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## *A Letter from the Editor in Chief*

JUR Press is proud to present Volume XI of the Journal of Undergraduate Research and Scholarly Excellence containing interdisciplinary published works completed by undergraduates from around the world.

We are a journal for undergraduates and by undergraduates. Our slogan – linking the global undergraduate community – captures our mission to serve the interests of worldwide undergraduate thinkers, experimenters, writers, and artists. While JUR does provide a platform for students to publish and showcase their work, we also give students the opportunity to learn about the publication process from start to finish through positions as associate editors, copy editors, and peer reviewers. Our undergraduate network has grown to include not only international authors, but also satellite editors from around both the USA and the world! We are truly committed to enhancing the undergraduate experience, and we continually seek to engage as many undergraduate students in our organization as possible.

To say that the Journal of Undergraduate Research experienced challenges the past two years would be an understatement. From moving to virtual meetings, shifting advisor leadership, trying to keep up with a mass amount of submissions while having an editor shortage, and all while living in a world of pandemic uncertainty, there has been no shortage of obstacles. For the past year that I have been privileged to act as Editor in Chief, I have been incredibly proud to see the editors and staff of JUR Press rise up to the occasion and continue to dedicate their effort and time to this amazing journal. We have rebuilt our staff, established new connections within our home base, created a social media presence, and now have birthed a print edition for the first time in two years.

For all that we have accomplished the past few years, I want to say congratulations to each member of our team and how incredibly thankful I am for their efforts. You are exceptional individuals with a wide range of talents. I look forward to what the future has to offer for all of you both in your careers and, for those returning, in your participation with JUR Press. I cannot express how blessed I have been to lead JUR Press this past year as the Editor in Chief, thank you to everyone who made it one of the best experiences of my undergraduate career.

To our published authors, I congratulate each of you on your accomplishment and we are thankful that you chose JUR Press to be a part of your undergraduate academic experience.

Yours Truly,



Cheyenne Izon  
Editor in Chief  
Journal of Undergraduate Research  
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## Special Thanks

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# Students Assemble: Acclimating to College using the Marvel Cinematic Universe

By CODY T. HAVARD, PH.D.

THE UNIVERSITY OF MEMPHIS

Welcome to college everyone! While college should be a time that is both fulfilling and formative in helping shape your life, it is also one that is filled with questions and situations that require thoughtful consideration and decision making. For most, this is the first time that you will be or are in charge of your daily schedule and time. In essence, you are for the first time in charge of making the decisions that shape your future - albeit in a controlled environment. So, this is an exciting time. I want to wish you all good luck and know that people at your institution want to support your education and matriculation.

The purpose of this essay is an attempt to offer help and assistance as you begin, or continue your path through college. Hopefully this essay also encourages you to take responsibility over your educational experience and work to make sure that you take full advantage of the possibilities and opportunities at your disposal. The Marvel Cinematic Universe (MCU) holds a very popular and important place in contemporary society<sup>1</sup>, and this essay uses the universe and some of its characters to draw comparisons to contemporary college life. Specifically, we will look at various characters in the MCU to discuss how they can provide lessons to finding your fit in college and taking control of your educational experience. Areas this essay will not address are some off-campus or inappropriate behavior, instead, focusing on how to encourage positive interactions between you and your educational environment.

Marvel characters have been used throughout history to help people understand their surroundings, whether it be a teenager dealing with the problems facing youth (e.g., Peter Parker/Spider-Man and Kamala Khan/Ms. Marvel), or the United States involvement in worldwide events such as World War II (e.g., Issue #1 of Captain America shows him punching Adolf Hitler), the Cuban Missile Crisis (e.g., Tony Stark/Iron Man), or the Cold War-era space race (e.g., Fantastic Four). Additionally, Marvel books and the MCU have been used to explain such topics as philosophy (White, 2012), politics (Spanakos, 2012), ethics

(White, 2012), academic research (Harvard, Fuller, Ryan, & Grieve, 2019), storytelling (Yockey, 2017), and popular culture (Chambliss, Svitavsky, & Fandino, 2018).

I want to offer two important notes on this essay. First, while the information in this essay is meant to represent and reach as many readers as possible, there will undoubtedly be areas that do not receive the attention they deserve. As the characters discussed in this essay come from the MCU, it is important to note that Marvel continually updates their character offerings and introduces more superheroes to the universe. So, in addition to the characters included in this essay, I also call on you to identify your own characters which can provide you with inspiration. Second, even if you are not in currently in college (e.g., high school, middle school, grade school, or are not in school), it is the goal and hope that you can also find benefit in most if not all sections of this narrative. Because, just as responsibility tracked down Peter Parker/Spider-Man in Spider-Man: Far from Home (2019), every-day responsibilities do not subside for most, and we are left with the task of finding ways to adapt to our environment. The rest of this essay will discuss the similarities between the MCU's Avengers headquarters and college campuses, select characters and their lessons within the MCU, a note on inclusion, and a concluding statement on how the MCU story arc compares to all of us. So, with that, please come along with me, enjoy, and let's break some eggs (Thank you Tony Stark)!

Welcome to Avengers (and College) Campus

A university or institution of higher education is made up of facilities that are used to teach those attending classes about relevant information, while encouraging a shared experience and dissemination of knowledge. College campuses contain services meant to help students (e.g., food, shopping, health management). In that way, a college campus can become a place where students live, learn, and engage with others in an effort to find similarities, discuss

differences, and work to understand and help solve important issues facing communities and larger society.

Just as a college campus can provide all of this to a student, the Avengers Campus plays the same role for the characters of the MCU. When Tony Stark/Iron Man decided to move the Avengers headquarters to up-state New York from Manhattan, effort was made to construct a campus in which heroes could live, train, work, and engage with others. After all, the Avengers Campus is the primary place where Wanda Maximoff/Scarlet Witch and Vision learn more about each other and grow their relationship - which is the theme of the Disney+ series WandaVision (2021)! Just like a college campus provides a place for students and faculty to hone their skills and study their craft, the Avengers Campus does the same for various MCU heroes. Also, just as visiting a college campus can inspire admiration - and sometimes intimidation or surprise - at the grounds, the same can be said of the Avengers Campus as experienced by Peter Parker (admiration) in Spider-Man: Homecoming (2017) or Scott Lang (intimidation, surprise) in Ant-Man (2015).

Another important role a college campus plays is providing a place of grounding for current and former students. The sense of being at home many people feel when they visit their college campuses occurs as a result of memories formed from relevant events and experiences. In the MCU, this is similar to Natasha Romanoff/Black Widow holding down the fort at the Avengers Campus in Avengers: Endgame (2019)<sup>2</sup>.

MCU Heroes and Us

This section highlights various heroes and characters in the MCU in an effort to allow everyone to identify similarities and inspiration. As previously noted, the characters below have been featured in the MCU - rather in a primary or sometimes secondary role - and while careful attempt has been made to include as diverse a lineup of characters as possible, limitations imposed on the content material in turn limited such efforts. The goal of this section is that everyone can find one or more characters in which they are similar, and thus can garner important lessons. Feel free to identify and draw inspiration from as many characters as needed.

Carol Danvers/Captain Marvel

1. As evidence of the MCU's popularity, the franchise has placed three movies in the top ten best all-time box office sellers (Avengers: Endgame, 2019 at number one), and nine movies that have grossed over one billion dollars (Top Lifetime Grosses, 2020).

2. There is even a scene in the movie where Natasha asks Steve Rogers/Captain America if he has returned to do *laundry* as a way to exhibit the importance of *home* or *place*.

Even as Carol Danvers/Captain Marvel has appeared only twice in the MCU - in *Avengers: Endgame* (2019) and her own stand-alone movie *Captain Marvel* (2019) - it is apparent that she is a very important piece to the MCU who will shape the future of the universe in numerous ways. *Captain Marvel* (2019) picks up when Vers, not knowing her true identity as Carol Danvers, is training as part of a group charged with protecting the Kree empire. During a recovery mission, she is captured by Skrull soldiers and has her memories mined, which sets off the beginning of Carol remembering her former life. Upon escape, she finds herself on Earth (planet C-53 in her lexicon), where she meets a younger Nick Fury and the two set out to try and protect against the Skrulls. When she finds out the Skrull are not a threat, and rather the Kree are the true invaders, she comes to the realization of her powers and defeat the Kree in space and on Earth, while taking the name of Captain Marvel to honor a former mentor.

While we will undoubtedly get more details about Carol and her friends in subsequent stand-alone and team up movies, the important trait to discuss in this essay is her evolving understanding and control of her powers - both super and human innate. When she tells the Supreme Leader that she has been fighting with one hand tied behind her back, she is signaling that she has discovered her abilities and true self, and will not allow others or herself to hold her back anymore. This is a very important lesson for everyone in that some - or perhaps everyone to a certain extent - may feel that they have been held back by others or oneself. If this is something that speaks to you, it is now the time to accept your full abilities and display them for others to see. Don't go through college and life without using the powers and abilities you possess. Instead, learn from Carol Danvers/Captain Marvel, and strive to find and use your true potential.

#### Steve Rogers/Captain America

When we meet Steve Rogers/Captain America in the MCU, he is a young man with a dream of serving his country, but kept from doing so for physical and health reasons. He is so determined to serve his country during World War II that he breaks laws by trying to register in different counties

and precincts, only to be rejected each time<sup>3</sup>. Once he becomes Captain America, Steve longs to serve his country and protect his friends and fellow soldiers. He shows great selflessness by choosing to crash a plane loaded with explosives headed for New York

City when he cannot safely land it.

Upon waking up after 70 years in a coma, Steve finds himself in an era that he does not understand being confronted with people he is unfamiliar with. However, the one thing that Steve understands is his duty to his mission and country. After defeating Loki with the Avengers (*The Avengers*, 2012) - where he initially sees cracks in the veneer surrounding the mission and purpose of Strategic Homeland Intervention, Enforcement, and Logistics Division (S.H.I.E.L.D.) - we next see Steve experience an existential crisis. In *Captain America: The Winter Soldier* (2014), Steve's fears of S.H.I.E.L.D. are confirmed, he becomes a fugitive of the law alongside Natasha Romanoff/Black Widow and Sam Wilson/Falcon, reunites with his childhood friend Bucky Barnes - who has been turned into the Winter Soldier - and battles Hydra.

When Steve is confronted with choosing to sign and abide by the Sokovia Accords (*Captain America: Civil War*, 2016), we observe Steve truly evolve from someone who views serving and protecting country of utmost importance to someone that sees freedom, friendship, and protecting friends as paramount. Throughout his actions in *Avengers: Infinity War* (2018) and *Avengers: Endgame* (2019), we repeatedly see Steve make the decision to follow his own personal moral compass, even when it runs contrary to pre-prescribed rules and expectations. This culminates when Steve travels back in time to return the Infinity Stones and decides to stay in the alternate timeline with this life-long love Peggy Carter (*Avengers: Endgame*, 2019).

Steve Rogers/Captain America is seen as someone whose story evolves a great deal as he discovers his talent in leading others and his own sense of morality. Throughout his story, Steve makes it well known that friendship and protecting the ones he loves along with those that cannot protect themselves is of utmost importance, which is not unlike another MCU hero Gamora. So, if you identify with Steve, do you see yourself as loyal to friends/family and your set of beliefs? Are you willing to help others in need when maybe it is not the popular thing to do (e.g., stand up for or help someone in their hour of need)? If so, then he may be a source of inspiration.

#### Shuri

Next, we have Shuri, someone that finds her true power when she is able to create and help others. When we meet Shuri, she is the tech genius younger sibling of T'Challa in

*Black Panther* (2018). Appearing in three movies, we have yet to see the complete growth and arc of Shuri, but her place in the MCU is cemented by her willingness to help her brother thanks to her unsurpassed technological skills, all while having to deal with the loss of her father.

Shuri is also responsible for helping other heroes in their time of need. After all, she is the one who is placed in charge of caring for Bucky Barnes/Winter Soldier when he is transported to Wakanda during his self-imposed frozen isolation. Then, when he is needed to help defend against Thanos in *Avengers: Infinity War* (2018), Shuri is presumably the one who designs his new bionic arm. Additionally, Shuri is left with the responsibility of taking the Mind Stone out of Vision<sup>4</sup>. In the subsequent battle scene, before the outlanders enter her lab, we get a glimpse of Shuri making one final gesture on her display screen, which perhaps signals her role in future projects such as the Disney+ series *WandaVision* (2021).

Throughout Shuri's arc and time in the MCU, she has repeatedly been established as an invaluable member of the Avengers. From her first appearance in *Black Panther* (2018) to her standing as one of the strong female heroes of the MCU in *Avengers: Endgame* (2019), it is undeniable that Shuri is extremely important to the present and future of the shared universe. We will see more of Shuri in *Black Panther 2* (expected 2022) and other projects. For example, it has long been rumored that she would take the mantle of *Black Panther* in the second installment - following a story line from the comics - even before the tragic loss of Chadwick Boseman. If you are someone who feels that your skills and expertise set you apart, you may identify with Shuri.

Finally, and most importantly, the popularity of the movie *Black Panther* (2018) is only surpassed by its importance and meaning in our society for people of color and underrepresented groups. Not only is Shuri a great character in the MCU, she signals the potential for underrepresented people, especially young women of color, to serve as true experts and inspirations in society. At a time when the United States has elected its first woman, and woman of color to the Vice Presidency, the lessons and inspiration from projects like the MCU is needed to help mold future generations of leaders.

#### T'Challa/Black Panther

Standing alongside Shuri and his mother at the end of *Avengers: Endgame* (2019) is

3. When he meets Dr. Abraham Erskine, he states "I just don't like bullies" (*Captain America: The First Avenger*, 2011), before finally being given the opportunity to serve as a member of the Strategic Scientific Reserve (SSR).

4. While also delivering a little jab at the work of Bruce Banner/Hulk and Tony Stark/Iron Man.

King T'Challa/Black Panther. First seen in *Captain America: Civil War* (2016), T'Challa becomes king of Wakanda when his father T'Chaka is killed while attending the signing of the Sokovia Accords. He initially tries to avenge the death of his father by tracking down Bucky Barnes/Winter Soldier, then the real culprit and villain Baron Zemo. However, when given his chance for retribution, T'Challa decides not to kill Zemo, but rather let him face authorities.

We next pick up T'Challa's arc in the stand-alone movie *Black Panther* (2018), when he is officially taking the throne of Wakanda. Throughout the movie, we see T'Challa grow into his role as king and protector of Wakanda, and come to terms with the sins and of his father and subsequent fallout<sup>5</sup>. After having been defeated by Eric Killmonger (born N'Jadaka), T'Challa has to rely on a rival tribe and three strong women in his life (e.g., his mother Ramonda, ex-girlfriend Nakia, and sister Shuri). Upon returning to battle Killmonger for the throne, he relies on more strong female characters, the Dora Milaje and Okoye to reclaim the throne and stop the spread of Wakandan weapons around the world. After reclaiming the throne, T'Challa is inspired to open an outreach center in the United States and announce Wakanda's willingness to help around the world.

In *Avengers: Infinity War* (2018) and *Avengers: Endgame* (2019), T'Challa plays a very important role in protecting the galaxy from Thanos<sup>6</sup>. Throughout his time on screen, T'Challa/Black Panther let his presence be known as someone who accepts ultimate responsibility for protecting his county and fellow citizens, while also providing the important lesson of relying on strong female characters for help. If you are someone that believes strongly in protecting friends and loved ones, then you may find similarities with T'Challa/Black Panther.

Even as T'Challa appeared in only four movies, his importance in the MCU is unquestionable. While the tragic passing of Chadwick Boseman cuts short his storyline in the MCU, the importance of the character and movie cannot be overstated. *Black Panther* (2018) was the first time that a large segment of underrepresented people saw a superhero on the big screen that resembled them. This feat is extremely important as our society seeks to include more diverse voices, people, and ideas. This is one reason why the legacy of T'Challa/Black Panther, and Chadwick Boseman, will live on forever.

Thor

Next, we have Thor Odinson, the God of Thunder. When we first see Thor, he is set to take over rule of Asgard (Thor, 2011) as a vane and hard-headed person. As a matter of fact, his vanity and unwillingness to listen and problem solve with others in a responsible way by battling the Frost Giants on Jotunheim, is what leads to him being banished to Midgard (i.e., Earth) without his powers or hammer Mjolnir. Only after Thor learns the importance of listening and empathy – he sacrifices himself to save his friends – is he able to use Mjolnir and his power again.

Throughout his story arc, Thor learns what true responsibility, leadership, and friendship mean, like when he has to defend Asgard from Malekith and Jane Foster from the Aether/Reality Stone, all while coping with the loss of his mother (Thor: The Dark World, 2013). Later, when he has been stranded on the planet Sakaar, Thor teams up with Valkyrie, Hulk, and Loki (sort of) to find a way back to save the people of Asgard and settle a new homeland on Earth in modern-day Norway (Thor: Ragnarok, 2017).

His travels and struggles in *Avengers: Infinity War* (2018) and *Avengers: Endgame* (2019) highlight the human nature in Thor. After, as some have argued (e.g. Sean Gerber from MCU Fanshow), his vanity strikes again and he does not properly defeat Thanos in *Avengers: Infinity War* (2018)<sup>7</sup>, Thor seemingly learns his lesson when he finishes off Thanos early in *Avengers: Endgame* (2019). However, he falls into a depression – seemingly from the guilt of not being able to stop Thanos' snap, and his, as some would say, over-reaction to slaying Thanos at the beginning of *Avengers: Endgame* (2019) – thus revealing one of his original problems from his first adventure in the MCU. His need for friendship is also highlighted in *Avengers: Endgame* (2019), as his fellow Avengers help him throughout his guilt realize that he can still help. Remember, when prompted by Rocket Raccoon (albeit in an ornery way) and his mother, Thor realizes he is still worthy of Mjolnir despite his depression, and can help defeat a time-traveling Thanos to bring back those lost in the snap. When we leave Thor, he has seemingly accepted his fate to strike out on his own adventure of self-discovery rather than serve as King of New Asgard – an honor and responsibility he passes to Valkyrie.

Thor's story arc, while couched in humor and various mis-adventures, is one of the

more striking when one considers applicable lessons. He begins as a vain individual who is unwilling to listen to the advice of others. Along the way, he learns humility, what friendship and companionship mean, and while he does slip up and reveal his vanity again in *Avengers: Infinity War* (2018), he learns to trust others and do what he believes is best for friends, loved ones, and humanity. Additionally, his mistake in *Avengers: Infinity War* (2018) reveals that while we may strive to improve and help others, we do still make mistakes.

Thor's depression in *Avengers: Endgame* (2019) – while portrayed in a somewhat comic relief fashion – also provides an important lesson. Even as we may feel sad and depressed at times – or for a prolonged period of time – we still have value and can help others and ourselves. Remember the excitement Thor displays when he is reunited with Mjolnir and realizes he is still worthy? Thor's story offers several important lessons, and his character offers many with a path toward self-improvement and service to others.

Loki

On the flip side of the Asgardian coin, we are presented with Loki, the God of Mischief. And while it can be argued – and has been many times – whether he is a hero or villain, Loki illustrates that everyone has the capacity to do right when they are compelled to do so while also behaving out of pettiness or jealousy at times. It is apparent from the first time we see Loki that he is in a constant struggle for the admiration of his father and competition with his brother, something most, if not all siblings can identify with. While most (or no one) tries to (nor should) capture Manhattan and take over the world (*The Avengers*, 2012), they can make sense of Loki's sometimes childish behavior when looked at through the lenses of familial ties and sibling rivalry. After all, rivalry is something that is established and grows over time when faced with competition, and can lead people to celebrate others failures (Cikara, Botvinik, & Fiske, 2012; Havard, 2014; Havard, Gray, Gould, Sharp, & Schaffer, 2013; Elsbach & Bhartychary, 2001). The narrative of family ties and relationships will undoubtedly be told through the future feature film *Fantastic Four* (TBA).

Most people can also identify with Loki's seemingly selfless behavior in the final battle of *Thor: The Dark World* (2013) after his mother has been killed. Loki feels guilt for playing a role in the tragic events, and thus feels compelled to avenge (maybe he is an

5. His father leaving a young Eric Killmonger behind in America, and Wakanda's role in modern society.

6. First, the battle of Wakanda is the setting for the snap, and upon the Avengers reversing the snap in *Avengers: Endgame* (2019), T'Challa is the first to walk through the portal to fight with Captain America, flanked by Shuri and Okoye, and followed by Wakandan warriors.

7. Thor goes for the body rather than the head of Thanos because he wants to see the fruits of his labor and have Thanos know he was responsible for his demise.

Avenger after all) his mother's fate and help defeat Malekith. Even his events at the end of the movie - altering himself to become an illusion of Odon so that he may rule Asgard - is something that people can learn from. Other than possibly the truly selfless among us, most people can understand doing good and bad things as a means to an end.

Throughout *Thor: Ragnarok* (2017), we see Loki using his cunning to win favor with the Sakaar Grandmaster - even trying to trick Thor once again for his own personal benefit. It takes Thor turning the tables on Loki, and Meek finding him, to set Loki on a path meant to help the people of Asgard. We even see his self-imposed triumphant return to Asgard when he lands, announcing his role as the true savior to his subjects. This again is something most people can understand, as personal motives often combine - and sometimes override - the motive to help others. Rather than those behaviors making someone a bad person, it highlights the juxtaposition of human nature - balancing selfish with selfless behavior at times. This is perhaps one reason why Loki is such a popular character in the MCU. He represents the struggle that many experience from time-to-time. Similar things can be said of Yondu and Nebula through their narratives in the MCU (e.g., both - *Guardians of the Galaxy*, 2014 and *Guardians of the Galaxy Vol. 2*, 2017; Nebula - *Avengers: Infinity War*, 2018, *Avengers: Endgame*, 2019).

When we leave Loki in *Avengers: Infinity War* (2019), he has made the ultimate sacrifice, and thus his (current) story arc seems to show him going from good to bad. Instead, Loki is a true representation of the human condition as he balances good and bad, and struggles with selfish, vain, and childish behavior while at times trying to help others. However, throughout Loki's arc, when forced with the decision to help others, he more times than not makes the appropriate and socially acceptable decision - possibly a dichotomy that will be further explored in the Disney+ series *Loki* (expected 2021). So, perhaps you identify with Loki because you feel your actions do not always convey your intended message. Everyone makes mistakes and does things that hurt others, often for selfish reasons. However, when push comes to shove, someone like Loki makes the correct decision, which is not unlike many of us.

Natasha Romanoff/Black Widow

Natasha Romanoff/Black Widow is introduced to the MCU in *Iron Man 2* (2010), as an apparent consultant for Stark Industries. After getting small glimpses of

her abilities<sup>8</sup>, we learn her true identity as a S.H.I.E.L.D. special agent sent to monitor, protect, and assist Tony Stark/Iron Man, and her full range of skills as the lethal Black Widow. In *The Avengers* (2012), Natasha is sent to retrieve Bruce Banner/Hulk, with whom she forms a strong bond, and is the one able to trick Loki into sharing part of his plans of attack. She also shows compassion by saving Clint Barton/Hawkeye from Loki's mind control, and leadership by closing the portal over Stark Tower to end the Chitauri invasion.

In every story Natasha appears, she plays a vital role in the success of the Avengers. In *Captain America: Winter Soldier* (2014), she helps Steve Rogers stay under S.H.I.E.L.D.'s radar so they - joined by Sam Wilson/Falcon - can thwart Hydra's attempt to take over the world. In *Avengers: Age of Ultron* (2015), we see her bond with Bruce Banner grow as she asserts herself as the one Avenger who can calm him when he becomes the Hulk<sup>9</sup>.

Aside from her skills in espionage and battle, Natasha also serves as the emotional leader of the Avengers. For example, in *Captain America: Civil War* (2016), we see her ability to relate and sympathize with others - first T'Challa/Black Panther at the passing of his father and then Steve Rogers/Captain America when Peggy Carter passes away. She also shows support for her teammates during *Avengers: Infinity War* (2018) by joining Wanda Maximoff/Scarlet Witch and Okoye in battle to defeat Proxima Midnight. We see her true leadership, and others acknowledging as much, in *Avengers: Endgame* (2019) when she acts as monitor of galactic events and directs other Avengers on missions following the snap. Additionally, she shows her leadership by making the ultimate sacrifice on Vormir in order to retrieve the Soul Stone - much to the chagrin and sorrow of Clint Barton/Hawkeye and her fellow teammates.

