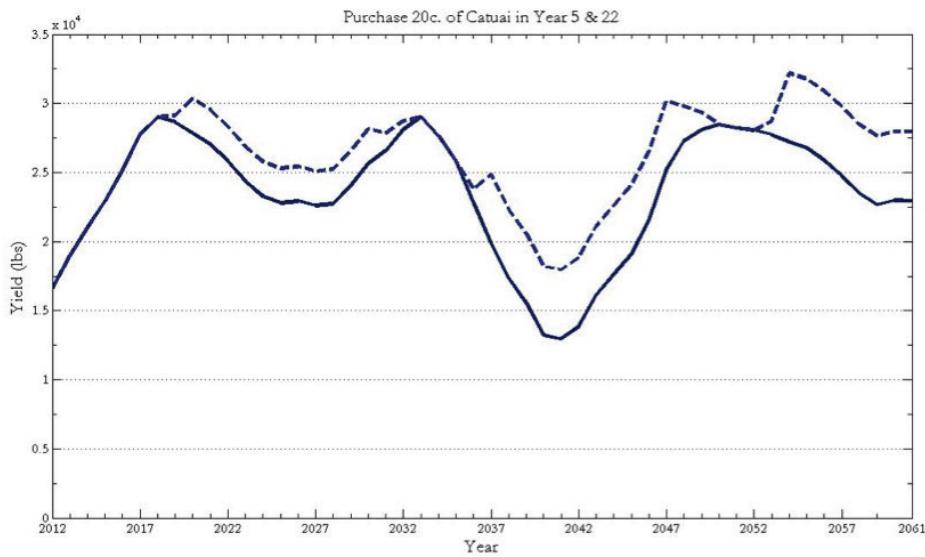
As evident from the graphs above, a purchase of Borbon is much more effective at lessening the minimal yield of both shortages than a purchase of Catuai. However, there is a valid benefit of planting Catuai: it does not exaggerate the second peak, but rather acts to fill in the gaps, whereas planting Borbon still creates a similar shortage in relation to new projected peaks and troughs.

It is useful to contemplate the hypothetical scenario of the cooperative being able to raise the necessary capital to purchase forty cuerdas instead of twenty. A purchase of Catuai trees in 2017 would be more effective at filling in gaps than an equivalent purchase of Borbon.⁵



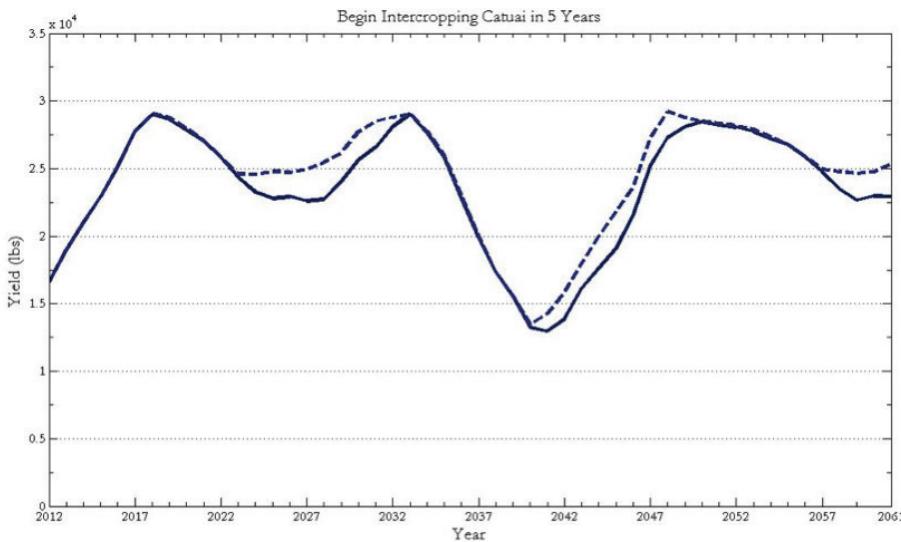
⁵ See Appendix B for a graph of a larger purchase of Borbon.

A larger acquisition of land that is distributed into two separate purchases of Catuai trees works best when done in 2017 and 2034.⁶ Once again, the downside to planning a purchase of land in 2034 is the likely continuation of current rising land prices.



INTERCROPPING

The process of intercropping—which is already being contemplated by the cooperative—Involves planting young saplings between the rows of trees that are reaching the end of their fruit-bearing lives. Since Catuai trees cannot produce sufficient yields after being trimmed (Borbon can) and require being replanted, intercropping shortens the amount of time the land produces no coffee. If intercropping takes place once yields begin dropping off, the number of years of low or nonexistent yield shortens from four to two years. This seems like a logical thing to do and the simulation supports it as well:

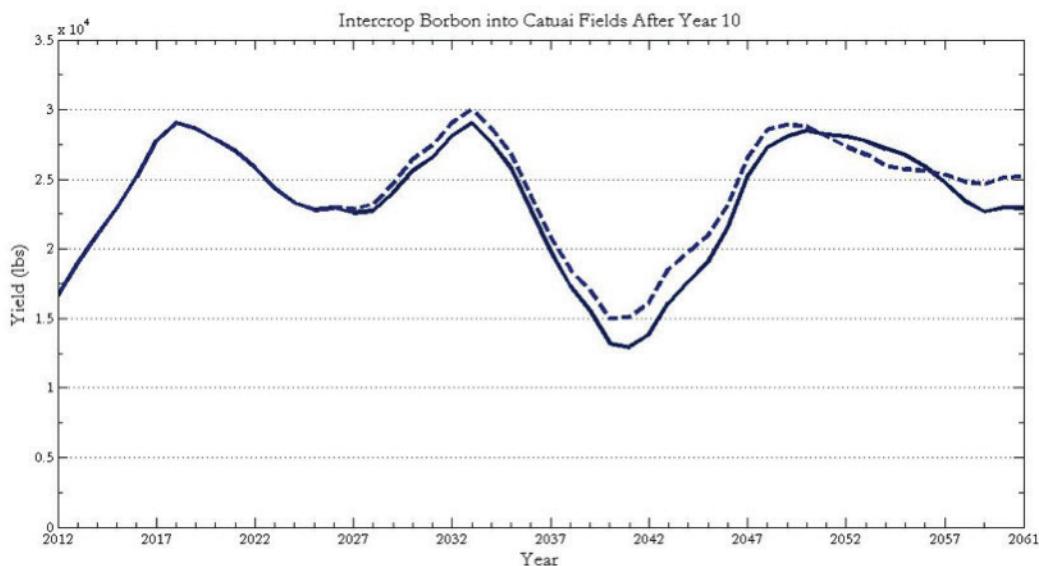


⁶ Assuming that the funds are available, purchasing twenty cuerdas of Catuai in five years could also be paired with an equivalent purchase of Borbon in year ten or twenty-two. For a discussion of these options, consult Appendix B.

Since most Catuai trees won't be reaching their periods of declining harvests until the end of this decade, the difference between initiating intercropping in five years and initiating in ten years is minimal. For farmers who wish to intercrop Catuai saplings into their declining Catuai fields, doing so makes complete sense and starting sooner is better than later.⁷ The only relative downside to the strategy of intercropping is the expenditure on crops must be made sooner. Since the expenditure must be made eventually regardless, it is better to do after a full harvest instead of after a year in which yields were lower (as they tend to be) towards the end of the Catuai's productive cycle.

The question remains, which choice of species to intercrop. It is useful to investigate what would happen if farmers switch their fields to Borbon trees. It cannot be assumed that all will do so; many might only consider it if they notice the benefit gained by others.⁸ For this reason, the simulation has programmed into it an element of randomness that accounts for the variability in the choice to switch.

A typical result, if approximately a third to half of farmers will choose to switch is displayed below.⁹



Running the simulation to initiate switching species after five years instead of after ten gives an almost identical result as the one above. This is because the majority of fields begin giving declining yields in about 2020. Waiting longer than five to ten years before beginning to converse with farmers about switching species is not advised, as it would miss the first opportunity to do so.¹⁰

Results are slightly better than those above when the simulation assumes that a little over half of farmers choose to switch, giving a minimal yield of about 2,000 lbs. higher than the forecast above. However, one should take heed to extrapolate from this increase in the number of farmers that switch. If *all* of the farmers choose to intercrop Borbon into their declining Catuai fields, the result is hardly optimal.¹¹

⁷ For graphs detailing the effects of farmers initiating intercropping later, consult Appendix C.

⁸ For most farmers with Catuai fields, there are two or three opportunities to intercrop in the fifty year time frame.

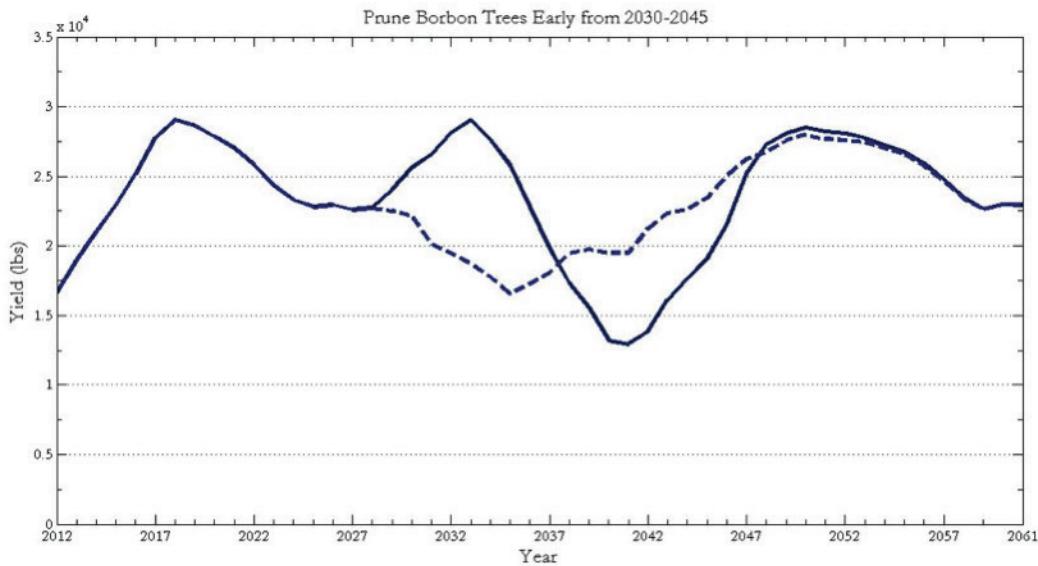
⁹ Best and worst case scenarios for farmers choosing to switch species can be found in Appendix C.

¹⁰ See Appendix C for graph.

¹¹ See Appendix C for graph.

EARLY PRUNING

The strategy of early pruning applies only to Borbon trees—they are the only ones that can be trimmed and still yield productive harvests once branches regrow. The idea behind early pruning is to trim trees while they are still in full production rather than waiting for production to decline to a fraction of full capacity towards the end of the tree's productive life cycle. This will indubitably be extremely difficult to propose to farmers,¹² but happens to hold some promise. For example, if the only change that the cooperative makes is pruning Borbon trees after 20 years instead of after 25 for the period of time between 2030 and 2045, the simulation yields the following result:



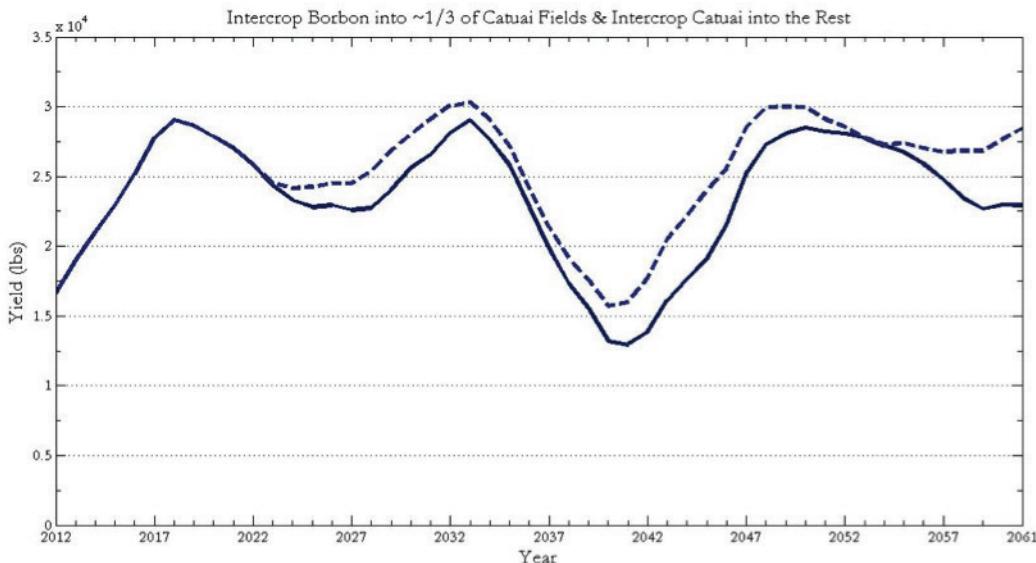
The first dip in the baseline projection is caused by the necessity of Catuai trees to be replanted. The second dip is caused the Borbon trees being pruned at the end of their productive cycle right before many of the Catuai trees need to be replanted again, compounding the decrease in yield. The reason early pruning makes the forecast fluctuate less dramatically is that doing so would shift the Borbon cycle back temporarily, preventing their years without yield from coinciding with those of the Catuai trees.

Even though early pruning results in a steady decline of production from 2017 to 2035, it becomes evident that pruning early has certain advantages when combined with other strategies: one example being that it balances out increases in yield from purchasing land. The inherent disadvantage of pruning early is that farmers are likely to not be receptive to the change as it would require them to sacrifice full yields that they know would continue for a few more years if pruning does not occur. Experimentation with combining other strategies and the strategy of pruning yielded some favorable results, to be discussed in the following section.

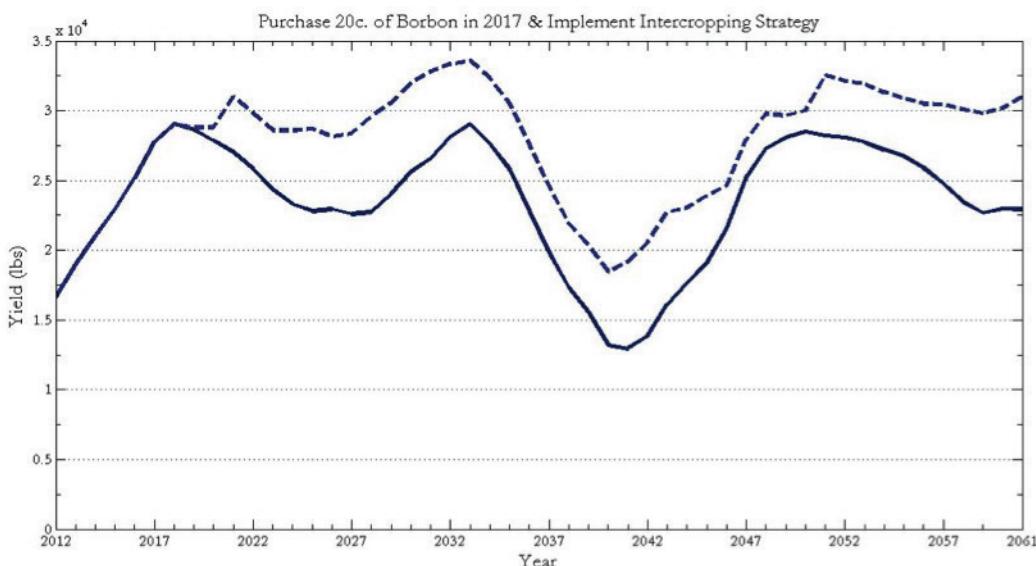
MIXED STRATEGIES & DISCUSSION OF OPTIMALITY

It is clear that none of the aforementioned strategies alone are sufficient enough to solve the problem of sustainable increasing coffee yields. Intercropping was a solution that appears to be an inherently logical thing to implement, as it helps improve yields and replanting to happen regardless. If approximately 30-60% of farmers choose to intercrop Borbon in their Catuai fields starting as soon as possible—with most intercropping occurring in the period between 2020 and 2030—and the rest choose to intercrop Catuai, the typical result will help somewhat with future crop yields:

¹² The farmers that own both Catuai and Borbon fields might stand to gain future yield consistency, but for the majority of farmers, early pruning provides little personal benefit and is a sacrifice for the collective good of the cooperative.



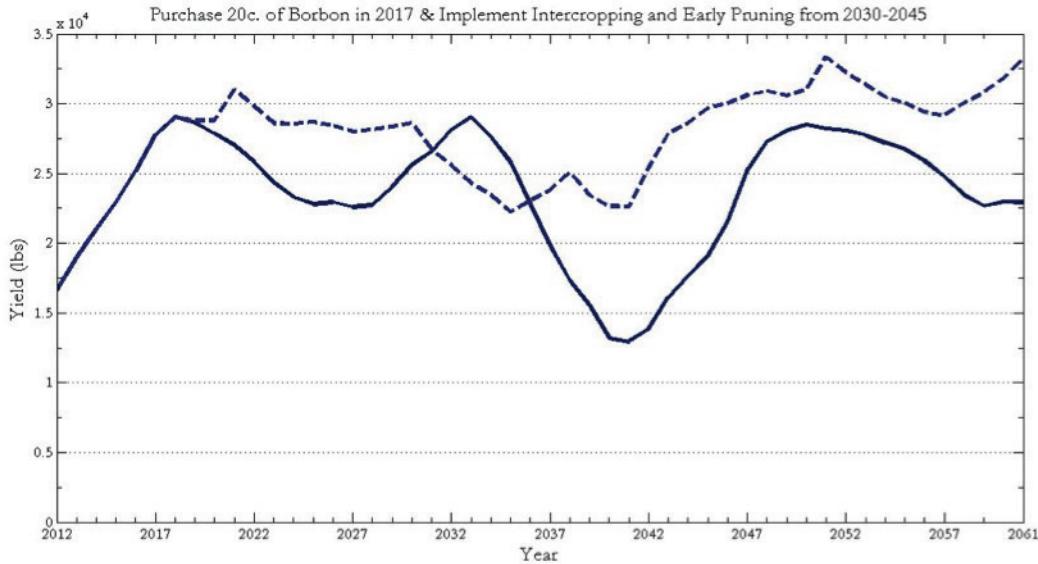
Building on this progress, henceforth referred to simply as the “Intercropping Strategy,” running a simulation that also includes a purchase of twenty cuerdas of Borbon in 2017 yields the following:



This result is still not optimal, and in fact still poses the same problem of a steep decline in yield starting around 2030.¹³ However, combining the above with the strategy of farmers pruning their Borbon trees early during the period between 2030 and 2045, the simulation yields the following as a typical result, with about 40% of farmers switching species when they intercrop.¹⁴

¹³ Running the same simulation with a purchase of Catuai instead of Borbon led to a less favorable result. Consult Appendix D for a graph of the result and other less favorable variations of strategies.

¹⁴ Refer to Appendix D for comparisons of different percentages of farmers choosing to switch to Borbon when intercropping. Some variation definitely occurs, but the general trend is still favorable compared to the baseline.



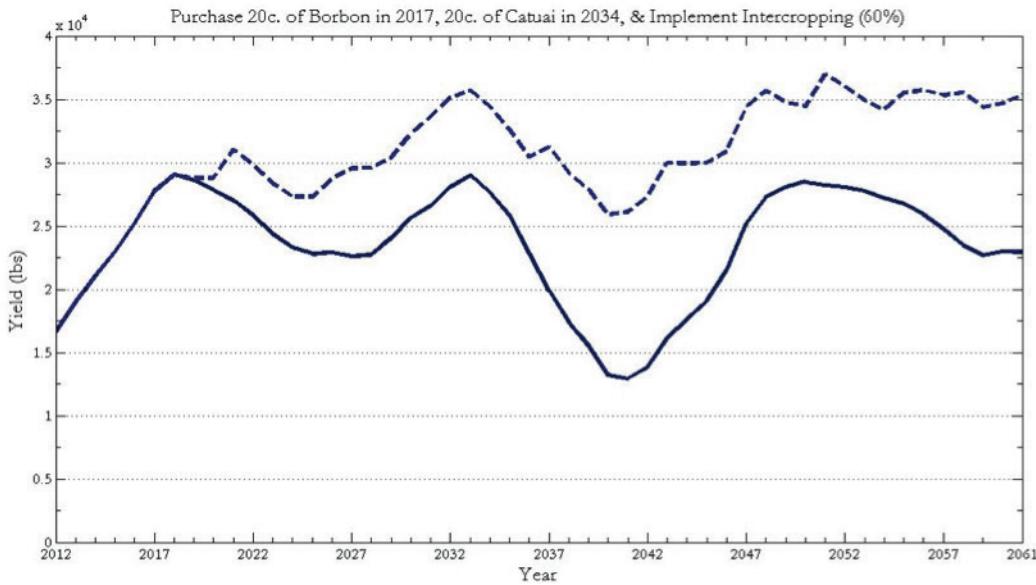
To reiterate, the simulation contained a random variable and thus simulates a slightly different variation of the above every time it is run. The reason for this is in order to account for the inevitable possibility of some farmers not wanting to intercrop Borbon into Catuai fields, opting instead to replant the same species. It is assumed however, that everyone will decide to intercrop.¹⁵

The biggest factor in developing the sort of favorable yield trend lines demonstrated in the graph above is the assumption that every farmer with a Borbon field—all but a few have at least one—will agree to prune their trees once they reach twenty years of full production. This will indubitably be a difficult thing to implement but cooperative-wise, the results would be quite favorable.

The reason that no randomness was programmed to account for farmers refusing to prune early and give up multiple years of full yields is the belief that such a decision would likely cause others to follow in suit. Unless all of the farmers affected are making the sacrifice, it is unlikely that the strategy will work in practice, leaving no use in guessing what fraction of farmers would elect to prune early. Unfortunately, this is one of those strenuous situations where the good of the cooperative would have to outweigh individual imperative for successful implementation. Fortunately, if the decision to implement early pruning is made, the cooperative has many years to begin facilitating open discussion with farmers to make the compromise and has thus, the ability to plan accordingly. It is useful to contemplate an alternative that would not involve early pruning.

Should the capital funds become available, a second purchase of twenty cuerdas in 2034 would help tremendously. Doing so in tandem with the Intercropping Strategy (assuming approximately 60% would switch to Borbon) would work to sustain yields quite well. Though still subject to some fluctuations, the result is not nearly as bad as the baseline forecast. Please note that the y-axis in the graph below has a maximum of 40,000 instead of 35,000 lbs.

¹⁵ If some farmers choose not to intercrop at all for whatever reason, the variation in the results of the simulation were quite negligible, and thus they were not chosen for inclusion in this report nor the appendices.



This strategy does not require the same kind of personal sacrifice from the farmers that early pruning might, but it would require purchasing large amounts of land twice. Thus, if chosen as a strategy, the cooperative will have to plan accordingly to raise the necessary capital. The price of land is also bound to rise significantly by 2034, so the implementation of this optimal strategy relies on the assumption that the cooperative will be in a position to make such purchases. Certainly, with the right coordination and determination, it would become feasible to purchase the quantities of land in the designated years. Doing so would greatly improve the productivity of the cooperative and would not require difficult negotiations with farmers who are unlikely to agree to prune their crops early.

CONCLUSION

It is important to note that the aforementioned strategic responses to problems forecasted in the next five decades do not sustain the cooperative indefinitely. They are merely solutions to a problem within a fifty-year time frame. The simulation is completely capable of forecasting for any number of years, but the farther away one attempts to look, the less reliable the results will be. More farmers are likely to join the cooperative, and few of the current ones are likely to be farming by the middle of the century, though the next generation very well may be.

It is the suggestion of this report that the cooperative should enact changes if it wishes to maintain steady, sustainable growth and continue providing developmental aid to rural coffee farmers in and around San Miguel Escobar, Guatemala. The simulation demonstrated that “Intercropping Strategy,” which involves everyone intercropping—and approximately half of farmers switching species when they do so—is highly beneficial, and implementing it should be relatively simple in practice. Doing so would shorten the time a plot of land would not be producing coffee by at least two years, increasing cooperative-wide yields in the periods of decline without any additional capital investment.

In addition, a purchase of twenty cuerdas of land in 2017 will likely be necessary, as it would cushion both dips in yield. A second purchase of twenty cuerdas in 2034 would go a long way in maintaining the coopera-

tive's growth in the fifty-year time frame if combined with the first purchase and Intercropping Strategy.¹⁶ The alternative to a second purchase of land would be pruning Borbon trees approximately five years earlier than they would normally be pruned. This strategy combined with a purchase in 2017 and the Intercropping Strategy is also sufficient to sustain the cooperative's growth. Once again, the disadvantage of early pruning is the inevitable difficulty of implementation, as many farmers are bound to be unreceptive to sacrificing years of productive yields for the benefit of the cooperative.

The simulation and resulting graphs demonstrated that while it may not be simple in practice, long-term sustainability and maintainable economic development is absolutely feasible for the San Miguel Escobar cooperative if the strategies discussed in the final section of the report are taken into consideration and implemented.

APPENDIX A: SIMULATION DETAILS & ASSUMPTIONS

Each of the four species has a different harvest cycle. Catuai, Catura, and E14 all have relatively similar cycles and estimated yields per cuerda. They begin giving full yields in the fourth or fifth year, produce at full capacity for about a decade, entering a period of steep decline before needing to be replanted, starting the cycle over again. Borbon begins giving a full yield in the fifth year, produces for about twenty-five years, and has larger harvest on average. Its production capacity then declines as sharply as the others' species before the trees need to be pruned, after which the cycle begins again. The table of specific figures pertaining to each of the four species is shown below, and can be considered a representation of major assumptions made by the simulation used in the investigation.¹⁷

Species	Full Yield In	Total Years of	Declining Harvest	
	Year	Production	Starts	Full Harvest
Borbon	5	25	23	200
Catuai	4	13	11	125
E14	5	10	8	125
Catura	4	12	10	125

Year Before Full Harvest: 20% of Full Harvest

An iteration of the simulation represents one year; it goes through each plot of land individually and determines whether or not a tree will be in full or partial production (i.e. if it is nearing the start of its peak productivity or if it is entering a decline). Once a state has been determined, the simulation assigns a yield for that specific plot by multiplying the appropriate full harvest value (in the table above) by the number of cuerdas on that plot of land. Taking a sum of all these values at the end of the iteration determines the cooperative-wide yield for that particular year.

