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Dear Reader,

We are pleased to present the sixteenth volume of the *Stanford Undergraduate Research Journal.*

In this volume, we invite you to analyze Western and African American art with Ella Bunnell, discover the impact of digital communication on romance with Angela Lee, investigate education barriers in rural communities with Madeline Musante, explore real-time visual subject tracking with Lucas Roitman, uncover the sources of trafficking victims with Jenny Vo, and learn through student-led research initiatives extending from around the world.

In addition to this volume of SURJ, we launched a new website for our online companion, LYNX Magazine. LYNX shares the stories and experiences of Stanford students and faculty who are passionate about research. By highlighting their work, we hope to encourage more undergraduate students to pursue research in fields that they truly care deeply about.

Since its founding in 2001, SURJ has produced intellectually vibrant collections of outstanding undergraduate research to celebrate students' accomplishments, share their discoveries, and promote an investigative spirit among undergraduates. SURJ's mission is to encourage, recognize, and reward intellectual activity outside the classroom, and we hope that through this publication, we can continue to foster undergraduates' pursuit of creativity and knowledge.

This year's journal would not have been possible without the tireless efforts of our staff. In particular, we would like to acknowledge our LYNX Editors Alan Aw and Aron Tesfai, Social Science Section Editor Ramya Balasingam, Natural Science Section Editor Melodyanne Cheng, Engineering Section Editor Nitya Mani, Humanities Section Editor Dana Huh, and Production Lead Jennifer Parker. This volume of SURJ is a testament to their dedication and leadership.

We would also like to express our gratitude for the support of our authors, the Office of the Vice Provost for Undergraduate Education, and the Office of Undergraduate Advising and Research, and our Faculty Advisor, Dr. Vivienne Fong.

On behalf of the entire 2016-2017 SURJ staff team, thank you for taking the time to pick up this journal. We hope you enjoy the work ahead.

Sincerely
Aanchal Johri and Kate Nelson
Editors-in-Chief
Stanford Undergraduate Research Journal

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MINDSETS AND MILKSHAKES

A CONVERSATION ABOUT FOOD WITH PROFESSOR ALIA CRUM

by Michelle Chang

If you want to maintain or lose weight, you might want to think twice about simply going for healthy, low-calorie meals.

That is, according to what Dr. Alia Crum, principal investigator of the Stanford Mind and Body Lab, has learned from her research. An assistant professor of psychology, Dr. Crum studies how subjective mindsets alter the way we perceive objective reality. "Personally, I struggled with my weight and eating the right foods in order to function as a Division I athlete during my undergraduate days at Harvard," she explained. "That drew me to the problems I'm researching as a psychologist today."

Part of Dr. Crum's answer to her struggle as a varsity ice hockey player was inspired by the placebo effect. As an undergraduate student, Dr. Crum completed a literature review on placebos, typically known as the "sugar pills", which are often used as the control condition in clinical trials of active drugs. The broader definition of the placebo effect encompasses the effects not of active drugs but of people's beliefs about those drugs. Crum found that, even when the drug outperformed the placebo, the placebo accounted for much of the medication's efficacy.

"I was just really blown away by how robust the placebo response is and how important it is in producing the effect of medications. What was most powerful for me is how our beliefs about something could change our body's response," Dr. Crum says. "The question then occurred to me: how much is the effect of the foods we choose due to what is in the foods--the nutrients, the calories, the fat--, and how much of that effect is perhaps due to our beliefs about those foods?"

Refuting "Calories In, Calories Out"

While completing her PhD in Clinical Psychology, Dr. Crum revisited this question with an experimental approach. Believing that they were participating in a shake-tasting study, 46 participants came into the lab twice. Both times, they consumed the same 380-calorie milkshake, but it was presented as a high fat, 620-calorie "indulgent" shake one time and as a low fat, 140-calorie "sensible" shake the other time. Her team then took blood samples to measure participants' ghrelin levels before and after consumption of the shake. The gut peptide ghrelin measures how "hungry" someone feels: before eating, ghrelin levels increase to induce appetite, and after eating, ghrelin levels lower to reduce appetite, making someone feel satiated.

The results demonstrated that when participants believed that they were drinking a healthier, "sensible" shake, their ghrelin levels remained mostly flat before and after consumption--meaning that they did not feel satiated. However, when they believed that they were drinking an "indulgent" shake, their ghrelin levels dropped about three-fold after consumption--meaning that they were more physiologically satiated.

Even though the contents of both milkshakes were exactly the same, what made a difference in how hungry participants felt was participants' mindsets about food. Indeed, the belief that one is eating healthily may actually be counterproductive to those trying to maintain or lose weight, as this belief can increase appetite and slow metabolism.

"The results were paradigm-shifting," Dr. Crum recalls. "The results challenged our traditional assumption that metabolic or weight maintenance is about calories in, calories out. It suggests that what matters is not just what we eat, but also what we think about what we eat."

The notion that the mind alone can change our body's physiological responses sounds like the stuff of "mind control" science fiction novels. However, the results of Dr. Crum's study came at a critical time when medicine was

shifting its focus from infectious diseases to chronic diseases, and when treatments were shifting from pills to behavioral modifications.