Introduced as a strong female supporting character, Natasha Romanoff/Black Widow quickly became a fan-favorite as her story arc progressed, thereby paving the way for other female characters and title films such as *Captain Marvel* (2019). In that, she represents the individuals that are sometimes overlooked until they no longer can be. Her leadership and compassion, combined with her expertise in being a spy and warrior, make her character one that many people, and women in particular, can aspire to. She was introduced in the background, but through determination and persistence, found her way into a leadership role. Additionally, she was the first female superhero to be included

in the MCU (Pepper Potts was not revealed as Rescue until *Avengers: Endgame*, 2019), making her character and placement in the MCU very important for women and other people used to seeing almost exclusively caucasian men in such roles. It will be exciting to see her story continue in *Black Widow* (expected 2021), and she is a testament to anyone that feels their skills and capabilities have been overlooked at any time.

Tony Stark/Iron Man

When we meet Tony Stark in *Iron Man* (2008), he is an arrogant and selfish individual. By design, he is not someone that is easy to like. He primarily looks out for himself and his company's profits - made from manufacturing and selling weapons used for war - and engages in a very self-serving lifestyle. When Tony is kidnapped by a terrorist cell and imprisoned in Afghanistan, he meets Dr. Ho Yinsen and together they produce a working suit of armor in order to escape their captors. When Tony finds his escape but Yinsen cannot, we see the first transformation in his outlook on his life and how he has made his fortune. Upon his escape, he sees weapons made by his company and what they are capable of, which causes Tony to divest from all military weapons manufacturing and begin to focus on renewable energy instead.

After Tony is forced to battle his business partner in order to protect his loved ones and others, his iconic line, "I am Iron Man" (*Iron Man*, 2008), signifies his willingness to take on the responsibilities of serving others. Throughout his story arc, we see Tony forced to navigate his mortality (*Iron Man 2*, 2010) and depression (*Iron Man 3*, 2013), but he continually makes moves to protect his friends, loved ones, and others (*The Avengers*, 2012). All through his brash and egotistical behavior, we are able to see another aspect of his personality in which he deeply cares about others - even taking on a mentor role in *Iron Man 3* (2013), and *Spider-Man: Homecoming* (2017), and posthumously in *Spider-Man: Far from Home* (2019). In the end, Tony sacrifices himself to save others while delivering his iconic line once again (*Avengers: Endgame*, 2019).

Tony's story arc is one of redemption and making adjustments in order to keep those around him safe. Throughout his relationship with Pepper Potts/Rescue, Tony switches between acting selfishly and responsibly. Along from being a technological genius, like Bruce Banner/

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8. She defeats Happy Hogan in a training match without any trouble.

9. A video recording of her also calms Bruce after two years of being Gladiator Hulk in *Thor: Ragnarok*, 2017

Hulk and Shuri, Tony shows fortitude in his journey. While trying to keep the Avengers together by signing the Sokovia Accords, Tony makes decisions he believes will protect others (Captain America: Civil War, 2016). Tony also shows a lot of folly, with many of his best-intentioned ideas and plans rubbing others the wrong way. From building Ultron (Avengers: Age of Ultron, 2015), to imprisoning Wanda Maximoff/Scarlett Witch (Captain America: Civil War, 2016), not all of Tony's decisions are taken kindly by his teammates and loved ones.

Tony is also a story of someone trying to do right, and sometimes hurting loved ones along the way-when he travels to space in Avengers: Infinity War (2018), Pepper Potts is left not knowing of his whereabouts or his safety. So, much like Loki, Tony's story is one that resonates with fans. Having to deal with personal struggles while trying to protect others is something that many people can relate to - the same may be said about Rocket Raccoon. The inappropriate behavior aside nor condoned, Tony shows us a human who makes the transition from selfish to selfless behavior, much the same as Dr. Stephen Strange (Doctor Strange, 2016). For anyone that struggles with doing right by others and the personal feelings of selfish and self-righteousness, Tony Stark/Iron Man is a character in which they may relate.

#### Nick Fury

We save Nick Fury for the last character discussion intentionally. Even though he has not been featured in his own feature movie - he will be star in a Disney+ project Secret Invasion (TBA) - Nick Fury plays an invaluable role in the MCU. From the first time we see Nick Fury appear in the end-credit scene in Iron Man (2008) to discuss The Avenger Initiative, it became apparent that he was instrumental to the success of the MCU, both through his leadership of S.H.I.E.L.D. and hard-nosed determination to protect others - even if he has to use unauthorized means at times.

His guidance in sending Natasha Romanoff/Black Widow to help and monitor Tony Stark in Iron Man 2 (2010) asserts his leadership over the Avengers team. In The Avengers (2012), Nick Fury is responsible for bringing together, manipulating, and manufacturing inspiration to the Avengers leading up to the battle with Loki in Manhattan. His clandestine plans being uncovered in Captain America: The Winter

Soldier (2013), Nick Fury's motives are once again questioned among the superheroes under his leadership. However, he shows his resolve when, before he is taken in the snap, he sends a crypted message to

Captain Marvel in Avengers: Infinity War (2018). Instrumental in helping Carol Danvers in Captain Marvel (2019), and after being brought back from the snap (Avengers: Endgame, 2019), Fury uses whatever means necessary in Spider-Man: Far from Home (2019) to coerce Peter Parker to battle the Elementals and Mysterio - sort of 10.

Nick Fury represents a strategically-minded leader who is willing to stick to his vision regardless of popularity. Often choosing to work behind the scenes rather than out in public, he uses his cunning wit and determination to take charge of positions and carry out missions. He is also someone that possesses the foresight to predict and plan for events well in advance, while also relying on the strong female character Maria Hill. Anyone who believes they possess skills in strategy and prediction, along with strong leadership, could look to Nick Fury for inspiration.

#### A Note on Inclusion

As previously stated, even with the recent emphasis on underrepresented characters receiving feature films (e.g., Black Panther, 2018; Captain Marvel, 2019), the MCU to this point has relied heavily on Caucasian male leads to tell the stories in the shared universe. As such, even as much care was taken in this essay to include as diverse array of characters as possible, the content material did not allow as much diversity as desired. It is worth noting that confirmed and rumored upcoming projects will introduce a more diverse set of heroes and characters into the MCU - both in terms of racial and ethnic makeup (e.g., Eternals, expected 2021; Shang Chi and the Legend of the Ten Rings, expected 2021; Ms. Marvel, expected 2021; Blade, TBA; She Hulk, TBA; Iron Heart, TBA; Miles Morales) and abilities (e.g., Moon Knight, TBA - Marc Spector/Moon Knight struggles with multiple personality disorder).

It is also worth noting that the MCU itself is an evolving universe, and efforts are continuous in including more diversity in both storytelling and characters in order to attract a wide range of viewers and fans. The efforts made by the MCU are admirable, and the popularity of its movies and projects provides an emphasis for some to watch stories involving diverse characters that may not have otherwise chosen to do so. Perhaps in the future we will see more developed

Social SEcdietnocrieasl roles for characters like Luis in Ant-Man and the Wasp: Quantumania (TBA), Valkyrie in Thor: Love and Thunder (expected 2022), Mary Jane in Spider-Man 3 (expected 2021), and Maria and/or Monica Rambeau in

Captain Marvel 2 (expected 2022) - Monica Rambeau, Maria's daughter, is slated to appear in the Disney+ series WandaVision (2021). As more projects are developed and characters introduced, the MCU will become more inclusive to an even greater number of fans. In the time being, however, it is the hope that the effort made in this essay will engage as many readers as possible from diverse backgrounds and makeup.

#### A Note on Story Arc

This essay focused on the application of the MCU in helping students find fit within their institutions and take ownership of their educational experience. To do so, we discussed the similarities between college and the Avengers headquarters, comparison, inspiration, and lessons from various MCU characters, and the need for increased and continued inclusion. To conclude, we will briefly discuss the story arc and what it means to all of us.

A story arc is the overall narrative told about a character over the various movies and projects in which they are involved. A great example of using a story arc to tell a character's narrative lies with Bruce Banner/Hulk. Due to contract stipulations - the character's distribution rights for stand-alone movies belong to Comcast/Universal, which is why The Incredible Hulk (2008) is his only title role within the MCU - his story has been told through projects in which he appears with other Avengers (Havard, 2020). For instance, his story arc of accepting the importance of Hulk is told through Thor: Ragnarok (2017), Avengers: Infinity War (2018), and Avengers: Endgame (2019). The same - minus the contract stipulations - can be said about War Machine, whose inspiring story is told through ten MCU projects. We will learn more about Colonel James Rhodes/War Machine in the Disney+ series Armor Wars (TBA).

Just as characters in the MCU follow a story arc, so too does everyone reading - and writing - this narrative. Further, just as each character's story arc in the MCU has evolved, the same can be said about each of us. For characters like Doctor Strange, we are just seeing the beginning of their arc - Doctor Strange in the Multiverse of Madness is expected in 2022. For others, like the Guardians of the Galaxy, we are currently approaching their full development - if you believe rumors that Guardians of the Galaxy Vol. 3 (expected 2023) will be the last project for the current team. And, if you see yourself as a supporting character in the MCU like Sam Wilson/Falcon, Bucky Barnes/Winter Soldier, Wanda Maximoff/Scarlet Witch, Vision, or Clint Barton/Hawkeye, rest

10. An end-credit scene revealed he was taking a vacation while Talos tried to handle his responsibilities.

assured that we will soon learn more about their characters and story arcs in various Disney+ series (The Falcon and the Winter Soldier, expected 2021; WandaVision, 2021; Hawkeye, expected 2021).

An individual's story arc is one that changes and alters as they encounter relevant events. At each turn - or fork in the road, if you prefer the metaphor - an individual is in charge of their decisions and story narrative, although it may not feel that way all the time. This is where a popular refrain it's not what is handed to you, but how you handle it (paraphrased) comes into play. Each of us has the ability to take control of our story arc and make the most of our situations and environments - whether in school, college, work, or life. It is up to us to shape the present and future that we want for ourselves - and to do our best to react to fortunate and unfortunate situations for our overall benefit, health, and safety. The characters and situations discussed in this narrative each chose a destiny or path - or at least their writers did - and that is something we all can apply to our lives. Choose what you want, and strive to reach that goal while trying to improve as a person each and every day. Finally, hopefully reading about popular MCU characters and their personalities can help you learn more about yourself and find fit in your current environment, whether you identify with one or several characters. Remember, with great power comes great responsibility. Now go forth and break some eggs.

Thank you for coming along on the adventure with me,

Cody T. Havard, Ph.D. The University of Memphis

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# Thrown Against a Sharp White Background

BY JAQUELIN MORA

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My work explores the issues surrounding race and racism in America. Through photography I wanted to show my experience with race in a predominately white environment and how race is still a common factor in today's society when constructing first impressions. People of color continue to be vulnerable to racism in the face of a white America; race will stand out and attract attention

when placed in front of a white background. I would like to pay special regards to Brian J. Moffitt and Brian Hayes, my teachers from the course Rams Read. Thank you for suggesting that my artwork should be seen by others and that my photography is worth publishing.



White paper canvas with black acrylic paint and colorful face paint, 2021.

# Topography

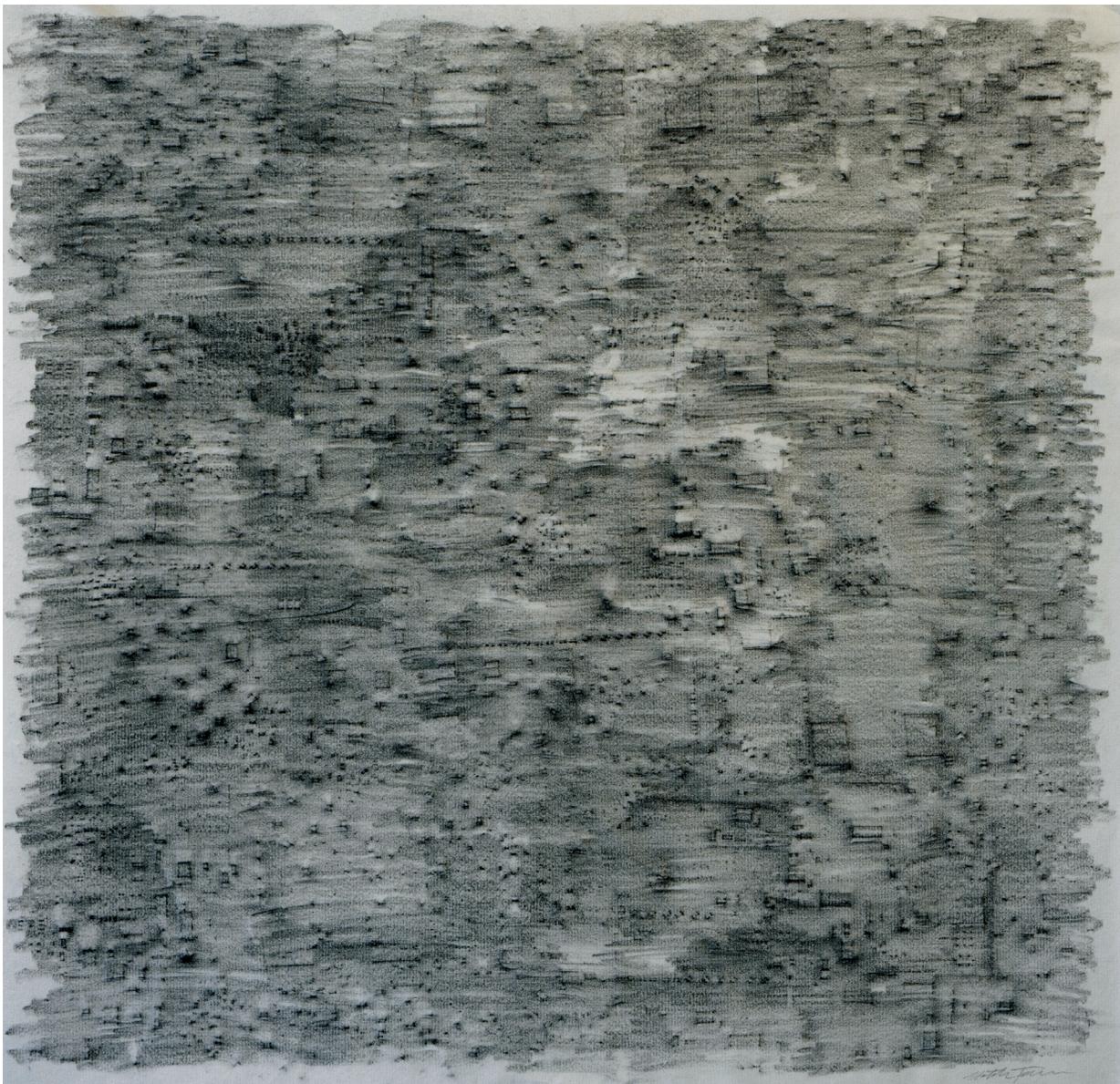
BY NATALIE FREEMAN

COLORADO STATE UNIVERSITY

Topography conjures images of the macroscopic scale: compilations of the encompassing landscape. At its core, topography is the practice of generating an artificial representation of a natural object or physical form. I have also noticed that artificial

forms generate natural representations. Using the technique of graphite rubbings to produce images, I utilized circuit boards to generate the resulting image. I believe the natural and artificial worlds may not be so disparate, but are intertwined and

unified with one another. As nature seems to be surpassed by technology, I speculate that nature will eventually reemerge as a product of technology, creating a cycle of two states: the natural and the artificial.



Graphite on Mulberry paper, 13x13 in, 2021

# To Love Others, You Must First Love Yourself

BY NATALIE FREEMAN

COLORADO STATE UNIVERSITY

Women are valued for their bodies—how their physicality can serve and satisfy others. This unwanted objectification reveals a disparity between a hyper-cultural focus on the female form, but a lack of research of female anatomy within science and medicine. Our understanding of female anatomy and acceptance of concepts surrounding female pleasure has continually lagged understanding of male anatomy and acceptance of male pleasure. Even when sex education isn't a point of contingency, curricula censor topics and behaviors integral to every human being, regardless of identity.

There must be more education, conversation, and representation of female pleasure and female masturbation. It is hypocritical that women are sexualized perceived as sexual beings, but are then shamed if they enjoy any sexual pleasure. Conversely, if a woman is not sexualized or does not feel a need to seek out sexual pleasure, then she is also shamed.

We can't win.

These issues are pervasive to my life. They enlighten my worldview, shape my behaviors, and impact me both in obvious and unconscious ways. I take up space I didn't think I deserved to enhance recognition, advocate for change, and empower others to do the same.



Mixed media on wood, 36x48 in, 2022

# Repose Series

BY NATALIE FREEMAN

COLORADO STATE UNIVERSITY

My interest in the sciences and humanities informs my creative practices, while my creative thinking informs my various studies. One summer, I worked in Colorado State University's Archaeology Repository, spending numerous hours handling and cataloguing approximately

seventy bison skeletons stored within the collection. I grouped the same types of bones with one another, and felt as if I was bringing this herd of bison together: a box of vertebrae here, a shelf of skulls there. But, while I was turning individuals into collectives, I was also scattering in-

dividuals across the room. I created a series of illustrations representing specimens within the collection. I wanted to experiment with the interplay between representation and abstraction while maintaining an accurate depiction of each osteological specimen.



Repose No. 1 (Hard Palate)



Repose No. 3 (Thoracic Vertebrae)



Repose No. 2 (Rib Fragments)



Repose No. 4 (Dentary)

Micron pen, 18x24 in each, 2020

# Myelin, Mycelium, and the Seat of Consciousness

BY NATALIE FREEMAN

COLORADO STATE UNIVERSITY

The human skeleton is an object of study in the fields of medicine and science and a symbol with a complexity of applications within art history; but rarely is the human skeleton simply appreciated for its form. My academic studies involve both science and art. Working in a human osteology lab, I could not prevent myself from appreciating the human skeleton for its artistic formal qualities while also analyzing

the functional and medically relevant qualities of human bones. This extensive and intimate study of the human form gave me the opportunity to look at each bone in isolation, turning it over in my hands—scrutinizing every feature—and I felt as if I was holding delicate sculptures every day. I wanted to convey my experiences and my appreciation for the design of the human skeleton through an artwork

and corresponding series of studies. By pairing scientific illustration with creative interpretation, I carve out a category of visualization between the diagrammatic and the abstract, the informational and the interpretive—the objective and creative.



Ink and gold leaf, 24x24 in, 2021

# Leptogorgia polyamides

BY NATALIE FREEMAN

COLORADO STATE UNIVERSITY

Leptogorgia polyamides is part of a larger series entitled Human's Nature, which reimagines the tradition of scientific illustration through the incorporation of pollution: encapsulating the beauty of organic forms that are haunted by artificial substitutions. Our propensity to amass waste and deposit it in the surrounding environment is largely

unchecked. Although humanity has been aware of the climate crisis for decades, our governments, legislations, and daily habits do not reflect the essential changes needed to mitigate this global degradation. Contemporary human behaviors generate single-use waste that form entire islands of plastic trash that float through the oceans. Scientific

illustration is an important tool in cataloguing biological organisms so they may be studied and understood. If we continue on our current path, then we cannot be upset by the consequences of our (in)action, but must appreciate the tragedy and the beauty within the cataclysmic mess we have made.



Gouache, acrylic, and ink, 24x24 in, 2021

# Of the Carpentry Profession

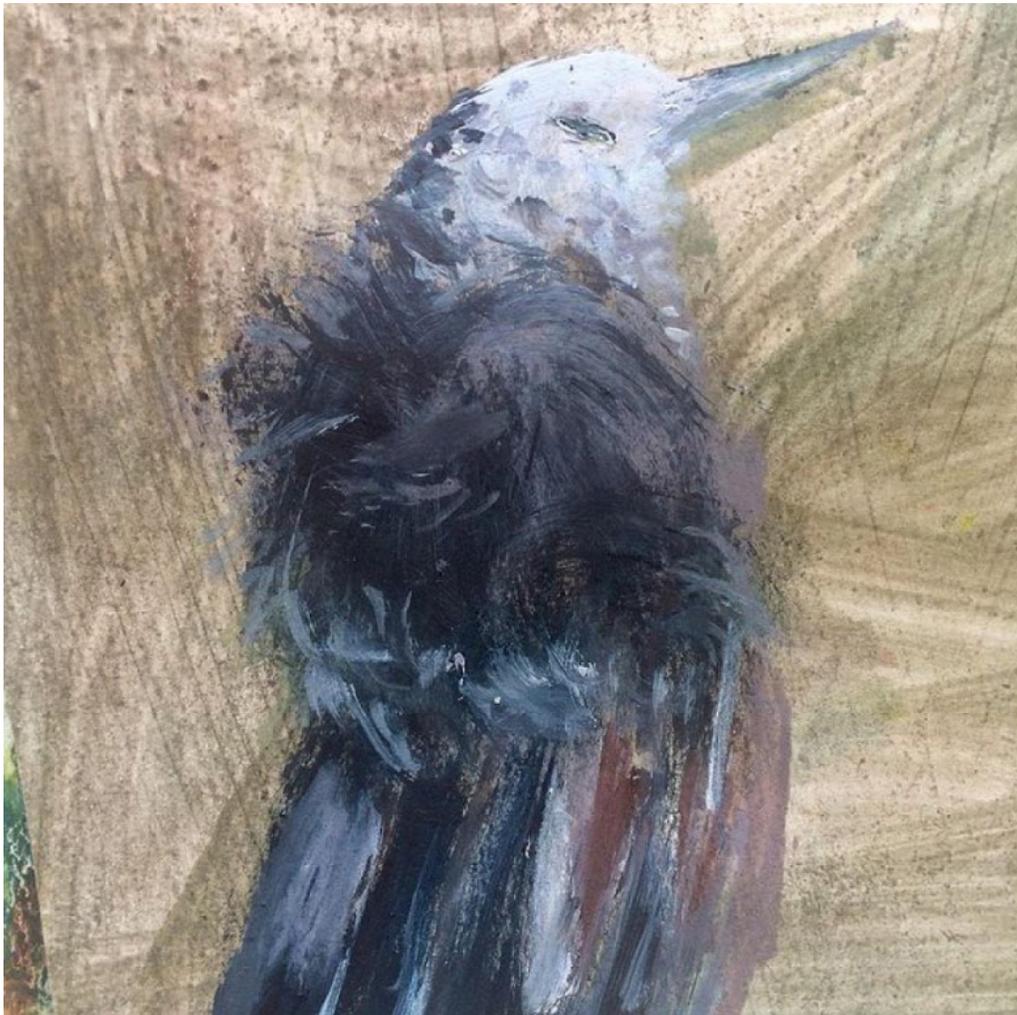
BY ELISABETH FAHRENBRUCH

COLORADO STATE UNIVERSITY

Color is the closest I get to spirituality. My art is largely focused on grief, and its rambling and stumbling path. I am also inspired by science and its empirical aspects. My shaky lines are largely influenced by strata, or layers in rock, while my bird death portrait is a pragmatic, albeit sad, study of decay. My iteration of Hell came from Dante Alighieri's *Inferno*, with seven blue, concentric layers. His center of the underworld

is the center of gravity and sin, which convinced me that light wavelengths and Wein's displacement law likely lose meaning, resulting in, at the very least, gravitational redshift. I did add a little red ink to the center, but wanted to focus on the red and warmth implied by the wooden frame of the canvas when illuminated. I hung it in my mother's bedroom in order to help accept her passing, and focused on the sunlight.

Though I have resisted advice to make art personal and solely about my own loss, I found it was the only thing I could make decent art about. But death is not rhetorical or only a subject. Red and all color loses electrons and oxidates. Light, and therefore color and life, is ephemeral. The title was inspired by a poem by Albert Caerio.