If a plot of land will enter full production in one year, the simulation assumes that the land will produce 20% of its full harvest capacity. In the following year (and for the number of years in the "Declining Harvest Starts" column), the simulation assumes the plot of land produces at full capacity. Yields enter a steep decline over the difference between the values in the aforementioned column and the "Total Years of Production" column. Once a tree has been producing for the number of total years, the simulation takes it out of production (representing either a replanting or pruning), during which the tree produces zero pounds for one year

¹⁶ Again assuming that approximately 30-60% farmers will choose to intercrop Borbon into their fields instead of replanting Catuai.

¹⁷ In the interest of transparency, a copy of the simulation can be requested by emailing mpilosov@gmail.com. However, specific information pertaining to the farmers and their land holdings cannot be disclosed.

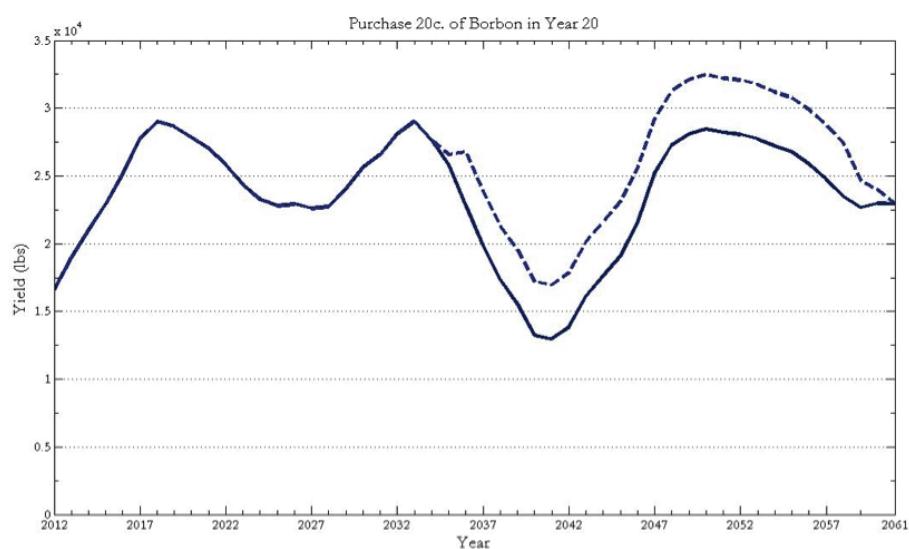
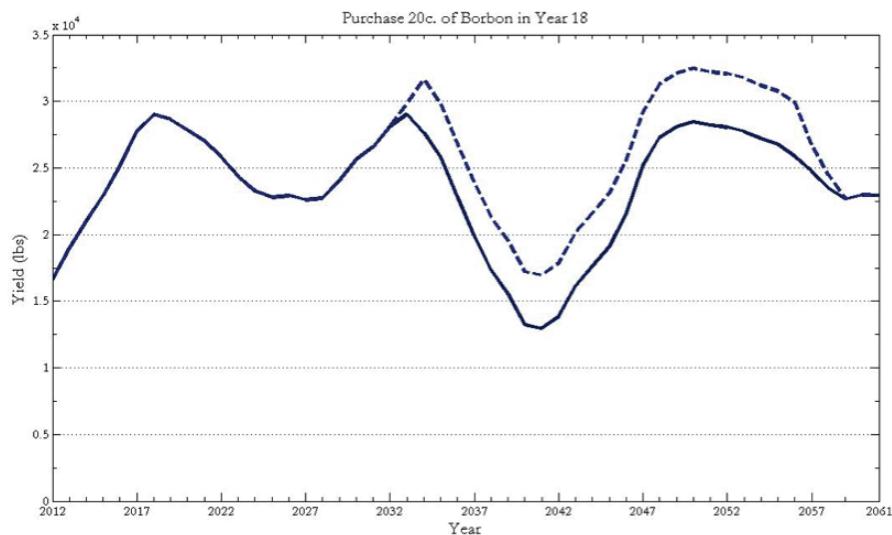
less than the value in the “Full Yield in Year” column, with the penultimate year before the beginning of full production being a partial harvest year.

The “Full Harvest” yield for a year is an estimated average based on prior experiences of the cooperative; thus for the purposes of this investigation, it is assumed that the annual full yield is static, changing only if the plot of land is in a partial harvest year or in decline.

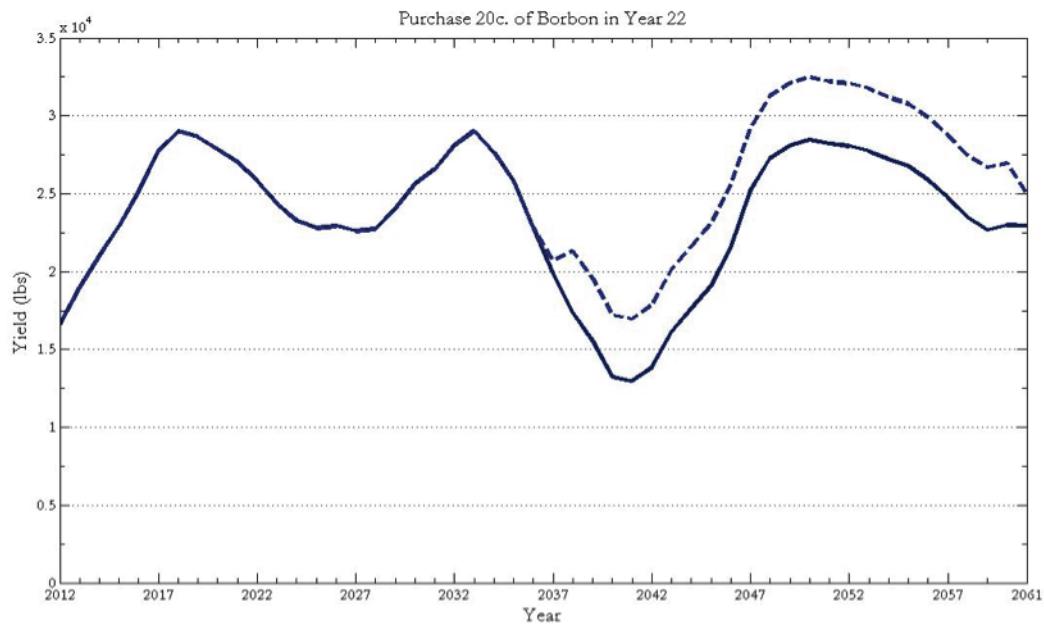
APPENDIX B: NOTES ON PURCHASING MORE LAND

ON PURCHASING IN DIFFERENT TIME FRAMES:

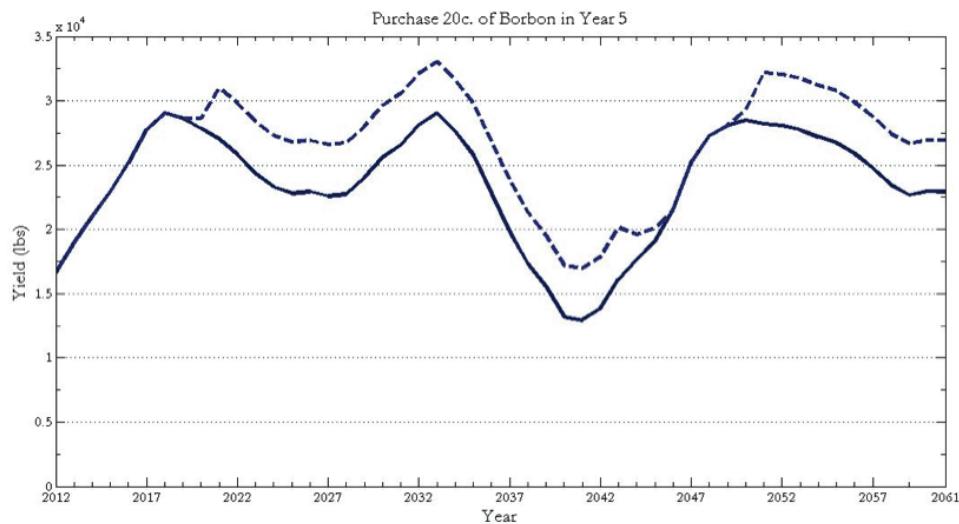
One would think that purchasing the higher yield per cuerda species Borbon right before the larger dip would be a beneficial strategy, but the simulation quickly demonstrates that this would not work as well as one would hope.



The purchase of land in preparation for the yield shortage results in a bloated peak following the dip. This further exaggerates the inconsistencies in yield from year to year.

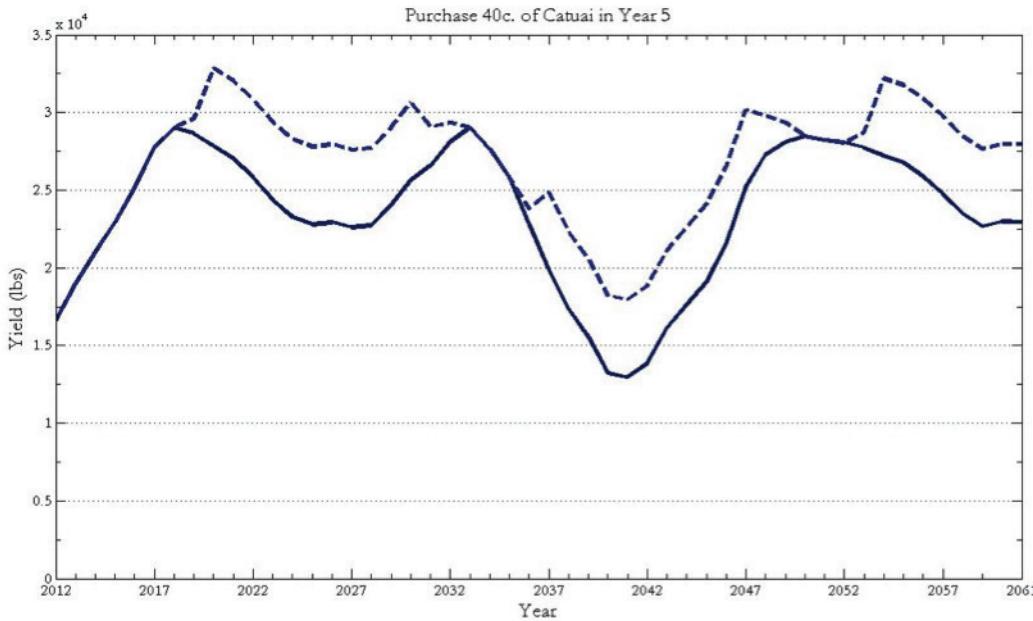


For comparison, here is the graph of the purchase of Borbon in five years. The additional benefit of more predictable land prices also adds to the appeal, as well as increased yields sooner from the new trees producing higher yields than the species that they are replacing.

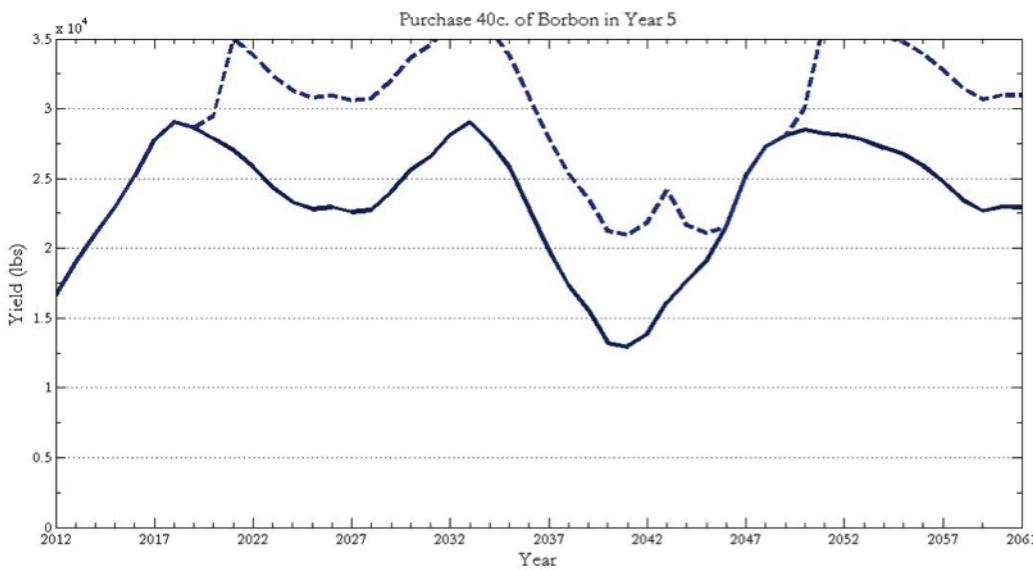


ON PURCHASING LARGER AMOUNTS OF LAND

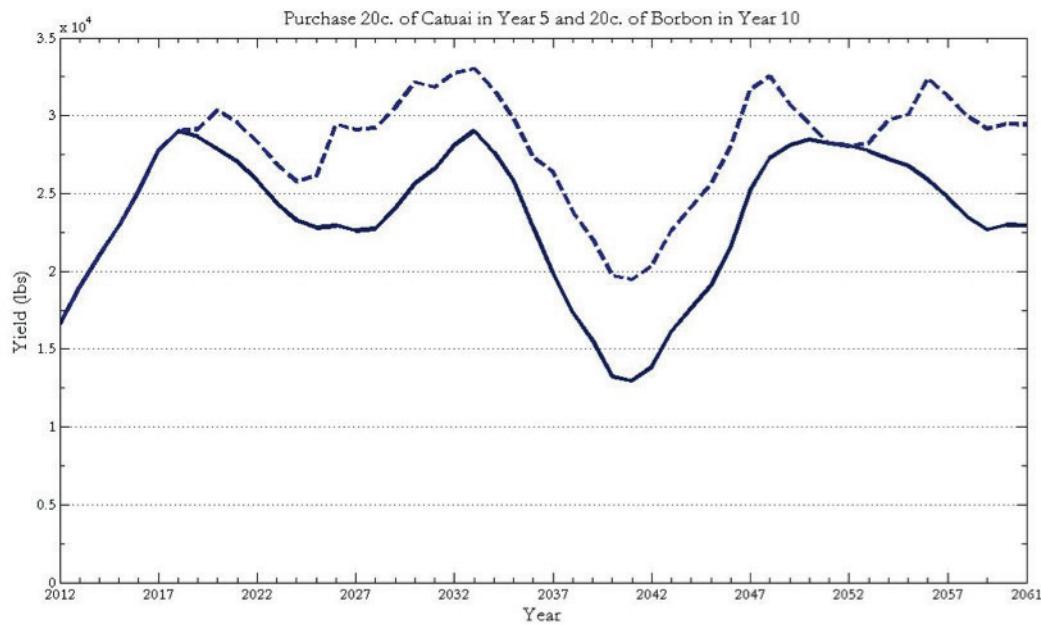
Should the funds become available, it is useful to evaluate what the effect of hypothetically purchasing forty cuerdas of land instead of twenty. The graph for a purchase of forty cuerdas of Catuai was shown earlier, but is reproduced below for comparison.



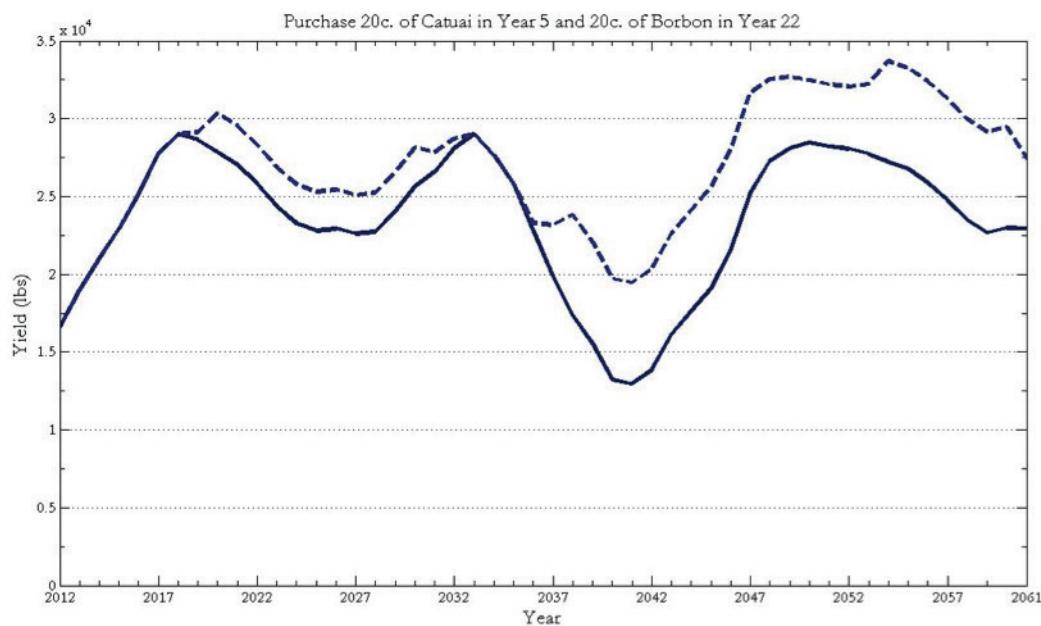
Planting forty cuerdas of Bourbon trees in five years will result in a less desirable result than purchasing and planting the equivalent amount of Catuai trees at the same time.



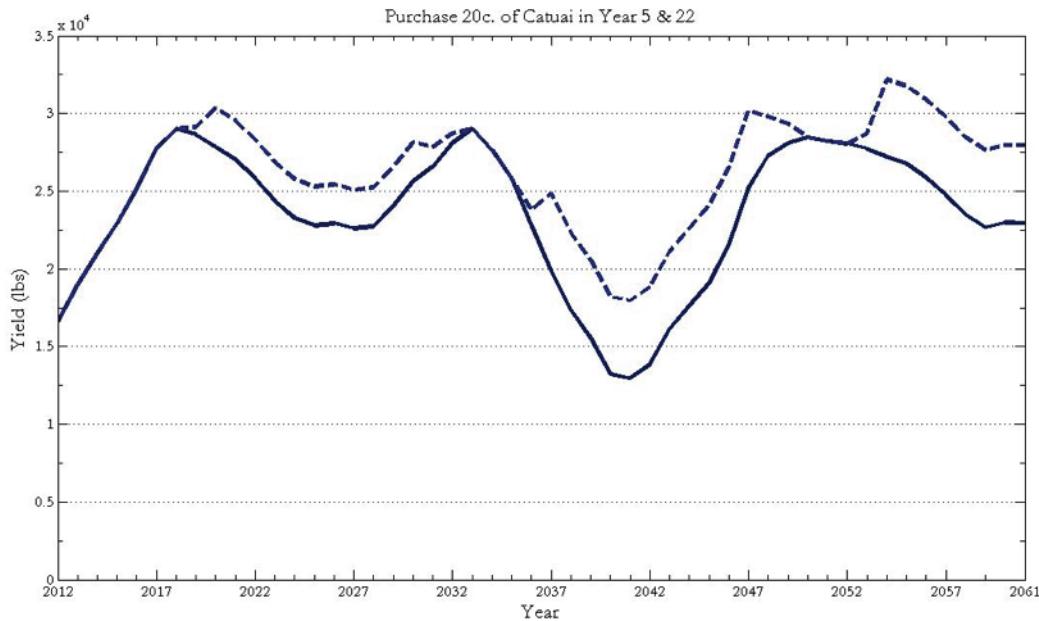
Using the strategy of purchasing Catuai in 2017 and then Borbon at a later time should be taken into consideration, and while both of the following graphs help ease the larger shortage by similar quantities, there are disadvantages to sustainability with both, as there is still a lot of fluctuation.



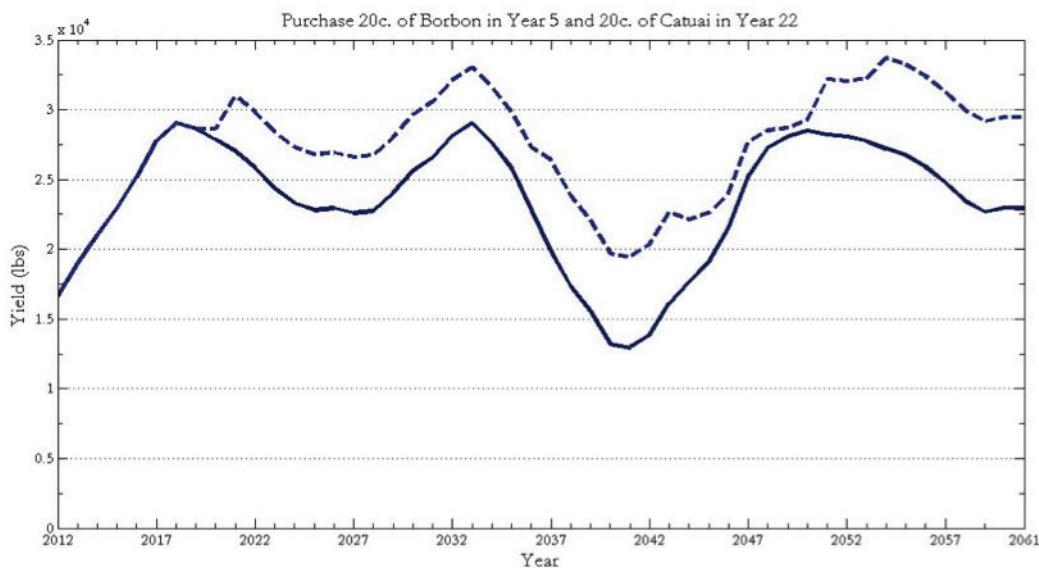
As seen above, a purchase of Borbon in 2022 would lower the minimum yield, but also still retain the relative dip by raising the yield in the years around 2030. Although the price of land will be higher in 2034 than in 2022, delaying the purchase would result in a less extreme difference between peaks and troughs overall. The benefit of rapid growth after the second dip is subjective; some might prefer slower but steadier and consistent growth:



The yields from purchasing twenty cuerdas of Catuai in 2015 and again in 2034 are certainly lower than the previous graphs, but it was chosen for inclusion in the report because of its ability to fill in the drops in yield without greatly increasing the average rate of growth.

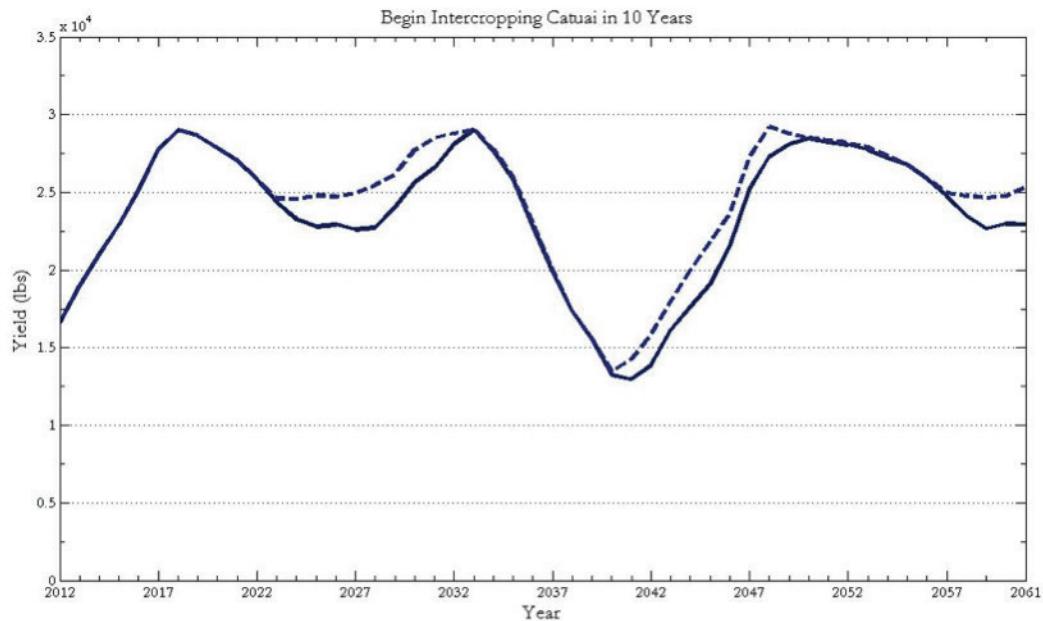


Purchasing twenty cuerdas of Borbon in 2017 and twenty of Catuai in 2034 had the best result from the sole strategy of two purchases:

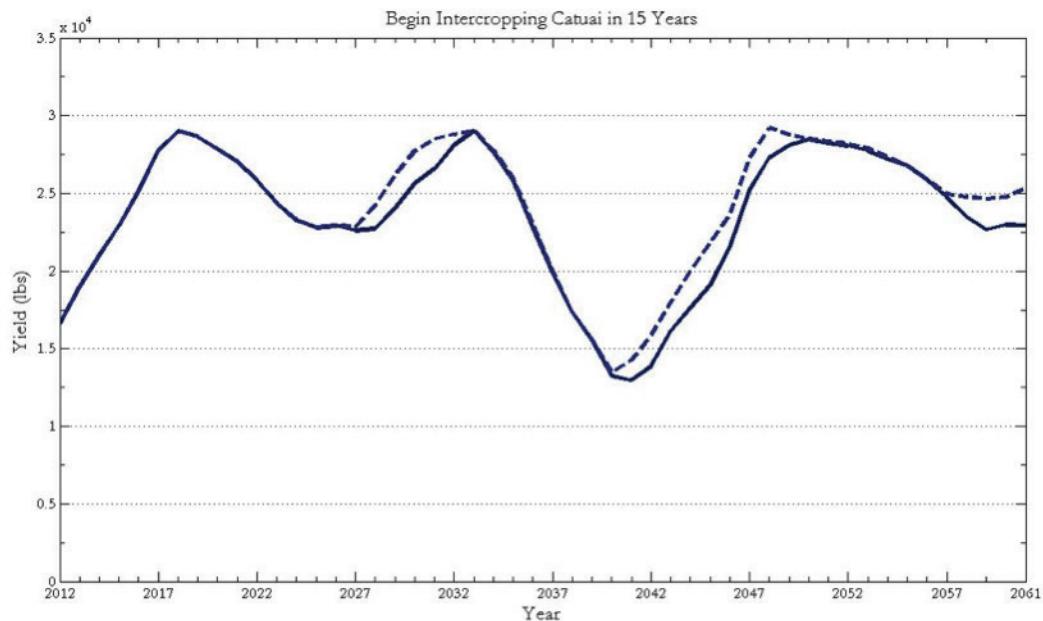


APPENDIX C: NOTES ON INTERCROPPING

INTERCROPPING CATUAI

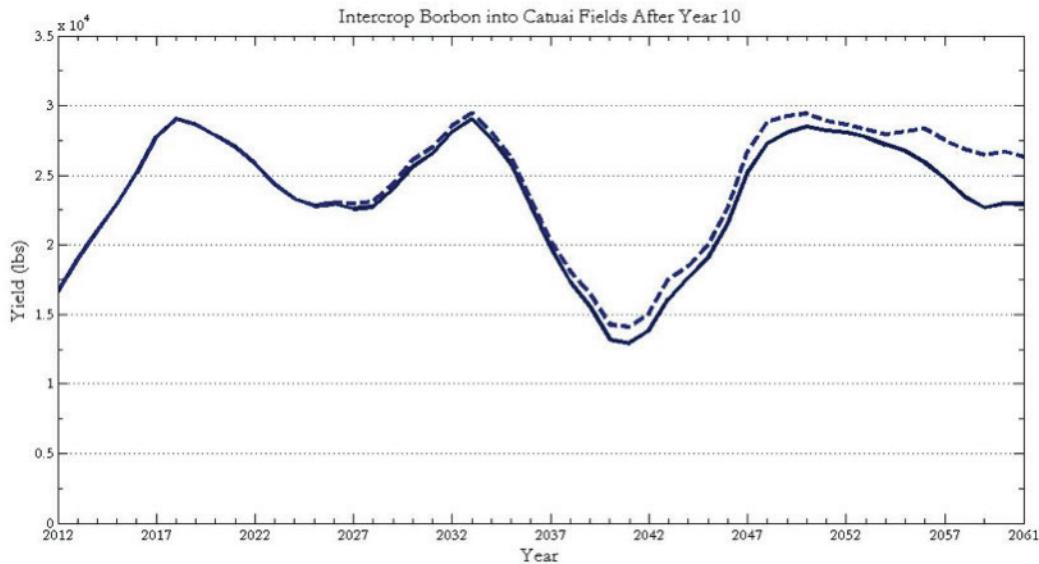


As mentioned in the report, the sooner one starts intercropping Catuai fields, the more beneficial it will be. Beginning to intercrop in 2022 is almost identical to doing so in 2017. Waiting until 2027, however, is not recommended, as it will not help the first decline in yield at all, providing no added benefit compared to beginning to intercrop sooner:

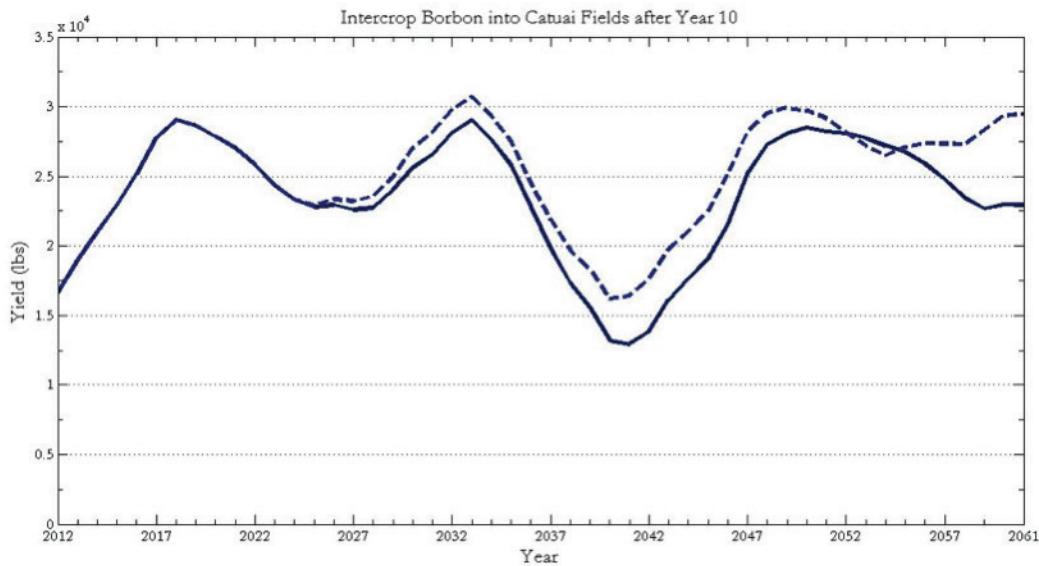


INTERCROPPING BORBON

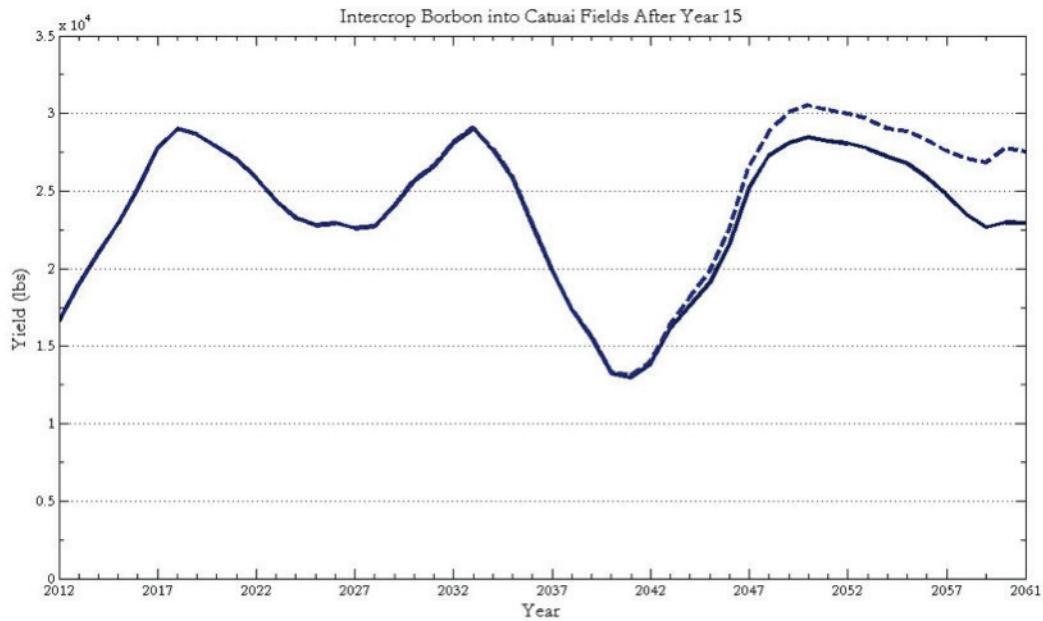
The result displayed earlier in the paper was a fairly typical result of the simulation, assuming between a third and half of farmers would begin to switch to Borbon once their Catuai fields reached the end of their productive cycles. The lower spectrum of results of the simulation looked more like the following:



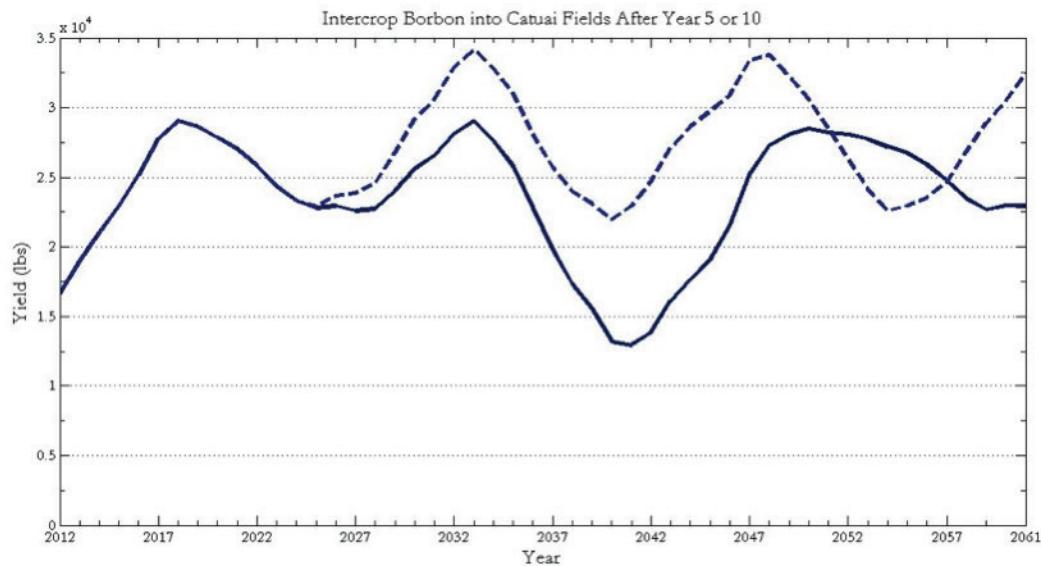
An optimistic result would help fill in the second dip in yield significantly more. The following is not the largest improvement the simulation managed to plot, but is certainly an accurate representation of the better results of the simulation (more farmers switching), with more favorable minimal yields:



As mentioned in the report, waiting fifteen years to begin implementing a switch of species is ill-advised, as the effects are not nearly as significant. Waiting twenty years is even worse. Attempting to begin intercropping Borbon trees into Catuai fields in decline is best started sooner than later. The best-case scenario from waiting fifteen years is shown below:



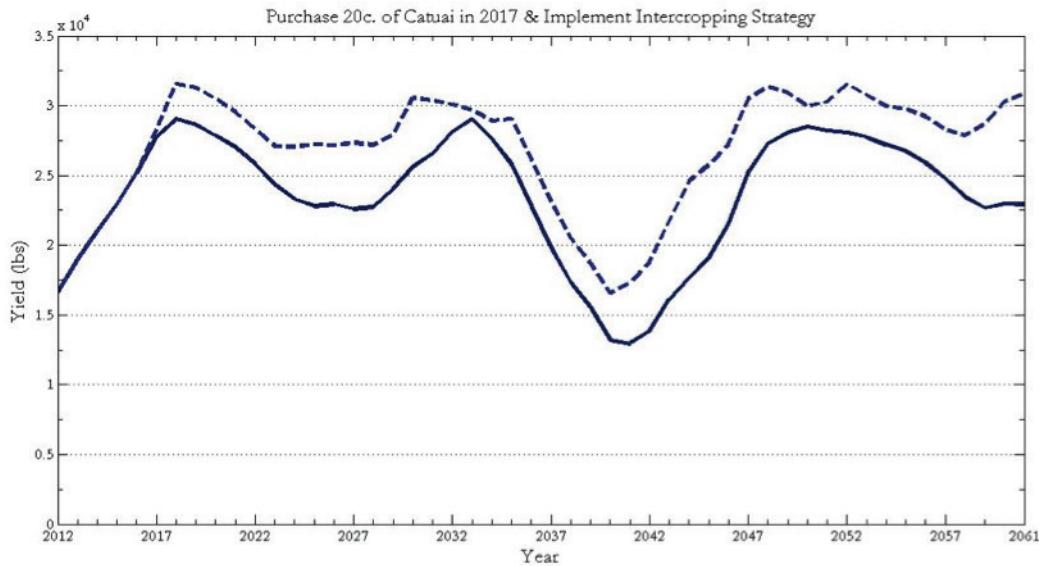
Furthermore, as unlikely as it will be that all of the farmers will choose to intercrop Borbon into their Catuai fields, it is important to reiterate that if they do, the results will not be desirable¹⁸



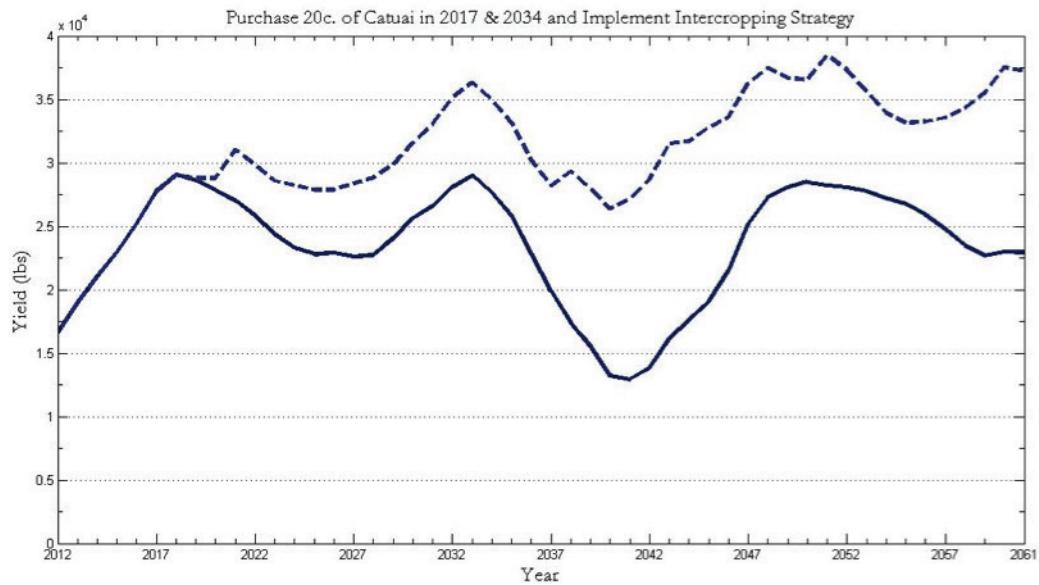
¹⁸ A note on the graph title: results from switching species after five years were nearly identical to doing so after ten, this is due to the first opportunity to intercrop for most farmers occurring around 2020.

APPENDIX D: NOTES ON MIXED STRATEGIES

There were many less favorable combinations of strategies, most of which were not selected for inclusion in this report. However, for the curiosity-inclined reader, this section will provide some graphs of other possible scenarios. The first is a graph resulting from the combination of the Intercropping Strategy and a purchase of twenty cuerdas of Catuai instead of Borbon in 2017:



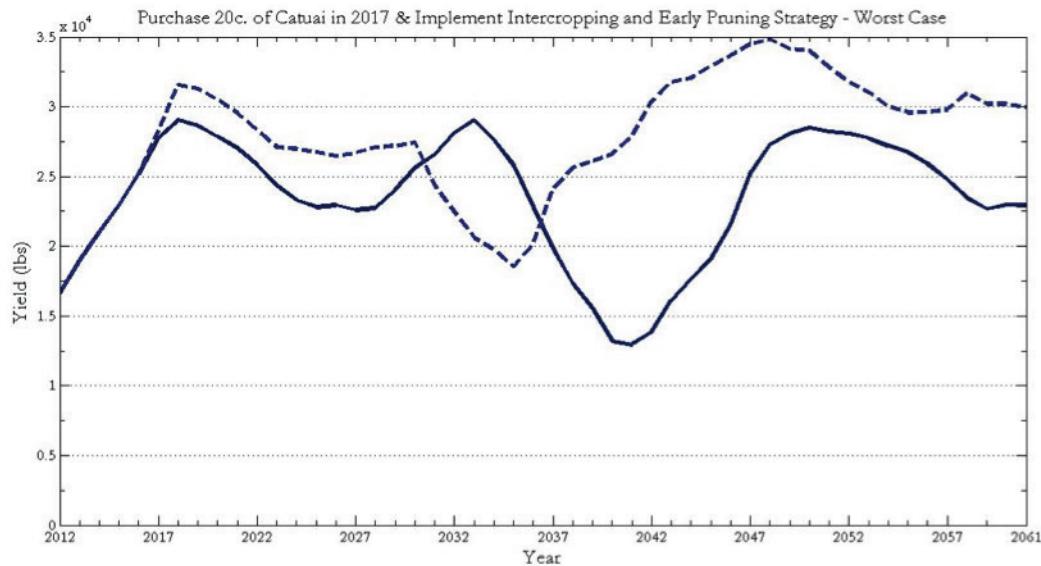
Purchasing twenty cuerdas of Catuai both times results in the following graph. Please note that graph below has a y-axis with a maximum of 40,000 instead of 35,000 lbs.



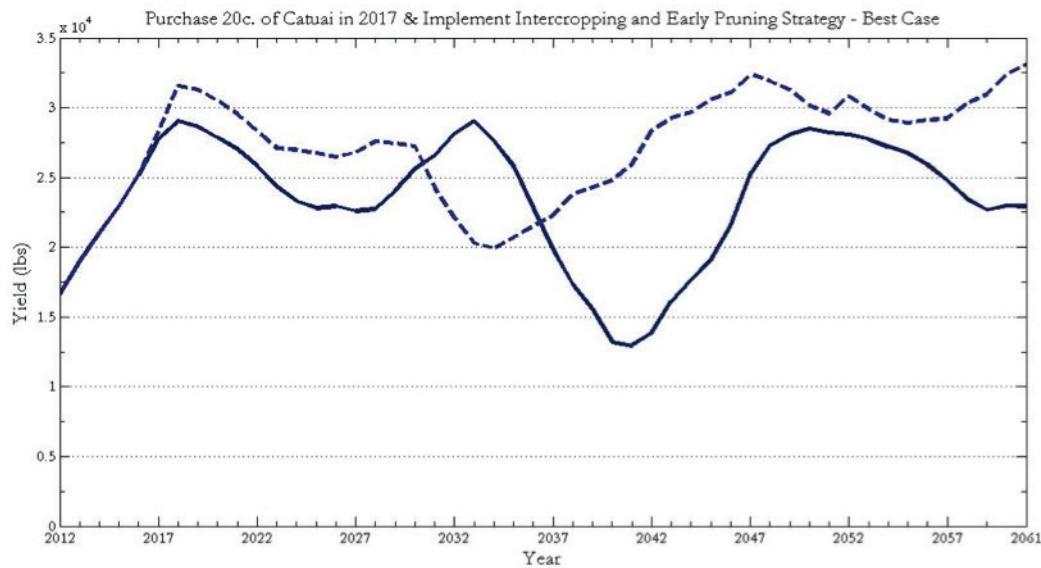
The remaining graphs in this appendix are all less favorable than the strategy of two purchases of land in combination with the Intercropping Strategy that involved about 60% of farmers switching to Borbon during their first chance to intercrop. The reason for their inclusion in this appendix is to account for the possible scenario of land prices climbing so drastically by the period before 2030 that the cooperative decides

that it will not be able to raise enough capital to make the necessary land purchases, and must turn to the alternative and less favorable strategy of early pruning.

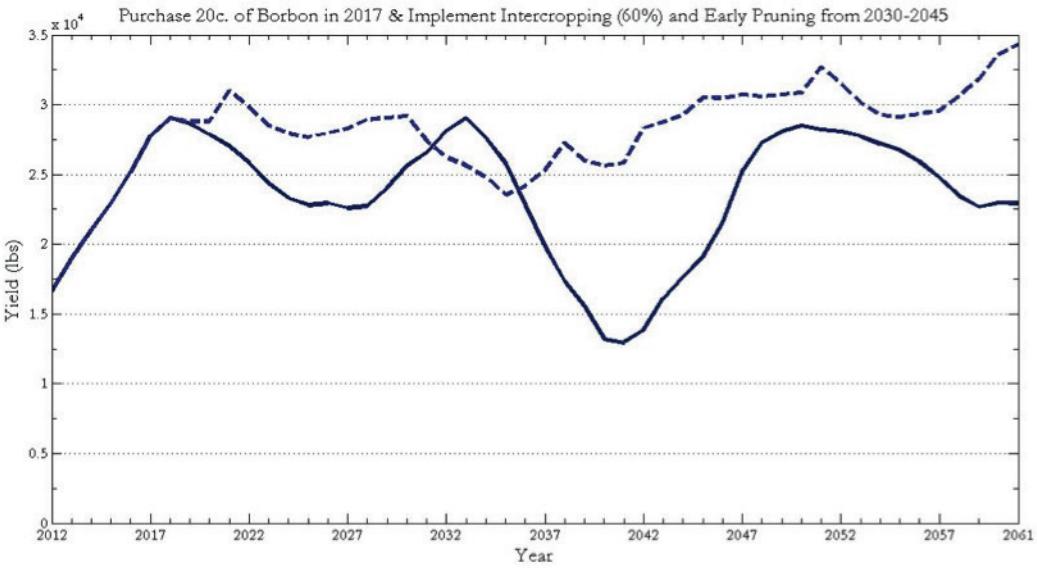
The Intercropping Strategy combined with Early Pruning and one-time land purchase, only this time with a purchase of Catuai instead of Borbon produces the following two graphs:



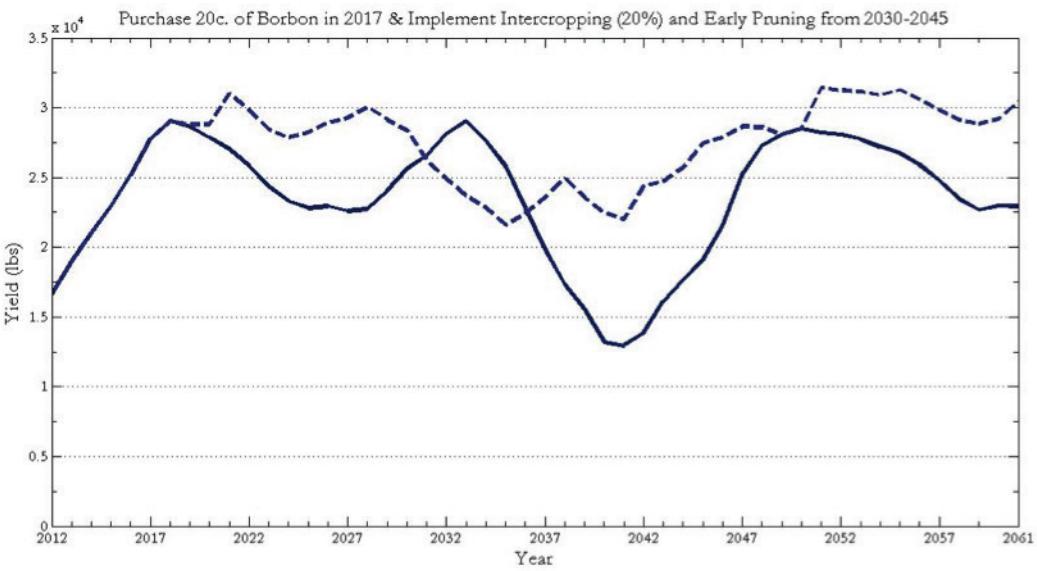
The above is the result of closer to 40% the farmers choosing to switch to Borbon when they intercrop. The graph below is the result of a simulation where the proportion that switch was 20%:



For comparison, the best-case scenario for purchasing Borbon in 2017 was the following, with about 60% of farmers choosing to switch when intercropping. Yields are more stable than in the graphs on the previous page.



The result of approximately 20% of farmers choosing to intercrop Borbon is shown below, which could be considered a worst-case scenario for the mixed strategy, still assuming that all farmers prune early. The results in the report used middle ground for the final graph of this strategy, assuming that 40% of farmers would switch to Borbon when it came time to intercrop.



AUTHOR'S NOTE

This study was performed on a purely volunteer basis and without any technical assistance or advisement during the course of my stay in Guatemala. When I arrived at the cooperative, I had only a general idea of the services I could possibly contribute depending on the availability of data. Since the only piece of documentation was a land-holdings survey done the previous year, I chose to program a simulation of the cooperative and look for patterns or areas of possible concern. My work was certainly cut out for me once the first long-term simulation plotted the curve of peaks and valleys seen throughout this report. The estimates used were gleaned from conversations with full-time employees of the cooperative, as were the strategies that were ultimately integrated into the simulation and investigated. I would like to thank the cooperative for allowing me to perform my study and for providing me with the opportunity to drink coffee bought directly from the people who grew it. The connection between farmers and their final products is one that was inspiring to witness firsthand and I sincerely hope for the best in the future of this cooperative.

Characterizing the Role of the Actin-binding Protein, TMD-1/tropomodulin in *C. elegans* Excretory Cell Morphogenesis

Samantha Smith

ABSTRACT

Tropomodulins are proteins widely expressed in all complex animals that help to regulate the shape of cells by modifying the cytoskeletal filament actin. *C. elegans* worms lacking the tropomodulin TMD-1 show defects in development of the excretory cell, which acts as a kidney for the worm. The excretory cell extends four canals out from the cell body so that the entire cell looks like a great letter H stretching the length of the worm. In *tmd-1* mutants, canals extend partially or not at all, and develop a dramatic crinkled appearance. The mechanism for this interference is unknown; however several possibilities are being explored. Excretory canals are often affected by mutations in genes, also needed in neuronal axon guidance. Knocking down one of these guidance proteins, MIG-10, produced a similar phenotype to that of the *tmd-1* mutants. However, further experiments did not uncover any neuronal guidance defects in *tmd-1* mutants. Instead, it is more likely that TMD-1 is essential for vesicle trafficking within the excretory canal. In this function TMD-1 may facilitate canal extension by providing membrane components to the growing canal tips. Insight into tropomodulin's role in single-celled tube formation can further our understanding of how these tubes form in many organisms.

INTRODUCTION

Tropomodulins are a family of proteins that regulate the minus end of actin filaments. In this capacity they are essential for many of the complex cellular processes in which actin is involved, including cell migration, adhesion, vesicle transport, and muscle contraction. The nematode *Caenorhabditis elegans* has two tropomodulin isoforms:

TMD-1 and TMD-2. Their roles in the worm are not fully understood, but these roles are likely to be the same in vertebrates due to the large degree of homology between worm tropomodulins and vertebrate tropomodulins.

C. elegans are convenient model systems for developmental biology studies. First used for research by Sydney Brenner, they were chosen for their simple nervous system, short life cycle, and the ease with which they could be genetically modified (Brenner, 1974). Brenner induced mutations in the worms using ethanemethylsulfonate, and identified many of the mutant phenotype classes still used today, including uncoordinated (*unc*), dumpy (*dpy*), and small (*sma*). They are particularly useful for microscopy because they are transparent and their embryos can be preserved on slides. Their genome has been fully sequenced and the lineage of all of their cells has been determined. This information can be used to manipulate the worms genetically, as they are also capable of RNA interference. The *C. elegans* community is also an overwhelming benefit to this model system. Volumes of information have been compiled in online worm databases (including WormBook, WormAtlas, WormBase, and others). Additionally, thousands of mutant worm strains are available from the Caenorhabditis Genetics Center.

The work presented here demonstrates that the tropomodulin TMD-1 is important for formation of the *C. elegans* excretory cell. This is a giant, H-shaped cell that regulates the osmotic balance of the worm and excretes waste (WormAtlas, 2012). It does this by collecting waste or liquid into its lumen and then transporting it to the pore, where it empties into the

worm's surroundings. The excretory canal, as a single-celled tube with long processes, is an ideal simple model for both tubulogenesis and cell migration.

The excretory cell is first specified at the end of gastrulation (Buechner, 2002). Fluid-filled vesicles coalesce in the center of the cell and join to form the beginnings of the lumen (Fig. 1). The membranes of these vesicles become the apical membrane, which surrounds the lumen in the mature excretory cell. The outer membrane facing the outside of the cell is then specified as the basal membrane. These membranes become polarized by the different proteins that localize to them over the course of development. The mechanism by which the lumen forms in the excretory cell is a canonical example of the cell hollowing mechanism (Fig. 2). This is a conserved mechanism for the formation of single celled tubes in many organisms.