Oil paint on paper, 4.5' x 7', 2021

# Short Term Effect of *sericea lespedeza* on Strongyle Fecal Egg Counts in Mature Horses

BY MARRISSA J. BLACKWELL, ANTHONY BRITT, MADISON FAGAN, KARI K. TURNER, KYLEE J. DUBERSTEIN  
UNIVERSITY OF GEORGIA

## Abstract

Control of parasitic infections in the equine industry is primarily accomplished through deworming programs that implement the use of anthelmintics, with the primary target in mature horses being small strongyles. Due to widespread use of common anthelmintics, the overall effectiveness of these treatment plans is at risk of diminishing. Though there have not been significant breakthroughs in equine anthelmintic resistance, small ruminant research has focused on non-chemical control for gastrointestinal nematodes that involves feeding plants containing condensed tannins (CT), namely *sericea lespedeza* (SL), to combat parasite populations. While no such studies have been conducted on equine subjects, SL may have potential as an alternative treatment. The objective of this study was to analyze the effects of SL as compared to russell bermudagrass (RB) with regards to parasite load in horses, as well as assess palatability and CT content of SL. Sixteen horses were divided into two treatment groups, each receiving 1.5% of body weight in either SL or RB hay daily over a four week period. Fecal egg counts (FEC) performed by mini-FLOTAC technique were conducted at d 0, 14, and 28 of the feeding trial as well as on d42 (two weeks after removing from diets). Average initial (d0) FEC for horses on both treatment groups was high and not statistically different (SL=393±49, RB=493±51, P=0.98). All horses showed significant increases in FEC by d42 (P<0.001), with no differences between treatment groups (P>0.05). However, the overall binding CT content of SL used in this study was considerably lower than values reported in previous small ruminant research. In regards to palatability, horses on the SL diet had significantly lower daily refusals, suggesting that SL was more palatable than RB. While no effect on parasite load was observed in this study, future studies could incorporate longer feeding times, feeding forages with higher CT content, and the combination of feeding SL in conjunction with a deworming program.

## Introduction

Control of parasitic infections in the equine industry is primarily accomplished through deworming programs that implement the use of anthelmintics. In the 1960s, rotational deworming practices gained popularity as a significant reduction in the most prevalent parasite, large strongyles (*Strongylus vulgaris*), was noted. Due to the widespread use of anthelmintics (dewormers), the large strongyle population was virtually eradicated. Today, the most predominant parasitic threat to horses is small strongyles (cyathostomins).

Cyathostomins have a unique life cycle. Eggs are passed from adult worms through the feces to begin development in pasture. Larval stages 1-3 take place here with the rate of development highly dependent on climate. Once the infective L3 stage is reached, the larvae become encased in a protective membrane equipping them with the ability to withstand freezing temperatures and allowing them to remain on pasture for longer periods of time. The larvae are ingested by the horse, allowing for the removal of the protective sheath as they enter the mucosa of the large intestine. Unlike large strongyles, small strongyles have the unique ability to encyst themselves in the gut wall until conditions

are favorable for their survival. The L3 larvae can remain encysted for up to 2 years. Once they emerge, larvae continue developing to the L4 and L5 stages, eventually reaching maturity as an adult parasite in the cecum or colon. At this stage they lay eggs to be passed through the feces as the next generation of cyathostomins begin.<sup>1</sup> This distinctive trait of being able to encyst in the intestine has led to the development of small strongyle resistance to rotational deworming, as most anthelmintics are only able to kill the parasites in the lumen of the intestine. In response to the increasing prevalence of anthelmintic resistance, the AAEP (American Association of Equine Practitioners) released a new set of recommendations that base parasite control on individual fecal egg counts rather than broadly deworming all horses at regular intervals.<sup>2</sup> However, the industry's practices are more prominently based in tradition and have lagged in adopting this evidence-based approach.<sup>3</sup>

Due to the widespread use of anthelmintics at high frequencies, as well as a lack of new methods, the overall effectiveness of conventional anthelmintics is at risk of diminishing.<sup>1,3</sup> Anthelmintic resistance is an inherited trait that can be passed from one generation of parasite to the next.

The great population size in conjunction with high levels of genetic diversity has allowed small strongyles to rapidly develop resistance to anthelmintics. Currently, there are three main classes of anthelmintics: benzimidazoles (fenbendazole, oxbendazole), tetrahydropyrimidines (pyrantel), praziquantel and macrocyclic lactones (ivermectin, moxidectin). Possibly due to poor deworming practices, resistance to these anthelmintics has been reported worldwide.<sup>4</sup> The World Association for the Advancement of Veterinary Parasitology considers anthelmintic resistance to occur if there is a 95% or less effective rate of the drug to the target parasite load.<sup>5</sup> It has been shown that the percentage of farms in the southern United States found to harbor resistant small strongyles was 97.7% for fenbendazole, 53.5% for oxbendazole, and 40.5% for pyrantel pamoate. In this study, 0% of farms harbored small strongyles that were resistant to ivermectin, however, it has been recently shown that resistance to ivermectin is common in another equine parasite, ascarids.<sup>3</sup> Substantial anthelmintic resistance has been noted among other livestock species as well, particularly small ruminants. The first reported case of anthelmintic resistance in the United States dates back to the late

1950s when producers discovered their sheep were showing resistance to phenothiazine.<sup>6</sup> Soon thereafter, reports followed exposing resistance to benzimidazoles, a class of anthelmintics still used today.<sup>7</sup> In the past 50+ years, as new anthelmintics have been produced, parasite resistance has eventually followed, leading researchers to look to new mechanisms to combat their ever growing problem.

Though there has not been a significant breakthrough in equine anthelmintic treatment, small ruminant research has recently focused on non-chemical control methods for gastrointestinal nematodes (GIN) that involve feeding plants containing condensed tannins to combat populations such as *haemonchus contortus*.<sup>8,9</sup> Many organizations such as the American Consortium for Small Animal Ruminant Parasite Control have sought to further study the potential of these plants, more specifically sericea lespedeza (SL). Many research studies have shown that SL is effective in reducing parasite counts in small ruminants, though the exact mechanism by which this occurs has still not been confirmed.

Studies on the effectiveness of SL on parasite populations in small ruminants have shown promising results. Terrill et al. (2009) showed a reduction in FEC of goats fed a diet of grain and either 25%, 50% or 75% SL as compared to bermudagrass, with a greater reduction in FEC seen with higher percentages of SL fed.<sup>10</sup> Lange et al. (2006) reported lambs fed SL hay for 7 weeks saw a 67-98% reduction in FEC as well as adult worms as compared to counterparts fed a bermudagrass diet.<sup>11</sup> Further demonstrating the efficacy of SL, Min et al. (2005) found Angora does grazing SL for 81 days resulted in a reduction of FEC, adult worms, and larval activity.<sup>9</sup>

Due to the fact that tannins were developed as a defense mechanism for plants, the first known variety of SL was extremely high in tannin content and therefore had extremely low palatability. Because of this, the original SL introduced to the United States in response to drought was not readily grazed by livestock, and lespedeza varieties remained unpopular as a livestock forage sources for many years. Over time, lespedeza has become a viable forage source, with several varieties being developed that contain overall lower tannin content, fine stems, higher protein content, and in some varieties, higher digestibility.<sup>12</sup> Though low tannin content improves palatability, higher tannin content has been correlated with lower fecal egg counts in small ruminants. SL has historically been fed to horses, with many current nutritional websites mentioning its virtues, namely increased protein and calcium levels and acceptable digestibility when harvested properly. While

not currently widespread in popularity, it is evident that SL has been, and is still, fed safely to horses, though no research is readily available examining the anthelmintic effects of CT in the equine diet. The aim of this study was to assess the effects of short term (4 week) feeding of SL on existing strongyle populations in adult horses as well as assess palatability and CT content of SL as a forage source for horses. Small strongyles were analyzed for this study as they are the priority target in deworming protocols and are closely related to the *haemonchus contortus* species that small ruminant research has previously focused on.

**Methods**

**2.1 Treatment Groups and Diet**

All protocols were approved by the UGA Institutional Animal Care and Use Committee. Eighteen stock-type horses (11.7±3.3 yrs, 552±49 kg) were used in a 4 week feeding trial to study the effects of daily feeding of SL hay as compared to Russell bermudagrass (RB) hay on existing parasite load. Horses had previously been group housed in large (12+ hectare) pastures and had not received anthelmintic treatment for a minimum of 4 months prior to initiation of the study. FEC were performed on all horses as described below on d0, and horses were then randomly assigned to one of two groups (SL or RB). Body weight (BW) of all horses was recorded by electronic scale on d0, and forage amounts were assigned based on this weight. Beginning on d0, 9 horses were randomly placed on a diet of 1.5% BW in SL hay in addition to pasture turnout, and 9 horses began receiving a control diet of 1.5% BW in RB hay in addition to pasture turn out. Amount of hay fed is based on recommendations for equine dry matter intake. Horses were housed in stalls for

approximately 6 hr/d to allow for individual consumption of hay. For the remainder of the day, horses were housed in one of two adjacent small pastures (2.8 hectare) for turnout, with each pasture having an equal number of RB and SL horses. Hay was weighed using an electronic scale each day, and any hay left uneaten at the end of the six-hour period was weighed and recorded.

**2.2 Fecal Collection Protocol**

Individual fecal samples were collected on two consecutive days via rectal palpation at the following time points:

- Prior to horses beginning forage diets (Day 0)
- Two weeks into feeding trial (Day 14)
- Last day of feeding trial (Day 28)
- Two weeks after end of trial (Day 42)

All samples were stored at 35°F, and samples were analyzed within one week of storage to ensure viability.

**2.3 Fecal Analysis**

Two subsamples from each FEC collection time point were analyzed, giving a total of 4 subsamples for each time point (i.e., 2 subsamples from 2 consecutive days for D0, etc.). Due to the proven accuracy of this method, fecal analysis was performed using the mini-FLOTAC procedure as described by Barda et al., 2014.<sup>13</sup> Briefly, each subsample was created by measuring 5 grams of fecal sample with a Mettler-Toledo Bd202 weigh scale (Mettler-Toledo LLC., Columbus, Ohio). The fill-FLOTAC container (Naples, Italy) was filled with 45mL of Feca-Med sodium nitrate solution with a specific gravity of 1.200 (Vedco Inc., Missouri). The conical collector on the lid of the fill-FLOTAC container was filled with the subsample and the surface was leveled. The lid with the subsample was screwed on the fill-FLOTAC container tightly. The subsample was agitated by lifting the plunger

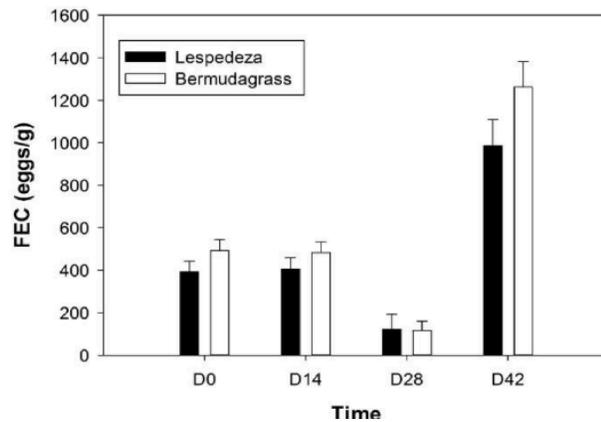


Figure 1. Mean fecal egg count over time for horses on either a lespedeza or bermudagrass hay diet. Lespedeza: Horses were individually fed 1.5% of body weight in sericea lespedeza hay daily. Bermudagrass: Horses were individually fed 1.5% of body weight in Russell bermudagrass hay daily.

Time: Represents number of days on hay diets. Overall treatment effect: P=0.14

on the lid up and down while twisting until the subsample was completely homogenized with the sodium nitrate solution. The mini-FLOTAC slide's three parts were assembled by following manufacturer's instructions. The chambers were filled with the homogenized sample from the fill-FLOTAC with the pipette attached to the lid while holding the mini-FLOTAC assembly at an angle. The sample was then allowed to sit and rest for 10 minutes to allow the eggs to rise and adhere to the reading disc grids. Slides were then read using the 10X objective lens of a Labomed binocular microscope (Labomed Inc., California). The fecal egg count was obtained using the equation below:

$$\frac{(\# \text{ of eggs in Grid 1} + \# \text{ of eggs in Grid 2}) \times 5}{5} = \text{Fecal Egg Count}$$

2.4 Statistical analysis

Four replicates of FEC were generated for each time point and incorporated into the statistical analysis. Time points were statistically analyzed with SAS version 9.4 (Cary, NC, USA) using proc mixed for repeated measures over time. Time, treatment and treatment by time interactions were analyzed for each parameter, with a post hoc PDIFF comparison used to compare treatment means within each time point. Data with P<0.05 were considered statistically significant.

2.5 Assessment of condensed tannin levels in hay samples

Hay samples were collected from at least 15 bales of each hay using a standard hay corer. Proximate analysis of hay samples was performed, and condensed tannin levels were

analyzed using two different techniques:

2.5a Method 1: Extractable procyanidin analysis

Proximate analysis was performed and extractable procyanidins quantified via the method adapted from Payne et al. 2010 and described below:<sup>14</sup>

Extraction of lipids from hay samples

A Soxhlet apparatus was employed to extract the lipids from the two types of hay. A representative sample of ground hay was weighed into a Whatman cellulose extraction thimble (43 mm *i.d.* × 123 mm *e.l.*, VWR International, Suwanee, GA, USA), and the mass recorded. Glass wool was placed in the mouth of the thimble to ensure that the contents would remain in place during extraction, which was performed using ~350 mL of hexanes for 20 h. Upon completion, the thimble was removed from the Soxhlet extraction tube and the contents were air-dried overnight. Hexanes were removed from the lipid extract via a Büchi Rotavapor R-210 using a V-700 vacuum pump connected to a V-850 vacuum controller (Büchi Corporation, New Castle, DE, USA) at 45°C. The crude lipid portion was weighed for gravimetric analysis.

Extraction of phenolic compounds

Each defatted hay sample was removed from the air-dried thimble and placed in a 500-mL Erlenmeyer flask. A 100-mL portion of extractant ((CH<sub>3</sub>)<sub>2</sub>CO/H<sub>2</sub>O/CH<sub>3</sub>COOH solvent mixture, 70:29.5:0.5 *v/v/v*) at a ratio of ~6:10 defatted hay:extraction solvent (*w/v*) was used to extract the phenolic compounds. Briefly, the contents in the flasks were heated

at 50 °C for 30 min in an orbital-shaking water bath (New Brunswick Scientific, New Brunswick, NJ, USA). The extraction was performed 3×, the supernatants pooled and acetone removed by the Rotavapor. The aqueous portion was poured into crystallization dishes (100 × 50 mm, dia. × H), covered with filter paper, and placed in a -80 °C freezer until completely frozen. The samples were then lyophilized (Labconco Freezone 2.5 L freeze dryer, Labconco Corp., Kansas City, MO, USA). The dried extract was weighed, placed in amber-colored vials, capped and stored at 4 °C until analyzed. The lipid and phenolic extractions were completed in triplicate for each hay sample.

DMAC assay

The total procyanidins content in the acetic crude extracts were quantitated by the 4-(dimethylamino) cinnamaldehyde (DMAC) assay according to Payne *et al.* (2010).<sup>14</sup> Briefly, 50 µL of methanol and 50 µL of standard solutions (+)-catechin or 50 µL of hay crude phenolic extracts, dissolved in methanol, were respectively added to a COSTAR® 96-well clear, non-sterile, non-treated microtiter assay plate and then mixed with 250 µL of the DMAC solution. This reagent was prepared fresh each day by dissolving 30 mg of DMAC in 30 mL of 1:9 (*v/v*) HCl and reagent alcohol. Absorbance readings were recorded with a FLUOstar Omega microplate reader (BMG LABTECH Inc., Cary, NC). Assay conditions comprised bottom scanning every 1 min over 12 min at λ = 640 nm at an incubation temperature of 25 °C. The plate was shaken for 3 s before

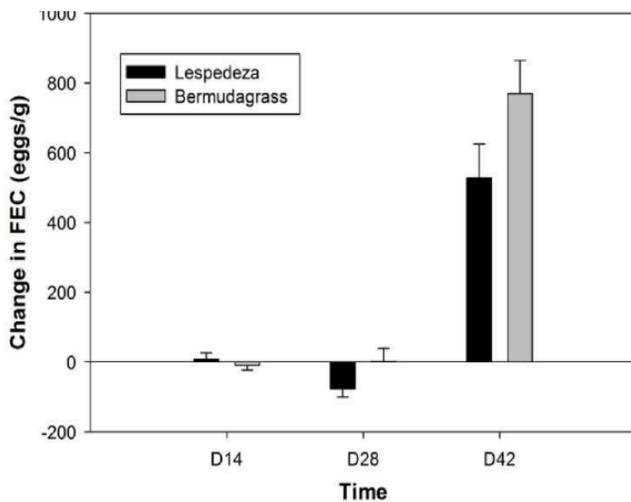


Figure 2. Change in mean fecal egg count over time for horses on either a lespedeza or bermudagrass hay diet. Horses remained on hay diets from D0 to D28.

Lespedeza: Horses were individually fed 1.5% of body weight in sericea lespedeza hay daily

Bermudagrass: Horses were individually fed 1.5% of body weight in Russell bermudagrass hay daily

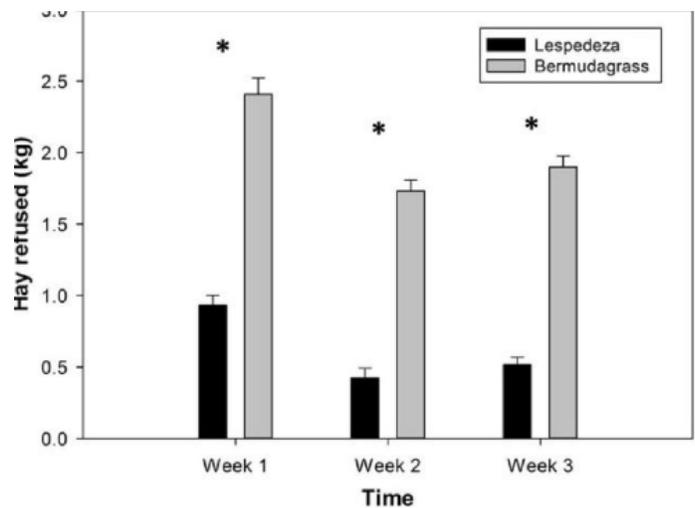


Figure 3. Hay refusals for horses fed either a lespedeza or bermudagrass hay diet.

Lespedeza: Horses were individually fed 1.5% of body weight in sericea lespedeza hay daily

Bermudagrass: Horses were individually fed 1.5% of body weight in Russell bermudagrass hay daily

\* indicates difference in treatment groups at specific time point (P<0.01)

Overall treatment effect: P<0.0001

Overall treatment effect: P=0.50

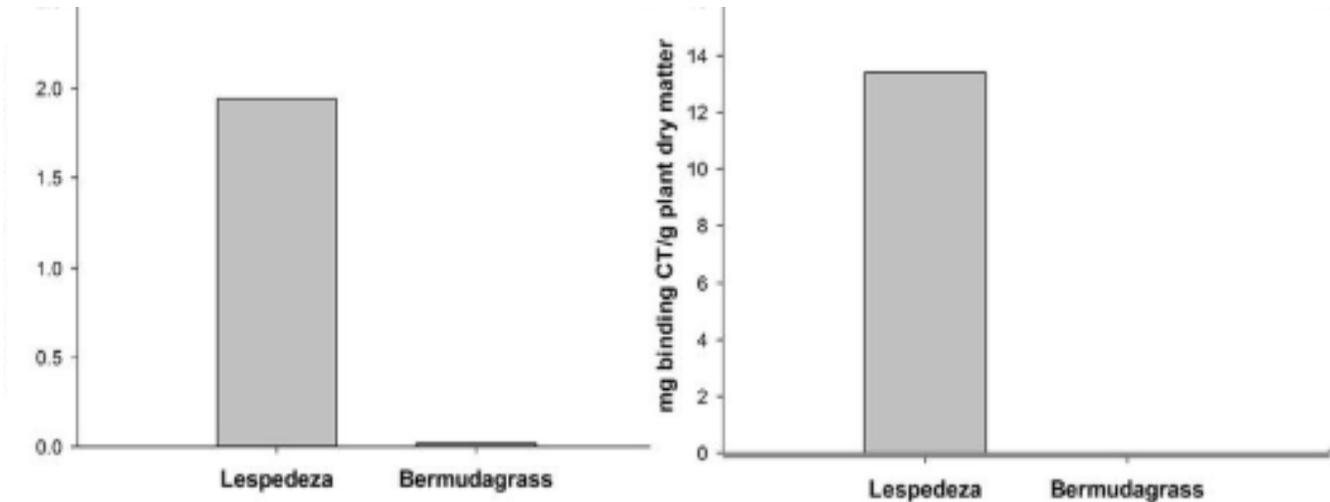


Figure 4. Condensed tannin analysis of sericea lespedeza hay and Russell bermudagrass hay diets. Figure 4a (left) represents the extractable procyanidin levels of hay fed to horses in this study. Figure 4b (right) represents the protein precipitable condensed tannin levels from hay collected the subsequent year from the same fields and harvest time.

measurement. The maximum absorbance during 12-min readings was used for calculation. Total procyanidins contents were expressed as mg (+)-catechin equivalents/g hay sample (f.w.). All assays were performed in triplicate.

2.5b Method 2: Determination of protein precipitable CT

Additionally, RB and SL hay samples from the subsequent year's cutting of the same harvest time and same fields were analyzed using a different technique to measure both total phenolic content as well as levels of protein precipitable condensed tannins (biologically active tannins). Samples from each type of hay were sent to Texas A&M Aglife Research, and protein precipitable CT were analyzed using methods described by Naumann, et al. 2014.<sup>15</sup>

Results

There were no statistical differences noted between treatment groups at any time point during the feeding trial. Both treatment groups at Day 0 show relatively high parasite counts (SL=393±49, RB=493±51 epg). By comparison, at D28 of the study, a decrease was seen in parasite count for both treatment groups (SL=123±70, RB=116±44 epg). At D42 (two-weeks post-trial) the FECs for both treatment groups was significantly higher (SL=986±124, RB=1262±119 epg) than time points between D0 and D28 (Figure 1). Changes in FECs over time were recorded in order to further examine changes in parasite populations relative to individual initial FEC, with no differences noted between treatment groups at any time point (Figure 2).

Weigh back data for the first 3 weeks of

the study is summarized in Figure 3. Over the course of the first three weeks, horses receiving SL diets had less hay refused as compared to RB horses (P<0.0001). By week 4, horses consumed most of the hay on both diets, and weigh backs were minimal and not recorded. Proximate analysis showed that SL hay had comparable moisture levels to RB, was somewhat higher in carbohydrates and lipids (SL= 70.23, 2.06%; RB= 65.92, 1.62% respectively) and lower in protein (SL=11.67%, RB=16.93%) (Table 1). CT content of SL hay was higher than that of RB measured both by extractable procyanidin levels (Figure 4a) as well as by precipitating CT levels from subsequent year's hay samples (Fig 4b).

Discussion

The aim of this study was to assess the nutraceutical value of SL as compared to RB in regards to parasite load in horses and to compare these results to studies done in small ruminants fed SL. The results of our trial demonstrate that feeding 1.5% BW in SL over a short time period of 4 wks had no effect on reducing existing FEC or in preventing an increase in parasite populations in horses. Our data show that at the beginning of this feeding trial, both experimental groups had relatively high parasite counts. By D42 these numbers had drastically increased beyond the original levels. This data reflect the normal 30-day life cycle of small strongyles that occurs under favorable conditions where the horse ingests parasite larvae from infective pastures that then develop in the intestines and lay eggs to be passed again. Given the higher than recommended stocking rate in this trial (<0.4 hectare/animal), by D42 we would

expect to see an increase in parasite loads as compared to when horses started the project and had been housed in larger pastures. The increase in FEC seen in both groups implies that feeding SL for a short time frame did not beneficially affect parasite load in mature horses. These findings are contradictory to the results of several previously cited studies in small ruminants. A study conducted by Lange et al (2006) examined the effects of SL on parasite load in lambs when fed as a hay for 49 days and then removed for 14 days.<sup>11</sup> In this study, feeding SL ad libitum reduced worm burden by an anywhere from 67-98% as early as 7 days after initiation of the diets. Removal from SL for 2 weeks post-feeding trial resulted in an increase in FEC, but SL fed lambs still had significantly lower FEC as compared to those fed bermudagrass. By contrast, horses in the current study showed no decrease, and in fact a dramatic increase, in FEC while on SL diets.