The excretory cell, located at the ventral midline of the worm, extends processes laterally until they span the width of the worm, and then the canals turn dorsally ((Buechner, 2002) Fig. 1). The canals do not grow entirely to the dorsal side of the worm, but stop about midway and extend processes anteriorly and posteriorly. The canals grow between the overlying hypodermis, or skin of the worm, and the hypodermal basement membrane. Adhesions form on these layers that anchor the canals as they grow (Buechner, 2002).

The width of the lumen and its distance from the basal membrane is tightly regulated. Twelve genes that affect the structure of the lumen have been identified, and are classified together as *exc* genes (Fujita et al., 2003). Several of these gene products are believed to interact with one another and to regulate different parts of the same processes. The *exc* mutant phenotypes reveal some of the processes necessary for shaping and maintaining this cell. *exc-5*, for example, codes for a guanine nucleotide exchange factor (Suzuki et al., 2001). A null mutation in *exc-5* causes large fluid-filled cysts to form in the lumen (Mattingly and Buechner, 2011). Conversely, when EXC-5 is overexpressed in nematodes, the apical and basal membrane of the canals polarize normally, but the basal membrane is defective (Tong and Buechner, 2008).

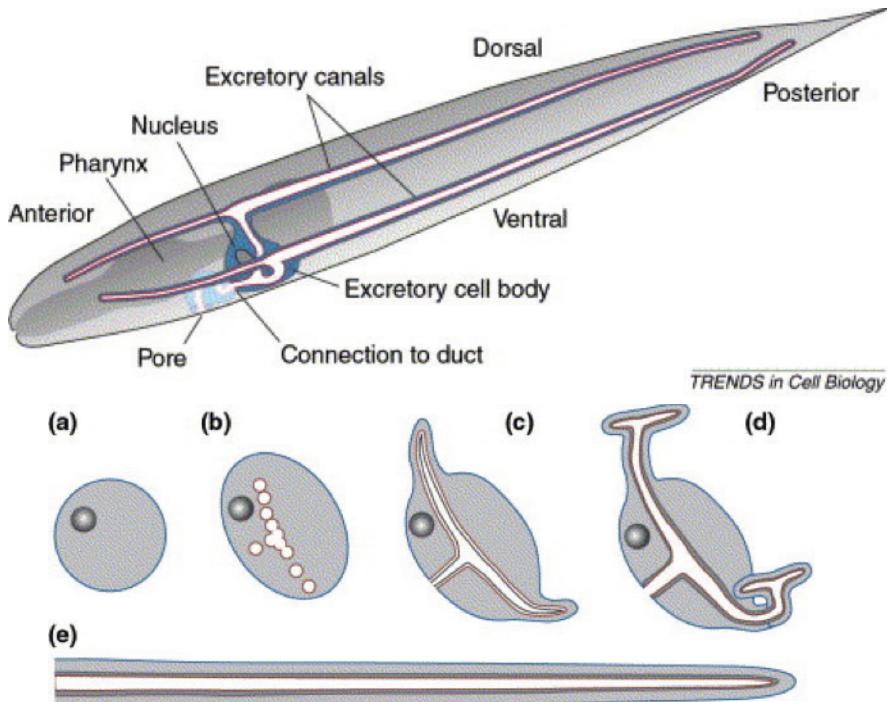


Figure 1: The excretory cell is shaped like a letter H, with 4 canals extending from a ventrally located cell body. The adult excretory cell (top) has polarized membranes, with the apical membrane surrounding the lumen and the basal membrane facing the outside. The pharynx is shown as a gray shadow. When the excretory cell is first specified (a) it is shaped like a simple circle. Fluid filled vesicles coalesce to form the lumen (b), and the apical and basal membranes together grow outward towards the lateral

sides of the worm (c). The canals extend anteroposteriorly once they have migrated about halfway towards the dorsal side of the animal. (From Buechner, M. Trends Cell Biol. 2002(12), 479-484.)

This causes the apical surface to crumple up inside the basal membrane as it does not have room to extend fully, which is characterized as the convoluted tubule phenotype. EXC-5 is utilized in the regulation of Rho GTPases which regulate organization of the cytoskeleton (Suzuki et al., 2001). The cytoskeleton is crucial in the formation of the excretory cell and maintenance of its specialized structure. The cytoskeleton provides the means of transport for localizing specific proteins to the apical and basal membranes, which is how polarity is established. Actin has an additional cytoskeletal function in the reinforcement of the shape of the mature lumen. Actin and other associated proteins localize around the lumen to form a terminal web (WormAtlas). During development this must accommodate for the growth of the lumen lengthwise while preventing lateral swelling or collapsing. In *exc-5* mutants, polarity is established, but the cystic defects observed suggest that the terminal web is flawed.

Tropomodulins are a family of proteins that also regulate the cytoskeleton. They regulate the activity of actin by capping its slow-growing end, nucleating new filaments, and sequestering actin monomers (Fischer and Fowler, 2003; Fowler et al., 2003; Weber et al., 1994; Yamashiro et al., 2012). Actin filaments are composed of two strands of globular actin monomers that associate together to form a helical filament (Fig. 3). In some tissues, tropomyosin will co-polymerize with actin. These filaments are dynamic in their structure, depolymerizing and polymerizing rapidly and constantly. The two ends of actin filaments are polarized. At one end, actin monomers are associated with ATP, and at the opposite end monomers are associated with ADP instead. The ATP end is referred to as the barbed, or plus end, and the ADP end is the pointed, or minus end. Functionally, this polarity differentiates the two ends in their tendency to attract more monomers or to lose monomers. The barbed end is more likely to polymerize and the pointed end is more likely to depolymerize (Small et al., 1978).

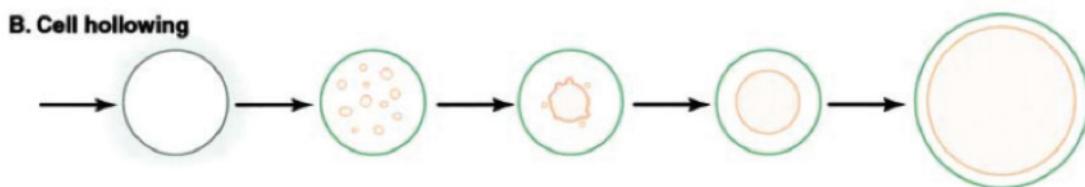


Figure 2: Cell hollowing involves the fusion of several fluid filled vesicles in a tubular cell to form a lumen within the cell. This is shown here in cross-section. The membrane surrounding the lumen is called the apical membrane, and the original cell membrane becomes the basal membrane. This process is conserved in many organisms. (Lubarsky and Krasnow, 2003)

Actin filaments are dynamic on their own, but their extensive regulation by dozens of proteins allows them to participate in such diverse cell processes as structural support, adhesion, vesicle transport, cell migration, and muscle contraction. Of the many of actin regulators that exist in eukaryotes, tropomodulins (Tmuds) are the only well characterized family that caps the minus (or pointed) end of actin filaments (Yamashiro et al., 2012). Tropomodulins are found in almost all cell types in all metazoans (Yamashiro et al., 2012). Vertebrates have four isoforms of tropomodulin, called Tmuds 1-4, and *C. elegans* have two: TMD-1 and TMD-2. The vertebrate tropomodulins, especially Tmod1, have been studied extensively in several cell types, but the *C. elegans* tropomodulins have only been studied in the body wall muscle (Stevenson et al., 2007; Yamashiro et al., 2008). However, due to homology in a number of conserved regions, findings from vertebrate tropomodulin studies can be tentatively assumed to apply to the *C. elegans* isoforms.

Tropomodulins have two capping domains: the extended, unstructured TM cap domain and the densely packed LRR cap domain (Fischer and Fowler, 2003; Fowler et al., 2003; Yamashiro et al., 2012). The amino and carboxy halves of tropomodulin can each cap actin independently in truncated forms of tropomodulin, but the strongest capping activity occurs when both capping domains are active (Fig. 4, Weber et al., 1994; Yamashiro et al., 2012). Within the amino-terminal TM cap domain there is an actin binding site and two tropomyosin binding sites. Binding of tropomyosin at these sites causes an increase in the β -helicity of the actin-binding site, which makes it far more active (Yamashiro et al., 2012). The carboxy-terminal LRR domain contains a TM-independent actin-binding site that alone can cap actin with a submicromolar affinity (Fowler et al., 2003).

Tropomodulin's binding to free actin filaments (without tropomyosin bound) is almost entirely accomplished by the actin-binding site in the LRR cap region with virtually no contribution by the TM-dependent actin-binding site (Fowler et al., 2003). Tropomodulin capping of TM-actin is much stronger than capping of free actin because it engages both the LRR and TM capping domains (Fowler et al., 2003; Weber et al., 1994). Some of this inhibition is caused simply by the association of tropomyosin, which alone slows elongation and depolymerization (Weber et al., 1994). Although tropomyosin may be working in concert with tropomodulin to slow polymerization, tropomodulin can cause complete arrest of depolymerization at concentrations of tropomyosin too low to cause an effect on their own (Weber et al., 1994).

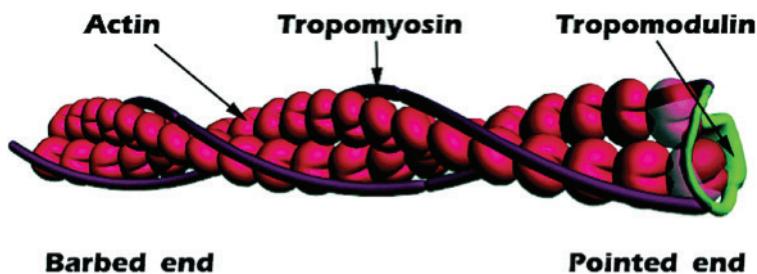


Figure 3: Tropomodulin caps the minus end of F-actin. Actin filaments are made up of two strands of globular actin monomers. There are two actin-capping domains on tropomodulin: one at the N-terminus (TM cap) and one at the C-terminus (LRR cap). Tropomyosin frequently co-polymerizes along actin filaments and stabilizes it. Tropomodulin's TM-binding site on its N-terminus associates with tropomyosin and allows stronger capping activity at the N-terminal actin-binding site in tropomodulin. The extended N-terminal half of the protein loops up and forward from the C-terminal half, which is more compactly folded and globular. (Kosyukova et al., 2006)

It is not known whether or not tropomyosin is associated with actin filaments in the excretory cell. However, actin is coated with tropomyosin in the intestine and pharynx of the worm (Anyafu et al., 2001). As the intestine and excretory cell are both tubes in the worm and undergo similar developmental hollowing processes, this may indicate that tropomyosin is also present in the excretory cell. Even if this is the case, however, there may not always be tropomyosin associated with the entire length of the actin filament. If tropomyosin does not extend all the way to the pointed end, it will not be able to bind tropomodulin and tropomodulin's capping activity will resemble capping of a free actin (Fischer and Fowler, 2003). In addition to variable capping activities, tropomodulin has also been shown to be capable of sequestering actin monomers and nucleating new actin filaments (Fischer and Fowler, 2003; Fowler et al., 2003; Weber et al., 1994). These activities may also contribute to tropomodulin's effects *in vivo*.

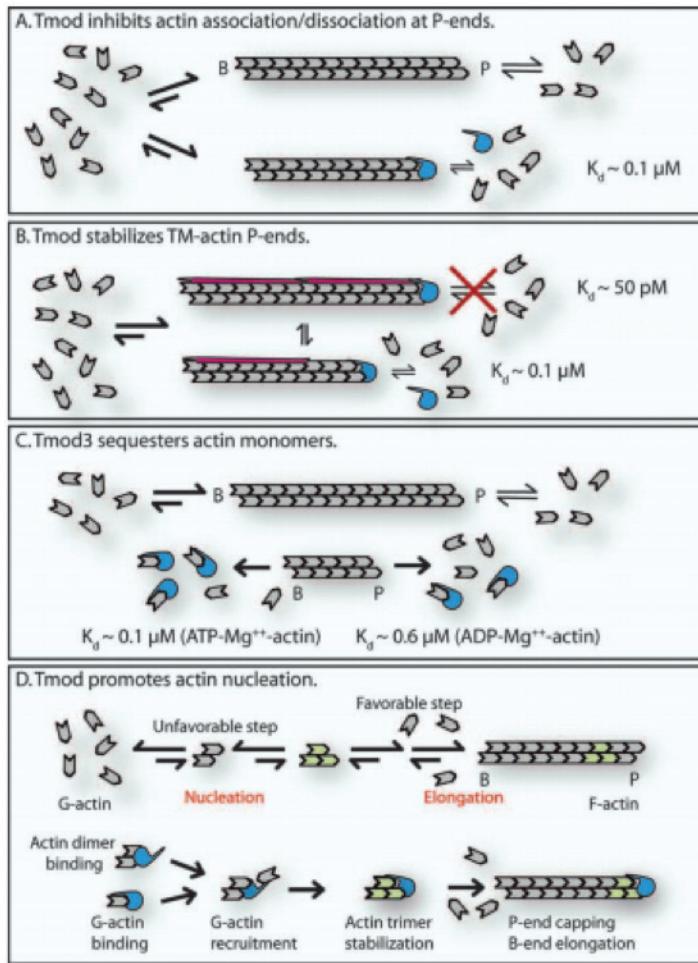


Figure 4: *Tropomodulin caps actin pointed ends, binds to tropomyosin, can bind G-actin, and can nucleate actin filaments. A) Tropomodulin forms a leaky cap at the pointed end of free actin with a submicromolar affinity. (Weber et al., 1994). B) The presence of tropomyosin at the pointed end of actin filaments results in a strong capping affinity in the nanomolar range for tropomodulin. This can vacillate back to free-actin binding kinetics if tropomodulin dissociates from the pointed end and the filament polymerizes beyond tropomyosins. C) Vertebrate Tmods 2 and 3 have also been shown to sequester actin monomers, thus decreasing the concentration of G-actin available for polymerization (Yamashiro et al., 2012). D) Tmods 1-3 can nucleate new actin filaments. *C. elegans* isoforms lack this activity (Shoichiro Ono, personal communication). (Yamashiro et al., 2012)*

Tropomodulins have diverse effects on actin in different tissues. In polarized epithelial cells, Tmod3 is found to localize to the lateral sides of cells and play a role in the structural support that gives epithelial cells their tall cuboidal shape (Weber et al., 2007). Without Tmod3, they become shorter and squatter, and significantly less F-actin and tropomyosin is found on the lateral sides of the cell. Tmod3 is believed to have a role in organizing the actin-spectrin network that structures these cells. In migratory endothelial cells, Tmod3 pointed end capping decreases the migration speed of cells and tends to decrease the polarization of the leading edge so that the cells adopt a more stationary morphology (Fischer et al., 2003). Further, Tmod3 tends to re-organize the actin cytoskeleton so that fewer barbed ends are positioned at the leading edge of lamellopodia. These two results are somewhat contradictory, in that Tmod3 seems to be upregulating the F-actin network in polarized epithelial cells and downregulating F-actin formation at the leading edge of migrating endothelial cells. These opposite effects suggest that Tmod3 may be executing different functions in each cell type. Indeed, it has been proposed that Tmod3 caps actin in polarized epithelial cells, stabilizing their structure, and sequesters actin monomers in migrating cells, which encourages depolymerization

(Yamashiro et al., 2012). The excretory cell is both a polarized structure and an extending one; thus it may be possible that tropomodulins have multiple roles in the excretory cell.

Because of the similarities between neuron development and excretory cell development, the role of tropomodulins in neurons is worth exploring. Like developing neurons, the excretory canals must synthesize and transport new membrane, form new adhesions, and the canal termini must migrate to the far reaches of the worm body. Further, the excretory canals use guidance cues much the same way as axon growth cones do during development (Buechner, 2002; McShea et al., 2013). Tmod1 and Tmod2 are expressed in neurons, but Tmod1 is found associated with actin, whereas Tmod2 is spread throughout the cytoplasm (Fath et al., 2011). This differential localization could be due to the different affinities for tropomyosin between the two isoforms. Tmod2 was found to act as a damper on the time of neurite extension and the length of these extensions. The knockdown of Tmod2 causes a compensatory rise in Tmod1 levels in neurons; however, it is the lack of Tmod2, and not Tmod1's increased expression, that makes neurite outgrowth more active (Fath et al., 2011). Because Tmod2 can bind to actin monomers, it may be that Tmod2 decreases the rate of actin polymerization, and thus the outgrowth ability of neurites, by sequestering actin monomers. Although these findings have not been studied in *C. elegans*, it is likely that tropomodulin would regulate actin in a similar way, tending to decrease the rate of outgrowth in neurons and, perhaps, the excretory canals.

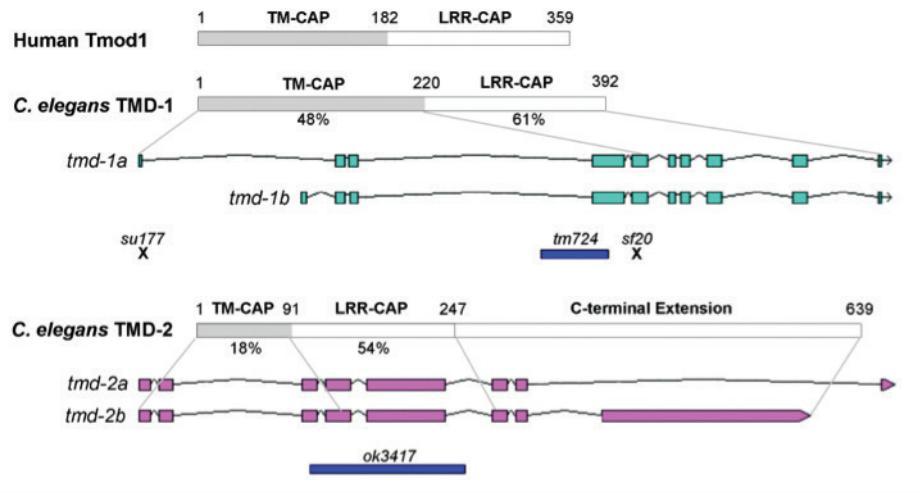


Figure 5: Structure of Human Tmod1, *C. elegans* TMD-1 and TMD-2 and position of mutations that were studied. Tropomodulins have two actin capping regions: a tropomyosin-dependent actin binding domain at the N-terminus (TM-CAP) and an actin binding domain at the C-terminus that contains leucine rich repeats (LRR-CAP). The percentage similarity of these domains in TMD-1 and TMD-2 to human Tmod1 is indicated below the domain (Yamashiro et al., 2012). The *tmd-1* gene encodes two isoforms that differ in their first exon and 5' UTR. The protein structure of TMD-1a is shown, and lines indicate which regions of the gene encode the protein domains. The *tmd-2* gene also encodes two isoforms, with *tmd-2b* encoding a C-terminal extension that is not present in *tmd-2a*. The protein structure of TMD-2b is shown, and lines indicate which regions of the gene encode the protein domains. The location of mutations that were studied is indicated below the gene structures. Image taken from Abbi Paulson.

Here, we explored the mechanism for excretory canal malformation in *tmd-1* (*tm724*) mutants (Fig. 5). This genetic deletion in the *tmd-1* gene yields failed apical surface extension, cysts, and dysregulated lumen width. A weak knockdown of *tmd-1* by RNAi results in generally successful lumen formation and canal extension. However, the presence of fluid-filled swellings both continuous and non-continuous with the lumen, suggests defects in vesicle transport. Notably, in *tmd-2* knockouts, small cysts form in their excretory cell lumens as well. A role for tropomodulin in vesicular transport has also been explored in the intestine, but not proven.

This role for tropomodulins has not yet been characterized. Tropomodulins have been shown previously to play a role in cell migration and the structure of specialized cells, both of which are relevant to the excretory cell. However, tropomodulin may be affecting the structure and extension of the excretory cell by the mechanism of vesicle transport rather than direct regulation of F-actin structures. Thus, the findings reported here could have far reaching implications for tubulogenesis studies or cell migration. If tropomodulin is indeed playing a role in vesicle transport that enables apical and/or basal surface extension, this role may be conserved in other tissue types or in other organisms.

MATERIALS AND METHODS

C. ELEGANS CULTURING AND STRAINS USED

C. elegans were grown on plates containing nematode growth media (NGM) and fed OP50 bacteria according to standard practice described in Stiernagle 2006.

Strain	Description
N2	Wild type
VJ402	<i>erm-1::gfp</i> (apical surface marker)
TM724	<i>tmd-1</i> genetic deletion
GSC5	<i>tmd-1</i> genetic deletion, <i>erm-1::gfp</i>
GSC9	<i>tmd-2</i> genetic deletion, <i>erm-1::gfp</i>
BK36	<i>rha-1::gfp</i> (cytoplasmic marker)

FEEDING RNAI

In *C. elegans* it is possible to target the expression of specific genes by simply feeding the worms containing double stranded RNA (dsRNA) corresponding to the target gene (Timmons and Fire, 1998). This activates the natural RNA degradation processes in the worm, and over the course of one or multiple generations the expression of the gene is reduced. A feeding RNAi library originally designed by the Vidal lab (Rual et al., 2004) was purchased from Open Biosystems (now ThermoScientific) and was used for all feeding RNAi experiments. The bacteria in this library were all HT115 (DE3), a strain of *E. coli*.

Feeding RNAi is a multi-day process. On the first day feeding RNAi media was made, autoclaved, and poured into 65mm petri dishes (see recipe below). Worms were bleached using bleach solution (see recipe below) to obtain embryos of approximately the same age as described in Stiernagle 2006. Bacterial cultures containing dsRNA corresponding to the target gene were inoculated. Feeding RNAi bacteria containing either an empty feeding vector (L4440) or a feeding vector for *cap-1* were used as negative and positive controls, respectively.

On day two, bacterial cultures were spread on the feeding RNAi plates and allowed to grow overnight. On day three, worms were added to the feeding plates and allowed to grow for either two days (single generational knockdown) or four days (for multi-generational knockdown). On the final day, worms and embryos were collected from the plates. Worms were bleached to release their eggs using bleach solution. Eggs were added to poly-L-lysine coated slides and fixed using a fix solution (see recipe below). After 20 minutes of fixing, eggs were washed with phosphate buffered saline and SlowFade Gold mounting media (Invitrogen) and

coverslips were added. Slides were stored at 4°C for imaging.

Feeding RNAi Media (200 mL)

0.24G NaCl
0.8G BACTO PEPTONE
0.6G KH₂PO₄
0.1G K₂HPO₄
320 mL CHOLESTEROL
4G AGAR
BRING TO 200 mL WITH DDH₂O

After autoclaving and media has cooled to 55°C, add:

200 μL 1M CaCl₂
200 μL 25 MG/mL AMPICILLIN (FILTER STERILIZED)
2 mL LACTOSE

Bleach solution (8 mL)

7.2 mL DDH₂O
0.4 mL NaOCl
0.4 mL 5M KOH

Fix solution (500 mL)

206 μL H₂O
10 μL 4MG/mL LYSOLECTHIN
10 μL 0.5M EGTA, pH 8
48 μL 1M PIPES, pH 6.8
25 μL 1M HEPES, pH 6.8
1 μL 1M MgCl₂
200 μL 10% PARAFORMADEHYDE

IMMOBILIZING WORMS FOR LIVE IMAGING

Worms were anesthetized with 20mM levamisole to immobilize them for imaging without the necessity of fixation. Worms were mounted either on poly-L-lysine coated slides or gelatin-coated slides sealed with velap.

IMMUNOSTAINING

Immunostaining to visualize neurons in *tmd-1* knockdown and wild type worms was performed on mixed stage worms. Antibody 6-11 B-1 (Sigma) was used to stain acetylated tubulin with GFP. 6-11 B-1 stains six touch neurons: the PVM (posterior ventral microtubule), ALML (anterior lateral microtubule, left), ALMR, AVM (anterior ventral microtubule), PLML (posterior lateral microtubule) and PLMR (Siddiqui, 1990). Protocol was modified from Siddiqui 1990.

Briefly, worms were washed off plates in M9 and fixed in 4% paraformaldehyde and 1X PBS for 30-40 minutes at 0°C. Worms were washed in M9, then added to gelatin coated slides. A second slide was pressed hard on top of the worms and left on dry ice for 30 minutes. The slides were then pried apart and immersed in 1:1 acetone: methanol for 4 minutes on dry ice. The worms were re-hydrated in an ethanol series (90%, 70%, 50%, 30%) for 20 minutes each at 0°C. Slides were then immersed in 0.1% Triton X-100 for 4-6 hours at 0°C. Excess Triton X-100 was wiped off the slides and 10 mL of primary antibody was added. The primary antibody incubated on the slides at 4°C in a humidified container for 8-10 hours. Slides were washed with phosphate buffered saline and then incubated with 10 of μL secondary antibody (Jackson Immunoresearch) at room temperature in humidified containers. Slides were washed and mounting media and coverslips were added and sealed with nail polish.

IMAGING

All microscopy was performed with a Nikon EZ-C1 Confocal Microscope or a Zeiss Imager M1. Images were taken with Nikon EZ C1 software or AxioVision Rel. 4.6. Image processing was done with ImageJ 1.47a and Imaris versions 7.2.3 and 7.4.2. The scale bar in Figure 4C was calculated using Adobe Photoshop Elements.

RESULTS

Previous work in the Paulson lab has shown that the *C. elegans* tropomodulin TMD-1 is essential for proper development of the excretory cell, although its precise function has not been elucidated. Worms

with a *tmd-1(tm-724)* mutation, which is a putative null allele (Yamashiro et al., 2008), do not produce TMD-1. Using a green fluorescent protein tag on the apical surface marker ERM-1, we have observed that the apical surface of the excretory cell in *tmd-1(tm724)* homozygotes is crinkled and displays failed extension of some of the canals (Fig. 1B). The lumens which do extend are also wider than in wild type (Fig. 1C) and show cysts (Fig. 1D). These defects begin within 1 hour of development and persist into adulthood (Fig. 2). The goal of the experiments presented here was to elucidate the mechanism by which tropomodulin facilitates extension of the apical and basal surfaces of the excretory canal.

Several hypotheses guided our experimentation. Two of these featured tropomodulin acting cell-non-autonomously, as tropomodulin has thus far not been found in the excretory cell by antibody staining. This result is not conclusive proof that tropomodulin is not present in the excretory cell, however, as the methanol treatment used during antibody staining destroys the cytoskeleton. It could be that tropomodulin is localized to the skeleton and is also removed by the methanol. Nonetheless, because we had no proof that tropomodulin was expressed in the excretory cell, we considered ways that tropomodulin could affect the cell from other tissues. In one hypothesis, tropomodulin would act as an aid to some sort of adhesion complex. The excretory canals form adhesions with the basement membrane upon which it extends; these are necessary for traction and forward motion as the canals extend away from the cell body. Tropomodulin might be involved in the regulated secretion of some basement membrane components by the hypodermis, without which adhesions would be compromised. In this case, I might expect the basal surface to appear as a bubble around the mass of apical membrane observed near the cell body. The apical surface would grow, but would be prevented from extending as usual by the fact that the basal membrane was not growing away from the cell body.

Another theory included tropomodulin as critical regulator in the release of a guidance cue. The excretory cell has been shown to rely on guidance cues to extend; the same cues, in fact, that axon growth cones use (Buechner, 2002). Additionally, tropomodulin has been shown to potentially prevent vesicle release in the *C. elegans* intestine (Hoffman, 2012). If this is also occurring in the tissues surrounding the excretory cell, it could be that the worm is missing a chemical gradient that guides the canals as they extend. In this case, the basal surface of the canals would grow and the canal width would not be disrupted, but the canals would not extend properly in a straight line because they would not have the guidance provided by the chemical gradient.

Our third hypothesis accounted for the fact that TMD-1 could be present in the excretory cell even if it did not appear by antibody staining. If this is the case, TMD-1 could still participate in adhesions and in guidance, but simply from within the excretory cell. Instead of affecting secretion of a basement membrane protein to which the excretory cell adheres, TMD-1 could regulate actin participating in the adhesion complex on the inside of the cell. Similarly, TMD-1 could participate in the interpretation of a guidance cue inside the excretory cell, rather than the secretion of that cue from the hypodermis.

We also hypothesized an entirely new role for TMD-1 as a regulator of vesicle transport. Actin is needed both for vesicle transport and vesicle fusion. The osmotic regulatory function of the excretory cell necessitates a large amount of vesicle transport, as does the outgrowth of the canals and lengthening of both apical and basal membrane. If actin is not available to facilitate vesicle transport, the outgrowth of the canals could be compromised.

These hypotheses were explored using various experimental approaches. I compared the tropomodulin mutant apical surface phenotype to that of different gene mutants using RNAi. The genes tested have known roles in excretory canal development. The hope was that a phenocopy of the *tmd-1(tm724)* mutant would also be functioning in the same process or pathway as TMD-1, and this would give us a clue as to its mechanism. I also observed the development of neurons in *tmd-1(tm724)* mutants to determine whether tropomodulin also had a role there. If indeed TMD-1 was regulating the secretion of a guidance cue, it likely would affect

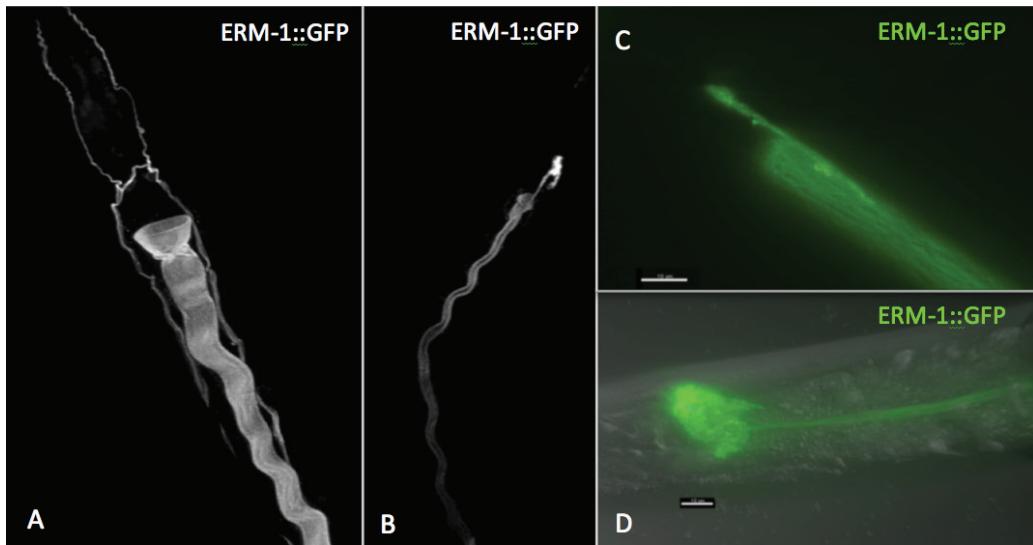


Figure 1: The *tm-724* genetic deletion of *tmd-1* causes failed extension of the apical surface of the excretory canals and luminal defects. A) Wild-type worm expressing a GFP fused to the apical surface marker ERM-1. This marks the excretory canal lumen and the intestinal lumen. The lumen of the canals is uniformly narrow and in the bridge it is slightly thicker. Kinks in the canals are caused by the *rol-6* marker used to distinguish worms with the fusion protein (Tong and Buechner, 2008). B) Genetic deletion of *tmd-1* results in failed apical surface extension. Some canals extend partially or fully, or no canals extend. C) *tmd-1(tm724)* mutants show cysts in the excretory cell lumen. D) The apical surface has a crenelated appearance when it fails to extend. Width of the lumen is also increased abnormally in *tmd-1* mutants. Images A and B are projections of confocal z-stacks generated by Matthew McIntosh, taken of L1 larvae. Images C and D are of worms between the L1 and adult stages. Bars=10 μm.

the neurons as well as the excretory cell. I visualized weak tropomodulin knockdown using a fluorescent marker for the entire excretory cell in order to inspect the development of the basal surface as well as the apical surface. The weak tropomodulin knockdown also provided insight into a phenotype pathway between wild type and the dramatic failed extension of the *tmd-1(tm724)* mutants. This showed us the defects that still persisted even when the worms had a partial dose of TMD-1. Finally, I performed initial characterization of the *tmd-2* mutant excretory cell phenotype to gain a more fully rounded idea of the role of tropomodulins in the excretory cell.

THE KNOCKDOWN OF MIG-10 INDUCES A CRINKLING AND FAILED EXTENSION OF THE EXCRETORY CELL SIMILAR TO TMD-1(TM724) MUTANTS

Several genes were identified from the literature to have a role in excretory cell development. Of these, *unc-52* and *mig-10* were tested to see if their mutation produced a comparable phenotype to

that of *tmd-1(tm724)*. These genes were chosen to allow us to address our first two hypotheses. If TMD-1 is necessary for the secretion of basement membrane proteins, the *unc-52* mutant phenotype should be similar. UNC-52 is analogous to perlecan, an extracellular matrix proteoglycan (Rogalski et al., 2001). In *C. elegans* this is secreted by the hypodermis as a component of the basement membrane whose absence causes defects in canal and neuronal axon outgrowth (Buechner, 2002). Perlecan links to the actin cytoskeleton through associations with integrin adhesion complexes (Rogalski et al., 2001). If TMD-1 is instead regulating a guidance cue, then the *mig-10* mutant phenotype may resemble *tmd-1(tm724)* mutants. The *mig-10* gene encodes two proteins of unknown function, but which resemble Grb7 and Grb10, proteins used in vertebrates for signal transduction (Manser et al., 1997). Defects in *mig-10* cause aberrant migration of the CANs (canal associated neurons), as well as the hermaphrodite specific neurons (HSNs) and anterior lateral microtubule (ALM) neurons (Manser and Wood, 1990). MIG-10 has additionally been shown to be necessary for vesicle transport neurons near

synapses, and this role in vesicle transport may be related to its role in facilitating excretory canal and neuron migration (McShea et al., 2013). Vesicle transport provides necessary membrane components and proteins to the leading edge of the migrating cell.

unc-52 and *mig-10* were knocked down by feeding RNAi in worms expressing the apical membrane marker ERM-1::GFP. *unc-52(RNAi)* did not produce an abnormal apical surface phenotype. *unc-52* may be one of the genes that cannot be knocked down by feeding RNAi.

mig-10(RNAi), however, produced a phenotype not identical, but similar to that of tropomodulin mutants. The apical surface of all four canals extended only partially and terminated in crinkled clumps (Fig. 2). The lumen width was consistent and without cysts in worms exhibiting this phenotype.

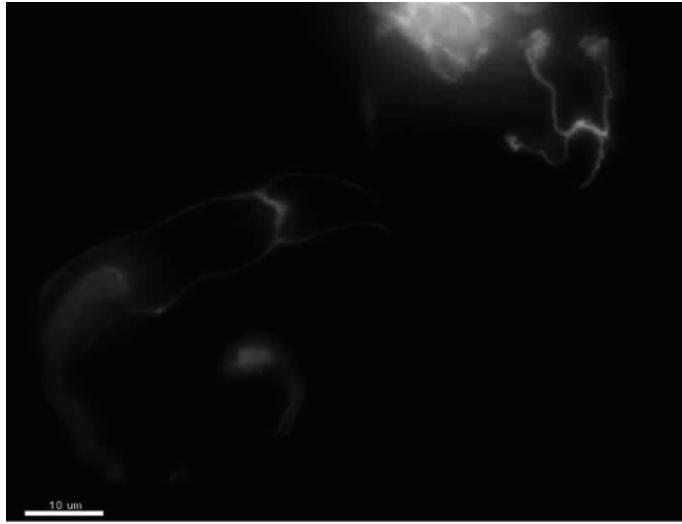


Figure 2: *mig-10 RNAi* causes the early termination of canals and the same crinkled apical surface phenotype seen in *tmd-1* mutants. The phenotype was not fully penetrant; only one embryo in the picture is affected (right). Embryos that did show a loss-of-function phenotype showed partial canal extension in one or more canals and apical surface convolutions at the canal ends. These embryos were between the comma and three-fold stage. Bar = 10 μm.

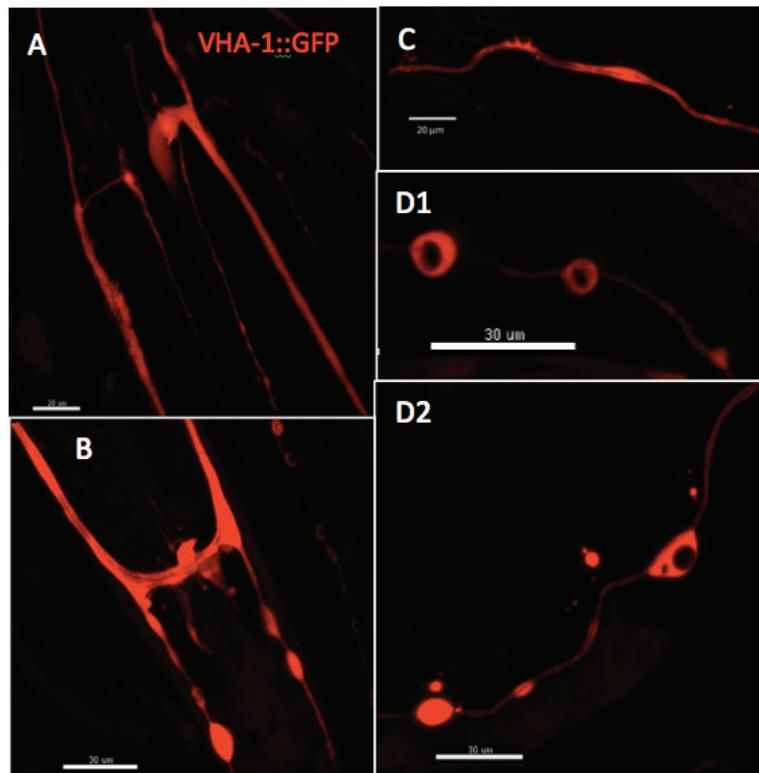
A LACK OF NEURONAL DEFECTS IN TMD-1(*tm724*) MUTANTS DECREASES THE LIKELIHOOD THAT TMD-1 REGULATES THE SECRETION OR INTAKE OF A GUIDANCE CUE.

The similarity between the *mig-10* and the *tmd-1* mutant phenotypes encouraged us to further pursue the guidance cue hypothesis. If TMD-1 was affecting the release of a guidance cue, it would be likely that these guidance cues would also be used in axon guidance and that in *tmd-1(tm724)* mutants neuronal defects would be present. The possibility of neuronal defects was supported by the observation of compromised worm coordination in tropomodulin mutants, although it was also possible that this was due to known defects in the body wall muscle (Stevenson et al., 2007; Yamashiro et al., 2008).

Antibody 6-11 B-1 was used to stain some of the neurons in the worm, including the ALM neurons, which are known to be affected by *mig-10*. Antibody staining was performed on the *tmd1(tm724)* mutants. This experiment did not show any neuronal defects, suggesting that tropomodulin may not be regulating the release or intake of a guidance cue, despite its similarity with *mig-10* in its excretory cell mutant phenotype.

WEAK KNOCKDOWN OF TMD-1 LEADS TO SUCCESSFUL EXTENSION OF THE EXCRETORY CANALS, BUT FLUID-FILLED SACS ARE PRESENT IN THE CYTOPLASM.

After the neuron experiment I turned my attention to other hypotheses. The full visualization of the excretory canal would allow us to see the morphology of the entire excretory cell and not the apical membrane alone. This might provide clues as to the process that goes awry upon *tmd1* (*tm724*) mutation. To this end, I performed *tmd-1* (*RNAi*) on worms with a VHA-1::GFP cytoplasmic marker so as to visualize the entire excretory cell, not just the lumen. In wild type worms, the excretory canals showed small periodic swellings in the cytoplasm (Fig. 5A). The lumen width was narrow and uniform. However, a small number of the worms showed fluid filled sacs in the cytoplasm that were distinct from the nucleus (Fig. 5B). These may have been vesicles just endocytosed, waiting to be exocytosed, or parts of the lumen that had failed to fuse.



*Figure 3: Weak *tmd-1* knockdown by *RNAi* causes cysts to form in the excretory canals. A) The wild-type excretory canal is thicker at the bridge of the canal than elsewhere but the canal width changes gradually. Thickness at the cell body is to be expected to accommodate the nucleus and a higher concentration of organelles. B) *tmd-1* knockdown causes a thickening in the bridge of the canal and swellings in the cytoplasm as compared to wild type. C) The wild type canal has only small cytoplasmic swellings and rarely has fluid filled sacs, which never reach the size observed in the *tmd-1* knockdown worms. D1, D2) The excretory canals in *tmd-1* knockdown worms show dramatic periodic swellings in the cytoplasm and fluid filled sacs. These sacs are sometimes separate from the lumen (D2) or part of a luminal swelling (D1). These images were taken in worms ranging from L1 to adult. The fluorescent marker here (VHA-1::GFP) marks the cytoplasm.*

In the *tmd-1* knockdowns these fluid-filled sacs were far more prevalent and larger in size. The swellings in the cytoplasm were correspondingly larger in the areas where the fluid-filled sacs were present. Some of these fluid filled sacs were distinct from the lumen, but some were continuous with the lumen (Fig. 5C, 5D). In these cases, the lumen was swollen and cystic. Despite these deformations, the luminal width overall was narrow and consistent and the canals displayed full extension of both apical and basal surfaces. This phenotype most likely represented an incomplete tropomodulin knockdown by *RNAi*, and this can account for the differences in lumen formation here from the *tmd-1* (*tm724*) mutants.

TMD-2 MUTATION CAUSES SMALL CYSTS TO FORM IN THE LUMEN OF THE EXCRETORY CELL BODY

In an attempt to gain a more generalized idea of tropomodulin's role in the excretory cell, the role of TMD-2 was studied. GSC9 worms containing an apical surface marker and a deletion in the *tmd-2* gene were imaged. The lumen was found to extend normally in all worms, but some cysts were present in the lumens, especially in the cell body (Fig. 3). These cysts were not always circular and bulbous in appearance as were those noticed in the *tmd-1* mutants, but sometimes appeared as flaps protruding from the lumen. Thus, TMD-2 may also play a role in vesicle trafficking in the excretory cell.

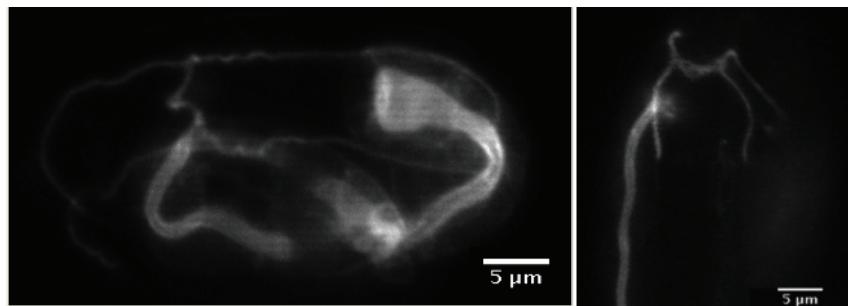


Figure 4: A genetic deletion in *tmd-2* does not disrupt canal extension, but does cause small cysts to form in the bridge of the lumen. Lumen width in the canals is narrow and consistent. These worms were between the comma and three-fold embryo stages.

DISCUSSION

The role of tropomodulin in excretory canal development has not yet been determined. However, these experiments provide some insight. Although we originally doubted the presence of tropomodulin in the excretory cell itself, we are now reconsidering. The methanol fixation in the antibody staining procedure destroys the cytoskeleton, and this is where tropomodulin would be present. Unfortunately, other attempts to visualize tropomodulin in the worm have been unsuccessful. The creation of a tropomodulin-GFP fusion protein has been reported for vertebrate isoforms, but all attempts with TMD-1 have failed. This may be due to the fact that most of tropomodulin's capping activity comes from the two ends, and the middle seems to merely link the two capping domains together. It may be possible to fuse a fluorescent tag to the middle of the protein. Another avenue for localizing tropomodulin is the development of a tissue-specific RNAi strain. I attempted this unsuccessfully using a strain with RNAi activity only in the hypodermis. In the future, I would like to attempt this once more by crossing a worm strain with hypodermal-specific RNAi capability and our strain carrying the *tmd-1(tm724)* mutation.

Because *mig-10* knockdown produces a mutant phenotype similar to the *tmd-1(tm724)* mutation, it is possible that they are performing similar functions. Both TMD-1 and MIG-10 organize the actin cytoskeleton (Stavoe and Colon-Ramos, 2012). MIG-10 acts downstream of the guidance cue netrin in axons, presumably to participate in cell signaling that aids in axon guidance and outgrowth (Stavoe and Colon-Ramos, 2012). This role in guidance was the reason that we believed TMD-1 might be necessary for neural development. However, more recent research suggests that MIG-10 is actually involved in vesicle trafficking, and this may be the mechanism for its effects on axon and excretory canal migration (McShea et al., 2013). This result, taken with our observations of a weak *tmd-1* knockdown, suggest that tropomodulin may also be regulating vesicle trafficking. Although tropomodulins are present in vertebrate neurons, TMD-1 does not appear to share this role. TMD-1 may have a different role in neurons or may not expressed there.

As tropomodulin has previously been shown to negatively regulate cell migration, it seems counterintuitive that in this situation it is facilitating excretory canal outgrowth. This suggests that its role in not to directly regulate the actin cytoskeleton at the leading edge of the canal, as occurs in migrating endothelial cells and neurons. Instead, it is more likely to be regulating processes that indirectly enable canal extension and apical surface maintenance. We hypothesized several roles for tropomodulin both in the excretory cell itself and in surrounding tissues. Because TMD-1 does not nucleate new actin filaments in *C. elegans*, our hypotheses featured tropomodulin in its actin-capping capacity, only. The hypothesis that seems most supported by our results is that tropomodulin is acting in vesicle transport needed to bring membrane components to the growing apical and basal membranes during canal extension.

Cell migration requires constant transportation of materials from the site of synthesis to the site of membrane expansion. Therefore defects in vesicle trafficking would certainly account for failed canal outgrowth. This explanation would also account for the observations of the weak tropomodulin knockdown and the *tmd-2* mutant phenotype. The fact that genetic deletion of *tmd-2* did not produce strong excretory canal defects suggests that TMD-2 is not the primary isoform used in the excretory cell. The small cysts observed in the lumen of the canal bridge could simply be a small manifestation of the same vesicle trafficking defect observed in *tmd-1* mutants. Weak knockdown of *tmd-1* by RNAi also manifests abnormalities that could be attributed to vesicle trafficking defects. Fluid filled sacs exist in the cytoplasm in larger size and greater numbers than in wild type worms. We have not yet characterized these sacs, but they appear as vesicles that have either failed to fuse with the lumen or be exocytosed. The lumen is occasionally cystic as well, which is reminiscent of the *exc-5* mutants previously described (Mattingly and Buechner, 2011). If tropomodulin is acting to stabilize actin structures involved in vesicle transport, fusion, or the integrity of the lumen, it could be that the actin filaments are far too dynamic in its absence to accomplish these processes.

To confirm or refute this hypothesis, I would like to cross the *tmd-1(tm724)* mutants with worms expressing the *rha-1* driven GFP so that the entire cytoplasm can be visualized in worms without any TMD-1. If TMD-1 is indeed causing defects in vesicle transport, I expect that the basal surface will also show failed extension and will form a large bubble around the crinkled apical membrane. I would also like to stain the excretory canals for actin to observe any cell-wide or localized changes in actin organization in *tmd-1* mutants. This may support the vesicle transport hypothesis or one of the other hypotheses proposed at the beginning of experimentation.

Tropomodulin has been previously shown to have widespread effects in diverse tissue types. It can act as a negative regulator of cell migration or an organizer of the actin cytoskeleton in specialized structures. Here, tropomodulin is facilitating the formation and maintenance of an apical lumen and the outgrowth of this lumen along the sides of the worm. Tropomodulin's role in the excretory canal is in need of further study. The high amount of homology between *C. elegans* TMD-1 and vertebrate Tmod isoforms makes this work highly translatable. Similarly, the fact that single celled tubes in higher organisms form by cell hollowing, the same mechanism used by the excretory cell, means that this process is likely to be affected by tropomodulins in other tissues in other organisms.

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Chinese and Indian Military Modernization: An Asian Arms Race?

Eric Gomez

INTRODUCTION

The states of India and China have experienced massive economic growth over the last three decades, which has produced a commensurate growth in political power and status in the international community. One natural consequence of a stronger economy and greater political power is the development of a modern military to both protect the homeland and exert more influence abroad. Both India and China have been engaged in significant military modernization programs since their economies “took off,” and over the last decade many new weapons systems have been either acquired or developed by both states as a result of their newfound wealth.

As both India and China acquire sophisticated and modern militaries, there is a concern that the two states are entering an arms race. An arms race “is a reciprocal process in which two (or more) states build up military capabilities in response to each other” (Goldstein and Pevehouse 2012, 57). The political consequences of an arms race include the erosion of confidence, the reduction of cooperation, and a heightened risk of warfare. Before the outbreak of World War I there was a significant naval arms race in Europe, which exacerbated existing tensions between the states and contributed to the start of the war (Till 2013). Arms races make the international system fraught with risk and often result in warfare between powerful states.

The possibility of an arms race existing between India and China is especially dangerous given their history of armed conflict and mutual distrust. However, there is cause to hope that the ongoing military modernization in India and China is not an arms race, but a “natural” development as a result of the increasing economic and political power of both states. Technological development of weapons sys-

tems is occurring at a very steady pace with no state frantically trying to rush development and outdo the other. Policymakers are also purposely avoiding using terms like “getting ahead” and other arms race rhetoric (Till 2013). Another important piece of the arms race puzzle is threat perception. States do not engage in arms races against states that they do not deem to be a credible threat. Even though the present relationship between India and China is not perfectly balanced or without mistrust, there is no sense of an immediate threat. If the political and military elite of both states are able to continue basic cooperation, then the chance of an arms race breaking out will be significantly reduced.

This paper is broken into four major sections. First, the history of Sino-Indian relations since 1949, by which time both states had adopted the political organizational forms that they have today, is briefly outlined. This section is further divided into three subsections: the period before the Sino-Indian War of 1962, the aftermath and effects of the war on both India and China, and the long-term consequences and lingering mistrust that affect both states today. Second, India’s modernization program is examined, with emphasis on the development of their nuclear triad and their complicated military acquisition process. Third, China’s military modernization program is examined. Major new weapons systems such as the *Liaoning* aircraft carrier, DF-21 ballistic missile, and Y-20 transport plane, and the impact these new systems have on Chinese military strategy and foreign policy are discussed.

Finally, the paper concludes with an argument for why India and China are not engaged in an arms race. While the two states do have an interest in building up military power, they do not view one another as their primary threats and are not engaged in an arms race that attempts to radically upset the

current balance of power. The absence of an arms race between India and China takes away one major source of potential instability in Asia. Hopefully, the Sino-Indian relationship will continue to deepen and improve. A positive relationship between the two rising Asian powers would go a long way toward ensuring a peaceful twenty-first century.

A BRIEF HISTORY OF SINO-INDIAN RELATIONS

The history of Sino-Indian relations can be divided into two distinct periods. The first period, lasting from 1949–1962, was characterized by a strong desire on the part of the Indian and Chinese political leadership for cooperation and close relations. The second period, beginning in 1963 and lasting to the present, saw a rapid deterioration in relations, closer Chinese cooperation with Pakistan, and a deep-seated feeling of mistrust between India and China. The 1962 Sino-Indian War was the primary cause of the dramatic shift in relations. While there have been some signs of improvement in relations—especially economic partnership—, feelings of mistrust and suspicion still exist at the highest levels of government and military in both states, as well as among the populace. In order to decrease the likelihood of armed conflict, both states must work toward addressing the lingering suspicions of one another.

SINO-INDIAN RELATIONS BEFORE 1962: COOPERATION AND CHINESE ENCROACHMENT

When India gained independence from Great Britain in 1947 and Mao Zedong declared the formation of the People's Republic of China (PRC) in October 1949, both countries shared several historical experiences. Both had been controlled by Western colonial powers, both had mostly rural and agrarian economies, and both had experienced painful internal strife and political division. Jawaharlal Nehru, India's first prime minister, was aware of these similarities and believed that the two countries could work together. He “articulate[d] a vision of two civilizations co-operating to end balance-of-power politics and assisting in the emancipation of other regions afflicted by colonialism” (Joshi 2011b, 85).

This belief was promoted throughout the 1950s through two major events. First, in 1954 India and China agreed to the Panchseel Agreement, a joint declaration that advocated five principles of coexistence: mutual respect for territorial integrity, non-aggression, noninterference in each other's internal affairs, equality and mutual benefit, and peaceful co-existence (Devotta 2010, 100). Panchseel was part of a larger agreement on Tibet called the Agreement Between the Republic of India and the People's Republic of China on Trade and Intercourse between the Tibet Region of China and India (Rowland 1967, 85). Nehru was particularly excited about the five principles, and was outspoken in claiming them to be a major positive step in Sino-Indian relations.