A potential explanation for the lack of anthelmintic effect of SL in this study may be the levels of CT found in the forage when analyzed. Both RB and SL samples for our study were analyzed for CT content using two different methods. In the first method, CT levels were assessed by analyzing the procyanidin content of both hays. While SL hay did have a higher procyanidin content as compared to that of RB hay (1.94 mg/g vs 0.02 mg/g), it was considerably lower than CT levels reported for SL in other small ruminant studies (0.194% as compared to levels of 5% or higher).<sup>16</sup> However, Mechineni et. al (2014) reported that the majority (>90%) of CT in SL forage are of the prodelphinidin type rather than procyanidin.<sup>17</sup> Additionally, the first method used analyzed only extractable CT rather

%	Russell Bermudagrass	Sericea Lespedeza
<b>Moisture</b>	9.76	9.90
<b>Crude Lipids</b>	1.62	2.06
<b>Crude Protein</b>	16.93	11.67
<b>Carbohydrate</b>	65.92	70.23
<b>Ash</b>	5.77	6.13

Table 1. Proximate analysis for Russell bermudagrass and sericea lespedeza hays fed to horses for duration of study.

than also accounting for protein bound CT. To examine this further, samples from the subsequent year's hay crops of the same month and field were analyzed for protein precipitable condensed tannins which are generally considered to be biologically active. Again, the levels of CT in SL (13.4 mg/g, 1.34%) were higher than that of RB (0 mg/g), but considerably lower than what was reported by Mechineni et. al in 2014 (125 mg/g, 12.5%).<sup>17</sup> It is well understood that high levels of CT result in reduced palatability, which may explain why SL in our study was so readily consumed by horses. However, future studies may want to investigate how prodelphinidin and procyanidin types produce anthelmintic effects as well as explore feeding varieties of SL containing levels of CT more closely resembling that which has been fed to small ruminants. Despite the vast literature available regarding tannins and their effect on the small ruminant gastrointestinal parasite populations, little data exists in regard to anthelmintic effects of SL in other species of livestock. Our study offers viable preliminary data to act as a basis for future studies. Though no significant effects on strongyle populations were noted, our data provided insight on alternative methods for future studies as well as justification to suggest that SL is a palatable forage that could potentially act as a highly nutritive roughage for horses.

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# Bowdoin Confederates: Why Maine Students Fought for the South During the Civil War

BY ARTUR KALANDAROV

BOWDOIN COLLEGE

## Introduction

During the Civil War, Bowdoin College earned a reputation for producing Union leaders who contributed significantly to the North's victory over the Confederacy. The most famous of these men was Joshua Lawrence Chamberlain, a Bowdoin professor who joined the Union Army during his sabbatical and would go on to become a renowned soldier best known for defending Little Round Top during the Battle of Gettysburg against repeated Confederate assaults in 1863. Oliver Otis Howard, another former student, also became a key player in the war, rising to the rank of general and later overseeing the Freedmen's Bureau during Reconstruction. Bowdoin's Civil War record, however, went far beyond the heroic military careers of Chamberlain and Howard. As a community, the college had the highest percentage of students and alumni serving for the Union amongst all northern colleges, among which Bowdoin produced the highest percentage of commissioned officers.<sup>1</sup> In total, 298 Bowdoin students fought for the Union, and many others supported the war effort in numerous ways, such as volunteering for the Christian Commission.<sup>2</sup> Harriet Beecher Stowe, wife of Bowdoin Professor Calvin Ellis Stowe, famously wrote *Uncle Tom's Cabin* on Bowdoin's campus. Yet, despite the school's overwhelming association with the Union cause, there were eighteen alumni who took up arms in defense of the Confederacy. After graduating from a school in the northernmost part of the country, what motivations did these Bowdoin Confederates have? To get an answer, one has to consider the history of Maine, the Civil War, and the lives of these 18 men.

A close evaluation of the available documents on this unique group of men, the context of their lives in the North and South, the circumstances of their careers, and their personal beliefs, allows a clearer picture to emerge of what led them to fight for the South. This group of eighteen men can be divided into three distinct categories, ranging from least to most ideologically motivated. Conversely, the subgroups that consist of soldiers less inspired by ideology show other factors that contributed to their decisions to join the Confederate Army.

The subset of Bowdoin Confederates who were lowest on the ideological spectrum

were the alumni who moved to the South because of their occupations and residence there for many years before the war began. For them, it is most likely that ideas of duty and discipline — attained at Bowdoin — were primary factors in their enlistments. The second subset consists of Bowdoin students who were Southerners by birth. Their motivations appear to be linked to their allegiance to the state in which they grew up. The third group, consisting of individuals who went to the South specifically for the Civil War and fought because they fervently supported slavery, showed the largest and clearest commitment to the Southern Cause and the racial supremacy that defined the Confederate States. To varying degrees, all these men went “against the grain” of pro-Union sentiment at their school when they joined the Confederate Army.

## Pro-Union Activity at Bowdoin

At the outbreak of war, Bowdoin College was firmly against the rebellion of the Southern states. Bowdoin students overwhelmingly voiced their support for Abraham Lincoln during the election of 1860, with 135 joining a political club created for his campaign, compared to 30 who supported Stephen Douglas, and seven who supported John Breckinridge.<sup>3</sup> Reflecting on the attitude of Bowdoin students towards the war, alumni of the class of 1862 described themselves as a “war class” who responded to the call that “thundered all around the horizon” and enlisted in the Union army immediately after graduating.<sup>4</sup> Before them, the classes of 1860 and 1861 “had already sent more than a score each into the field.”<sup>5</sup> Graduating students were not the only ones joining the Union Army. Professors Chamberlain and Whittlesey “exchanged the professor's chair for the saddle” and enlisted as well.<sup>6</sup> Students still enrolled in the college created volunteer companies with drill practices.<sup>7</sup> As a community, Bowdoin embraced the Union cause.

The personal circumstances of the Bowdoin Confederates make the question of why they fought even more intriguing. Many of them not only attended Bowdoin for four years, but also grew up in Maine or other parts of New England and spent some time after college living in the North. John M. Morrill, class of 1844, was born in 1825

in Limerick, Maine. After graduating from Bowdoin, he worked as a schoolteacher in Sing Sing, New York.<sup>8</sup> James L. Hoole, class of 1849, was born in Fryeburg, Maine. He spent his youth in Portland, before moving to Durham, Maine at age 14. After Bowdoin, Hoole resided in Brunswick and found work as an apprentice to a local attorney.<sup>9</sup> John C. Merrill, class of 1851, attended the College of Physicians and Surgeons in New York, and then returned to Maine to practice medicine in Lewiston.<sup>10</sup> The stories of other Bowdoin Confederates are similar to these, and indicate that most of the students who fought for the Confederacy spent a significant part of their lives in the North, before leaving for the South. In many cases, their families and friends even remained in New England during the Civil War.

While Confederate students from Bowdoin were an incredibly small minority compared to those who fought for the Union, an additional detail worth considering is how they fit into the larger population of Civil War soldiers. Seventeen out of the eighteen Bowdoin Confederates enlisted voluntarily at the start of the war. While it is true that Bowdoin had an exceptionally high number of Union soldiers, many Bowdoin graduates chose not to fight on either side. The most enlisted class graduated in 1863 with 52 percent of students directly participating in the war effort. Enlistment percentages for other class years never exceeded 50 percent, and the class of 1865 had only 29 percent participation.<sup>11</sup> Thus, most alumni made the choice of either leading a civilian life or becoming a Union soldier. Eighteen graduates of Bowdoin, however, chose to fight for the Confederate States of America (CSA).

The George J. Mitchell Department of Special Collections and Archives at Bowdoin has “Biographical Profiles” for all graduates of the college. With the exception of Arthur McArthur Jr., the archives contain no letters written by Bowdoin Confederates before or during the Civil War. However, the archives possess obituaries and letters that recount biographical information as it was reported to staff members at the Bowdoin library. In the years after the war, Bowdoin gathered information on its alumni for the college's catalogue, and the inquiries staff made into the graduates lives after Bowdoin have

provided valuable information about how the men ended up in the Confederate Army. Unfortunately, since the college's queries were solely for the purpose of informing the school about the whereabouts and occupations of the alumni, the responses they received were written in a matter-of-fact tone, with few details about military service. Out of the eighteen Bowdoin Confederates, the profiles for John F. Shaw, class of 1855, and Robert M. Spearing, class of 1857, are the only ones that are completely empty. Information on their lives was obtained from the Bowdoin catalogue and Nehemiah Cleaveland and Alpheus Packard's *History of Bowdoin College*, which contained biographical summaries of all graduates from 1806 to 1879.<sup>12</sup>

Overall, while the scarce amount of information undoubtedly limits our ability to understand why Bowdoin students became Confederates, the available resources have proven sufficient in revealing important patterns in the lives of these men. In particular, the career parallels found amongst this group provide clues as to why they joined the rebellion. As historian James McPherson notes, "The motives of many volunteers were mixed in a way that was impossible for them to disentangle in their own minds."<sup>13</sup> Looking at the totality of their lives from beginning to end, however, provides a special opportunity to discover the most plausible motivations of these men.

Other studies of Civil War soldiers' decisions to enlist have shown a spectrum of motives that were determined by their class, education, commitment to ideology, and wartime fervor.<sup>14</sup> In the case of the Bowdoin Confederates, they all had a similar economic background and the same Bowdoin education. The reasons that led them to join the Confederate Army, therefore, were rooted in their commitment to the ideology of the CSA and the nationalistic excitement that both the North and the South developed as the conflict neared. For the South, nationalism and culture created the idea of "Southern Honor." Historians use the term to describe the code of discipline and dedication that was a part of Southern society. Bertram Wyatt-Brown, for example, views Southern Honor as consisting of a belief that the "personal bravery" of Southerners "stood next to no other people," with "a capacity for hatred" that upheld the view of death as the better option compared to being a coward and living with dishonor.<sup>15</sup> Did Bowdoin Confederates develop an allegiance to the Southern Code of Honor in this manner after growing up in the North, or at least spending a portion of their formative years there?

Recent scholarship on the motivations of Union troops for participating in the war has shown them to be led by a sense of "Northern Duty," a code of conduct

that parallels the "Southern Honor" which inspired many southerners to take up arms.<sup>16</sup> While precisely how — and if — the battle cultures of the North and South differed are still debated, the lives of the eighteen Bowdoin Confederates suggest that they were all influenced by both Northern Duty and Southern Honor, albeit to varying degrees. Their unique experiences in the antebellum period shed light on the personal and societal forces that caused them — and many other northern-educated men — to become Confederates.

### **Brunswick, Maine in the Antebellum Era**

While it is true that the sentiment on Bowdoin's campus during the time of the war was decidedly in support of the Union, the same cannot be said for the college — and the rest of the North — in the years before the firing on Fort Sumter. Unlike Bowdoin graduates who fought for the Union, the majority of Bowdoin Confederates attended the school at a time when abolition was not popular in Maine and many people residing in New England sympathized with the South. After a public discussion on slavery in Brunswick in 1838, town citizens made a resolution that any attempt to "mislead" the "brethren of the South" and convince them of slavery's evil was "unjust, inexpedient, and an unwarrantable encroachment upon the rights of a portion of the citizens of our country."<sup>17</sup> Considering that almost half of all Bowdoin Confederates graduated within a decade after this proclamation by the townspeople of Brunswick, it is likely that they too viewed slavery as an undeniable right of the South.

The reasons these sympathies prevailed are varied. White supremacy was an inherent characteristic of the American breed of slavery, and one did not have to reside in the South to view the ownership of African Americans as a fair and just policy. Voting records of elections in Maine during the 1840s indicate that antislavery candidates for governor polled below 15 percent, sometimes attaining as little as 5 percent, a far cry from the electoral domination of the proslavery Democrats.<sup>18</sup> A positive — or at least acquiescent — view of slavery existed beyond the Mason-Dixon line, and its presence in Maine in the prewar years arguably made allegiance to the Southern Cause easier for future Bowdoin Confederates.

Secondly, Maine was also connected to the Southern states by trade, so issuing a denunciation of slavery was viewed as an unnecessary instigation of conflict for many Mainers. The state was home to shipyards that had strong business ties to the South, and as Charles Calhoun notes, for "commercial parties" who appeared to have "any sympathy with antislavery... their chance for Southern freight was at an end."<sup>19</sup> Even if Maine

residents had personal disagreements with the institution of slavery, the political climate that the majority of Bowdoin Confederates lived in did not reflect these views. On campus, there was a club devoted to electing Bowdoin alumnus and pro-slavery Democrat Franklin Pierce in the early 1850s.<sup>20</sup> In fact, a consideration of the class years that most Bowdoin Confederates came from reveals few alumni who fought for the Union. The graduating classes of the 1840s and early 1850s, produced minuscule amounts of Union soldiers when compared to later class years (see *Figure 1*).

Therefore, whereas overall Bowdoin Unionists outnumbered Confederates roughly 18 to 1, earlier classes saw a much smaller — and more balanced — number of Union and Confederate troops. The class of 1847, for example, produced two Union soldiers and two Confederates.<sup>21</sup> These Bowdoin students were not exposed to the strong anti-slavery sentiment that swept Brunswick in later years, and so among the graduating classes of the 1840s were many more future Confederates. The markedly lower Union to Confederate ratio before the late 1850s also indicates that older Bowdoin alumni who supported the South were more likely to enlist than their northern counterparts.

For the two Bowdoin Confederates who graduated during 1861, however, their direct ties to the South appear to have made up for the increased antislavery sentiment that developed in the North during the buildup to the Civil War. These two men were Sidney M. Finger and Manuel E. Shell. They were born and raised in the South. Both were North Carolina natives, and returned to their home state months before the war began.<sup>22</sup> The only other Bowdoin Confederate from the decade of the war was Winthrop Norton, class of 1860. Unlike Shell and Finger, he was from the North. Nonetheless, he only served — and died — as a Confederate soldier because of the compulsory service that was implemented in 1863.<sup>23</sup>

Thus, the Bowdoin Confederates who graduated immediately before the war commenced either enlisted because of their birthplace loyalties or as a result of compulsory service. For those who graduated in the early 1850s and earlier, the time they spent at Bowdoin and in the North in general was not marked by a concerted pro-Union effort, simply because war was not yet on the horizon. McPherson writes that "patriotic furor" only spread after the South fired on Fort Sumter in 1861. Only then did "Northern cities and towns" erupt "into volcanoes of oratory and recruiting rallies."<sup>24</sup> Evidently, Bowdoin took part in this wartime fervor as well. During the senior orations of 1862, all but two of the speeches were about support for the Union and the need for

abolition.<sup>25</sup> However, while school, state, and countrywide sentiment evolved to embrace the Union cause, it occurred only after these future Confederates already found their way to the South. Once there, the lives of this group would develop in such a manner that each would enlist.

### Life in the South: Road to the Confederacy

In attempting to understand how Bowdoin students ended up fighting for the Confederate States of America (CSA), the career choices some of these men made appear to be the turning points that led them to the South, and ultimately, the Confederate army. Of the eighteen graduates, nine moved to various southern states for their occupations many years before the Civil War. Their experiences mirror those of Confederates from other northern schools such as Harvard, which also saw some of its students move South for a job and end up fighting for the Confederacy. Other research into “adopted Southerners” — individuals who moved from the North to the South to begin their careers — has shown that sectional identity was not “fixed at birth.” Native northerners who spent their early careers in the South or started their families there quickly developed an affinity for their new home that played an important role in their decision to enlist. As David Zimring notes:

[Adopted Southerners] based their justifications for secession mainly

on loyalty to the section that provided them the opportunities and stability to succeed in adulthood. Regardless of how long these native Northerners had actually lived in the South, they felt compelled by the power of residence, community, family, property, and ideology to join the Confederacy.<sup>26</sup>

Additionally, there were often societal pressures at play. Native northerners had to “prove” their allegiance to their adopted state or risk suspicion, isolation, and harassment. Men from the upper ranks of society also experienced a collective coercion to exhibit their sense of honor and duty by enlisting.<sup>27</sup>

For other Bowdoin Confederates, their reasons for joining the army were more politically motivated than desiring to support a new home state or being pressured by societal factors, as their actions show a genuine and intense support for the Confederate agenda. Three graduates went back to the South months after graduating from Bowdoin because they were originally from a Southern state.<sup>28</sup> Their voluntary enlistment demonstrates a level of ideological devotion above Southerners who did not volunteer as well as the Bowdoin Confederates who were employed in a seceded state when the war began. Consisting of five Bowdoin Confederates, the most ideologically motivated group contains graduates who demonstrated significant allegiance to slavery and the Southern Cause.

John C. Merrill, class of 1851, is a member of the first subgroup, and one of many Bowdoin alums who traveled to the South after graduating (see Figure 2). He went to New York Medical School (NYM) immediately after finishing his studies at Bowdoin. After earning his degree from NYM in 1854, he practiced in Portland, Maine and Lewiston, Maine, before taking a job in St. Paul, Missouri. He was working in Natchez, Mississippi when the war broke out, at which point he became a surgeon for the Confederate Army. While the duration of his time at each of his practices is unknown, he moved to the South long before people crossed into slaveholding states specifically to support the war effort.<sup>29</sup>

Similar circumstances are seen in the geographic movements of James Hoole, Charles Butler, Thomas Lenoir, and John Morrill. Hoole, class of 1849, apprenticed with a Brunswick attorney for less than a year before traveling to Holly Springs, Mississippi, to teach at a “country school.” He would become an Associate Principal at Chalmer’s Institute, a Presbyterian boys school, before passing the bar exam to become an attorney in 1855. He moved to Panola, Mississippi in 1857 to continue working as an attorney before joining the Confederate army.<sup>31</sup> Charles E. Butler, class of 1850, was a Mainer who graduated from Bowdoin with honors, and up until the war taught in Tennessee, Mississippi, and Alabama. In 1861, he joined the Confederate army, and served until the

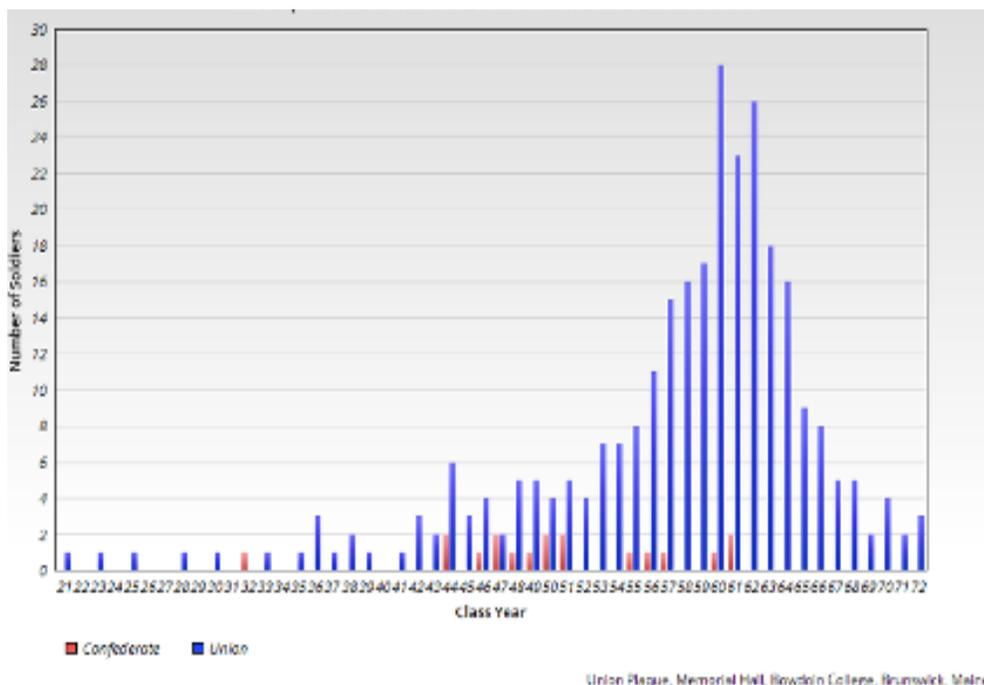


Figure 1: Bowdoin graduates participated on both sides of the Civil War.

conclusion of the war.<sup>32</sup> Thomas B. Lenoir, class of 1856, was born in Missouri. He graduated from Bowdoin closer to the start of the war and at age 18. At 19, he became a cotton planter in Mississippi, and would go on to serve as a Confederate Adjutant General and Lt. of ordinance for the last two years of the war.<sup>33</sup>

The availability of information on the life of John Morrill, class of 1844, provides more insight into the lives of the men that moved to the South years before the war. After graduating, Morrill went to Tennessee to be a teacher. He tutored a family in Madison county, and then clerked for a judge before opening his own law practice. He would work as an attorney for over a decade before the war started, getting married for a second time in 1860. His brother, Reverend Abner Morrill, wrote: "At the breaking out of the war of the Rebellion, [John] was an officer in one of the regiments of the Tennessee Militia, and was called into service."<sup>34</sup> Morrill's prewar participation in the militia, as well as his brother's remark that he "was drawn in by the enthusiasm of the moment" clearly indicates Morrill's commitment to the Confederacy.<sup>35</sup> However, while "enthusiasm" for the war inherently implies support for the CSA, he was probably less ideologically driven than some other soldiers, as his initial motivation to move to the South was an intention to finish his legal education.

William O. Otis, class of 1851, had a similar career path to Morrill. After passing the bar, he went to Austin, Texas to practice law and teach language, later serving in the Confederate Army as a quartermaster. In a letter written by his brother to the College for Otis's entry in the school catalogue, his brother wrote that Otis "was a union man and that his service in the confederate army was only in the quartermaster's department."<sup>36</sup> The catalogue recorded his time in the army but did not report his position, opting for the generic term of "soldier."<sup>37</sup> McPherson writes that many men who did not want to fight sought out positions such as quartermaster, which entailed office work and ensuring troop regiments were supplied and sheltered.<sup>38</sup> Considering Otis's brother's statement and the position he held, it appears that he was not in support of the Confederacy on an ideological level.<sup>39</sup>

Henry Whitcomb, class of 1847, John Goodwin, class of 1844, and John F. Shaw, class of 1855 also ventured South for their occupations. Whitcomb and Goodwin were both civil engineers, and Shaw was a teacher. In 1849, Whitcomb was offered \$60 for a one-month job in Virginia, which he accepted. After liking "the surroundings and the people," Whitcomb agreed to have a more permanent position and rose through the ranks until he became general superintendent in 1861.<sup>40</sup> Having this title

during the war meant Whitcomb "was in charge of the transportation of troops and supplies."<sup>41</sup> Less is known about the careers of John Goodwin and John Shaw. Like Whitcomb, Goodwin also worked as a civil engineer in Lynchburg, Virginia before the war, and achieved the rank of major.<sup>42</sup> Shaw was born in Greenville, Maine, but was a teacher in Georgia and South Carolina before joining the army. The position he held is unknown, but the Bowdoin catalogue states that he died in service in 1863.<sup>43</sup>

The only Bowdoin Confederate from the decade of the war who went to the South for his occupation was Winthrop Norton, class of 1860. While his biography up until the war resembles other graduates — Norton, like John M. Morrill and James L. Hoole, went to the South to teach — he is the only Bowdoin Confederate who was conscripted into the Confederate Army. Born in Norridgewock, Maine, Norton traveled to Sterling, Texas immediately after graduating to open a school. His family in Maine received a letter from him at the very start of the war, saying that he planned on continuing to run his school. Two years later, through a truce-established mail line that was censored by Confederate authorities, Norton's family learned that he was a member of the 4th Texas regiment, but suspected by his tone and word usage that he had been forced into service. This was the last they ever heard of him, as he died on the battlefield in Chickamauga, Tennessee, on September 20th, 1863.<sup>44</sup> The first conscription law was passed by the Confederate Congress in 1862, but it had an exemption for teachers that appears to have applied to Norton. In 1863, with the Confederacy facing a shortage of soldiers, new legislation removed the exemption for teachers, thereby leading to Norton's involuntary conscription into the Confederate army.<sup>45</sup>

It is important to note that moving to a southern state after graduating from school and ending up in the Confederate army was not an experience unique to these few Bowdoin Confederates. In *Crimson Confederates*, Helen P. Trimpi catalogues the lives of all Harvard University students who fought for the South.<sup>46</sup> While the vast majority of them were born and raised in Georgia, the Carolinas, Alabama, Kentucky, and Tennessee (among other Southern states), some were Northerners by birth. Although Harvard students tended to come from wealthier families than their Bowdoin counterparts, Confederates from both schools were similar in that they often relocated to the South years before the Civil War, adopting secessionist views after their arrival.<sup>47</sup>

William A. Davis, for example, graduated from Harvard College in 1837 and Harvard Medical School in 1840. Originally from New

York City, after graduating, he worked as a doctor throughout Massachusetts for twelve years, during which time he married and had a daughter. In 1852, he moved to Virginia to continue his practice and also run his own farm.<sup>48</sup> When the war started, he became a surgeon in the Confederate Army, eventually becoming Chief Surgeon in April of 1864.<sup>49</sup> Another example of career paths leading to participation in the Confederate army can be seen with Jeremiah M. Clough, Harvard Law School class of 1844. A native of New Hampshire, Clough went to Texas the year after he graduated to open his own law firm. He gained military experience as a volunteer during the Mexican American War and served in the Confederate forces as a private. He participated in many battles, ultimately dying alongside nineteen other Texans in an attack on Union Captain Andrew H. Foote's troops near the Cumberland River.<sup>50</sup> A third example can be seen in the life of William H. Brown, whose immediate post-college plans mirrored those of Bowdoin Confederate James L. Hoole. A Harvard College graduate of 1841, Brown moved to Virginia "to teach young ladies."<sup>51</sup> After marrying the daughter of a wealthy farmer and opening his own seminary, he would organize his own company and become a commissioned Confederate captain less than three weeks after the first battle of the war.<sup>52</sup>

The significance of these accounts — the lives of Bowdoin and Harvard Confederates — resides in the details that are revealed when considering the group as a whole. Confederates from Bowdoin were not always men who espoused secessionist sentiment and moved solely for the purpose of joining the rebellion. Analysis of nineteenth century census data shows that college educated and skilled men were more likely to travel across state lines to find work than unskilled laborers. Relocating was also most common amongst younger, unmarried males.<sup>53</sup> More than half of the Bowdoin Confederates fit this description. They moved to the South for apprenticeships and to become doctors, lawyers, and civil engineers. Seven of the eight graduates enlisted at the start of the war and — while proclaiming their allegiance to the CSA by doing so — their lives beforehand set them apart from the Bowdoin Confederates who were native Southerners, and from those who showed support for upholding slavery even before the events of 1861.

The second, and smallest group of Bowdoin Confederates, addresses the three individuals who were Southerners that only went north to attend Bowdoin. Sidney M. Finger, class of 1861, was born and raised in North Carolina. He returned there after graduation and became a major in the 11th North Carolina regiment. Finger would go on to attain moderate prominence as the superintendent of state public schools after

the war.<sup>54</sup> Manuel E. Shell, also a member of the class of 1861, was born in North Carolina. He was killed in battle in 1862.<sup>55</sup> His regiment and position are not known. Robert M. Spearing, class of 1857, was born in New Orleans. While it is not known exactly when he returned to the South, he became a colonel in the Confederate army and died in service in Fredericksburg, Virginia, in 1862.<sup>56</sup>

Whilst this group volunteered for service (as did seven of the eight Bowdoin Confederates who went South for their careers), the biographies of these three men suggest a more ideological bend to their actions. They all graduated much closer to the start of the war, when the North was uniting around an opposition to slavery. Likewise, their records do not show any other occupations beyond the positions they held in the Confederate Army, making it likely they enlisted immediately upon graduating. In fact, in the case of Manuel E. Shell, a 1915 article in the *Lewiston Journal* claims he left Bowdoin two months prior to commencement in order to enlist in the Confederate army.<sup>57</sup>

For Robert Spearing, who had four years between his graduation and the start of the war, this is more likely a result of missing information. In the cases of Finger and Shell, however, their immediate enrollment into the Confederate Army can be attributed to their identity as native Southerners, as well as the “*rage militaire*” that McPherson says swept the country in 1861 and was most probably a factor in encouraging the first group of Bowdoin Confederates to enlist.<sup>58</sup> While it is possible that Spearing, Finger, and Shell were conscripted into the army (the first Confederate Conscription Act was implemented in April of 1862, and their precise date of enlistment is unknown), their upper class background makes it probable that either of these men could have afforded a substitute or finagled their way out of participation by claiming an exemption.<sup>59</sup> Their respective reversions to their places of birth, however, suggests that all three felt some measure of allegiance — whether it was emotional, ideological, or both — to their home states.

The third and most ideologically motivated subgroup — Bowdoin Confederates who went to the South specifically to fight in the impending war — is comprised of five individuals: Jabez C. Rich, class of 1832, George F. Mellen, class of 1846, Jasper S. Whiting, class of 1847, Joseph C. Ives, class of 1848, and Arthur McArthur, class of 1850. By their words and/or actions, each of them expressed a clear support for the Confederate cause that was not a result of their geographic location or place of birth. The circumstances of their participation in the Confederate Army indicate that they were avowed supporters of the Southern way of life, and the institution that the Confederacy was trying to preserve:

slavery.

Jabez Cushman Rich, the oldest Bowdoin Confederate, was born in North Yarmouth, Maine in 1812. After graduating from Bowdoin in 1832, he became a Marine, achieving the ranks of second lieutenant in 1834 and captain in 1853. When war broke out in 1861, Rich was stationed at the Norfolk Shipyard in Virginia. Members of the Confederate-aligned Virginia militia attempted to take over the shipyard and use its warships and cannons to fight the North. The ill-equipped crew was ordered to burn the ships and destroy the weapons before the rebels could take them.<sup>60</sup> According to Cleveland and Packard’s *History of Bowdoin College*, Rich “espoused the Southern cause” and joined the rebels instead, later formally enlisting into the Confederate Marine Corps.<sup>61</sup> Literally on the precipice between the Union and the Confederacy, Rich had a choice to make. Evidently, despite growing up in the North and having a career in the U.S. Marine Corp, Rich’s allegiance was with the South. He was later captured by Federal troops and imprisoned at Fort Preble, dying shortly after the conclusion of the war.<sup>62</sup>

George F. Mellen was born in Durham, New Hampshire, and studied medicine in Saco, Maine after graduating from Bowdoin in 1846. He got his medical degree from Jefferson College in Philadelphia in 1851, after which he moved to Mississippi and accompanied William Walker to Nicaragua for his last attempt at establishing a colony there.<sup>63</sup> As with Jabez C. Rich, the actions Mellen undertook are sufficient to firmly establish his devotion to the white supremacist ideology of the Confederacy. Mainly, it is Mellen’s voluntary participation in William Walker’s 1860 invasion of Nicaragua that confirms his personal views.

Walker was a militant vigilante who unsuccessfully attempted to establish his own country in a largely unoccupied territory of Mexico and southern California in 1853. Lacking resources, funding, and men — his “army” consisted of forty-five people — Walker returned to the American South in 1854. About one year later, Walker and fifty-eight men invaded Nicaragua and “through a series of negotiations, deceptions, secret financial deals, and executions, he... became the de facto dictator of Nicaragua,” with the goal of creating a slaveholding ruling class.<sup>64</sup> Deposed by a multinational army of Central American troops with help from American mercenaries in 1857, Walker would once again unsuccessfully attempt take over Nicaragua in 1860.<sup>65</sup> It was on this final journey that future Bowdoin Confederate George F. Mellen joined Walker, thereby establishing his willingness to go to war for white supremacy.

“Slavery is not abnormal to American society. It must be the rule,” wrote William

Walker in 1860.<sup>66</sup> To him, it was clear that the Northern states would ensure all newly incorporated territories would become free states. Invading South American countries was the only way the Southern states could preserve the institution of slavery, which was essential to “furnish certain labor for the use of agriculture,” and “separate the races.”<sup>67</sup> Walker wanted an extension of the American slaveholding South, and by traveling with him on his last-ditch effort to accomplish this goal, George Mellen was on board with the plan. As a volunteer soldier, he was willing to risk his life to establish more territory that allowed for the enslavement of people. At the core of William Walker’s colonization efforts was his “dream of an empire where slavery would be recognized.”<sup>68</sup> After failing to help him achieve his “dream,” Mellen would attempt to preserve its inspiration back in the U.S. by serving in the Confederate Army as a soldier and doctor.<sup>69</sup> By being a part of Walker’s small army determined to expand slavery, George Mellen revealed his motivations for becoming a Confederate and earned a spot in a dark part of history.

Another Bowdoin Confederate, Jasper S. Whiting, joined the U.S. Military Academy at West Point after graduating from Bowdoin in 1847. He was an aid to U.S. General Charles P. Stone when the war broke out and left for the Confederate Army once South Carolina seceded from the Union. According to a postwar letter from fellow Bowdoin Confederate Henry Whitcomb, Whiting was married to a woman from South Carolina, although it is unclear if she resided in South Carolina at the time of the rebellion. Either way, Whiting’s decision to resign from his position in the U.S. Army demonstrated his unwillingness to support the Union. He died in Richmond, Virginia on Christmas Day, 1861 of what Whitcomb believed to be scarlet fever or “black measles.”<sup>70</sup>

Graduating a year after Whiting, Joseph C. Ives joined the Bowdoin class of 1848 for its senior year after being tutored at Yale University. Born in New York City, his father died when Ives was nine years old, causing his mother to move him and his six siblings to New Haven, Connecticut, where she ran a boarding house. After Bowdoin, Ives graduated from West Point with an exemplary record, attaining a ranking within the top five students in his class for every year he was there. Upon graduating, he worked as an engineer and topographer for the U.S. Army, participating in projects as varied as mapping out the Colorado River and Grand Canyon to constructing the Washington Monument.<sup>71</sup> Ironically, building a monument dedicated to the United States was one of the last projects Ives was involved in before he joined the CSA.

Two months after the war’s commencement, Ives was offered a position

as a captain for the 17th Infantry in the U.S. Army, which he rejected. As Bowdoin historian John Cross explains, Ives “waited six months before offering his resignation. His request was rejected, however, and he was dismissed for ‘having tendered his resignation under circumstances showing him to be disloyal to the Government.’”<sup>72</sup> This charge was accurate. After Ives’s attempt to resign, he defected to the Confederate army, where he served on Robert E. Lee’s staff, was promoted to colonel, and spent the last two years of the war as an aide-de-camp for Confederate President Jefferson Davis.<sup>73</sup> Ives and Whiting’s resignations are not unique occurrences. During the war, hundreds of officers resigned and jumped ship to join the Confederate army.<sup>74</sup>

Unlike Ives, who switched his allegiance only with the commencement of the war, Arthur McArthur Jr. exhibited vehement opposition to the North as early as 1853, the year he went to the South. As a result of the McArthur family’s prominence in New England, the extensive correspondence he maintained with his family members has been preserved, and the letters McArthur Jr. wrote depict the extreme ideological convictions that led him to take up arms against his own classmates and brother in 1861. Born in 1830, McArthur Jr. was a second generation Bowdoin student, his father having graduated from the College in 1810.<sup>75</sup> The family’s ties to Maine dated back to the time of the American Revolution,

when members of the McArthur clan settled in what would later become the town of Limington.<sup>76</sup> Despite the loyalties that the McArthur family possessed towards their home state, McArthur Jr.’s post-Bowdoin path shows how his ideological extremism was rooted in his adoration of Southern society.

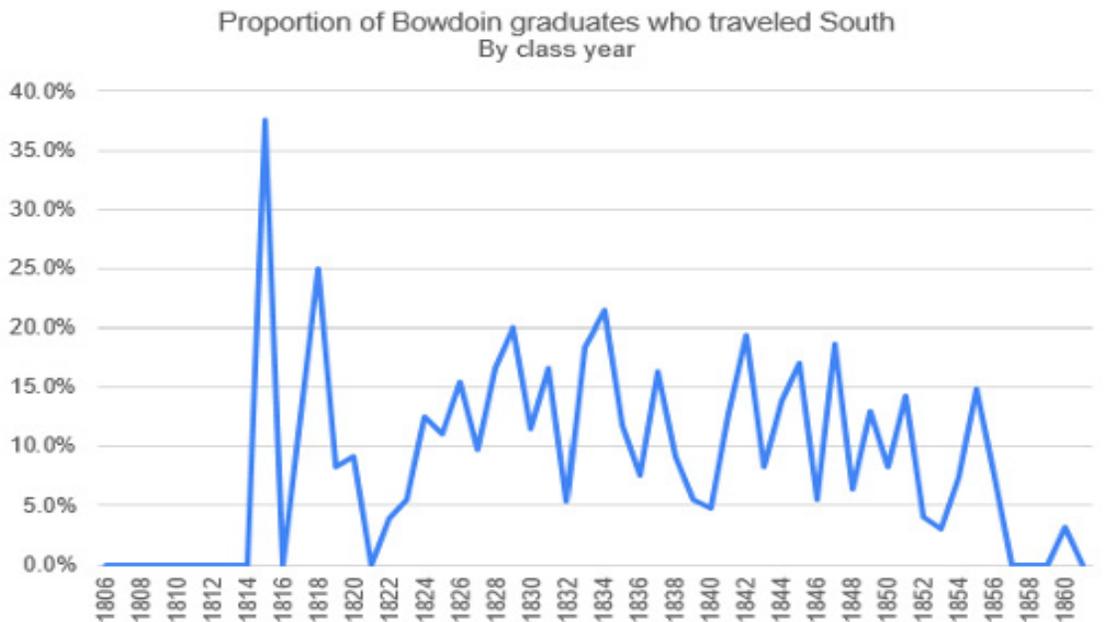
At Bowdoin, McArthur Jr. was a good student in the classroom, but his restless nature frequently got him into trouble. Future Union general Oliver Otis Howard was his college roommate and mentioned McArthur in his autobiography. Otis described him as possessing “mental talents above the ordinary,” but noted that he “so suffered from his drink that he had hard work to secure his diploma.”<sup>77</sup> In three years, McArthur was suspended three times from Bowdoin on the grounds of his rebellious behavior.<sup>78</sup> Upon graduating in 1850, McArthur Jr. decided to sail through the Isthmus of Panama to get to San Francisco, where he hoped he could find wealth in the gold rush. The venture proved expensive and fruitless. In a letter to his father, McArthur Jr. wrote that he and his friends encountered “many difficulties of which they never dreamed.”<sup>79</sup> Unhappy, McArthur Jr. went to the South in search of a job. In addition to finding employment, however, McArthur Jr. found the cause to which he would devote his life to: slavery.

While traveling to the South for occupational purposes would seemingly

place McArthur Jr. in the first category of Bowdoin Confederates (those who fought for the South because they lived there as a result of their careers), his numerous endeavors to expand and defend the institution of slavery indicate that his ideological motivations greatly surpassed those of most other Bowdoin Confederates, if not all. Hence, he belongs alongside the Confederates who enlisted because they fervently believed in the Southern Cause. It was during his first job in the South — in 1853, 8 years before the Civil War — that McArthur Jr. expressed support for slavery.

McArthur Jr. was hired to tutor the children of the Gardner family in St. Louis, Missouri. Originally from Virginia, the Gardners were slave owners. In observing them and their slaves, McArthur Jr. concluded that Southerners were “the finest people in the world,” who were “right in summarily disposing of all freebooting abolitionists... They hang horse thieves [*sic*] in Illinois & Iowa & why not negro thieves in Virginia?” McArthur Jr. reasoned.<sup>80</sup> In his view, slaves made the lives of Southerners more relaxed. He remarked at “how easy people live with their niggers to do the drudgery” unlike the “poor day laborers” in Maine.<sup>81</sup> It is unclear whether the economic or racial element of slavery appealed more to McArthur, but his enthusiasm for the institution would define the latter part of his life.

Enamored with human bondage, McArthur Jr. resolved to fight for its



**Figure 2.** This graph depicts the percentage of students from each class year that resided in the South. With the exception of the four years leading up to the war, there does not appear to be substantial variation in the preceding three decades. A total of 178 students traveled to the South from 1814-1860.<sup>30</sup>

expansion by joining William Walker on his 1858 expedition to Nicaragua, which ended abruptly when their ship was damaged by a reef in Honduras.<sup>82</sup> While the shipwreck prevented him from engaging in any combat, McArthur Jr.'s intentions in 1858 made it very clear how profound his commitment to the Confederacy would be three years later. Two days after the firing on Fort Sumter — in his last letter home — he told his father that he was “a secessionist, immediate, no-compromise, never-go-back fire-eater,” adding that he had enlisted to fight for a country that was “destined to be the most powerful, richest & most glorious nation on the western continent.”<sup>83</sup> As historian Elizabeth Ring noted, “[McArthur Jr.] had no property to lose — nothing to gain by fighting for the South except for the satisfaction that he was fighting for a just cause.”<sup>84</sup>

A year later, while his younger brother William McArthur was fighting for the Union as a member of the 8th Maine regiment, Arthur McArthur Jr. would die for the CSA in Winchester, Virginia.<sup>85</sup> Perhaps more so than any other Bowdoin Confederate, McArthur Jr.'s life exemplifies the tremendous power ideology played during the Civil War. Despite being a small group, the Bowdoin Confederates provide a conduit through which the various circumstances and motivations of other Confederates who went to college in the North can be gauged.

**On the Eve of War: Why They Chose to Fight**

Thus far, a look at the lives of the eighteen Bowdoin Confederates has shown the many reasons why they were not supporters of the Union cause and how they ended up in the South. The one query that remains is what motivated them to risk their lives for the South. For those who served only as civil engineers and surgeons (Henry D. Whitcomb, John. C. Merrill) or enlisted by compulsion (Winthrop Norton), their motivations are relatively straightforward. Norton simply did not have a choice, while Whitcomb's and Merrill's occupations directly related to the conflict. Whitcomb, a Chief Engineer in Virginia, saw

his position incorporated into the military arm of the Confederate government. While John Merrill's personal views on the rebellion are unknown, his role as a surgeon during the conflict and subsequent return to Portland at the end of the war imply that he was not truly devoted to the Southern cause.<sup>86</sup> For the other Bowdoin Confederates, it was clear that they developed loyalty to the South, or at the very least to the state in which they resided. In the words of David Zimring, “They arrived as strangers but emerged as full-fledged members of their communities.”<sup>87</sup> What is not as clear, however, is why they decided to voluntarily take up arms. A consideration of their standing in society as well as their Bowdoin education provides some clues.

In *Northern Character: College-Educated New Englanders, Honor, Nationalism, and Leadership in the Civil War Era*, historian Kanisorn Wongsrichanalai considers why college graduates from New England decided to take up arms in defense of the Union. By tracing the lives of forty-nine graduates from various New England colleges (including Bowdoin), Wongsrichanalai argues that the North possessed a distinctive set of attitudes which were responsible for the decisions of many college graduates to enlist in the Union army. These northern colleges “taught their young men to think independently, restrain their emotions, and never compromise their positions...Such ideas also corresponded with these individuals' sense of masculinity and their class-based concepts about themselves and their role in nineteenth-century society.”<sup>88</sup> The over 250 Bowdoin students who became Union soldiers may have been motivated by the values Wongsrichanalai claims were imbued in them through their education, but is it not also possible that these same values were merely transplanted to the opposing side for Bowdoin Confederates? Historian Timothy Williams disagrees with Wongsrichanalai's assertion that the North had a “regionally unique” code of discipline, arguing that Southern schools instilled similar values.<sup>89</sup> Furthermore, Williams asserts that it was the South's views on race and nationalism that were more central

to their culture during the time period, as opposed to the character development that happened in colleges across the country.<sup>90</sup> Hence, Bowdoin Confederates may have attained the discipline and grit required to participate in armed conflict through their Bowdoin education, and combined them with wartime excitement and ideological support for the South.

Dan Frost echoes the former part of William's comment, saying Wongsrichanalai has a “disinclination to acknowledge fully where his evidence leads: that northern character and southern honor are essentially the same thing.”<sup>91</sup> This idea can perhaps be used to better understand why some Bowdoin students joined the CSA. The code of duty that they developed at Bowdoin was simply applied to the circumstances the graduates found themselves in when the war started.

In fact, it is possible that “Northern character” blended with “Southern honor.” For those that resided in the South before the outbreak of conflict, perhaps they would have felt obligated to join the Union's war effort if they worked or were born in the North instead. The only difference in the positions Bowdoin alumni assumed in the war was the side they were on as a result of circumstances and ideology; being in either army required similar discipline, commitment, and effort. Jasper S. Whiting and Joseph C. Ives served in the U.S. military before defecting to the Confederacy. Both had graduated from West Point. Presumably, it was their discipline — attained at a northern college — that allowed them to succeed at the military academy. The intensive dedication seen by Bowdoin students on both sides of the conflict suggests that their time in school taught them how to be soldiers and leaders, but not for which cause. Bowdoin graduates were inspired by the ideas of honor and loyalty, but these rather abstract concepts were molded by each person's individual experiences and views.

In *For Cause and Comrades: Why Men Fought in the Civil War*, James McPherson analyzed thousands of letters and documents from 1,067 Civil War soldiers, 429 of whom

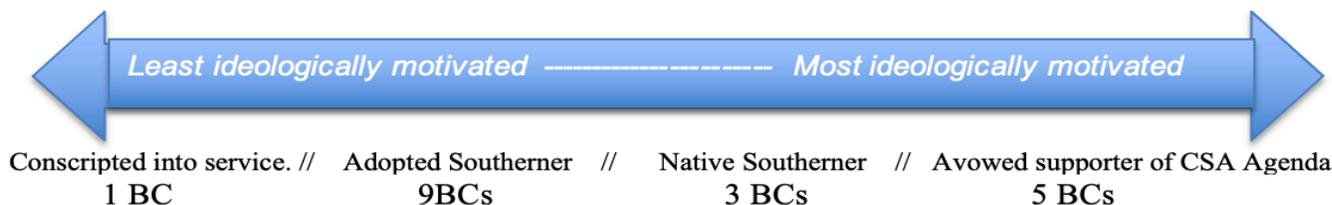


Figure 3: Ideological commitment typology. (BCs= Bowdoin Confederates)

were Confederates.<sup>92</sup> Across both armies, McPherson found that men of the upper and middle classes tended to be motivated by “duty, honor, and patriotism,” and conversely disliked the lower class soldiers who were often unmotivated, conscripted, or skulkers.<sup>93</sup> At the time, Bowdoin was part of a group of rural northern colleges whose students sought to become “gentlemen” and leaders willing “to do what was ‘right’ even if [it] was unpopular.”<sup>94</sup> Therefore, it is fair to say that the first and possibly second subset of the eighteen Bowdoin Confederates fit into this characterization found by McPherson in his survey of soldiers’ motivations. Bowdoin Confederates applied the values they attained at Bowdoin to the circumstances of their lives in 1861 and decided to join the rebellion. For the soldiers for whom there is less evidence of ideological support for the CSA, other factors likely contributed. A key element of the South’s Code of Honor was the “community pressure” which coerced men into situations where they could exhibit “military valor.”<sup>95</sup> Among the Bowdoin alumni who settled in the South, this pressure may have led them to enlist despite their personal desires.

Beyond a commitment to fighting because it was their duty, however, McPherson also found that many soldiers strongly believed in the cause they were fighting for. “White supremacy and the right of property in slaves were at the core of the ideology for which Confederate soldiers fought,” writes McPherson.<sup>96</sup> The more enthusiastic Bowdoin Confederates, particularly the five members in the third group, fit this description. From Jabez C. Rich to Arthur McArthur Jr., these individuals had a well-documented and passionate commitment to the Southern Cause that pitted them against their classmates and — in the case of McArthur Jr. — their brothers.

Beyond merely delineating the events that led Bowdoin students to represent the CSA on the battlefield, this research provides a typology that can be expanded to consider all other Confederate soldiers who were educated in Northern colleges. Like Bowdoin, Harvard and other universities in the North had large numbers of Union troops and a minority of Confederates. Evaluating these unique groups of Confederates alongside one another may shed more light on the motives that lay hidden when each soldier’s life is studied on its own.

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<sup>3</sup>Louis Clinton Hatch, *The History of Bowdoin College* (Portland, ME: Loring, Short, & Harmon, 1927), 116.

<sup>4</sup>Fiftieth Anniversary, 10.

<sup>5</sup>*Ibid.*

<sup>6</sup>*Ibid.*

<sup>7</sup>Charles C. Calhoun, *A Small College in Maine: Two Hundred Years of Bowdoin*, (Brunswick, ME: Bowdoin College, 1993), 171.

<sup>8</sup>John M. Morrill (Class of 1844) Biographical File, Box 18, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>9</sup>James L. Hoole (Class of 1849) Biographical File, Box 23, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>10</sup>John C. Merrill (Class of 1851) Biographical File, Box 24, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>11</sup>Calhoun, *Small College in Maine*, 172.

<sup>12</sup>See General Catalogue of Bowdoin College and the Medical School of Maine: A Biographical Record of Alumni and Officers 1794-1950 (Brunswick, Maine: Bowdoin College, 1950); Nehemiah Cleaveland and Alpheus S. Packard, *History of Bowdoin College with Biographical Sketches of its Graduates from 1806-1879* (Boston: J.R. Osgood & Co., 1882). Information about the Bowdoin Confederates was obtained primarily from the college archives and biographies of the school. It is possible that there may be more information about the wartime experiences of the 18 men in regimental histories and other Civil War databases.