Second, in 1955, Nehru and Chinese Premier Chou En-Lai attended the Bandung Conference, which was a major event in the start of the Non-Aligned Movement during the Cold War that included representatives from many African and Asian countries. There they were able to get a stamp of approval for the Panchseel Agreement from other countries (Sandhu 1988, 98). The Bandung Conference was seen as a major success in Sino-Indian relations. It “produced a kind of euphoria that glossed over the cracks of Sino-Indian difficulties” (Patil 2007, 287). Nehru was very pleased at the progress made in strengthening Sino-Indian relations. The slogan “Hindi Chini Bhai Bhai,” which literally means “Indians and Chinese are brothers,” was used to sum up the belief among the Indian political elite that China was a natural partner for cooperation and could be trusted (Patil 2007, 286).

India's desire to find common ground and cooperate with China was outwardly reciprocated. However, China took military actions near the Indian border that ran contrary to the idea of Hindi Chini Bhai Bhai. Two actions in particular signaled China's intent to seize territory that was claimed by India. In 1950, China invaded and annexed Tibet. With Tibet under Chinese control, a large geographic and strategic buffer between India and China was removed, putting India as a geographic neighbor to China (Wang 2011, 449). Control of Tibet allowed China place troops on India's doorstep. Patil asserts that Nehru had “misjudged Chinese intentions... (and) did not anticipate Chinese actions on Tibet” (2007, 287). The India/PRC Agreement on Tibet of 1954,

mentioned previously, was created to deal with the Tibet issue. Under the agreement, India recognized China's sovereignty over Tibet and China allowed existing trade and pilgrimage rights to be maintained (Clark 1968, 44). In terms of security concerns, the most important part of the 1954 agreement was India's formal abandonment of its position that Tibet should remain autonomous (Rowland 1967, 85). The removal of the Tibetan buffer should have been seen as a major provocation on the part of the Chinese, but Nehru was reluctant to increase military readiness.

The second hostile action that China took was the construction of a network of roads along the Indian border. These roads would allow the People's Liberation Army (PLA) forces to rapidly deploy and sustain operations against the Indian military. By 1959, India discovered that one such road went through the Aksai Chin region, which was claimed by India as a part of Kashmir (Devotta 2010, 100). The construction of the Aksai Chin road signaled two troubling facts about Sino-India relations, "First that India was not in effective control of some territory... [second] China was in no mood to oblige its friendly neighbor" (Patil 2007, 289). B.N. Mullik, then Director of India's Intelligence Bureau (IB), claimed that despite knowing about the Aksai Chin road, the government did not take any extra precautions to secure positions in the area (Mullik 1971, 239).

The reasons for China's actions close to the Indian border were rooted in two issues. First, the Chinese government strongly opposed a border agreement that was reached when India was under British colonial control, which gave India control of land considered to be part of Tibet. In 1914, the McMahon line separating British India from Tibet was drawn and agreed upon by Britain, Tibet, and China (Wang 2011, 448). Along the border of Tibet and the Indian state of Arunachal Pradesh lies the town of Tawang. China claimed that the town and the area around it was once a part of Tibet, but according to the McMahon line, Tawang was on the Indian side of the border. However, China's claim extended beyond just the town. According to Wang:

The Chinese argue that Tawang is a Tibetan territory, and because Tibet is considered part of China, the entire

Arunachal Pradesh is Chinese territory.
(2011, 452-453)

India refused to bend on the border question and asserted that the McMahon line was an accurate and legitimate international boundary. However, the Indian government was unwilling to augment its military capabilities to mount an effective defense of its claim. Not enough members of the Indian military and political leadership perceived China's assertions regarding Arunachal Pradesh as a serious threat, which contributed to the Indian military's poor state of readiness when war did break out in 1962 (Patil 2007, 288-289).

The second cause of aggressive Chinese actions along the Indian border was the Indian government's support for the Tibetan government in exile. In March 1959, a Tibetan uprising against Chinese occupation resulted in the exile of the Dalai Lama, the spiritual leader of Tibetan Buddhists and Tibet's most important political figure, to India (Wang 2011, 450). One year later, Nehru offered the city of Dharamsala as a base of operations for the Tibetan government in exile. This put intense strain on Sino-Indian relations. The Chinese government viewed India's sheltering of the Dalai Lama and the Tibetan government in exile to be a "root cause of the 1962 war" (Malik 2011, 76). Indian support for the Tibetan government in exile and the question of the border drawn by the McMahon Line were the two primary political disputes that led to the 1962 Sino-Indian War.

From 1960–1962, relations between India and China rapidly deteriorated. After 1959, the Chinese government became more hostile in its relations with India. Hostile actions taken by the Chinese included: a propaganda war against India, demands for self-determination for Kashmir, and the provision of aid and asylum to Naga and Mizo insurgents (Patil 2007, 288). There was also a belief among the Chinese political leadership that the governments of the United States and India were conspiring against Chinese interests. Military force was seen as necessary to foil the conspiracy (Malik 2011, 77–78).

The Indian government also took actions that put strain on the relationship. In an April 1960 visit to India, Chinese premier Zhou Enlai offered a pro-

posal to Nehru in which China would drop its territorial claim to Arunachal Pradesh if India gave up its claim to the Aksai Chin. This swap “would have given each country legal right to territory already in its possession” (Garver 2006, 104). Nehru refused to accept the proposal and insisted that China give up claims to both Arunachal Pradesh and the Aksai Chin. Instead of accepting Zhou’s offer and cooling off tension between the two states, Nehru’s choice to become more confrontational over the border dispute put undue strain on relations between India and China. John Garver argues:

both sides bear onus for the 1962 war, China for misconstruing India’s Tibetan policies, and India for pursuing a confrontational policy on the border. (2006, 87)

THE 1962 SINO-INDIAN WAR AND ITS AFTERMATH

The worsening relationship between India and China came to a head on October 20, 1962 when the PLA launched a massive ground assault at several points along the Indian border. According to Wang, small skirmishes between Chinese and Indian soldiers along the border had been occurring for several years before the outbreak of war, but these clashes were never significant enough to prompt the Indian government to adequately fortify their positions (2011, 450). The PLA possessed a massive numerical advantage over the Indians, outnumbering them five-to-one, and caught the Indians completely off guard (Devotta 2010, 100). Unsurprisingly, the Chinese military was able to rapidly advance into the disputed territories and establish control over them. Indian positions in the Ladakh region of the Aksai Chin and border outposts in Arunachal Pradesh were almost immediately overrun in coordinated attacks (Rowland 1967, 166). In total, some 14,670 square kilometers of Indian territory were taken over by Chinese forces (Devotta 2010, 100). The Indian military was badly defeated because it lacked readiness and the proper equipment. As mentioned earlier, the Indian government did not perceive an open war with China as a possibility and was therefore not prepared for the invasion. There were simply not enough Indian military units that were

both trained and equipped to fight in the mountains where most of the fighting in the war took place (Patil 2007, 291–292). Despite their rapidly deteriorating relationship with China from 1960–1962, the Indian government failed to improve security along their border and suffered greatly for it.

Thankfully for the Indian military, the 1962 Sino-Indian War ended almost as suddenly as it began. On November 21, 1962, almost exactly one month after the start of the war, the Chinese government announced a ceasefire and ordered its troops to retreat back into China to positions 20 kilometers behind the original border (Hobday 1982, 256). Despite the short duration of the war, Indian losses, in terms of both territory and life, were massive. Well over 1,000 Indian soldiers were killed and many more were injured, and 2,000 square miles of northern Kashmir were given to China as part of a 1963 agreement between China and Pakistan (Devotta 2010, 100). The defeat also had intangible impacts on the Indian psyche and national attitude. The crushing defeat that India suffered marked “a huge setback in India’s confidence and international standing and tilted the regional power balance in China’s favor” (Malik 2011, 79). For the rest of the Cold War, India “embark[ed] on a ‘self-help’ strategy designed to guarantee its security.” (Ganguly and Pardesi 2009, 5)

India’s defeat to China led to several important immediate changes to foreign and military policy. First, the Indian government dramatically increased the amount of money spent on defense. From 1960–1962, when the Sino-Indian relationship began to deteriorate, defense spending as a percent of national revenue declined from 28% in 1960–1961 to 24.9% in 1961–1962 (Brecher 1968, 151). This spending decrease was tied to Nehru’s belief that China was not a threat:

Nehru was content once India had gained relative supremacy over Pakistan and did not pay attention to meeting the challenges posed by China. (Patil 2007, 291)

This trend changed after the war. Net defense expenditure in 1962–1963 was \$948.81 million USD, an increase of 36% from 1961–1962 net expenditure (\$608.03 million) and an increase of 45% from

1960–1961 net expenditure (\$519.86 million). (Patil 2007, 291)

Second, the Indian government began developing a nuclear strike capability to serve as a deterrent against another Chinese attack. In 1964, China successfully tested its first nuclear weapon. At the time, the Indian military was still recovering from its defeat two years earlier and a second invasion was seen by the Indian political and military elite as a real possibility (Cohen and Dasgupta 2010, 98). Because of the need for conventional rearmament and the embarrassment of 1962, the Indian military did not actively pursue the nuclear option. Instead, the civilian leadership took the lead on the program (Cohen and Dasgupta 2010, 98). In 1974, India successfully tested a nuclear device but not a truly functioning weapon.

Third, for over a decade after the war, the Sino-Indian relationship was put on hold. There was a general lack of political engagement between the two states, and India viewed China with a high degree of mistrust. From 1962–1976 there was neither a Chinese ambassador in New Delhi nor an Indian ambassador in Beijing (Wang 2011, 450). During this time period, both states cultivated diplomatic relationships with other states. China approached Pakistan as a major regional ally in the hopes that a strong Pakistan would be able to confine India's growing power and geopolitical interests (Wang 2011, 457). The Pakistani government officially recognized the Aksai Chin as Chinese territory, and in 1963 it ceded a portion of Kashmir to the Chinese (Devotta 2010, 112). The Chinese government came to Pakistan's aid in 1965, when it threatened "dire consequences" against India should the Indian military push too far into Kashmir (Watson 2002, 15–16). Meanwhile, India cultivated a closer relationship with the United States and, after the 1971 Indo-Pakistani War, the Soviet Union, which had broken off friendly relations with China after the Sino-Soviet split in the early 1960s (Malik 2011, 79).

LINGERING MISTRUST AND ATTEMPTS AT COOPERATION

From the 1970s onwards, Sino-Indian relations have been characterized by a sense of mistrust and suspicion. Many Chinese military and political leaders

view India as a rival trying to assert its dominance over South Asia, while the Indian leadership still remembers the Chinese "betrayal" of 1962 and views China's involvement in the Indian Ocean and its close relationship with Pakistan with concern. However, there have also been several important steps made over the last two decades to bring the two states closer together both economically and militarily. Recent military exchanges and joint training exercises could indicate the beginning of increased cooperation and a return to friendly relations.

The reestablishment of diplomatic contact in 1976 was a major step in returning a sense of normalcy to relations. The death of Mao Zedong in 1976 and the rise of Deng Xiaoping played an important role in improving Sino-Indian relations. Deng wanted to rapidly improve China's economy to bring it into the ranks of the developed states by 2000 (Dreyer 2012, 116). A peaceful external environment was seen as an important prerequisite for domestic economic development. The Chinese government needed to normalize relations with its neighbors in order to successfully implement Deng's ambitious modernization plan (Al-Rfouh 2003, 24). Not everyone in the Chinese government approved of Deng's decision to reengage with India. Military hardliners and CCP leaders in Tibet and the Yunnan province were suspicious that the Indian government would provide support to ethnic minorities in Chinese territory (Hol slag 2009, 43).

High-level diplomatic exchanges followed the establishment of formal relations. However, these exchanges and contacts did not significantly improve bilateral relations. In March 1978, a Chinese delegation visited New Delhi. In February 1979, Atal Bihari Vajpayee, India's foreign minister, visited China. These visits and others like them "initiated the process of normalization of relations between India and China" (Al-Rfouh 2003, 24). Soon after these initial visits, rounds of talks between Indian and Chinese government officials began that aimed to solve the border dispute that led to the 1962 war. These talks dragged on throughout the 1980s with no tangible results, due to several major setbacks (Al-Rfouh 2003, 24–25). In 1986, after the failure of the seventh round of talks, the Indian Parliament granted statehood to Arunachal Pradesh (Malik 2011, 85). Chinese and Indian troops were mobilized along the

border after the act was passed, and there were media reports of armed skirmishes that could have led to another war (Holstag 2009, 43). The late 1970s and 1980s saw a reestablishment of diplomatic ties between India and China, but the two states were unable to reach a settlement on the border issue that caused their relationship to collapse in the first place.

During the 1990s, promising signs for cooperation began to emerge in economic relations and trade. In the early 1990s, Indian Finance Minister Manmohan Singh initiated significant reforms that helped fuel an economic boom. The need for economic reform was spurred by an impending economic crisis caused by Operation Desert Storm (spike in oil prices) and the end of the Cold War (loss of the Eastern European market) (Ganguly and Pardesi 2009, 11–12). Singh's reform measures included cutting tariffs, reducing restrictions on private enterprise, and encouraging foreign direct investment into the economy (Adams and Kirk 2010, 144). The reforms were very successful, and have served as the base for India's rapid economic rise that has continued into the twenty-first century. From 2005–2010, India's economy grew at an average annual rate of 8.5% and was able to maintain a 7% annual growth rate after the 2008 global financial crisis (Sharma 2010, 77).

The mutual success of the Indian and Chinese economies has produced several positive steps towards friendly Sino-Indian relations. In 1992, consulates were reopened in Mumbai and Shanghai, two growing centers of international trade. One year later in June, economic memoranda were signed that encouraged trade between the two states by reducing double taxation in bilateral trade (Holstag 2009, 44). Economic cooperation was initially very limited, the 1993 memoranda placed a limit of \$160 billion USD in total trade and only \$3 million USD in investment, but it broadened throughout the 1990s and 2000s (Holstag 2009, 44). Two-way trade between India and China reached \$52 billion in 2008, and two years later China became India's largest trading partner (Devotta 2010, 111). However, the trade relationship between India and China does not equally benefit both states. India is running a massive trade deficit. In 2010, bilateral trade was valued at \$61.7 billion USD, but Chinese exports to India represent \$40.8 billion of total bilateral trade (Krishnan 2011).

Despite closer economic and diplomatic ties, there are two aspects of the Sino-Indian relationship that remain contentious: the relationship between Pakistan and China, and media sources that encourage mutual mistrust. As mentioned earlier, the relationship between Pakistan and China began in 1963, when Pakistan ceded a portion of the Aksai Chin to China (Devotta 2010, 112). Since the early 1960s, the Pakistani military has greatly benefitted from its relationship with China. Despite the close defense relationship between the United States and Pakistan since 9/11, China remains Pakistan's largest supplier of weapons, with Chinese-made weapons accounting for nearly 70% of Pakistan's military hardware (Malik 2011, 181–182).

Pakistan's nuclear weapons program has also received massive support from the Chinese government. The Chinese government first gave Pakistan nuclear "know-how and technology" sometime in the late 1980s or early 1990s (Devotta 2010, 114). Initially, the support was intended to be for the development of civilian nuclear power plants (Watson 2002, 28). The Chinese government has continued to support Pakistan's nuclear weapons program, providing Islamabad with nuclear bombs, uranium, missiles, and the plants used to make the weapons (Malik 2011, 182). Chinese support for Pakistan's nuclear weapons program is seen as a major threat by the Indian government and military given the long history of conflict between India and Pakistan.

The final military development that has hindered closer Sino-Indian relations has been the construction of the "String of Pearls," a series of port facilities in South Asian states near India. Since 2000, Chinese funding has secured access to ports in Pakistan, Sri Lanka, Bangladesh, and Myanmar (Wang 2011, 451). The new port at Gwadar, Pakistan is especially worrying to the Indian government. The Pakistani government has made statements that it is willing to station Chinese troops at the facility, and Gwadar's status as a natural deep-sea port opens up the possibility of Chinese nuclear-armed submarines being stationed close to India after many years of acrimony, chronic mistrust, and squandered opportunities (Rehman 2012, 76). Fears of mass terrorism in the wake of September 11 and subsequent revelations of extensive proliferation emanating from Pakistan added urgency to Western desires to preserve a mod-

icum of crisis stability in South Asia, as well as to prevent any form of escalatory behavior that could spiral into nuclear conflict or further the spread of radioactive material. Since the beginning of the Cold War, the quest for a nuclear deterrent has frequently been viewed as an imperative for second-rank powers desirous of maintaining a degree of strategic autonomy with respect to prospective adversaries that have vast nuclear or conventional superiority. Chinese government officials and corporations have claimed that these facilities exist solely to support trade security and expand Chinese presence in new markets (Bajaj 2010). However, Indian defense officials fear that the Indian Navy's ability to maintain military dominance over the Indian Ocean will be eroded by these facilities (Pandya, Herbert-Burns, and Kobayashi 2011, 22). In response to Chinese involvement in the Indian Ocean, the Indian Navy has sought out other states that could help bolster its power. These include the states of Vietnam, South Korea, and Japan, as well as the United States. The Indian Navy's relationship with the United States Navy has become very deep. "India now conducts more naval exercises with America than with any other country" (The Economist 2013).

The second major roadblock to close Sino-Indian relations is mutual hostility on the part of the media. India's defeat in the 1962 war had a strong detrimental effect on its national psyche:

A "victim mentality" persists to this day in India, "which plays [an] integral role in defining Sino-Indian threat perceptions. (Saalman 2011b, 174)

This victim mentality plays out over the Internet today, with private media outlets making fantastic claims such as claiming that the Chinese wanted to build an astronomical observatory in the Askai Chin in an attempt to solidify its territorial claim (Banyan 2012). Indian media have also sensationalized the threat posed by China by launching what Beijing considers to be

an aggressive anti-China campaign... over disputed borders, Tibet, UN reforms, unfair trade practices, terrorism, and nuclear issues. (Malik 2011, 104)

Chinese bloggers have also been inflammatory in recent years, making statements that China could break up the "Great Indian Federation" by taking very little action (Banyan 2012). This kind of aggressive language has spread to Chinese strategic journals and pro-Beijing Hong Kong media. In early 2006, these news sources "published commentaries discussing the possibilities of a 'limited border war' to 'teach India a lesson again'" (Malik 2011, 102). One possible solution to the raging media war could be a broader exchange of journalists between the two states. There are only four Indian reporters based in China, and very few Chinese reporters based in India (Banyan 2012). Having a free exchange of journalists might help de-sensationalize Sino-Indian relations to the general public in both states, which could lead to better bilateral relations.

The Sino-Indian relationship in the aftermath of the 1962 war has been characterized by a slow but steady normalization of relations. The decades following the reestablishment of diplomatic ties in 1976 saw little progress in resolving the border dispute that led to the 1962 war, but the mere fact that negotiations took place was a major step forward in bilateral relations. The most promising area of cooperation has been economic partnership. China has become India's largest trading partner, although a large trade deficit still exists in China's favor. Roadblocks to normalization include China's support for Pakistan's armed forces and nuclear program, the "String of Pearls," and a media war that is characterized by misinformation and sensationalized stories. Sino-Indian relations are still far from being completely normalized, but if both states continue to build on the work that has been done over the last 30 years then a positive, stable relationship between India and China could be a reality.

INDIA'S MILITARY MODERNIZATION AND ITS EFFECT ON FOREIGN POLICY

The Indian military's modernization process has focused on force projection. The Indian Navy and Air Force have either purchased or developed many new weapons systems that enable them to fight further from home. As of 2009, the Indian Navy was the fifth largest in the world with 145 ships. This number is projected to increase to over 160 ships by

2022 (Holmes, Winner, and Yoshihara 2009, 82–83). Meanwhile, the Indian Air Force has been acquiring advanced fighter aircraft like the Dassault Rafale as well as support aircraft, like the C-17 heavy-lift transport plane. However, unlike the Chinese military, which has domestically produced most of its newest equipment, the Indian military is a major arms importer. In 2006, India surpassed China to become the largest arms importer in the world by dollar value (Cohen and Dasgupta 2010, fig. 1–1). The Indian military has continued to be the world's largest arms importer. From 2007–2011, it purchased over \$21 billion worth of weapons from foreign states (The Economist 2013). As of 2012, “India continues to import approximately 70% of its military hardware and produces only 30%” (Latif and Lombardo 2012, 25). The development of a strong domestic defense industry is both essential for national security and necessary for India to become a major military power.

THE MODERNIZATION OF THE INDIAN MILITARY

The economic reforms that were implemented in the early 1990s by Prime Minister Narasimha Rao and Finance Minister Manmohan Singh produced a windfall that led to a substantial increase on defense spending. Brisk economic growth, coupled with dangerous political-military events like the 1999 Kargil crisis and the 2001 terrorist attack on Parliament, encouraged the Indian government to spend more on defense (Holmes, Winner, and Yoshihara 2009, 80). Since 2000, there has been a “74% real-term increase in India's defense spending” (Latif and Lombardo 2012, 5). This amounted to a budget of about \$40.8 billion for the 2012 fiscal year. The only other Asian states that spend more on defense than India are China and Japan. As of 2010, Indian defense spending was almost equal to Japanese defense spending, but China was by far the biggest spender in Asia (Latif and Lombardo 2012, fig. 1). In March 2013, the Chinese government announced that it would raise its defense budget by 10.7% to a total of \$114.3 billion, almost three times as much as the Indian government spent in 2012 (Zhou 2013).

A breakdown of the Indian defense budget reveals valuable information about the modernization

process. The segment of the budget that is most concerned with military modernization is the capital outlay account, which is used for the procurement of equipment and other materials for the Army, Navy, and Air Force (Latif and Lombardo 2012, 7). The 2012–2013 military budget included a 15% increase in the capital outlay account from Rs 69,198.81 crore to Rs 79,578.63 crore (Behera 2012). Taken together, the Navy and Air Force account for almost 70% of the capital outlay budget for 2012–2013. Around 89% of the total capital outlay account was earmarked for modernization. The Indian Navy has emerged as the leading force in the military's modernization and the 2012–2013 budget reflects this. The Navy received a 72% increase in its modernization budget, while the Air Force's modernization budget only increased by 0.5% (Behera 2012). The Indian Army “has long been the beneficiary to the largest portion of India's defense expenditure” (Saalmann 2011a, 97). However, most of the money budgeted for the Army is not earmarked for modernization. The capital outlay budget of the Indian military reveals a clear preference for the Air Force and Navy, the two branches most responsible for projecting force away from the homeland.

While the Indian government has approved more and more spending on the modernization of the armed forces, it has purposely made the acquisitions process grindingly slow. Simply put,

India's defense bureaucracy has historically showed an inability to spend all of its defense budget...especially in the capital outlay account. (Latif and Lombardo 2012, 9)

Since 2005, there has been chronic underspending in the capital outlay account, which is used for modernization, and overspending in the revenue account, which is used for paying salaries and other “day-to-day” expenses. This underspending problem is rooted in the Bofors scandal of 1989 in which Indian defense officials were accused of taking kickbacks from Bofors, a Swedish artillery company, in return for awarding contracts to Bofors (Cohen and Dasgupta 2010, 11). In October 2006, A.K. Antony was appointed as India's defense minister “to ensure that no Bofors-like scandal occurs within the Defense Ministry” (Latif and Lombardo 2012, 18). An-

tony's scrupulous approach to fighting corruption has led to significant acquisition delays that have put the brakes on the military's efforts to modernize. Unfortunately, it is not clear that this increased scrutiny has actually reduced corruption (Latif and Lombardo 2012, 18–19). The Indian military must figure out a way to stop underspending in the capital account in order to ensure that military modernization continues at a steady pace.

The Indian Navy, the primary driver of the modernization process, has focused on creating a larger fleet without sacrificing quality, while also purchasing support items such as maritime patrol and carrier-launched fighter aircraft. In 2012, the Indian Navy's ship inventory stood at around 150 ships of all sizes, with 38 principle combatants (destroyers, frigates, carriers, etc.) (Cohen and Dasgupta 2010, 71). Over the course of the next decade or two, the fleet will first shrink in size to around 70 ships, as obsolete ships are scrapped before bouncing back to 200 ships (Latif and Lombardo 2012, 11). So far, the modernization process has mostly involved the purchase of foreign-made weapons systems. Between 1997 and 2000, the navy ordered two Kilo-class submarines and three frigates from Russia (Cohen and Dasgupta 2010, 90). The most significant purchase from Russia, however, has been the *Vikramaditya* (*Admiral Gorshkov*) aircraft carrier. The *Vikramaditya*, first launched in 1982, is supposed to replace the 1950s-era *Viraat*, India's only other aircraft carrier (Holmes, Winner, and Yoshihara 2009, 83). Unfortunately, the purchase has been beset with problems, including a delivery delay and an increase in Russia's asking price for retrofitting the vessel (Cohen and Dasgupta 2010, 90).

The Indian Navy has not been completely reliant on other states for its modernization needs. The most important domestically made addition to the fleet is the *Arihant*, a nuclear-powered submarine that is the product of a collaboration between the Indian Navy, Larsen & Toubro, and Russia (Cohen and Dasgupta 2010, 90–91). The *Arihant* was launched in 2009 and is undergoing sea trials after successfully completing harbor trials in 2012. Once the *Arihant* is fully operational, India will join the United States, Great Britain, France, Russia, and China as the only states with an underwater launch system for nuclear missiles (Subramanian and Mallikarjun 2012). The

Indian government has approved funding for four additional nuclear submarines like the *Arihant* (Ingersoll 2012). Despite the success in building and testing the *Arihant*, the state of India's shipyards is a mixed bag. On the plus side for the Indian Navy,

Indian shipyards have been growing in number and capacity and are slowly replacing many of the aging platforms for the Indian navy's growing global role.
(Latif and Lombardo 2012, 11)

The modernization of the fleet is filling three major shipyards, which are producing two aircraft carriers, three destroyers, one large amphibious warfare vessel, and many other ships with more approved and ready to be built (Till 2012, 93). Unfortunately, many of these vessels won't be completed for some time. India's fleet modernization may take much longer than planned because India's shipyards are only able to deliver about one unit per year (Till 2012, 93–94). The Indian Navy has acquired many ships in recent years and is on its way toward a larger and more modern fleet, but this modernization process may take a long time to come to fruition unless India's shipyards can increase the rate of production.

While the Indian Navy had the largest increase in its modernization budget, the Indian Air Force (IAF) has gotten the most money for modernization over the last ten years. From 2002–2012, the IAF has received over 30% of the capital outlay budget; this peaked at 41% of the budget for 2010–2012 (Lombardo 2011, fig. 2). The large amount of money needed for the IAF's modernization has to do with the high cost of aircraft and the rapid pace of technological development. The IAF is in a technology trap because it "is caught between the enormous expansion of relevant technology and its astronomical costs" (Cohen and Dasgupta 2010, 83). For example, the cost of a top-of-the-line fighter in 1979 was about \$8 million per unit, but the cost of a modern top-of-the-line-fighter can be as high as \$40 million, not to mention the costs associated with maintaining the aircraft over several decades (Cohen and Dasgupta 2010, 83). Despite the large share of the capital outlay budget that the IAF receives, it remains below full operation strength. The IAF is authorized to operate thirty-nine and a half squadrons and has requested an increase to as many as forty-five squad-

rons (Latif and Lombardo 2012, 11). However, as of 2009 it only had enough aircraft for thirty-two squadrons (Cohen and Dasgupta 2010, 83). The fact that most modern military aircraft are produced in foreign countries compounds their already high cost.