<sup>13</sup>McPherson, *For Cause and Comrades*, 28.

<sup>14</sup>See McPherson, *For Cause and Comrades*.

<sup>15</sup>Bertram Wyatt-Brown, *Southern Honor: Ethics and Behavior in the Old South* (New York, NY: Oxford University Press, 1982), 34-5.

<sup>16</sup>See Kanisorn Wongsrichanalai, *Northern Character: College-Educated New Englanders, Honor, Nationalism, and Leadership in the Civil War Era* (New York, NY: Fordham University Press, 2016).

<sup>17</sup>Calhoun, *Small College in Maine*, 161.

<sup>18</sup>*Ibid.*, 159.

<sup>19</sup>*Ibid.*

<sup>20</sup>Hatch, *History of Bowdoin College*, 115.

<sup>21</sup>Patrick Rael, “Bowdoin Graduates Who Served in the Confederacy,” [http://www.bowdoin.edu/~prael/research/cwalum/alum\\_confed.htm](http://www.bowdoin.edu/~prael/research/cwalum/alum_confed.htm) (accessed April 4, 2018).

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<sup>23</sup>Winthrop Norton (Class of 1860) Biographical File, Box 33, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>24</sup>McPherson, *For Cause and Comrades*, 16.

<sup>25</sup>Documentary History Scrapbook of the Civil War, June 1860-August 1865, 6.1.19, Volume Two, College Archives, Bowdoin College Archives and Special Collections, Bowdoin College, Brunswick, Maine, 73.

<sup>26</sup>David Zimring, “For their Adopted Home: Native Northerners in the South During the Secession Crisis” in *So Conceived and So Dedicated: Intellectual Life in the Civil War Era North*, ed. Lorien Foote, Kanisorn Wongsrichanalai (Fordham Scholarship Online: Fordham University Press, September 2015), 175.

<sup>27</sup>See W. Eric Emerson, *Sons of Privilege: The Charleston Light Dragoons in the Civil War* (University of South Carolina Press, 2011).

<sup>28</sup>From Bowdoin’s first graduating class in 1806 to the class of 1861, there were only 10 Bowdoin students who came from the South. Three of them graduated in 1861, five fought for the Confederacy, and one fought for the Union.

<sup>29</sup>Merrill Biographical File, Special Collections and Archives.

<sup>30</sup>Artur Kalandarov, *The Demographics of Bowdoin Students: Class of 1806-Class of 1861* (2020), George J. Mitchell Department of Special Collections and Archives, Bowdoin College, <https://library.bowdoin.edu/arch/archives/a003/a003s032u006-KalandarovSummary.pdf>.

<sup>31</sup>Hoole Biographical File, Special Collections and Archives.

<sup>32</sup>“Charles Edward Butler,” in *General Catalogue of Bowdoin College and the Medical School of Maine: A Biographical Record of Alumni and Officers, 1794-1950*, (Portland, Maine: The Anthoensen Press, 1950), 95, “Bowdoin Graduates in Confederate Army,” *Lewiston Journal*.

<sup>33</sup>“Thomas Blanchard Lenoir,” in *General Catalogue*, 105. It is unknown if Lenoir owned or employed slaves as a cotton planter, although this is a possibility.

<sup>34</sup>Morrill Biographical File, Special Collections and Archives.

<sup>35</sup>*Ibid.*

<sup>36</sup>William O. Otis (Class of 1851) Biographical File, Box 24, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>37</sup>General Catalogue of Bowdoin College, 97.

<sup>38</sup>McPherson, *For Cause and Comrades*, 6-7.

<sup>39</sup>Another plausible interpretation is that Otis’ brother is playing down his service in the Confederacy out of embarrassment. Educated men were also coerced into the quartermaster service for their ability to write and maintain ledgers.

<sup>40</sup>Henry D. Whitcomb (Class of 1847) Biographical File, Box 21, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>41</sup>*Ibid.*

<sup>42</sup>John W. Goodwin (Class of 1844) Biographical File, Box 18, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>43</sup>General Catalogue of Bowdoin College, 104.

<sup>44</sup>Winthrop Norton (Class of 1860) Biographical File, Box 33, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>45</sup>James M. McPherson, *Ordeal by Fire: The Civil War and Reconstruction* (New York, NY: McGraw-Hill Inc., 1992), 184-5.

<sup>46</sup>Helen P. Trimpi, *Crimson Confederates: Harvard Men Who Fought for the South* (Knoxville, TN: University of Tennessee Press, 2010).

<sup>47</sup>For an analysis of the backgrounds, aspirations, and career paths of students from northern colleges, see Kanisorn Wongsrichanalai, “Leadership Class: College-Educated New Englanders in the Civil War,” *Massachusetts Historical Review* 13 (2011), 67-95, <https://www.jstor.org/stable/10.5224/masshistrevi.13.1.0067>.

<sup>48</sup>It is unclear whether Davis had slaves on his farm.

<sup>49</sup>Trimpi, *Crimson Confederates*, 56.

<sup>50</sup>*Ibid.*, 41.

<sup>51</sup>*Ibid.*, 26.

<sup>52</sup>*Ibid.* As with Harvard Confederate William Davis, it is unclear whether Brown or his father-in-law owned slaves. Running a large farm in the South, however, implies this was a possibility.

<sup>53</sup>Laura Salisbury, “Selective Migration, Wages, and Occupational Mobility in Nineteenth Century America,” *Explorations in Economic History* 53 (February 24, 2014): 47, February 24, 2014, accessed

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<sup>55</sup>Manuel E. Shell (Class of 1861) Biographical File, Box 35, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>56</sup>General Catalogue of Bowdoin College, 108.

<sup>57</sup>"Bowdoin Graduates in Confederate Army," *Lewiston Journal*, April 25, 1915, 10-11.

<sup>58</sup>McPherson, *For Cause and Comrades*, 17.

<sup>59</sup>McPherson, *Ordeal By Fire*, 184-5.

<sup>60</sup>McPherson, *Ordeal By Fire*, 155.

<sup>61</sup>Jabez C. Rich (Class of 1832) Biographical File, Box 9, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>62</sup>Cleaveland and Packard, *History of Bowdoin College with Biographical Sketches*, 435.

<sup>63</sup>George F. Mellen (Class of 1846) Biographical File, Box 20, Alumni Biographical Files, 1806- Present, George J. Mitchell Department of Special Collections and Archives, Bowdoin College Library, Brunswick, Maine.

<sup>64</sup>Brady Harrison, *Agent of Empire: William Walker and the Imperial Self in American Literature* (Athens, GA: University of Georgia Press, 2004), 7-8.

<sup>65</sup>*Ibid.*

<sup>66</sup>William Walker, *The War in Nicaragua* (New York, NY: S.H. Goetzel & Co., 1860), 263.

<sup>67</sup>*Ibid.*

<sup>68</sup>Harrison, *Agent of Empire*, 9.

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<sup>71</sup>John Cross, "Whispering Pines: No Ordinary Life," *Bowdoin Daily Sun*, published September 10, 2013, <https://dailysun.bowdoin.edu/2013/09/whispering-pines-no-ordinary-life/#comments> (accessed April 8, 2018).

<sup>72</sup>*Ibid.*

<sup>73</sup>*Ibid.*

<sup>74</sup>McPherson, *For Cause and Comrades*, 15.

<sup>75</sup>Cleaveland and Packard, *History of Bowdoin College with Biographical Sketches*, 661.

<sup>76</sup>Elizabeth Ring, *The McArthurs of Limington, Maine* (Falmouth, Maine: Kennebec River Press, 1992), 2.

<sup>77</sup>John Cross, "The Whispering Pines: A Tale of Two Brothers," *Bowdoin Magazine*, Summer 2011, 128.

<sup>78</sup>Ring, *The McArthurs of Limington*, 47.

<sup>79</sup>*Ibid.*, 45-6.

<sup>80</sup>*Ibid.*, 68.

<sup>81</sup>*Ibid.*

<sup>82</sup>*Ibid.*, 70. Note- Bowdoin Confederate George F. Mellen was not with McArthur Jr. on this expedition; he accompanied Walker on his next (and last) attempt at taking over Nicaragua in 1860. It is intriguing that two Bowdoin graduates joined Walker on his expeditions, given their small size and the small number of Bowdoin Confederates.

<sup>83</sup>*Ibid.*, 71.

<sup>84</sup>*Ibid.*, 70.

<sup>85</sup>Cross, "A Tale of Two Brothers," 128.

<sup>86</sup>Merrill Biographical File, Special Collections and Archives.

<sup>87</sup>Zimring, *For Their Adopted Home*, 183.

<sup>88</sup>Wongsrichanalai, *Northern Character*, 61.

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<sup>92</sup>McPherson, *For Cause and Comrades*, viii.

<sup>93</sup>*Ibid.*, 8.

<sup>94</sup>Wongsrichanalai, "Leadership Class," 68-69.

<sup>95</sup>Wyatt-Brown, *Southern Honor*, 39.

<sup>96</sup>McPherson, *For Cause and Comrades*, 106.

# MARCo: Solar Powered Autonomous Robotic Unmanned Surface Vehicle

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## Abstract

*Autonomous sailboats have demonstrated that a robot could potentially perform long-term ocean monitoring and traveling. However, self-operating sailboats in the past had sails, which could lead to issues caused by tipping and heeling too much, and were not fully solar powered, which leads to short power endurance issues. Energy efficient and low cost autonomous robotic unmanned surface vehicle, named MARCo (Marine Autonomous Robotic Communicator), was programmed, developed and tested throughout the year 2018 in a public, co-educational university in Morehead, Kentucky. An off-grid solar system, comprised of 3x 20-Watt 12-Volt panels and a 12-Volt charge controller, was designed, constructed, and installed on a 6ft surfboard to make it solar powered and increase power-endurance with the help of a power management algorithm written in Python. The boat is based on Raspberry Pi, a set of navigation sensors, and a ROCKBlock Iridium Modem. The project has been successful in building a solar-powered, sail-less, autonomous unmanned surface vehicle. The boat was tested in diverse marine environments (Eagle Lake, KY and an indoor pool) and the results showing the overall performance of our boat durability and energy consumption is presented.*

## Introduction

Unmanned Surface Vehicles (USVs) are fast, highly maneuverable, stable, and resistant vehicles that operate on the surface of water without a crew. USVs play important roles in performing tasks limited to manned vehicles, such as bathymetry, tracking large sea mammals for research studies, meteorological monitoring, maritime search and rescue, and depth measurements of oceans, seas, and lakes.<sup>3</sup> USVs are crucial because they are a cheaper but effective alternative to weather buoys, and research vessels; USVs reduce labor costs and increase productivity by reducing direct and indirect operating costs from humans.<sup>14</sup> Early USVs were developed at the MIT Sea Grant College Program in 1993, and these USVs were capable of testing the autonomous navigation and control systems.<sup>15</sup> Since the early 2000s, robotic USVs have been built with the aim of performing long-term autonomous ocean monitoring. However, none appear to be sail-less or solar powered.<sup>11</sup>

Although having a sail on a boat stabilizes it and uses wind power to propel it, there are disadvantages to using sails on USVs. These disadvantages include challenges in storing the boat, maintenance costs breakdowns, and stress during bad weather.<sup>2</sup> We were thus motivated to build a sail-less solar charged autonomous USV boat. The main advantages of building a boat on a paddleboat or a surfboard include, affordable price of \$746, a small size of 72"x26"x17",

and low weight of 24.13kg. This designed boat presents 97.23% less danger in terms on length and a complete reduction of the likelihood for accidents caused by force of wind/wake and hull failure. This USV is intended to be a low-cost alternative to other robotic sailboats like the Autonomous Robot for Rapid Transit and Ocean Observation (ARRTOO).<sup>8,13</sup>

In this paper, we describe the construction of the boat, the electrical components of the boat, hardware and software developments, and its design decisions. While building the boat, the goal was to design a small-sized, lightweight, and a low budget sail-less autonomous boat that as an USV could manage its power and perform long term testing under strong ocean waves, storms, and turbulences.

## Methodology

In this section, we introduce the design and implementation details of MARCo and highlight key characteristics of the autonomous navigation system. Figure 1 shows the outlook of MARCo. The three main components of the vehicle include: solar power system, autonomous navigation, and sensor package implementation.

### A. Hardware and components

Raspberry Pi 2011.12 is used as the main computer of the system.<sup>12</sup> It runs the main program, which is written in Python programming language. The Raspberry Pi communicates with other boards to work autonomously. Other significant hardware includes USB GPS, ROCKBlock ROCK7 Iridium Satellite Communication Modem, and Arduino Micro as shown in Table I.



Figure 1. MARCo autonomous unmanned surface vehicle.

Hardware Components	
Development Board	Raspberry Pi 2011.12
Rudder Servo	Waterproof Servo Driver DS3218
Main Battery	Renogy 12V 18AH Battery
Charge Controller	Gemasun 5 Amp 12 Volt MPPT Solar Charge Controller
Panels	3x 20W 12V Panel
GPS	GlobalSat BU-353-S4 USB GPS Receiver
Electronic Speed Control	EZRUN 18a ESC
Main Thruster	Bluerobotics T200
Board	6ft Surfboard
Main box/case	Pelican Case 1500
Second Board	Arduino Micro ATmega32u4
Voltage Converter	KNACRO DC 12V to 5V 3A Convert

Table 1. Hardware Components.

B. Software

At the beginning of the project, the software was developed in the C programming language and tested on an autonomous remote control (RC) car powered by Arduino. Once the software was successfully tested on the autonomous RC car, it was transferred to the boat.

An RC car was chosen for two main reasons. Firstly, the ground speed of the RC is similar to the surface speed of the boat when it is powered by two brushless DC motors. Speed plays an important role in the software development because the software must be able to accurately change the velocity of the vehicle and turn it at a particular angle. Therefore, robust software capable of rapid and accurate changes is needed. Secondly, software changes such as debugging and error handling may be easier with the RC car than the boat due to better accessibility. Furthermore, it is simpler to keep the electronics of the RC car safe from water.

Software for the boat has a main Python program that runs at boot up. The main program interacts with the USB GPS module, ROCKBlock Rock7, the sensors, rudder, and the thruster. A flow chart for the main program is shown below in Figure 1. The definition “multiplePoint()” plays an important role in the program: specifically, it manages all pinpoints and directs the boat to its next destination.

3D design of MARCO is shown below in Figure 3. To make the boat as light and as small as possible, a 6ft foam surfboard was used. The boat has one 20” x 16” x 8” box for electronics, controllers, and the power system. This box was installed on top of the boat’s back half to balance the total mass, which ensures a more optimal location of the mass’ center. Inside this box, L shaped enclosures were installed to protect the lead acid battery. The battery is laid on its back, thus allowing it to remain undamaged if the boat flips or tilts.

The second box was for the camera, UV (ultraviolet) radiation sensor, and the solar radiation sensor. This box was placed far from the main box and at the very front of the boat to allow the camera to have a better view and the sensors to access better sunlight.

The thruster and the rudder were installed in the back beneath the surfboard to maximize the turning force and the thruster power. The rudder was designed proportionally to the length and the weight of the boat.

Two fins were placed near the rudder and the thruster, to minimize the sideways motion.<sup>4</sup> The solar panels were placed on the box and the boat, which allowed them to intercept the most sunlight.

In Figure 3, “A” points to three 12V, 20W solar panels. “B” points to the 6ft surfboard which was used as the main body. “C” points to the main system box which stores the lead acid battery, Raspberry Pi, GPS module, charge controller, and Iridium Satellite Communication Module. “D” points to the rudder box which stores the waterproof servomotor. “E” points to the rudder system which is shown in Figure 4.

D. Power System

1) Components

As shown in Table I, the boat has three 12 volts 20-watt solar panels for its main power systems. A lead acid battery was chosen because of its low cost per kilowatt-hour of \$131/kWh,<sup>9</sup> ability to charge at extreme temperatures from -20°C to 50°C,<sup>6</sup> and its low self-discharge of 5% per month.<sup>5</sup>

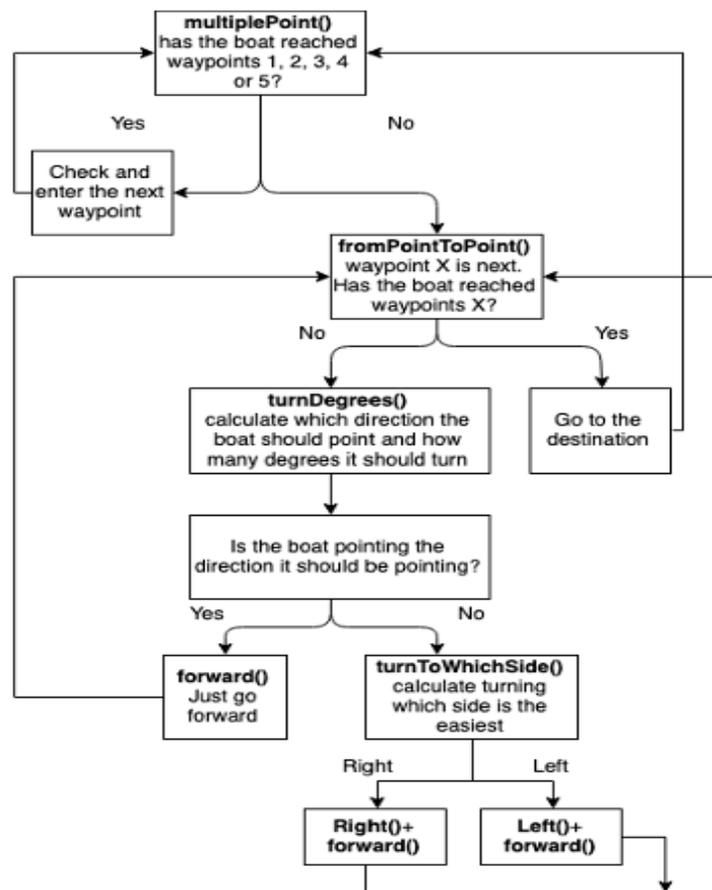


Figure 2. Flow chart for the autonomous Python program of MARCO.

C. Design approach

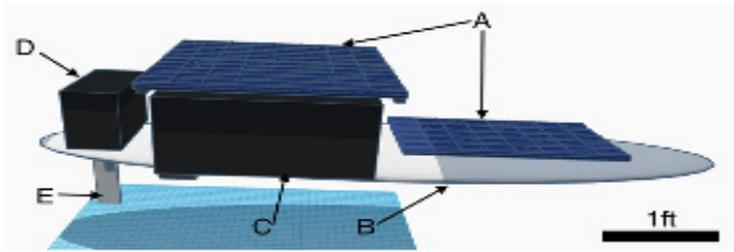


Figure 3. 3D design of MARCO.

For example, compared to a Lithium-Ion battery's cost per capacity, and charge temperature, the lead acid battery's cost per capacity (\$/kWh) is 75.28% cheaper, and the lead acid battery's charge temperature is 20°C lower and 5°C higher, respectively. The battery was chosen for the system's overall power consumption of 36W minimum per day and average cumulative energy of 214.57Wh from the solar panels.

2) Consumption

At night, the system consumes about 0.7 amps with the thruster off. During the day, depending on the voltage of the battery and the power generated by the current, the thruster can spin at different speeds and power consumption varies as shown in Table III. Total current consumption of the whole system varies as the speed and current consumption of the thruster varies depending on the given Pulse Width Modulation (PWM) signal as shown in Table II. Pulse Width Modulation is highly efficient with low power loss to use electricity to control analog devices such as motors and lamps. The pulse-width modulation technique controls the average value of voltage delivered to the motor by switching between power-on and

Pulse Width(PWM) Signal Input to ESC(μs)	Current consumption of the thruster (A)
1500	0.07
1550	0.07
1600	0.37
1650	0.64
1700	0.92
1750	1.15
1800	1.37
1850	1.565
1900	1.76

Table 2. PWM Signal Input to ESC(μs) and corresponding current consumption.

power-off at a fast rate. The main thruster Bluerobotics T200 takes only PWM signal to spin. Moreover, everything except the thruster runs at 5V, while the thruster runs on 12V.

3) Management

A specific power management system was developed: a voltage-based and sunlight power-based management system as shown in Table IV. MARCO's power endurance is 48 hours in the dark with the thruster off and unlimited in the sun.

4) Sensors

Table 4 lists the sensors of the boat, most of which are installed on the outside of the box. Although the majority of the sensors do not interfere with the performance of the boat, they give us data which could be used in the future. Because the Raspberry Pi does not have analog pins [10], Arduino Micro was used to control the UV (ultraviolet) radiation and the solar radiation sensors.

5) Rudder System

Given the unique properties of the boat, a unique rudder system needed to be developed. The whole rudder system was installed inside a waterproof box. The "skeg-hung rudder" is programmed to turn about 45° to the left and right. A waterproof DS3218 servo motor was chosen for the rudder system. The servo motor is attached to a gear which is connected to a rod as shown in Figure 4. "Straight leading edge" design was chosen because it is known to be mechanically stronger.<sup>7</sup>

6) Navigation algorithms and tracking

The boat uses five waypoints to navigate autonomously to any given location. The boat will follow a user defined path which

Overnight in 12 hours	During a day
0.6 Amps * 5 Volts * 12 Hours = 36 Watt-hours	Depends on the generated solar power

Table 3. MARCO's power consumption.

Sensors	Info
DS18B20 x3	Temperature Sensor Probes
MPU6050 3 Axis Gyroscope Module	Accelerometer
UV Sensor Davis 7841	UV Sensor
Solar Radiation Sensor Davis 7821	Solar Radiation Sensor
INA219 Current Sensor x2	Current and Voltage Sensor

Table 4. Sensors installed in the boat.

consists of five waypoints. Relative to the current latitude and longitude coordinates, the algorithm, specifically the turnDegrees() function, keeps calculating the exact direction in degrees the boat is supposed to travel to reach the next waypoint in the shortest amount of time. As soon as the boat reaches its desired waypoint, the next waypoint will be entered as its new destination. For example, researchers, professors, and students can define a path that goes through areas where the research needs to be conducted. The boat will closely follow this path and collect needed data. The Global Positioning System (GPS) plays a crucial main role in the autonomous navigation system developed from first principles, which include complicated autonomous navigation tasks. These concepts and the accompanying problems were broken down into basic elements of reasoning and navigation and then the algorithm was built ground up. Figure 2 shows the autonomous navigation algorithm as a flowchart. The navigation system was tested thoroughly on an autonomous RC car before installation. The testing was performed on an RC car prior to installation due to its ground speed and debug accessibility as per discussed above in Section II.

Five combinations of latitude and longitude [(38.190703, -83.430098), (38.190819, -83.430197), (38.190821, -83.430376), (38.190679, -83.430466), (38.190554, -83.430340)] were entered and the RC car was expected to reach five waypoints one. The RC car did not have to be near or at one of five waypoints. Once the system turned on, it immediately navigated to the first waypoint. On average, it took the car two to three turns to point to the direction of the next waypoint. As soon as the system was within a two foot range from the latitude and longitude location, it counted the waypoint as reached. After reaching the fifth waypoint, the RC car started navigating to the first waypoint.

Tracking can be done using the Iridium satellite modem. Every two hours, the boat sends a message that includes its latitude, longitude, temperature, information from

The voltage of the battery(V) VS generated solar current (mA)		<100mA	100mA - 300mA	300mA - 500mA	500mA+
Battery Voltage (V)	Battery Percentage				
5.1V - 12.1V	System OFF	Thruster OFF	Thruster OFF	Thruster OFF	Thruster OFF
12.1V - 12.5V	0-50%	Charging State	Charging State	Charging State	Charging State
12.5V - 12.6V	50%-60%	Charging State	Charging State	Charging State	1550 PWM
12.6V - 12.7V	60%-70%	Charging State	Charging State	1550 PWM	1600 PWM
12.7V - 12.8V	70%-80%	Charging State	1550 PWM	1600 PWM	1650 PWM
12.8V - 12.9V	80%-90%	1550 PWM	1600 PWM	1650 PWM	1700 PWM
12.9V +	90%+	1600 PWM	1650 PWM	1700 PWM	1700 PWM

Table 5. MARCO's power management system.

the sensors, tilt, and information about its power. By the same token, messages can be sent to the boat. From anywhere on Earth with a clear view of the sky, MARCO sends short messages which consist of bytes.<sup>1</sup>

**Results**

In this section, we present experimental results based on 24 hours of testing. Overall, the system weighted 24.13 kg, and dimensions were 72"x26"x17". The system had the weight capacity of 66.59 kg. To evaluate our algorithms and systems, several experiments were conducted with real robot systems. Performance was evaluated by plotting and graphing on Google Maps and Google Sheets, respectively. Real robot tests,

including autonomous and sensors testing, were conducted at a marine environment; meanwhile, the solar panel tests were conducted on land. Performance of the boat's power management was evaluated by observing whether the boat charges enough using the solar panels and how efficiently it manages its energy.

*A. Solar panels testing*

The solar panel testing was performed by placing the panels outdoors in direct sunlight. Panels were connected to the battery the whole time. Raspberry Pi, with the help of the INA219 sensor, recorded the current the panels are generating. Figure 5 shows power generated by the off-grid solar system on an average sunny day. The average power generated was 2.86 Watts and the average voltage was 10.84V throughout the day.

*B. Autonomous testing*

MARCO was tested at Eagle Lake (38.193491, -83.434520) in Morehead, KY. Four to five waypoints were given and MARCO was expected to go to each destination and return to the starting point.

As a result, the autonomous program worked well as intended. It completed 4-5 laps in an hour, traveling at about 1.5m/s. The boat's autonomous system is considered to be ready to perform long-term autonomous travel as long as solar energy is available. As discussed in II. Methodology, the boat can survive 48 hours with no sunlight and the thruster off. However, the distance the boat can travel depends on the solar power it gets as well as the current battery voltage. Other than the amount of sunlight it receives, there is no limit on how long or far the travel can occur. As long as there is sufficient solar power generated and enough battery voltage, the boat will keep traveling at different speeds

as shown in Table IV.

*C. Sensors testing*

Sensors were tested with the whole system. Sensors took accurate readings according to sunset and sunrise. Readings changed as the environment temperature changed. Results, which are plotted, can be seen in Figures 6, 7, 8 and 9 below. The testing was done between 6 PM on the first day and 6 PM on the second day.

A correlation between battery voltage and solar charging was recorded. For instance, around 12 PM, the solar panels generated about 150mA current as shown in Figure 8. As a result, the voltage of the battery stopped dropping and stayed at 11.8V or above.

Another correlation was recorded, specifically the external temperature and MARCO's Raspberry Pi's CPU temperature (°C). As shown in Figure 9, the temperature at the lake started dropping below 0°C around 4 AM. This resulted in a temperature drop in the internal temperature of the box and temperature of MARCO's Raspberry Pi's CPU (central processing unit) as shown in Figure 9 and Figure 10.

**Conclusions**

The low-cost, lightweight, and a small sized sail-less unmanned surface vehicle MARCO was designed, constructed and thoroughly tested. his solar-powered MARCO boat shown in Figure 1 was built based on three main components: solar power, autonomous navigation, and sensor package implementation. This solar-powered MARCO boat shown in Figure 1 was built based on three main components: solar powering, autonomous navigating, and sensor package implementation. Powered by a 12V 18Ah battery and three 20W 12V panels, MARCO autonomously navigates and records data through a path given in latitude

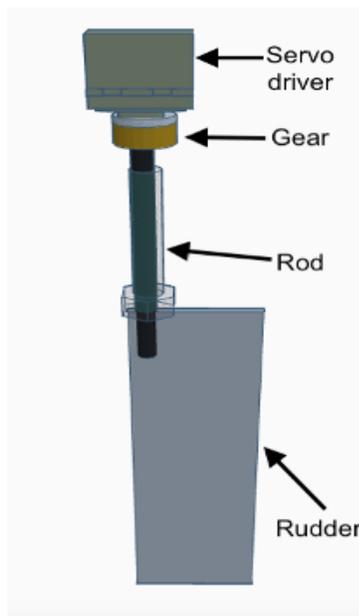


Figure 4. Rudder System as designed in 3D ThinkedCAD.

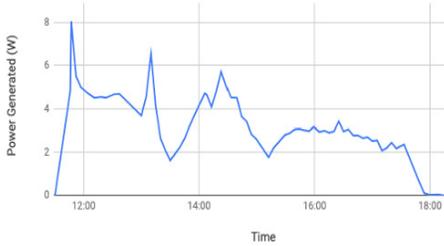


Figure 5. Power generated by three 20W 12V panels. Tested on 9/21/2018.



Figure 6. Path MARCO took during 5-waypoint testing at Eagle Lake. A waypoint is a specific location on Earth given in latitude and longitude. A longer path can be broken down into multiple waypoints. Between waypoints, the algorithm finds the shortest path between two points (current location and next waypoint) and tries to stay on that path. Waypoints play a crucial role in breaking the total path into smaller, shorter paths for the algorithm.

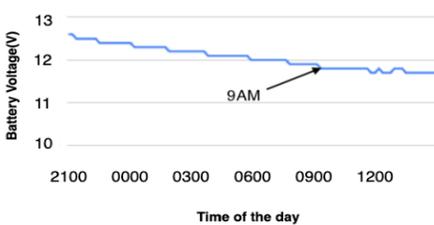


Figure 7. MARCO's battery voltage as it survives a 24-hour test on a cloudy day. At 9 AM, the battery voltage ceases to drop as the solar panels start generating energy as shown in Figure 5 and 7. This shows the battery voltage drops the most when the solar panels are not generating any energy due to absence of sunlight or at night.

and longitude coordinates. With its small size, light weight and lack of a sail, MARCO may be viewed as an alternative to other solar-powered USVs – such as Autonomous Robot for Rapid Transit and Ocean Observation (ARRTOO) – which operate autonomously on the surface of the water. This work has outlined the construction of the solar-powered USV MARCO and proposed the testing involving it. Our future work is aimed at adding Machine Learning to the software and developing an obstacle detection and avoidance system based on LIDAR sensors and cameras with the help of Deep Learning algorithms.

### Acknowledgements

The authors would like to thank Satish Chetty, Ethan Coldiron, and Luke Hoard for their contribution to the Marine Autonomous Robotic Communicator project and Charles Connors for his technical support. We thank the Morehead State University for giving us access to its lab room. Also, we thank the editor for comments and feedback on the manuscript.

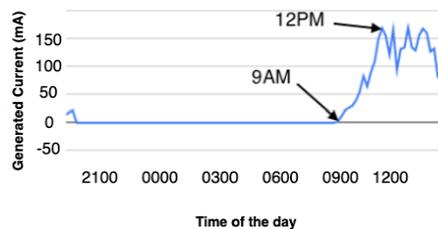


Figure 8. Generated current by the panels as it survives a 24-hour test on a cloudy day. The graph shows the most solar energy productive hours are between 9AM and 5PM. The average generated current was 29.78mA throughout 24 hours and 103mA between 9AM and 5PM.

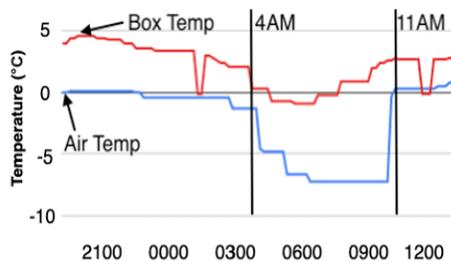


Figure 9. Air temperature (blue) and the temperature inside the box (red) as MARCO survives a 24-hour test on a cloudy day. Monitoring the box or the battery temperature is crucial as all battery capacities drop drastically at low temperatures. The graph shows the battery environment reaches its lowest temperature between 4 AM and 11 AM. Based on this, it is best for the system to perform minimal tasks between 4 AM and 11 AM.

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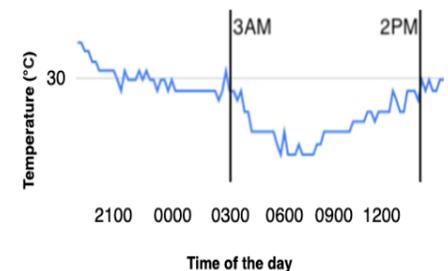


Figure 10. MARCO's Raspberry Pi's CPU temperature(°C) as it survives a 24-hour test on a cloudy day. This shows the direct effect of the environment temperature on the CPU. The CPU temperature drops drastically past 3 AM and rises back to an average of 30°C at 2 PM. It is crucial to measure the CPU temperature as the board can behave differently at extreme temperatures.

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# The Framing of North Korean Refugees in South Korean Media

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## Abstract

*As of 2013, South Korea's Ministry of Unification recorded more than 25,000 North Korean refugees living in South Korea, while upwards of 100,000 North Korean refugees await their passage to South Korea in neighboring countries such as Mongolia, China, Thailand, and Russia. The Korean War, though never formally having ended, caused the division between the two Koreas, resulting in the fleeing of North Korean refugees to the increasingly prosperous South. North Korean refugees' integration into South Korea and reception by South Koreans provides a lens for the "micro-unification" of the Korean peninsula, a glimpse into the possible pan-Korean identity that will be forged should the two nations reunite. The media, as a powerful agent of a society's public discourse, societal norms, and formation of national identity, is an integral tool to utilize in the study of refugee reception in South Korea. The purpose of this study is to explore the ways in which English language South Korean news media frames North Korean refugees. Although North Korean refugees are often referred to as "defectors," refugees will be defined as "someone who is unable or unwilling to return to their country of origin owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion".<sup>33</sup> Articles pertaining to North Korean refugees will be collected from the two oldest, and most distinguished English language daily newspapers circulated in South Korea: The Korea Herald and The Korea JoongAng Daily. Articles published between 2012-2017 will be considered for analysis, as this follows the rule of Kim Jong-Un, the newest dictator in the line of the Kim regime. Practical implications of this study include further investigating the reasons behind the well-documented discrimination that North Korean refugees face in South Korea and providing an account of the South Korean response to North Korean refugees. Similarly to most media portrayals of refugees, North Korean refugees are likely to be framed in a negative light.*

## Introduction

The reception of North Korean refugees into South Korea is a glimmer of what the presumed reunification of the two Koreas could present: either an assimilation approach, in which those from the North must adopt the ways of the South, or a bidirectional social adjustment on behalf of the two sides. Entangled within the "micro-unification" that North Korean refugees living in South Korea present, is the forging of national identity and the social exclusion obstacles that North Korean refugees already face that may be exacerbated by negative public perception.<sup>1,2,3,4</sup> North Korean refugees compose a vulnerable social group, with a secondary education dropout rate climbing ten times higher than their South Korean peers, a disproportionate burden of mental stress (87.3%), and unequal unemployment and underemployment in comparison to their South Korean counterparts.<sup>1,4,5</sup> Often, North Korean refugees are met with hostility, resentment, and discrimination, making their reintegration especially difficult.<sup>6,7</sup> Given the media's ability to create "out-groups," the media may play a role in further entrenching social exclusion.<sup>8</sup>

The South Korean news media, "situated

within societal norms, culture...and an audience to resonate with," and its portrayal of North Korean refugees presents a lens through which the unification of the two Koreas might unfold.<sup>9,10</sup> In a study of South Korean attitudes towards North Korean refugees, 40% of respondents indicated that the media strongly influenced their

personal views of North Koreans.<sup>2</sup> Although the South Korean news media provides just a singular view of the reception of North Korean refugees in South Korea, its place as a "data source from which inferences about public discourse can be drawn,"<sup>5</sup> make it relevant to the multi-faceted aspects of North Korean refugee reintegration into South Korea.<sup>9</sup>

Studies concerning the portrayal of refugees in Western media have largely been about ethnic minority refugees (such as Tamil refugees) or refugees fleeing conflict (such as Syrian refugees) into Western nations. Currently, this study is among the only to specifically analyze the framing of North Korean refugees in South Korean news media.

The purpose of this study is to explore the most salient frames created by South Korean English-language media of North

Korean refugees. In further exploring South Korean media, this study also seeks to find an explanation for the social exclusion that refugees face in many of the host countries they occupy, using North Korean refugees in South Korea as a case study. In addition, North Korean refugees living in South Korea pose a unique angle to the framing of refugees in the media, as the Korean people are historically considered one, although the manifestations of that reality are suspect.

## Literature Review

To guide the analysis of media frames of North Korean refugees, an intertwining of De Vreese's<sup>11</sup> theory of "frame-setting," and Lawlor and Tolley's<sup>9</sup> theoretical framework for their study of news media framing of immigrants and refugees will be used. De Vreese's<sup>11</sup> "Frame-setting" indicates that media framing is a communicative process, one that "affects learning, interpretation, and evaluation of issues and events," so that the intended audience begins to mirror and reflect the frames presented in the media. De Vreese's framework provides a unidirectional pathway of the media to its audience, where the media activates the audience's individual attitudes about an event or group of people.

Similarly, Bos et al.<sup>12</sup> further the notion of a unidirectional media to audience framework, suggesting that “framing effects” result from frame-setting, shaping audience opinions, attitudes, and even behaviors. Lawlor and Tolley’s<sup>9</sup> study contests this unidirectional relationship between the media and audience, arguing that the media “does not exist in a vacuum, but is situated in societal norms and culture,” presenting stories “that are likely to resonate with the intended audience.”

In light of this idea, a reciprocal relationship between the media and its audience can be reimagined, where the media is not simply a “textual artifact” from which the passive audience deduces their positions, but is rather “a data source from which to draw inferences about public discourse.”<sup>9</sup> For this study, the theoretical framework rests upon the notion of a reciprocal media

and audience relationship; the two entities draw upon one another, leading and following one another. The relevance of this reciprocal relationship between media and audience is clear within studies concerning the media’s framing of refugees. Indeed, the media has the ability to further perpetuate otherness, especially when refugees are juxtaposed against a strong national identity of the host nation, as they often are in the media.<sup>13,14,15,16,17</sup> Especially important to this study is the ability for the media to create an “out-group,” as well as a corresponding “out-group” response from the audience, a sociological term used to describe those who are barred from the “in-group” through lack of incorporation into the majority society.<sup>8</sup> North Koreans, as co-ethnics to South Koreans who share the same history and language, would seemingly appear to be members of the “in-group” with South Koreans. The media is a powerful tool that acts as a function of the intended audiences’ public opinion and has been analyzed extensively in its framing of refugees throughout the world in a variety of host country settings. In the following section of the literature review, the three most salient findings categorized as (1) refugees as a “crisis”, (2) refugees as a “moral obligation,” and (3) refugees as the “undeserving other” and their respective sub-themes will be analyzed and provide insight into potential results from this study’s analysis.

### *Refugees as a "crisis"*

When the word “refugee” is mentioned in the news, “crisis” often follows thereafter. The term “refugee crisis” as a media entity itself invokes a sense of panic, trouble, or even danger. Overwhelmingly, studies that have documented the media framing of refugees note that the portrayal of refugee arrivals as presenting a “crisis” to the host nation is pervasive.<sup>9,15,18,19</sup> The crisis theme was often

characterized by language that signified that refugees come in “floods,” presenting a security threat, crime, and a costly burden to the host nation.

### *Refugees as a "flood"*

In Lawlor & Tolley’s study of refugee portrayal in Canadian media, language such as “flood,” “deluge,” “wave,” “influx,” “flows,” and “masses” were often used to characterize refugees. Such language implicitly calls for harsher border control and security measures, subtly hinting at the lack of securitization in light of the “masses” of people who flow so easily through borders. For example, Mollard’s<sup>18</sup> analysis of Scottish media’s portrayal of refugees found that keywords such as “influx,” “wave” and “flood” accounted for 31% of negative press coverage. Importantly, this language “dehumanizes asylum seekers and shifts the focus of the debate away from the reasons why people are seeking asylum...towards how many people are applying for asylum.”<sup>18</sup> Such language appears to be reserved for refugees in particular, as immigrants, who tend to arrive more incrementally, yet are plagued by similar stereotypes as refugees, are rarely referred to as arriving in “floods.”<sup>9</sup> Importantly, many news articles when mentioning the seemingly large numbers of refugees, fail to mention their proportion relative to the host population.<sup>12,19</sup>

### *Refugees as criminals/terrorists that pose a security threat*

Many refugees, especially those fleeing war-torn nations are presented as linked to “sinister global networks of terror,” which ironically constitutes the main reason why many refugees flee their home countries.<sup>20</sup> The framing of refugees as portraying a security threat is also linked to their portrayal as criminals. Repeatedly, the literature has pointed to the media’s preoccupation with refugees’ crime rates. Headlines such as “Terror suspects claim refugee status,” cast terrorism as being inextricably linked to refugees, making the unethical error of connecting a singular crime to the existence of entire group of people.<sup>13</sup> Rather than terrorists, North Korean refugees are often regarded with suspicion in the rare case that they may actually be spies.<sup>10</sup>

### *Refugees as an economic burden*

The largest economic burden that refugees present is their case processing time and the expenses involved therein.<sup>18</sup> However, refugee use of social benefits, such as the cost of their housing or its alleged usurpation from natives, are often the focus of articles describing the financial burden

of refugees. Furthermore, most articles refuse to recognize that many countries have volunteered themselves to receive refugees.<sup>13</sup> When host nations focus solely on what refugees “take,” it questions what or if refugees will contribute anything in kind.

### *Refugees as a moral obligation*

In opposition to the “crisis” theme, is the media framing of refugees as a humanitarian obligation. A call to act, support, and become aware of refugee needs are often provoked by media images, such as that of Omran Daqneesh of Syria whose stunned and bloodied face signified the gravity of the situation in Syria to the world, as well as the indiscriminate nature of the conflict.<sup>21</sup> The moral obligation theme is mostly characterized by sentiments that create a sense of responsibility to refugees, focus primarily on children or women and other “innocents” involved in conflict, and cast refugees as victims. Unfortunately, the “moral obligation” theme is often short-lived in the media and often thrives on a narrative that does not credit refugees with strength, resilience, or other positive attributes.

### *Refugee reception is a humanitarian obligation*

Georgiou and Zaborowski<sup>22</sup> describe the media response to images of three-year old Aylan Kurdi’s lifeless body washed upon Turkey’s shore as “ecstatic humanitarianism”. In their systematic year-long analysis of European media’s framing of refugees, Georgiou and Zaborowski (2017) found that media accounts of previous preparations for refugee arrivals, including increased physical barriers, deportations, and increasing security presence ceased shortly after Kurdi’s images were circulated. The framing of refugees as a humanitarian obligation is often built upon portraying refugees as needy, desperate, and helpless.<sup>15,23,24</sup>

When the media frames refugees as a moral or humanitarian responsibility, the use of refugee women and children is often utilized.<sup>15,25</sup> Venir<sup>15</sup> describes how refugees have been referred to as an “entire generation of children” whose fate rests with the United Kingdom’s decision to accept more of them.<sup>15</sup> Similarly, the mentioning of “families,” “innocents,” and “baby/babies” are terms with similar connotations, meant to emphasize the sympathy the reader ought to feel towards refugees. Rettberg and Gajjala<sup>25</sup> echo this finding in their analysis, revealing that in two contrasting images in the media (one of a naked child in the dust of a refugee camp, the other of men talking in a boat), although both of refugees, were labeled differently. The child was a “real refugee,” while the men on the boat were “soldiers of Islam”.

## *Refugees as one's fellow man*

Media that frames refugees as worthy and deserving of care were often likened to the reader, where a commonality was thread between the subject (refugees) and readers. Intrinsic to viewing refugees as deserving were keywords such as “hunger” and “hopeless,” feelings that the audience is likely to have experienced to some degree.<sup>26</sup> When refugees were directly quoted in interviews and other news pieces, the personal touch granted to refugees opposes the faceless “mass” or “flood” language, and portrays their humanity.<sup>15,22,26</sup> In addition, when refugees’ demographic characteristics, such as their name, age, occupation, and country of origin were named, they were portrayed in a more humanitarian light.<sup>22</sup>

## *Refugees as the undeserving other*

The lexicon of “boat people,” “queue-jumpers,” and “back door entrants” used to describe refugees not only egregiously misrepresents the plight of refugees but seeks to delegitimize their claims of persecution. Due to its ability to erase an out-group’s legitimacy, the media’s framing of refugees as illegitimate can jeopardize the very well-being of current and future refugees.

## *Refugees as queue-jumpers*

When refugees are referred to as “queue-jumpers,” and “back door entrants” it points towards “weak refugee policies and over

accommodation”.<sup>20</sup> Krishnamurti’s analysis of Tamil refugees in the Canadian media emphasizes that the use of the word “queue-jumpers” is meant not only to delegitimize refugees, but denotes an assault on Canadian values. “Queuing” is the epitome of Canadian politeness and orderliness, which refugees supposedly defy.<sup>14,20</sup> The “queue-jumper” frame is often justified with the supposed “evidence” of refugees who still maintain ties to their family and homeland.<sup>20</sup> The transnational ties that refugees maintain serves as fodder to deny their legitimacy, while in actuality, such ties are a testament to the longing for but impossibility of staying in their homelands.

## *Refugees are illegitimate*

Characteristic of the illegitimacy frame is the featuring of stories of deportations, failed asylum cases, and confinement of refugees.<sup>13,20</sup> The conflation of refugees with “economic migrants” was salient within the illegitimacy frame, which poses the danger of sending refugees back to their hostile home countries.<sup>18</sup> The illegitimacy frame portrays host nations as “subjected to” refugees. Host countries may portray themselves as victims of, rather than signatories to, international policies that protect refugees.<sup>13</sup>

Although there exists an extensive literature on the media framing of refugees, there exists only three studies that have focused specifically on North Korean refugees portrayal in South Korea. Most relevant to this study’s analysis is the

findings from Son’s<sup>10</sup> 2016 study, especially as they correlate with the findings from the literature previously reviewed. From 1997-2012, Son<sup>10</sup> documented some of the key influences behind changes to policy and perceptions regarding North Korean people in South Korea, using the media as part of its analysis. Findings conclude that an overall shift of viewing North Korean refugees as “heroes” to “welfare dependent migrants,” from “brothers/compatriots” to “foreigners” occurred. Three themes arose in Son’s<sup>10</sup> analysis: us, them, and multicultural framing of the South’s reception of North Koreans. The “us” theme labeled the separation of the two Koreas as a tragedy, especially due to the shared history and culture of the two nations. Words such as “co-ethnic,” “common destiny,” and “brethren” were common within this label. The “them” theme focused heavily on the growing presence of refugees in the South, presenting them as an imbuing threat. A focus on “re-defections” back to North Korea sought to delegitimize refugees in South Korea as a whole. The “multicultural” theme was the least common and was characterized by the bidirectional relationship that the two Korean people may share, one that is cognizant of the differences between the two without imposing a hierarchy of superiority. The social exclusion that North Korean refugees face in South Korea is well documented, which Mathieson et al.<sup>27</sup> argue is perpetuated by mass media. Indeed, hostility towards immigrants and refugees is often further entrenched by the media.<sup>27</sup> The foundation for social

## Results

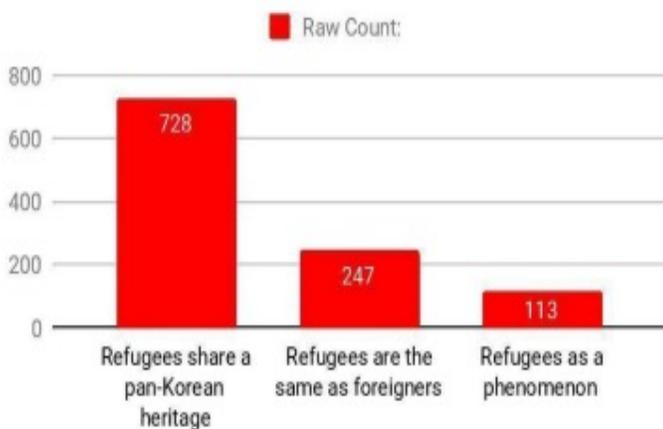


Figure 1: Raw count of all 1088 coded text and their corresponding themes.

## Results

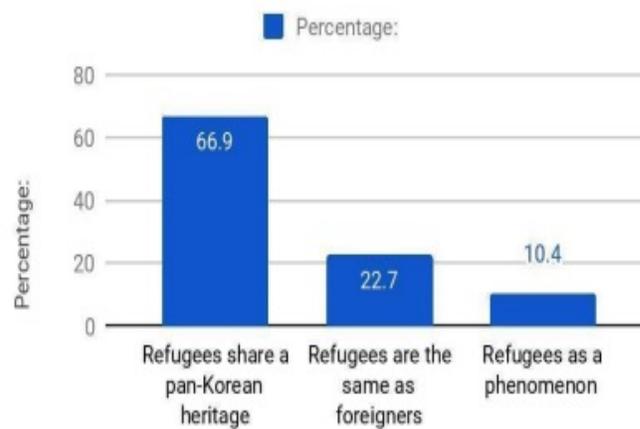


Figure 2: The 1088 coded text and their corresponding theme by percentage.