India's lack of a robust domestic defense industry is especially noticeable for the IAF, which has had to look abroad in its quest to modernize. Most of the IAF's new fighter aircraft are produced in India but based off of Russian and European designs. Currently, the Russian-designed and Indian-produced Su-30MKI is the primary air superiority fighter of the IAF, with 170 in operation and over 200 more in production (Menon 2013). In addition to maintaining air superiority over a hostile air force, the Su-30MKI gives the IAF a "seeming qualitative edge [over the Pakistani Air Force] that may [...] translate into air superiority in the next war" (Cohen and Dasgupta 2010, 84). The Su-30MKIs also have the capability to carry nuclear weapons, making them one of the three legs of India's nuclear triad (Saalman 2011a, 104). The IAF understands the importance of the Su-30MKI's power projection capabilities and in 2009, the number of Su-30MKIs along the border with China was increased (Saalman 2011a, 104).

The other major air force modernization initiative was the Multi-Role Combat Aircraft (MRCA) competition, which was launched after the IAF requested a replacement for its aging fighter fleet (Cohen and Dasgupta 2010, 86). The American-made F/A-18 and F-16 were eliminated from the competition in April 2011 (Latif and Lombardo 2012, 2). In January 2012, the Dassault Rafale was selected as the winner of the competition. The IAF will buy eighteen of the fighters "off the shelf" (equivalent to one squadron) and will build 108 of the fighters domestically with foreign assistance for a total of 126 fighters (Cohen and Dasgupta 2010, 86). The contract is estimated to be worth \$12 billion, but the deal could expand to include as many as 220 aircraft at a total cost between \$25–30 billion over ten years (Al Jazeera 2012a). The Su-30MKI and the Rafale will provide the IAF with a technological edge and could serve as a jump-start to the domestic defense industry, as most of the fighters will be manufactured in India.

The IAF has also significantly improved its other capabilities via the purchase of foreign-made aircraft. American companies have had much more success in selling non-combat aircraft. Shortly after making the announcement that American fighters would not win the MRCA competition, the Indian government approved a deal for ten Boeing C-17 cargo aircraft worth \$4.1 billion (Latif and Lombardo 2012, 3). The C-17's long range (2,785 miles) would give it the IAF the ability to airlift troops and supplies throughout the Indian Ocean region (Cohen and Dasgupta 2010, 82). The United States has also sold the IAF the smaller C-130 transport aircraft. In 2008, the IAF bought six C-130s for \$962 million and a deal for six more C-130s was made in 2011 (Latif and Lombardo 2012, 12–13). Other non-fighter aircraft sales to India include the American-made Boeing P-8I Orion, which is used for coastal patrolling and anti-submarine warfare, and the Israeli-made A-50 Phalcon airborne early warning and control (AEWC) aircraft (Saalman 2011a, 103–104). The wide range of capabilities that the modern IAF possesses greatly enhances its power projection capabilities. However, this new capability has so far been dependent on foreign states because India lacks a strong defense industry.

The final major component of India's military modernization is its nuclear forces, specifically the development of a "triad" of delivery capabilities. Until recently, the Indian military only had the air- and land-based delivery systems available. The *Arihant* will give the Indian military the third leg of the triad once it is fully operational. In late 2012, the two-stage K-15 missile, which can be equipped with a nuclear warhead, was successfully launched from a submerged pontoon. Once the *Arihant* has completed all of its trials, it will be armed with twelve K-15 missiles (Subramanian and Mallikarjun 2012). The *Arihant* gives India a second-strike capability to respond to a nuclear attack that the other two legs of the triad can't reliably provide. According to Admiral Nirmal Verma, "[India's] maritime and nuclear doctrines will then be aligned to ensure our nuclear insurance come from the sea" (Ingersoll 2012). The Indian military's push for a second-strike capability is not without a good reason. In 1995,

China amended its No-First-Use (NFU) of nuclear weapons pledge to make it

applicable to only nuclear-weapons-free zones and to countries that had signed the Nuclear Non-Proliferation Treaty (NPT) ...excluding India from its NFU pledge. (Malik 2011, 42)

The *Arihant* completes India's nuclear triad by giving it a mobile launch system that is hard to destroy. India now has a virtually guaranteed second-strike capability, which significantly enhances its military power.

Strategically, the *Arihant* was the most significant addition to India's nuclear weapons arsenal, but the land and air legs of India's triad have also received major upgrades since 2000. As mentioned earlier, the new Su-30MKI fighter aircraft have the capability to be armed with nuclear weapons, a major upgrade over the 1970s-era SEPECAT Jaguars and other aging nuclear delivery aircraft (Cohen and Dasgupta 2010, 81). The Indian Army operates several classes of ballistic missiles with different ranges. The Agni series of missiles are capable of hitting many Chinese cities. In April 2012, the latest Agni missile, the Agni-V, was successfully test fired. The Agni-V has a range of 5,000km, which is enough to hit almost every major city in China, Iran, and Southeast Asia (Al Jazeera 2012b). Immediately following the test, Chinese officials released statements saying that the Agni-V was not a serious threat to China. Liu Weimin, a spokesman for China's Foreign Ministry, said,

We believe that both sides should cherish the hard-won good state of affairs at present, and work hard to uphold friendly strategic cooperation [...] [and] make positive contributions towards maintaining peace and stability in the region. (BBC 2012)

India's military modernization has aimed at creating a military that can project power further afield with conventional and nuclear weapons. The modernization and expansion of the Indian Navy will allow the fleet to better patrol the Indian Ocean, which is very strategically important. The acquisition of modern aircraft like the Dassault Rafale, Su-30MKI, and C-17 heavy lift transport aircraft allow the IAF to have a fighting advantage over many other air forces and gives them the capability to move troops and supplies further from home. New nuclear weap-

ons delivery systems like the *INS Arihant* and Agni-V ballistic missile have completed India's nuclear triad and have provided the Indian military with a viable second-strike capability. However, the Indian military's dependence on foreign states for modern weapons technology must be overcome before India can reach its full military potential.

THE EFFECTS OF INDIA'S MILITARY MODERNIZATION ON FOREIGN POLICY

India's growing military power has had several lasting effects on its foreign policy and how other states view India. After the Cold War ended in 1991, the Indian government adopted a pragmatic foreign policy most in line with the principles of realist international relations theory (Ganguly and Pardesi 2009, 4). The Indian government is aware that a stronger military allows it to carry more weight in regional and international politics. For the most part, Indian strategic thinking has stayed regional (Ciorciari 2011, 62). The ability to exert influence and project power into the Indian Ocean has been one of the most important geopolitical issues for the Indian armed forces for many years, but until recently it has not possessed the capabilities to back up their strategic goals. Military modernization has also resulted in changes to Indian relations with foreign countries, especially the United States. Finally, a modern Indian military could mean a greater role for India in maintaining international peace and security. Piracy and terrorism are security issues that affect multiple states and can only be defeated by cooperation among many states. A modern navy and air force would give India the ability to patrol the Indian Ocean and keep South Asia's sea-lanes open to international trade.

Control of the Indian Ocean has long been a strategic imperative for India. Since the 1970s, "Indian policy has articulated a suspicion of the military presence of outsiders in the Indian Ocean" (Pandya, Herbert-Burns, and Kobayashi 2011, 22). However, throughout most of its history, India has been confined to a status as a continental power since former colonial powers guaranteed the security of the seas until India gained independence in 1947 (Winner 2012, 105). Throughout the Cold War, the Indian navy lacked the necessary capabilities to keep other

states out of the Indian Ocean. Recently, the America, French, and British navies have all been very active in the region, but the Indian military does not view their presence with suspicion, as most of their operations have been focused on either monitoring Iran or combating terrorism (Herbert-Burns 2012, 43–44).

Chinese military interest in the Indian Ocean have increased as China's economy and foreign trade has increased. Significant Chinese investments and trading relationships with countries in East Africa such as the Sudan, South Africa, and Tanzania depend on Indian Ocean sea lanes (Pandya, Herbert-Burns, and Kobayashi 2011, 20). In order to protect these economic interests, the Chinese government has invested money in port facilities in Pakistan, Sri Lanka, and Bangladesh, also known as the "String of Pearls." Additionally, China depends on the Indian Ocean for energy imports. In 2002, oil accounted for about 20% of China's energy consumption. Approximately half of this oil came from Saudi Arabia, Angola, and Iran, and was shipped across the Indian Ocean (Klare 2002, 110–111). From the oilfields of Saudi Arabia to the Nile delta, from the shipping lanes of the South China Sea to the pipelines of Central Asia, *Resource Wars* looks at the growing impact of resource scarcity on the military policies of nations. International security expert Michael T. Klare argues that in the early decades of the new millennium, wars will be fought not over ideology but over access to dwindling supplies of precious natural commodities. The political divisions of the Cold War, Klare asserts, have given way to a global scramble for oil, natural gas, minerals, and water. And as armies throughout the world define resource security as a primary objective, widespread instability is bound to follow, especially in those areas where competition for essential materials overlaps with long-standing territorial and religious disputes. In this clarifying view, the recent explosive conflict between the United States and Islamic extremism stands revealed as the predictable consequence of consumer nations seeking to protect the vital resources they depend on. *Resource Wars* is a much-needed assessment of a changed world which takes a compelling look at warfare in an era of rampant globalization and intense economic competition. As China's economy has grown, so has its demand for

oil. While estimates vary, most agree that Chinese oil demand will double from 2000 to 2020, with foreign sources accounting for 75% of Chinese demand by 2020 (Holmes, Winner, and Yoshihara 2009, 129). Given their contentious past, the Chinese government fears that the Indian navy would close Indian Ocean sea lanes should the two states come into conflict (Gordon 2010, 207). However, Indian military leaders are wary of these facilities and are worried about Chinese encirclement of India (Holmes, Winner, and Yoshihara 2009, 127). This has produced a classic security dilemma in the Indian Ocean. The Chinese believe that having port facilities and a naval presence in the Indian Ocean is vital to their security, but the Indian government views these facilities as a security threat to India.

The modernization of India's navy has been aimed at developing the capability to ensure a qualitative and quantitative edge in the Indian Ocean region. As mentioned earlier, the navy wants to have a fleet of over 160 ships, three aircraft carriers, and 400 aircraft by 2020 (Pandya, Herbert-Burns, and Kobayashi 2011, 118). A fleet with three aircraft carriers and modern submarines like the *Aribant* would allow India to assert itself as the dominant power in the Indian Ocean (Saalman 2011a, 99–100). India's location next to the Indian Ocean, combined with China's geographic distance from the Indian Ocean, will ensure that the Indian navy will always have a more significant presence in the region, unless the entirety of the Chinese Navy was moved to the Indian Ocean.

The Indian government has used their growing navy in a variety of roles designed to enhance political and security partnerships with states that border the Indian Ocean. This is manifested by a "Look West" policy,

that seeks to pro-actively engage western Indian Ocean littoral states...via investment, trade, aid, and security arrangements. (Malik 2011, 341)

Since October 2008, Indian Navy ships have been deployed to the Gulf of Aden and off the coast of Somalia to arrest pirates and prevent piracy attacks (Pandya, Herbert-Burns, and Kobayashi 2011, 118). India has also signed security pacts with Qatar and Oman, and conducts joint naval exercises with Ken-

ya, Tanzania and South Africa (Malik 2011, 341). However, the security environment in other states like Pakistan, Iran, and Iraq has placed limits on the effectiveness of the “Look West” policy (Dutta 2011, 139). India’s “Look West” policy has enjoyed initial success, and is both a testament to the growing power capabilities of their modernizing navy as well as an indication of India’s desire to cement its presence across the Indian Ocean.

In addition to forming security and political links with African and Middle Eastern states, the Indian navy and government has reached out to states in Southeast Asia as strategic regional allies. Most of the contact between India and Southeast Asian states so far has related to either security or economics. Economic partnerships include the signing of a Free Trade Agreement with the Association of Southeast Asian Nations (ASEAN) in 2009 and the forging of economic partnerships with Singapore and Thailand (Dutta 2011, 139). The Indian military has been active in Southeast Asia in a wide variety of missions. After the massive 2004 earthquake, “the Indian Navy deployed 27 ships and over 5,000 Naval personnel in disaster relief operations [...] it was the first navy to reach the affected areas” (Pandya, Herbert-Burns, and Kobayashi 2011, 118). The Indian Navy has also conducted joint exercises with Southeast Asian states, including Indonesia, Thailand, Singapore, and Burma (Malik 2011, 352). India is using its growing navy as a tool to increase its influence on both sides of the Indian Ocean. By conducting disaster relief operations in Indonesia and conducting counter-piracy operations off the coast of Somalia, the Indian navy is promoting India’s strategic interests and creating a network of potential allies across the region.

India’s military modernization has also had a lasting effect on its relationships with states far away from the Indian Ocean. With the exception of the *Arihant* submarine and the Agni-V ICBM, most of India’s latest major weapons systems have come from foreign states. Russia is India’s preeminent arms partner, with Russian-made weapons accounting for 77% of India’s defense imports from 2000–2011 (Latif and Lombardo 2012, 14). This relationship was first established in the 1970s, when the United States moved closer to Pakistan after the Soviet invasion of Afghanistan in 1979 (Ganguly and Pard-

esi 2009, 10). Part of closer American–Pakistani ties was military support, which caused the Indian government to enter into a closer military relationship with the Soviet Union so as to not lose their military superiority over a stronger Pakistan (Ganguly and Pardesi 2009, 11). Throughout the Cold War, “Russia was forthcoming with its most advanced military hardware” (Latif and Lombardo 2012, 14). During the Cold War, a strong strategic relationship developed between India and the Soviet Union because of American support for Pakistan.

After the Cold War ended, Russia continued to reign supreme in supplying arms to India. In 2000, India and Russia signed a strategic partnership, and later in the decade the two states “concluded a number of pacts for military, technical, and economic cooperation” (Ciorciari 2011, 76–77). Russia is the only state that supplies China with advanced weapons and other essential military hardware like jet engines (Dasgupta and Cohen 2011, 174). However, its willingness to supply India with top of the line hardware like the Su-30MKI and a refitted aircraft carrier have put the Indian military at ease. India’s pursuit of a modern military has deepened its long-standing defense relationship with Russia, which has continued to dominate the market for weapons sales to India.

France has emerged as India’s strongest defense partner in Europe. When many states, including the United States, condemned India’s 1998 nuclear tests and imposed sanctions against India, the French government refrained from implementing sanctions (Latif and Lombardo 2012, 14). Several recent political actions have cemented a strong defense trade relationship between France and India. In May 2011, the French government decided to cease all sales of heavy military equipment to Pakistan (Latif and Lombardo 2012, 14–15). One month later, President Nicolas Sarkozy announced France’s support for India becoming a permanent member of the UN Security Council (“Britain, France Back India’s UN Security Council Bid” 2011). The French have also been one of India’s most reliable trading partners in the field of technology transfers, which is an essential component of building a stronger domestic defense industry in India (Cohen and Dasgupta 2010, 149). Most of the technology transfers from France, as well as other major weapons suppliers like Russia, has focused more on coproduction of equipment

and maintenance, which helps India keep foreign weapons systems functioning but doesn't help Indian companies develop their own equipment (Latif and Lombardo 2012, 16). France's political and technological support was rewarded handsomely in January 2012, when the Indian military selected the French-made Dassault Rafale as the winning fighter in the MRCA competition.

The state that has come the furthest in its relationship with India as a result of military modernization has been the United States. A significant trust deficit existed between India and the United States due to American support for Pakistan during the Cold War and American hostility towards India's nuclear weapons program (Latif and Lombardo 2012, 28). The Indian government's refusal to sign the NPT because:

"it believed the treaty discriminated against states without nuclear weapons capability and...did nothing to stem nuclear proliferation among countries with nuclear weapons," was a particular sore spot between the two states. (Devotta 2010, 114)

When India tested a nuclear weapon in 1998, the United States placed "wide-ranging" sanctions on India (Cohen and Dasgupta 2010, 13). The political and security relationship between the United States and India during the Cold War and the 1990s was characterized by mistrust brought on by diverging international security interests.

The dawn of the twenty-first century ushered in a new international security environment and opened up the door for a stronger relationship between the United States and India. In 2000, President Bill Clinton visited India, which was the first visit by a sitting American president since 1978 (Saalman 2011a, 87). Clinton was able to lay the groundwork for improving bilateral relations. The terrorist attacks on September 11, 2001 provided the final push necessary for India and the United States to fundamentally change their relationship. India was the first country to come out in support of the global "War on Terror" (Devotta 2010, 114). The United States acted quickly and "conducted a large scale removal of Indian companies from the US Entity List [list of

companies involved in proliferation]" in late 2001 (Saalman 2011a, 87).

In 2005, the United States and India reached a substantial civilian nuclear deal "which holds the promise of ending India's nuclear isolation" (Ganguly and Pardesi 2009, 15). The agreement promised to give the Indian government access to nuclear technology while allowing the Indian military to keep its nuclear weapons. The Indian government pledged to prevent the transfer of materials between their civilian and military nuclear programs, but diffusion of information will be hard to stop (Cohen and Dasgupta 2010, 167). The lifting of sanctions in 2001 and the nuclear deal of 2005 helped repair Indo-American relations to the point where significant American arms sales to India became a possibility. Since 2002, the United States has completed fifteen major arms deals with India, valued at approximately \$8.83 billion. This figure only accounts for major conventional hardware like transport aircraft, missiles, and the like; it does not include smaller sales like special-forces equipment and small arms (Latif and Lombardo 2012, 12–13).

American arms sales have accompanied more frequent contact between the American military and its Indian counterpart. The American and Indian navies have been especially active in joint operations. In 2002, they worked together to export high-value ships through the Malacca Strait. When major natural disasters struck Southeast Asia in 2004 and 2008, the American and Indian navies provided disaster relief on short notice (Malik 2011, 337). U.S. Navy pilots have trained Indian pilots in carrier operations, which will be essential as the Indian Navy acquires more aircraft carriers (Cohen and Dasgupta 2010, 174). The United States has become India's closest partner in terms of joint military exercises (Malik 2011, 337). These exercises have allowed the two militaries to engage in closer defense collaboration. Sharing techniques and equipment via arms sales, "allows for greater personal interaction between militaries, [and] joint training on tactics" (Latif and Lombardo 2012, 21). The growing American defense trade relationship with India has had spillover effects in the form of joint training exercises and enhanced interoperability, which will allow Indian and American forces to react to crises more effectively.

Chinese analysts have been dismissive toward India's domestic defense industry, despite the fact that the Chinese military has also relied on foreign military technology (Saalmann 2011a, 98). Despite the weaknesses of India's defense industry, its growing military power has propelled it into the forefront of Chinese strategic thinking. Chinese analysts are increasingly de-hyphenating India from Pakistan in their writing, indicating that "India's military modernization is no longer couched solely within the India-Pakistan dynamic" (Saalmann 2011b, 93–94). The United States has also taken a strategic interest in India. This marks a significant change from the early days of the Cold War, when:

the United States was virtually ignorant of India and had few cultural, strategic, or economic links with [India]. (Ganguly and Pardesi 2009, 5)

CHINA'S MILITARY MODERNIZATION AND ITS EFFECTS ON FOREIGN POLICY

The rise of China's military has been one of the most rapid and impressive in living memory. According to data from the Stockholm International Peace Research Institute's (SIPRI's) military expenditure database, China's total defense spending has increased from \$37.04 billion in 2000 to \$157.6 billion in 2012, an increase of 325%. Unlike India's military modernization process, which has heavily relied on foreign arms suppliers for the latest and greatest military hardware, China has domestically developed and produced many of their modern weapons systems. Between 2008 and 2012, Chinese arms exports rose by 162%, launching China into fifth place on the list of the world's largest arms exporters (Anderlini and Mallet 2013). The types of equipment the Chinese have been developing are focused on two military missions: force projection and asymmetric warfare. This is slightly different than India's focus on force projection and the nuclear triad.

THE MODERNIZATION OF THE CHINESE MILITARY

China's military modernization process has focused on the development of weapons systems that are designed to seize and maintain control over the sea

and airspace around China. This is known as an Anti-Access/Area Denial (A2/AD) approach to warfare. China's pursuit of A2/AD capabilities began in earnest in the early 1990s, when it started devoting more of its defense budget to the modernization of the People's Liberation Army Navy (PLAN). In 1991, around 32% of China's defense budget went to its navy (Till 2012, 85). However, the pace of naval modernization in the early 1990s was still slow and plagued with difficulties. In 1995, China unveiled the *Luhu*, its first indigenously built modern destroyer. The ship was

derided as a hodgepodge of Western equipment that was already at least one generation behind warships from the developed world. (Holmes and Yoshihara 2008, 88)

During this early phase of modernization, the PLAN tried to bring in technology from states with more advanced navies (Kaplan and Peterson 1999, 32). In the early 1990s, the PLAN's modernization push ran into difficulties and was more dependent on foreign-made weapons systems.

The PLAN's fortunes began to change in the mid-1990s, and the fleet went through a period of rapid change from 1996 to 2006. The quantitative change of the fleet during this time period was modest. By 2006, the PLAN only had nine additional destroyers, eight additional frigates, and five fewer tactical submarines (Holmes and Yoshihara 2008, 88). However, the qualitative changes to the fleet were significant. Many of the PLAN's outdated major surface combatants were decommissioned during this period (Kaplan and Peterson 1999, 32). Another major qualitative change was a shift away from building smaller ships in favor of fewer, bigger, and more powerful ships. Between 1996 and 2006, "five entirely new classes, featuring displacements from 6,000 to nearly 8,000 tons, entered the fleet" (Holmes and Yoshihara 2008, 88). The logic behind this decision is that larger ships are both harder to sink and have the ability to carry more systems that are essential for an A2/AD mission, such as advanced radar and area-air-defense missile systems (Till 2012, 89). These new vessels contributed to a major "bulking up" of the PLAN's capabilities, but there are some key capabilities that the PLAN has yet to de-

velop. In 2006, the PLAN still lacked the command and control capabilities, coordination, and targeting support systems that qualify a navy as truly modern (McVadon 2006, 94). The decade of 1996–2006 saw some major qualitative improvements in the PLAN’s ship inventory that made up for the number of outdated ships decommissioned and removed from the fleet.

The PLAN has continued its modernization at an impressive clip since 2006, and has added many new ships and other support systems to its inventory. In 2012, the PLAN had a total of 78 principle surface combatants and 71 submarines in a fleet of 876 vessels (Till 2012, 86). The PLAN has assembled this fleet by both importing high-quality ships and weapons systems from abroad (primarily Russia), while also developing advanced indigenous systems that utilize domestically-produced technology (“The PLA Navy - Capacity and Growth.” 2010, 353). The story of the *Liaoning* is an excellent example of how the PLAN has blended foreign and domestic development of its ships. In 1998, the Chinese purchased the *Varyag*, a Soviet-era *Kuznetsov*-class aircraft carrier, from the Ukraine (Department of Defense 2010, 2). The *Varyag* was delivered essentially as just a hull, lacking engines and other critically important systems. In 2011, the PLAN completed outfitting the vessel with these systems and the *Varyag*, now called the *Liaoning*, began sea trials (Axe 2011c). In September 2012, the *Liaoning* was commissioned into service. By serving on the *Liaoning*, PLAN service members will gain valuable experience in aircraft carrier operations. There is also evidence that the PLAN is developing a program to produce its own carrier-based fighter aircraft as well as its own aircraft carriers (Till 2012, 90). The *Liaoning* aircraft carrier is an example of the new major surface vessels that the PLAN has been adding to its fleet in recent years, as well as an example of how the PLAN has blended domestic technology with foreign ship design.

The example of the *Liaoning* is becoming the exception to the rule of PLAN reliance on foreign-made ships. Overall, the PLAN has tried to shift away from relying on foreign shipbuilders. Since the late 1990s, the Chinese government has worked to create a domestic defense industrial base by streamlining bureaucracy, boosting quality control, and improv-

ing business practices (Department of Defense 2010, 43). These policies, combined with the ability of Chinese arms manufacturers to integrate with civilian firms, have significantly reduced the military’s dependence on foreign suppliers. The production of high-quality indigenous vessels like *Song*-class submarines and *Luyang* II destroyers shows how far China’s military industry has advanced since the 1990s (Till 2012, 86). By 2025, the PLAN’s structure will likely include at least two aircraft carriers, six to eight new nuclear attack submarines, and several additional ballistic missile submarines (Duchatel and Sheldon-Duplaix 2011, 33). A strong domestic shipbuilding industry will be essential to China’s national security goals.

The Chinese military’s pursuit of A2/AD capabilities has also been manifested in the People’s Liberation Army Air Force (PLAAF). The PLAAF is currently undergoing a transformation from a force structured for domestic defense to being able to operate further from China in both offensive and defense roles (Department of Defense 2010, 25). The PLAAF’s airlift and aerial refueling capabilities have been especially focused on as being areas ripe for modernization. In January 2013, the PLAAF ran a successful test flight of the Xian Y-20 transport aircraft (Axe 2013). The Y-20 would give the PLAAF a much-needed heavy airlift capability, which could be used to transport soldiers and equipment in times of war and help rescue crews and emergency services workers reach natural disaster areas (Department of Defense 2010, 34). Aerial refueling enables fighter aircraft to stay in the air longer and fly further away from bases. In order for China to become a true regional power, it must possess a strong aerial refueling capability. In 2011, the PLAAF operated only fourteen tankers, each carrying 17,000 kg of fuel. To put this in perspective, the US Air Force has more than 500 tankers, which can carry around 100,000 kg of fuel (Axe 2011b). Having strong airlift and aerial refueling capabilities will be an essential part of the PLAAF’s modernization in the coming years.