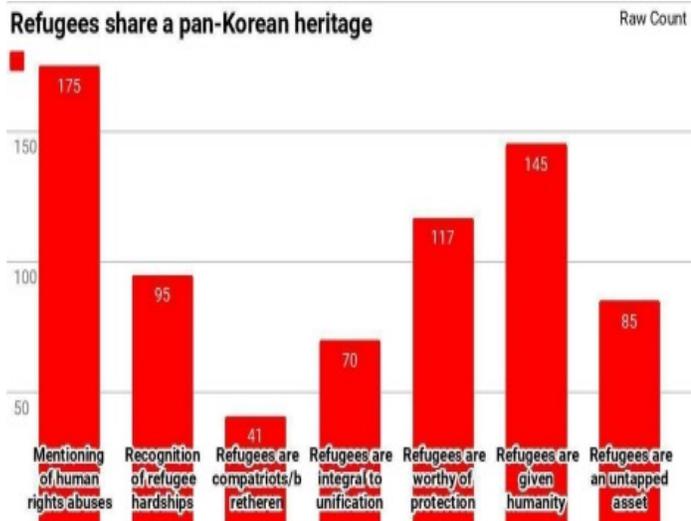


Figure 3: The first theme, “refugees share a pan-Korean heritage,” contained seven different codes. The above bar graph illustrates the raw count of the theme’s seven codes.

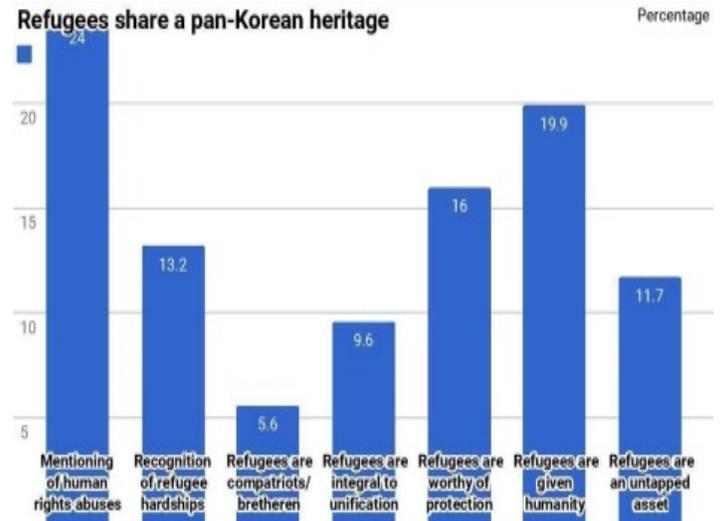


Figure 4: The first theme, “refugees share a pan-Korean heritage,” contained seven different codes. The above bar graph illustrates the theme’s seven codes by percentage.

exclusion of North Korean refugees lies also in their characteristics that mark them visibly, verbally, and culturally as a separate ethnic group.<sup>4,8</sup> The “years of disconnection has created a culture, a value system, and an accent that clearly distinguish North from South Koreans,” while a history of malnourishment and famine has created stunted growth in some North Koreans, marking them outwardly as different from South Koreans.<sup>28</sup> A “wide linguistic gap” has occurred due to the many years of separation between the two Koreas, one that leaves refugees “unable to comprehend the South Korean language” according to Kim<sup>2</sup>, while Ha & Jang<sup>8</sup> add that such a gap serves as “the principal impediment to their job acquisition”. South Korean media has the potential to further propagate the social exclusion that North Korean refugees face, serving as a tool to further entrench existing negative stereotypes. The media’s power to create “dissimilarity/otherness,” means it “can take an active part in the processes of stigmatization of minorities and thus become an instrument of social exclusion of their members.”<sup>29</sup>

In a national poll, it was found that almost half of South Koreans were overall apathetic to the needs of North Korean refugees.<sup>8</sup> Refugee accounts and satellite imagery testify to the systematic imprisonment of repatriated refugees to political prison camps, human trafficking at the China/North Korea border, and the lack of provision of basic needs in North Korea and are among some of the human rights abuses that North Korean refugees face. In South Korean social studies textbook the mentioning of “human rights violations happening in Darfur, Sudan and Guantanamo camps” were found, while

none mentioned North Korean human rights abuses. Park<sup>30</sup> concludes that a “prerequisite to stronger action [against North Korean human rights abuses] is raising public support through awareness,” in which the media can play an integral role.

### Research Design

Media was limited to the South Korean English-language press only, as it is “an excellent source of data for the examination of the construction of refugees and asylum seekers,” due to its reciprocity between reader and material,” as well as its vast “selection, frequency, extent, and nature of reporting”.<sup>15</sup> Articles pertaining to North Korean refugees were collected from the two oldest, and most distinguished English language daily newspapers circulated in South Korea: The Korea Herald and The Korea JoongAng Daily. Articles published between 2012-2017 were considered for analysis, as this follows the rule of Kim Jong-Un who came to power in December of 2011 and is the newest dictator in the line of the Kim regime and ends with the six months following the election of South Korean president Moon Jae-In in May 2017.

### Research Methodologies

In order to garner themes surrounding the framing of North Korean refugees in the South Korean media, thematic analysis was used. Thematic analysis does not seek to quantify codes as a means of proving a theme’s salience. Rather, thematic analysis relies upon providing a rich, complex, and saturated story of the data collected.<sup>31</sup> Within a thematic analysis, the researcher is expected

to create codes that eventually crystallize to a larger entity, theme, or overarching sentiment that characterizes the majority of the dataset. Borrowing from Braun & Clarke’s<sup>31</sup> five-step system to thematic analysis, this study’s analysis was tailored to the framework that Braun & Clarke have created.

The first stage of thematic analysis is the (1) familiarization phase, which entails the immersion of the researcher into the universe of the data. Familiarization includes reading an initial twenty-five articles from each English Language Journal selected (The Korea Herald and The Korea JoongAng Daily), in order to generate keywords (“North Korean refugee”, North Korean defector\*), a coding scheme or sketch of preliminary codes, as well as a general idea of events surrounding refugees during the selected time period.

The second phase involves (2) the systematic generation of initial codes. At the micro level, small pieces of information that are even potentially meaningful were coded. All data that fell within the 2012-2017 time period was selected for initial coding. This initial coding phase involved both semantic and latent codes. Semantic codes, described as “surface level” take words at face value. If refugees are described as “naïve,” a semantic code could be created which simply means that refugees are characterized as naïve. Latent codes search for “hidden meaning” and would take the characterization of refugees as “naïve” to deduce that refugees are framed as childlike, feeble, or inept. A preliminary set of codes were generated as a product of the familiarization and generation of initial code phases. No new codes were added after this phase.

The third phase casts a broader focus for analysis and is considered to be (3) the

“searching for themes” phase. Analytical judgments were used to identify meaningful, important, and broad themes that both answer the research question and encapsulate the most salient codes that were already created. The themes must create a coherent and analytical story. Within this phase, a candidate set of themes were produced in order to proceed to the step of reviewing themes. This phase ended not only with a set of candidate themes, but also the “collation of coded data relevant to each theme,” as well as a “sense of connection/relationship” between the themes.

The fourth phase is (4) reviewing potential themes, which entailed the evaluation of themes to ensure that they were substantial, coherent, and well organized. The researcher must evaluate whether themes work in (1) relation to the coded data and (2) in relation to the entire dataset.

The fifth phase of thematic analysis involves the (5) defining and naming of themes. A detailed definition of each theme were created that tells a “rich, nuanced, conceptually informed interpretative story about the meanings embedded in and beyond the surface of the data”.<sup>31</sup> In addition, informative and engaging names should be given to each theme. By the end of this process, a final set of themes were gathered.

The final phase of creating a thematic analysis is (6) producing the report. By the time the report is drafted, the analysis has been fully conducted. However, the report phase involves integrating literature into findings, as well as convincing the reader of the researcher’s interpretation.

## Results

In conducting the initial familiarization and generation of initial code phases, a total of fifteen codes were generated, not including child codes of the larger codes. The codes were then named, defined, and evaluated for their comprehensiveness. The article universe initially included 314 articles from *The Korea Herald* (113) and *The Korea JoongAng Daily* (201), but as repeated and irrelevant articles were removed, the final article universe comprised of 294 articles from the *Korea Herald* (110) and *The Korea JoongAng Daily* (184) published between January 2012-December 2017. After reviewing the entire article universe/data set and applying the 15 codes and child codes, two additional codes that were initially child codes emerged as salient enough to be separate codes. A total of seventeen codes emerged from the review of the data set.

Upon reviewing the data set in its entirety with the seventeen codes applied throughout, themes were generated from the data that

were built upon the initial codes. The three themes that emerged from the data include (1) refugees share a pan-Korea heritage, (2) refugees are the same as foreigners, and (3) refugees as a phenomenon.

Two layers of analysis were involved in this study: (1) the descriptive numerical summary of the most prevalent codes and their corresponding themes of the data and (2) the interpretative story that the themes capture of the data. The first layer of analysis will remain in the results section, while the second layer will be detailed in the analysis section. Among the 294 articles coded and analyzed, there was significant overlap in the number of codes that appeared within one article. Therefore, the number of excerpts of individually coded text, rather than articles, will serve as a more useful measure for understanding the manifestation of the codes and themes. In total, 1088 excerpts of text were coded. Of the three themes, “refugees share a pan-Korean heritage” appeared 728 times within the data set (66.9%). The “refugees are the same as foreigners” theme was coded 247 times (22.7%), while the “refugees as a phenomenon” theme was coded 113 times (10.4%). Graphic 1 and 2 as shown below detail the raw count and percentage makeup of each theme.

The seventeen codes were categorized so that they became the substance of each theme. The theme, “refugees share a pan-Korean heritage,” contained seven different codes: (1) the mentioning of human rights abuses (raw count: 175, 24%), (2) the recognition of refugee hardships (95, 13.2%), (3) refugees are compatriots/brethren (41, 5.6%), (4) refugees are integral to unification (70, 9.6%), (5) refugees are worthy of protection (117, 16%), (6) refugees are given humanity (145, 19.9%), and (7) refugees are an untapped asset (85, 11.7%).

The theme, “refugees are the same as foreigners,” contained six of the seventeen codes: (1) the idealization of South Korea (31, 12.6%), (2) North and South Koreans are inherently separate (21, 8.5%), (3) refugees are inherently lacking/inept/deprived (48, 19.4%), (4) refugees are distant others (339, 15.8%), (5) refugees are cast as objects (67, 27.1%), and (6) suspicion towards refugees (41, 16.6%).

Within the theme, “refugees as a phenomenon,” four codes were contained within it: (1) focus on non-refoulement over refugee status (37, 33%), (2) North/South Korea relations are jeopardized by refugee arrivals (14, 16%), (3) refugees are a bargaining tool between China and South Korea (10, 9%), and (4) China/South Korea

relations are jeopardized by refugee arrivals (50, 44%).

## Analysis

The “refugees share a pan-Korean heritage,” theme interweaves the notion that refugees deserve further protection, bolstered by the idea that refugees can be a viable part of Korea’s rise as a regional power. Articles that fell within this theme were cognizant of refugee hardships as being exacerbated by the prejudice that some South Koreans have towards them. For example, the discriminatory treatment of refugees as “second class citizens,” contributed to their rejected or immediately discarded job applications upon the employer discovering their North Korean background as described by the press. Instead of being framed as a signifier of refugees’ ineptitude, the mentioning of refugee hardships pointed to the failure of South Korean integration systems and implored the South Korean public to do more for refugees. Another means of imploring the audience to have more sympathy towards refugees found within this theme, was the discussion of the shared ethnic, cultural, linguistic, and historical pasts of the two Koreas. Articles that mentioned the Japanese occupation of Korea, the literal description of refugees as “brothers and sisters,” and the idea that the “5,000 years of Korean history,” outweighs the “short moment” of the recent seventy years of separation fell within this theme. Because of the ties between South and North Korea, the articles that fell within the theme portrayed the divide between the two Koreas as a tragedy. Refugees were framed as a natural part of this tragedy, since the two Koreas are “technically still at war,” given that a truce, rather than a peace treaty ended the fighting. As a counterpart to the tragic divide, was the “shared dream of the two Koreas” to eventually reunite. Refugees were framed as the “groundwork” and “literal living representation” of reunification, with one article referring to the German chancellor, Angela Merkel, originally from East Germany, as a hopeful example of what refugees could become in South Korea.

While such framing of refugees literally demarcates refugees as integral to unification, it also implies that unification is deeply social, not simply political. As instruments of reunification, refugees were portrayed in other ways that cast them as untapped assets, which also fell within the theme. Articles that referred to North Korean refugee poets, doctors, activists, and students sought to expose that refugees are not huddled victims, but rather contribute to South Korean society. The *Korea JoongAng Daily*

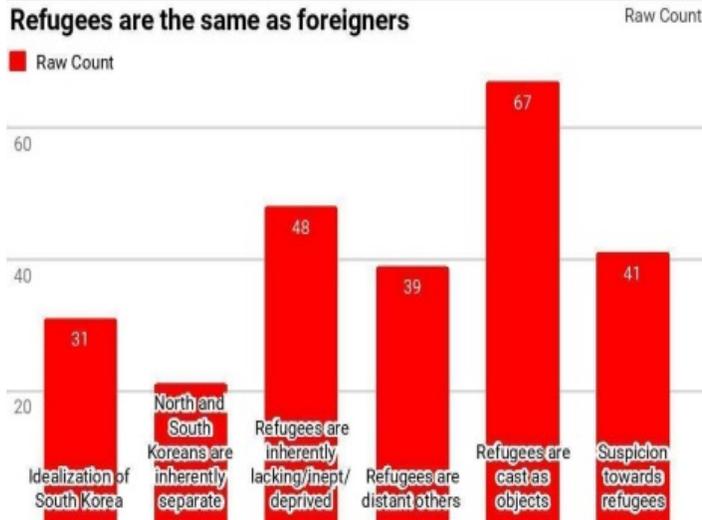


Figure 5: The second theme, “refugees are the same as foreigners,” contained six different codes. The above bar graph illustrates the raw count of the theme’s seven codes.

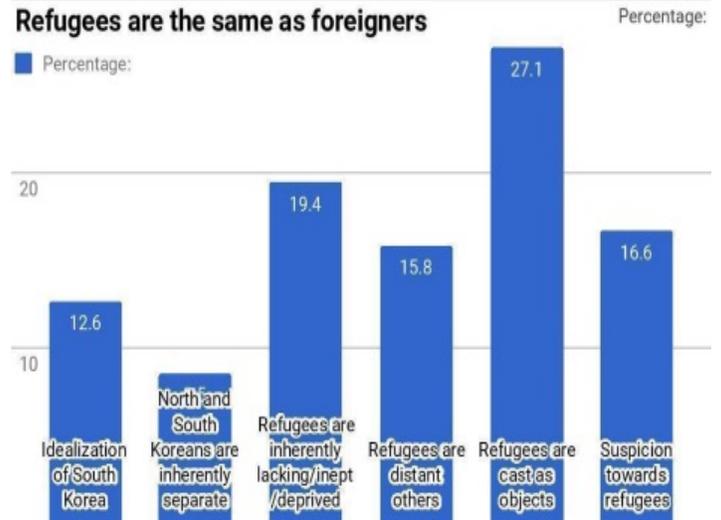


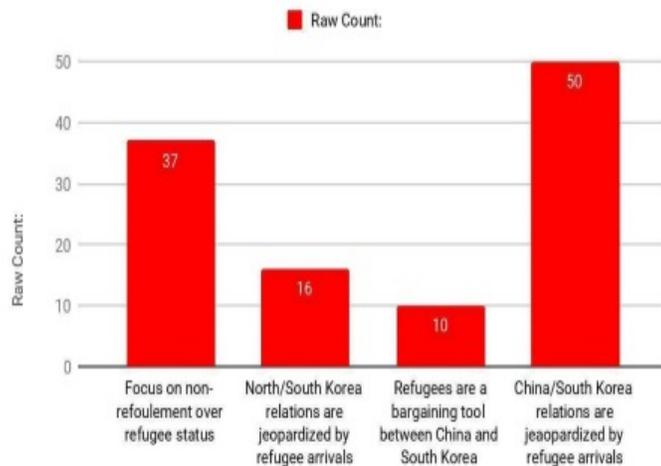
Figure 6: The second theme, “refugees are the same as foreigners,” contained six different codes. The above bar graph illustrates the theme’s six codes by percentage.

even created a “hidden defectors” collection of stories that highlighted refugee success stories to counter the narrative that refugees are “incompetent parasites who can never succeed in their adopted country.” Conversely, the theme “refugees as foreigners” emerged as counter to the theme describing refugees as sharing a pan-Korean identity. Within this theme, refugees were framed as inherently separate from South Koreans, with emphasis placed on the seventy years of separation between the two Koreas. The two nations were presented as antagonistic to one another, unable to reconcile their differences. Several articles within this theme made reference to the “Stalinist State” from which refugees hailed, juxtaposed with the “Capitalist South,” which served to delineate how far removed refugees are from South Korean society. Reference to the cultural, linguistic, and sometimes even physical differences between North and South Koreans were frequently mentioned in text excerpts that fell within the theme. For example, one article described the way the South Korean diet has evolved such that standard tofu dishes, which are “more than enough to satisfy” refugees, are “too plain and simple” for the South Korean palette.<sup>2</sup> Linguistically, refugees “take a long time to comprehend the words used in everyday life,” and even though they speak the same language as South Koreans, it sounds “weird.”<sup>2</sup> Even physically, refugees are “notably smaller” and darker skinned than South Koreans, according to text that fell within this theme.<sup>2,11</sup> Semantically, such descriptors serve to enumerate the many differences between North and South Koreans, but also serve to describe the rift between the two as almost too great to

overcome. Refugees are portrayed as unable to thrive in the “cutthroat competition” of South Korea’s “already saturated job market,” which implies that even if there were less competition or more job opportunities, refugees have little to offer. To prove how disparate the two societies are, text often relied on accentuating the incompetence of refugees, which was especially noticeable in comparison to the affluent and digitized South. Even for refugees that come from privileged and educated backgrounds in the North, their skills were described as “non-transferable” and irrelevant to the South. Similarly, some articles described refugees as using government aid as a crutch and their only means of becoming successful. Several findings from this analysis echo the findings of Ha and Jang’s<sup>8</sup> analysis that found that North Korean refugees were generally regarded as an outgroup. Within the theme “refugees are the same as foreigners,” refugees were both objectified and met with suspicion. Articles that objectified refugees within this theme, used dehumanizing language such as refugees being “rounded up,” and coming in “swarms” and “surges,” which renders refugees devoid of any human characteristics.<sup>18</sup> Such words that frame refugees as an out-group were compounded by suspicion towards refugees. References made to the “big hole in [the South Korean] intelligence capabilities for screening out spies” and the “weaknesses in defector management” present refugees as a security threat. According to the articles that fell within this theme, “it is hard to tell the difference between North Korean defectors and ethnic Koreans in China,” which alludes to the both the separation and suspicion between refugees and South Koreans.

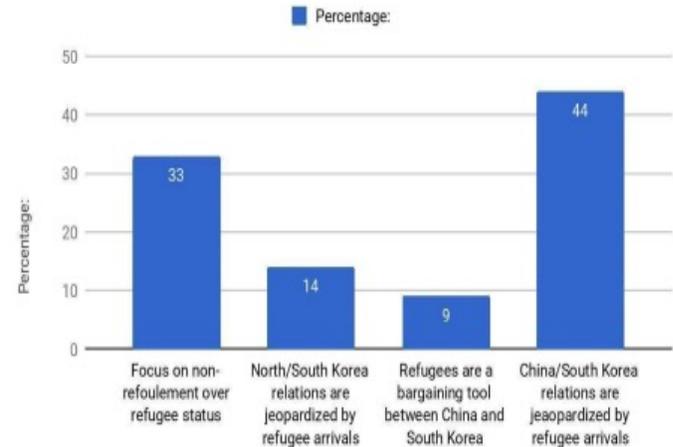
In the final theme, “refugees as a phenomenon,” refugees were portrayed almost as an event that has the capability to alter or taint South Korea’s relations with both China and North Korea. The classification of North Korean refugees has been hotly debated, although refugees can be defined as any person “owing to the well founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion...and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who...is unwilling to return to it.”<sup>32</sup> Given that the majority of North Koreans fall within the “hostile” political class based on their perceived lack of loyalty to the North Korean government, many North Korean refugees rightly fear political persecution, punishment, or even imprisonment for “infractions” such as watching foreign films. Even if North Korean refugees maintain characteristics of economic migrants, they can be classified as “refugees sur place” who may have exited their home country as economic migrants but face public execution and torture if they were to be repatriated.<sup>33</sup> Within this theme, the South Korean media largely focuses on repatriation of refugees instead of refugee status. For example, the primary argument against China’s repatriation of refugees was that “the South Korean Constitution stipulates South Korean territory covers the Korean Peninsula...so thus, North Koreans should be seen as having South Korean nationality”. The argument that refugees are actually South Korean citizens by South Korea’s constitution allows South Korea to argue against the repatriation of refugees without having to urge China into recognizing North

Refugees as a phenomenon



Graphic 7: The final theme, “refugees as a phenomenon,” contained four different codes. The following bar graph illustrates the raw count of the theme’s four codes.

Refugees as a phenomenon



Graphic 8: The final theme, “refugees as a phenomenon,” contained four different codes. The following bar graph illustrates the theme’s four codes by percentage.

Koreans’ refugee status. To do so would be China’s blatant admission of the considerable human rights abuses of North Korea, as well as a soured relationship with North Korea. Another facet of South Korea’s “ginger” stance towards China in regards to refugees, was its desire to maintain its strong economic relations with China as both a major investor and tourist market for China. Similarly, this theme was characterized by the ability for refugees as a phenomenon, to taint North/South Korea relations. Oftentimes, articles mentioned how North Korea refers to South Koreans as “human trafficking agents,” and refugees themselves as “abductees” who were deceived or payed into defecting. South Korea retorts that the North’s claims take the tragic repatriation of North Korean refugees and turn it into a “propaganda coup” whereby repatriated refugees are made to publicly denounce South Korea. Additionally, this theme contained the underpinning idea that refugees can be used as bargaining tools among China, South Korea, and North Korea. For example, the South Korean press often alludes to the effectiveness of sanctions on North Korea as being a trade off with an “exodus...of the world’s most sequestered people” who suffer economically with increased sanctions. Likewise, the return of illegal Chinese fishing boats found in South Korean waters is often mentioned in text about South Korea urging China against refugee repatriation, often as a compromise used to appease China. When refugees are portrayed as bargaining tools, it alludes to their relevance in political strife, but their simultaneous irrelevance, as they are merely objects to be freely traded for favorable political conditions.

## Discussion

Overall, the findings from this study demonstrate that the portrayal of refugees in the media is mixed. As expected, the negative portrayal of refugees was enshrouded within already existing stereotypes surrounding refugees: that refugees are actually spies, that they are inept and lazy, and language that regarded refugees as statistics and faceless swarms, rather than people. Positive framing of refugees implored the South Korean public to do more for refugees, including acknowledging their prejudices, becoming more aware of human rights abuses, and seeking the likeness and humanity that they share with refugees. Unexpectedly, refugees as a phenomenon was a new finding that appears to fluctuate greatly with the international climate in regards to refugees and gives insight into how the dynamics among South Korea, North Korea, and China relations are shaped by refugees.

## Limitations

Limitations of this study include the sole use of English-language media, excluding all Korean-language news outlets that are not published in English. In addition, the use of South Korean media produced in Korean (as opposed to English) would mediate the translational pitfalls that may lack the cultural nuances, unique phrasing, and intended meaning that the original Korean articles provide. Another potential limitation of this study is its inability to triangulate the data gathered through the thematic analysis of South Korean media, with interviews with North Korean refugees nor South Koreans. The difference in the framing of refugees in

the two journals and their respective slants were not analyzed, which serves as another limitation. In addition, there was only one researcher involved within the analysis of data collection, so intercoder reliability was not upheld. However, an outside evaluator reviewed the comprehensiveness of the created codes; the codes themselves were organized in a chart used as a reference so that codes maintained consistency throughout their application.

## Recommendations for further study

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