In order for China’s A2/AD strategy to be effective, it must possess the ability to control the skies and deny an enemy air force from operating over China. In 2000, the PLAAF had around 2,500 fighter aircraft, but this number has dwindled as 1960s and 1970s era fighters like J-6s and J-7s have been retired

in favor for more modern planes like J-10s and J-11s (Axe 2011a). Before joint producing the J-11 with the Russians and developing the J-10, the PLAAF purchased Su-27s and Su-30MKK/MKK2s from the Russians. By 2007, the PLAAF had 280 of these Russian-made fighters (Gregory 2012, 16). While most of the PLAAF's newer planes like the J-10 and J-11 are technically domestically produced, they are based on foreign designs (usually Russian) and are either the product of foreign-assisted development and/or licensed production (Liff and Erickson 2013, 7). If current trends in the PLAAF's acquisition process continue, then it should have around 1,000 fighter aircraft by 2020, but most of them will be modern planes (Axe 2011a). Like the PLAN, the PLAAF has been forced to retire many of its outdated pieces of equipment, but both services have gained a significant qualitative improvement in their capabilities.

The final major component of China's A2/AD strategy is its missile arsenal. According to the Department of Defense, "China has the most active land-based ballistic and cruise missile program in the world" (Department of Defense 2010, 1). The Chinese military has developed an impressive missile arsenal that could be used to strike against enemy ships and bases that would otherwise be unreachable by the PLAN or PLAAF. Many western analysts believe that China's missile arsenal is "directed specifically at deterring, delaying, or complicating timely and effective American access and intervention" should China make an aggressive move against Taiwan (McVadon 2006, 92). Despite the qualitative improvements that have been made to the PLAN and PLAAF, the two branches still lack the number of planes and ships needed to stop the three to four U.S. carrier battle groups that would respond to a crisis in the Taiwan Strait (Kim 2012, 364). The Chinese military has turned to missiles to make their A2/AD strategy credible. In 2011, the Chinese military had as many as 2,000 non-nuclear ballistic and cruise missiles (Axe 2011b). In order to make up for not having enough ships and planes, the Chinese military has invested in building a large missile arsenal to ensure that its A2/AD strategy works.

Some of the missiles that the Chinese military has developed have highly advanced targeting systems and pose a significant threat to enemy surface warships.

PLAN has focused on acquiring advanced anti-ship cruise missiles (ASCMs) and over the horizon targeting systems (OTHT) to engage enemy ships from a distance ("The PLA Navy - Capacity and Growth." 2010, 353). In addition to these cruise missiles, "the Chinese are...developing ballistic missiles with maneuvering warheads and terminal seekers to hit ships at sea" (McVadon 2006, 93). One such missile is the DF-21, a medium-ranged ballistic missile that has been specifically designed to target aircraft carriers. If the DF-21 is deployed successfully, then it would be the first anti-ship ballistic missile (ASBM) capable of hitting a moving aircraft carrier (Erickson 2010). Having the capability to destroy moving aircraft carriers without risking dozens of aircraft and ships in a frontal assault gives the Chinese military the ability to prevent any large naval force from coming too close to its coastline.

The key difference between China and India's military modernization processes is China's booming domestic defense industry. Since the late 1990s, the Chinese government has made several policy changes that have helped defense-related companies thrive (Department of Defense 2010, 43). The rapid expansion of China's civilian economy has been very beneficial for defense companies. By integrating with civilian firms, defense firms have been able to improve in the areas of research and development (R&D) and production (Department of Defense 2010, 43). One of the effects of increased domestic weapons production has been increased arms exports. Chinese arms exports "increased a total of 95 per cent between the 2002–2006 period and the 2007–2011 period" (Liff and Erickson 2013, 8). In March 2013, China overtook the United Kingdom to become the world's fifth-largest arms exporter (Andlerini and Mallet 2013). However, the true size of China's domestic defense industry is hard to determine because the government does not release any information about the equipment it produces (Liff and Erickson 2013, 7). China's domestic defense industry has grown substantially in recent years and is much more developed than India's domestic defense industry.

Despite the growth of its domestic defense industry, the Chinese military still relies on other states for some of its most advanced equipment. From 2008–2012, China was the world's second largest

arms importer behind India (Anderlini and Mallet 2013). The reason for China's double status as one of the world's largest arms exporters *and* importers has to do with the types of weapons being exchanged. Most of China's weapons imports (69%) come from Russia (Anderlini and Mallet 2013). These imports represent key technologies that China either has not developed or cannot mass-produce, such as high-performance aircraft engines (Liff and Erickson 2013, 8). The Y-20 transport aircraft is a good example of how China's domestic defense industry still relies on foreign suppliers for key pieces of equipment. The Y-20 was made by the Xian Aircraft Industrial Corporation, but instead of having purpose-designed engines the plane is fitted with Russian-made engines (Axe 2013). Chinese defense industries have come a long way in producing equipment and creating a strong base for domestic weapons manufacturing to build upon, but it still relies on foreign suppliers, especially Russia, for more advanced weapons technology.

The modernization of China's armed forces has focused on an A2/AD approach to warfare. In the event of a conflict, the PLAN and PLAAF want to rapidly seize control of the sea and sky, respectively, and prevent another military from wresting control away from them. To this end, the military has acquired modern ships, airplanes, and non-nuclear ballistic and cruise missiles to strike enemy ships from a distance. China's land forces have been receiving money for modernization as well, but the developments for the PLAN and PLAAF have been much more significant in formulating China's A2/AD strategy.

THE EFFECTS OF CHINA'S MILITARY MODERNIZATION ON FOREIGN POLICY

China's military modernization has given it a great deal of power in a short amount of time. This has produced two trends in Chinese foreign policy. First, the Chinese military and government have been more assertive in defending contested territorial claims like islands in the South China Sea and the Senkaku Islands which are currently claimed by Japan. Second, Chinese foreign policy has become much more responsible in a variety of issue areas, especially its relationship with North Korea. China

has become increasingly willing to contribute to international peace and stability in order to maintain a status quo that allows it to grow economically and to prove that it is a responsible state to the international community.

The growing power of China's Navy and Air Force has made Chinese claims over disputed territories in the East and South China Seas more credible. The South China Sea's (SCS) strategic importance to the Chinese military has to do with energy security and international trade. In 2009, the SCS was the world's busiest shipping lane. Over half of the world's supertanker traffic passes through the SCS (Hong 2009, 42). China is dependent on SCS shipping lanes for a large share of its oil imports. Oil accounts for about 20% of China's energy consumption, and just under half of this oil (49%) is shipped from Saudi Arabia, Angola, and Iran (Department of Defense 2010, 20). There are also substantial oil reserves underneath the SCS. The exact amount of oil under the SCS is not known. A 2011 article in *The New York Times* estimated that the SCS had 61 billion barrels worth of oil and natural gas, with another 54 billion barrels that could be discovered (Landler 2011). According to a Chinese estimate cited in a U.S. Energy Information Administration Report, there could be as many as 213 billion barrels of oil under the SCS (US Energy Information Administration 2008). Even though the exact amount of oil under the SCS is not known, it is clear that the state which has control over the SCS will have a strategic advantage over many other states that rely on the SCS as a conduit for energy imports.

The geostrategic importance of the SCS has prompted China to take a very active stance in asserting and defending its territorial claims. The Strait of Malacca is at the west end of the SCS. It is considered one of China's sea-lanes of communication (SLOC) and is a major choke point for shipping into the SCS. The Chinese government views the presence of the Indian and American navies along this SLOC as a major threat to Chinese economic and energy security (Malik 2011, 206–207). Within the SCS itself, China's military modernization has spurred what some analysts consider to be a naval arms race among Southeast Asian claimants to the SCS. The states of Malaysia, Thailand, Indonesia, Singapore, and Brunei have all increased the size of their navies by ei-

ther buying or producing modern warships (Klare 2002, 129–130). However, none of these states have the ability to oppose China unless they take collective action. In 2011, the member states of the Association of Southeast Asian Nations (ASEAN) had a fleet of 680 fixed-wing aircraft, 412 surface ships and eight submarines (Cordesman and Hammond 2011). This combined force could serve as a deterrent to China, but ASEAN is an economic and political union, not a mutual defense organization. In the absence of treaty obligation that would draw all of ASEAN into conflict with China, should China attack islands in the SCS, the Chinese military has little to fear from the other claimants (Dillon 2011, 63).

The Chinese military has been very active in defending claims to the SCS. In 1992, The National People's Congress adopted the Law of the PRC Concerning the Territorial Sea and the Contiguous Zone, which effectively codified China's claim over the SCS into domestic law (Holmes and Yoshihara 2008, 52). After the law was passed, the frequency of clashes between Chinese forces and other claimant states increased significantly. Between 1992 and 2002, there were fifteen reported incidents of military clashes in the SCS, ten of which China was involved in. A period of relative stability began in 2002 when ASEAN and China released the Declaration on the Conduct of Parties in the South China Sea (DOC). The DOC established a status quo that the claimants would seek diplomatic solutions to territorial disputes (Department of Defense 2010, 39). However, Chinese efforts to modernize their navy have begun to upset the balance of power, and the stability that was established by the DOC is beginning to strain. The SCS falls into the same category of geopolitical interest areas as Tibet and Taiwan for China's government, considered to be "core interests" (Malik 2011, 24). The Chinese military has used force in the past to assert China's claims over Tibet and Taiwan, so the use of force in the SCS is a very real possibility.

Recent developments in the SCS have confirmed its importance to China's foreign policy. According to Duchatel and Sheldon-Duplaix:

Gaining effective control over its claimed Exclusive Economic Zone (EEZ) in the...South China Sea stands out as a

priority and...a guiding principle...for China's maritime policies. (Duchatel and Sheldon-Duplaix 2011, 33)

The acquisition of the *Liaoning* aircraft carrier gives the PLAN the ability to put strike aircraft anywhere in the SCS, giving them a significant military advantage over all of the other claimants, none of which possess an aircraft carrier (McVadon 2006, 102). The acquisition of more attack submarines and larger surface combatants also make for a more threatening PLAN presence in the SCS. The PLAN's expanded submarine fleet would likely operate with the *Liaoning* and its aircraft, with the carrier providing air cover and defense for the submarines which would engage enemy ships with anti-ship missiles (Duchatel and Sheldon-Duplaix 2011, 35).

Actions by Chinese forces in the SCS over the last four years have ratcheted up tension. Some analysts believe that China's foreign policy towards the SCS took an assertive turn beginning in 2009 (Kim 2012, 362). There were several incidences involving American and Chinese naval forces in 2009. In the spring, PLAN ships harassed the USNS *Impeccable* and *Victorious*, two surveillance ships. In June, a PLAN submarine collided with a sonar array towed by the USNS *John McCain* (Dillon 2011, 56). In 2010, a Defense Department report to Congress stated that a new PLAN base on Hainan Island was "essentially complete":

The base is large enough to accommodate a mix of attack and ballistic missile submarines and advanced surface combatants. (Department of Defense 2010, 2)

In 2012, a PLAN frigate ran aground on a disputed island, "raising regional suspicions that Beijing was trying to bolster its claim to the entire South China Sea" (Kurlantzick 2012). Chinese officials have also ramped up rhetoric about their claims to disputed islands, and the government has repeatedly sent ships close to areas claimed by other states.

Chinese actions in the SCS have been more aggressive and assertive in recent years, but in many other issue areas Chinese foreign policy has become more tempered as its military has modernized. China's "fourth generation" of leaders (Hu Jintao era) "pur-

sued a [foreign] policy of ‘peaceful rise’ or ‘peaceful development’ that relies more on reassurance and incentives than on coercion or power politics” (Wang 2011, 441). One major change to China’s foreign policy that stems from the “peaceful rise” model has been the way China interacts with multilateral institutions. The Chinese government has realized that engaging these organizations “helps promote the country’s trade and security interests” (Wang 2011, 442). The modernization of China’s military did not cause Chinese foreign policy to undergo this shift by itself; rather it was a piece of a larger move towards multilateralism that was encouraged by China’s overall development. In order to gain the trust and respect of the international community, the Chinese government must use its new military power responsibly.

In recent years, the most major strategic change in Chinese foreign policy has to do with its relationship with North Korea. China’s relationship with North Korea began in 1950, when a nascent Communist China sought the support of the Soviet Union as a counterweight to the United States. By supporting North Korea in the Korean War, the Chinese government hoped to:

demonstrate its loyalty to Moscow and vividly underscore the threat the United States posed to all socialist states. (A. Goldstein 2006, 133)

Throughout the Cold War, China was a major ally of North Korea, and provided North Korea with significant economic and military support to prop it up as a buffer against American interests in East Asia. During the 1960s and 1970s, “several hundred North Korean experts were trained in [...] nuclear technologies in China” (Malik 2011, 237). North Korea’s arsenal of ballistic missiles include some models, like the *Taepo Dong*, that have their origins in Chinese ballistic missile technology (Malik 2011, 237). However, the main supplier of conventional weapons to North Korea was the Soviet Union. After the Soviet Union broke up, the Russian government attempted to remain active in North Korea, but a significant economic crunch in the mid-1990s severely limited the possibility of continued Russian support (Harada 1997, 68).

China filled the economic void left after the collapse of the Soviet Union, helping keep North Korea’s economy afloat after the end of the Cold War in addition to providing North Korea with badly needed energy resources. Before the Soviet Union collapsed, it was North Korea’s major economic provider. By the end of 1990, North Korea owed about \$4 billion to the Soviets (Lee 1996, 138). Once Soviet economic assistance dried up, North Korea relied on China for most of its economic aid. In 1993, just three years after Soviet assistance stopped, China’s share in North Korea’s total foreign trade was 34% (Lee 1996, 139). China’s commitment to North Korea’s energy security also has a long history. In January 1976, the China-Korea Friendship Pipeline was completed, supplying North Korea with oil at below-market prices. Chinese engineers and technicians helped build North Korea’s energy infrastructure by constructing oil refineries, petrochemical plants, and other related structures (Lee 1996, 134–135). North Korea’s reliance on China as an energy supplier has increased dramatically since the Cold War. In 2011, “China alone account[ed] for 70% to 90% of North Korea’s fuel imports” (Malik 2011, 253).

In 2010, China’s response to two major provocations by North Korea indicated the importance of North Korea to China’s foreign policy. In March 2010, a South Korean corvette, the *Cheonan*, was sunk off the coast of North Korea. Once North Korea was named as the culprit in the sinking, China’s Premier Wen Jiabao offered condolences for the sailors killed, but stopped short of criticizing North Korea for its action (Sang-hun 2010). The Chinese government reacted similarly to the bombardment of the island of Yeonpyeong by North Korean artillery in November 2010. China’s unwillingness to put pressure on North Korea for its aggressive actions in 2010 could be connected to North Korea’s Rajin naval base. The North Korean government has allowed Chinese military forces to use the base, giving China a naval presence in the Sea of Japan for the first time (Malik 2011, 270). Also in 2010, Wen Jiabao offered a \$10 billion aid package to North Korea, which undermined UN sanctions designed to prevent North Korea from receiving international assistance (Malik 2011, 270–271).

Given the long history of political, economic, and military support that China has given North Korea,

China's reaction to North Korea's successful nuclear test in February 2013 should have been minimal. Instead, the Chinese government has been active in both denouncing the nuclear test and has played a major role in bringing multilateral pressure against the North Korean government. Less than one month after the test, the UN Security Council unanimously approved new economic sanctions against North Korea that were drafted by the U.S. and China (Gladstone and Sanger 2013). This is not the first time that China has supported sanctions against North Korea in response to nuclear tests. Successful nuclear tests in 2006 and 2009 caused the Security Council to approve sanctions, and both times China voted in favor (Lim 2013). However, the 2013 sanctions seem to have produced a much stronger reaction from the Chinese government and could indicate a major shift in Chinese policy towards North Korea. According to an article in *The New York Times*, "A more heightened debate about North Korea is now swirling around China's foreign policy circles" (Perlez 2013). One side of this debate has argued that China should cooperate with the United States to curb North Korea's nuclear program, which would be a major step in proving to the world that China is a responsible player in the international system.

While it is too soon to definitively state whether or not China will substantially change its foreign policy towards North Korea, there are some promising signs that it will keep up the pressure to bring the nuclear program to heel. On May 7, 2013, the state-controlled Bank of China declared that it had ended all dealings with North Korea's Foreign Trade Bank, a "key North Korean bank" (Bradsher and Cumming-Bruce 2013). The Chinese government has encouraged state-controlled enterprises, which make up a large portion of the Chinese economy and strategic industries, to cease dealing with North Korea to ensure that the latest round of international sanctions have more weight. According to a Chinese professor of Korean Studies at Fudan University:

this appears to be a step by the government to show that it's willing to cooperate with the international community.
(Bradsher and Cumming-Bruce 2013)

The Bank of China's decision to close its doors to North Korea's Foreign Trade Bank is a major symbolic act, showing how serious the Chinese government is about becoming a responsible member in the international system.

It is too early to tell whether or not China's foreign policy towards North Korea will be significantly changed in the long term, but China's actions in response to the February 2013 nuclear tests have been the harshest to date. This indicates a willingness on the part of China to be a more responsible member of the international community. As China modernizes militarily and economically, it will likely be faced with more situations when it will have to make a trade-off and follow the will of the international community instead of acting solely in accordance with its interests. The ability to compromise national goals for the sake of international peace and stability is the mark of a great power. China is developing the military of a great power, but it will not be a true great power until it uses its military and political clout to create and protect a positive environment for all states to exist within.

AN ASIAN ARMS RACE?

The question of whether or not China and India are engaged in an arms race is an important one to answer. Arms races breed instability as two states develop deadlier weapons in an attempt to stay one step ahead of each other. What starts as two states trying to secure their own survival and protection against one another usually ends in warfare as any miscommunication or misperception can rapidly escalate into war. State resources get focused on making better weapons and not on other causes like providing healthcare and education to its citizens (Till 2013). Thankfully, China and India do not appear to be engaged in an arms race. Instead, both states are going through a "natural" phase as they acquire militaries that better reflect their growing power and importance in the international system.

Although India and China do view each other with suspicion and consider one another to be rivals, their main threat perceptions are directed elsewhere. This is reflected in the types of weapons both states are acquiring. India's military is geared toward conventional power projection, while China's military is

specifically developing capabilities that are focused on an A2/AD war fighting strategy. If the two states were in an arms race with one another, then they would be trying to develop capabilities that countered one another, but this is not happening. The political and military leadership of both states have made efforts to increase cooperation and reduce the chances that a dispute could get out of hand and flare up into all-out war. Arms races in the past have tended to eat up a large portion of state resources, but both China and India have experienced such massive economic growth that military spending is taking up a very small percent of their national spending. The absence of an arms race between India and China neither removes the possibility of armed conflict nor prevents strategic rivalry, but it does lessen the prospect of war and allows more opportunities for cooperation to exist that can hopefully lead to a friendly relationship between the two states.

India and China are not in an arms race because they do not perceive one another as their primary threat. Of course, two states do not have to perceive of one another as their primary threat in order to be in an arms race. However, threat perceptions play a big role in the types of military capabilities that states develop. A state will not put that much effort into developing weapons technology and military doctrine to counter another state that it does not perceive as a threat. If the balance of threat theory is applied to the Sino-Indian relationship, it is clear that while both states perceive each other as potential threats, the states they perceive as greater threats are not one another. Additionally, both states have engaged in activities that have reduced their threat perception of one another.

Balance of threat theory is a modification to balance of power theory, which are both affiliated with the Neorealist School of international relations theory. According to neorealists, states are constantly trying to tip the balance of power in their favor in order to ensure their survival in an anarchic international system (Mearsheimer 2010, 80). In this system there is a “perpetual security competition,” which exists in part because states are not fully sure about the intentions of other states (Mearsheimer 2010, 81). Adherents to a balance of power view of the world focus most on the “physical” power capabilities of

states, such as the size of a state’s military or the economy (Wohlforth 1999, 10). The problem of focusing solely on power capabilities as a predictor of state behavior is that it ignores important factors that determine state behavior. One such factor is how states perceive the intentions of other states, or the “threat” that other states pose. In 1985, Stephen M. Walt started to take threat into account when he asserted that states will balance “against the threats posed by the power, proximity, offensive capabilities, and *intentions of others*” (Walt 1985, 18 emphasis added).

Walt examined the behavior of the Soviet Union and alliance formation of states to explain how balance of threat theory explains state behavior. In response to a powerful economic and military alliance headed by the United States, the Soviet Union began devoting considerable economic resources to its military. The military then developed a force posture and doctrine that put emphasis on offensive capabilities. This focus on offense “increase[ed] the level of threat that Soviet neighbors perceive” (Walt 1985, 37). This caused many of the Soviet Union’s neighbors to be wary and actually drove them closer to the United States and its allies. Soviet aggression in Afghanistan during the 1980s, as well as heavy-handed policies in Eastern Europe, caused many independent neighboring states to see the Soviet Union as a threat (Walt 1985, 37). Threat perceptions were therefore a major factor in determining the behavior of weaker states near the Soviet Union. These states feared the Soviet Union because of the Soviet’s aggressive foreign policy, and many of these states began forming closer relationships with states that were opposed to the Soviet Union.

In the case of Sino-Indian relations, both states perceive each other to be a threat to some degree. A useful benchmark for determining threat perceptions is examining what strategic and military experts think of another state’s military modernization process. India’s military modernization began receiving attention in Chinese academic journals in 2000, the year when President Bill Clinton visited India. Soon after Clinton’s visit, the United States began lifting sanctions on India that had been in place since 1974, which allowed the United States to reemerge in the Indian defense market (Latif and Lombardo 2012, 12). From 2000 onward,

there were fewer dismissive or negative articles within the Chinese media and government statements on India. (Saalman 2011a, 90)

Another important feature of the articles is their length. Chinese analysts have written many long articles on Indian military modernization since 2000, with peaks in 2005 and 2009 (Saalman 2011a, fig. 2). These longer articles allow for more in-depth analysis, indicating that Chinese analysts are taking the Indian modernization more seriously. Great attention has been paid to India's military development, but Chinese analysts have not yet designated India as a major threat. Instead, India is regarded as an ambitious strategic rival, a state that is capable of much but does not yet strike fear in the hearts of Chinese defense planners and therefore does not need to be balanced against at the moment.

The Indian strategic community is more wary of China's military modernization and strategic goals. After the Sino-Indian War, China became India's primary security threat, which caused the Indian government and military to begin balancing against China. For example, the Indian nuclear weapons program started after the Chinese successfully tested a nuclear device in 1964 (Cohen and Dasgupta 2010, 98). However, China ceased to be the primary threat to India's security in 1965, when Pakistan fought its second war with India. For most of the twentieth century, India's military capabilities and doctrinal thinking has been focused on the threat emanating from Pakistan (Sahgal 2012, 284). This view of Pakistan as India's primary threat has begun to change. Reports and directives written by Indian strategic planners in the last five years have paid more attention to China's military modernization and strategic goals. The defense minister's 2010 operational directive,

asks the Indian military to prepare for a full-spectrum war [with China] that could include WMDs. (Sahgal 2012, 284)

Some Indian strategists believe that competition between India and China is a zero-sum game. This makes Chinese hegemony in Asia unacceptable, as it would prevent India from achieving great power status (Wang 2011, 460). Despite the characterization of China as a major threat by the Indian strate-

tic community, Indian foreign policy towards China has focused on engagement, lowering tensions, and building "a win-win transactional relationship that underscores cooperation and downplays competition" (Sahgal 2012, 286). Although many prominent figures in Indian strategic circles view the military rise of China as a threat, there is a desire to find ways to cooperate with China and reduce mutual threat perceptions while maintaining Indian strategic autonomy.

The Indian and Chinese political leaderships realize that cooperation in multilateral institutions and person-to-person contacts can be excellent ways of opening up lines of communication, reducing threat perceptions, and making conflict less likely. In 2006, the Chinese invited India to become a member of the Shanghai Cooperation Organization (SCO), which "seeks to promote regional economic and security cooperation in Central Asia (Malik 2011, 306). The Indian government initially refused China's offer, but in June 2009, Prime Minister Manmohan Singh attended an SCO summit. The Indian government began reconsidering full membership in the SCO to move closer to regional powers after the Obama administration began tilting more towards Pakistan to help with the war in Afghanistan (Malik 2011, 308). The SCO provides India and China with a place to enter into strategic dialogue and address security concerns (Sahgal 2012, 304).

Small improvements to diplomatic relations have been made via high-level visits and simple displays of goodwill. For example, in 2009, the Indian and Chinese premiers established a hotline between them to deal with political crises before they escalated out of control (Joshi 2011a, 572). In April 2013, small incursions by Chinese military forces across the Indian border near Ladakh caused tensions to rise, but both governments quickly downplayed allegations that these incursions marked a significant deterioration of relations (Guha and Spegele 2013). It is not clear whether or not the 2009 hotline was used during the April 2013 incidents, but the fact that both the Indian and Chinese governments were quick to downplay the incidents shows a desire for stability in bilateral relations and a willingness to rapidly bring potential political disputes under control before a situation can escalate.

The types of military capabilities being purchased and developed by India and China reveal their primary strategic goals and offer insight into the question of an arms race. The Indian military is focused on building capabilities that would allow it to project power throughout the Indian Ocean region (Saalmann 2011a, 99–100). This has placed the focus of military modernization on acquiring modern ships and aircraft. Meanwhile, China's military has been developing technology for an A2/AD strategy. China's massive arsenal of non-nuclear ballistic missiles, which includes new anti-ship ballistic missiles like the DF-21, would be able to destroy large surface ships like aircraft carriers (Erickson 2010). Instead of preparing its military to fight a war against India, China's military is being built up to counter American intervention in the East and South China Seas (McVadon 2006, 96). Both India and China have been developing very similar weapons technology as part of their military modernization process, but neither state is attempting to specifically counter the capabilities of the other.

CONCLUSION

Despite their long history of mistrust and lingering suspicions of one another's intentions, India and China are not engaged in an arms race. Both states have invested considerable resources into the modernization of their militaries, but this is merely a reflection of each states' growing power. As China and India have grown politically and economically, they have tried to create militaries that reflect their status. Power-projection has been the major focus of the military modernization in India, as it seeks to become the predominant power in the Indian Ocean. China's military modernization has focused on developing A2/AD capabilities, which would allow its navy and air force to rapidly take control of the sea and sky close to China. At this point, China lacks the support capabilities to carry out the A2/AD strategy far from China's territorial waters, making serious Chinese military involvement in the Indian Ocean unsustainable.

Indian and Chinese officials should continue to build on the steps that have already been made towards normalizing relations and reducing threat perceptions. High-level diplomatic visits, regular contact,

and joint exercises between militaries, as well as ensuring open lines of communication during potential crises will go a long way in clarifying each state's strategic goals and will make the chance of war less likely. Both states should also be encouraged to take active roles in peacekeeping missions, disaster relief, and counter-terrorism/anti-piracy missions that are organized by multilateral organizations like the UN. If India and China can use their military power in these issue areas, they would be helping other states as well as themselves and would create a positive model for developing states to follow. Rivalry between rising great powers cannot be eliminated, but if China and India make the effort to cooperate and reduce their threat to one another, then a hopeful model of great power ascension can be created.

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