"We've been trying for a long time to combat obesity and health-related issues on the one hand and eating disorders such as anorexia and bulimia on the other hand. In many ways, both of those approaches were failing. The practical implications of this finding, that the mindset of sensibility is counterproductive, helps provide a reason for why our traditional approaches to obesity are failing and why this war with food keeps perpetuating these issues," Dr. Crum explains.

Still, the study is not an end-all; there are still limits to how the results should be taken.

"The question that comes up is how much does the mindset matter? We're still understanding that we can shift our physiological responses according to our mindsets--but not so much so that we become divorced from reality. However, we're not licensing people to stop paying attention to their physiological health or the objective nutrients of food," Dr. Crum warns.

Where does Dr. Crum want to go with all of this? Her team is now partnering with restaurants and organizations to shift their labeling and marketing of healthy foods, employing mindset insights to improve the health of their constituents.

"What I'm trying to do now is help people reach higher levels of health and flourishing through their own agency. That's what I'm really passionate about. The running joke is that psychological research is ME-search," Dr. Crum laughed. "At the end of the day, our relationship with food is a very deeply human experience."

Abraham's Sacrifice: Solitude and Disquiet in Contemporary Islamic and Jewish Poetry

Anish Gawande

Columbia University in the City of New York
Institute for Comparative Literature and Society

This article examines the differences between the tales of Isaac and Ishmael in the Tanakh and the Quran to explore how the discourse around these stories has affected contemporary poetic and literary works responding to the Holocaust and the conflict in Kashmir. It compares poems from Agha Shahid Ali, Chava Rosenfarb, and Haim Gouri that reference the sacrifice of Abraham to explore the recourse to religious themes by poets responding to two distinct yet intricately related religious backgrounds, eventually demonstrating the possible reconciliation between narratives from two faiths that have oft been described as irretrievably destined to be at odds with each other.

I beg for haven: Prisons, let open your gates –
A refugee from Belief seeks a cell tonight.
And I, Shahid, only am escaped to tell thee –
God sobs in my arms. Call me Ishmael tonight.
— Agha Shahid Ali, Tonight [1].

Isaac, as the story goes, was not
sacrificed. He lived for many years,
saw what pleasure had to offer,
until his eyesight dimmed.
But he bequeathed that hour to his offspring.
They are born with a knife in their hearts.
— Haim Gouri, Heritage [2].

Written over four decades apart, these verses from Aga Shahid Ali's "Call Me Ishmael Tonight" and Haim Gouri's "Heritage" resonate eerily despite the vast histories of conflict that have been unleashed by the oppositional interpretations of the very tale they are both retelling. An undercurrent of loss pervades the dark narratives within these poems, written during moments of painful reflection after horrors unimaginable, and a sense of deep sadness blunts the almost surreal imagery. Themes of betrayal, of unkept promises, of uneasy reconciliations swirl through each of these pieces: yet, the conclusions drawn by each poet of the sacrifice made by Abraham are vastly different. In this paper, I attempt not only to understand the differences between the stories of Isaac and Ishmael in the Tanakh and the Quran, but also to get a glimpse into how the discourse around these stories has transformed the poetic and literary traditions emerging out of them. I provide an insight into the crafting of emotions from texts by comparing works of profound loss from the Holocaust and from the conflict in Kashmir that have been inspired by a Tanakhic and Quranic tale. In comparing these works, I explore the recourse to religious themes by poets responding to two distinct yet intricately related religious traditions, eventually demonstrating the possible reconciliation between narratives from two faiths that have oft been described as irretrievably destined to be at odds with each other.

Abraham's sacrifice remains one of most controversial aspects of scholarship on both the Quran and the Tanakh. While the Tanakh claims that it was Isaac who was meant to be sacrificed

by Abraham, the Quran argues that it was Ishmael who was put upon the altar. This fundamental argument, which centres around which son both texts refer to as the only son of Abraham, has been put forth as the source of all disputes between the Judeo-Christian traditions and Islam: ranging from a justification for the discrimination by one faith against the other to an explanation of the conflict in the Middle East in its entirety [3]. Such incredible importance given to the subject of Abraham's sacrifice has to be understood through the lens of how the choice of son affects the narratives that follow –the choice between Ishmael and Isaac determines the legitimacy of Abraham's successors, thus affecting the tracing of lineages and the foundation narratives told by each faith. The choice also affects the familial relations described within both the Tanakh and the Quran – between Abraham, Sarah, Hagar, Ishmael, and Isaac – and consequently the relationship between the two faiths themselves.

Abraham, the messenger of God and an example of pure and unconditional devotion, occupies a pivotal role in both the Tanakh and the Quran. The Tanakh describes the marriage of Abram to Sarai, and the subsequent entering into a covenant with God by Abram that prophesied that he would be the progenitor of nations and that his descendants would eventually inherit the land of Israel [Genesis 15:1-21, 4]. Distressed by their lack of a child, and puzzled by the prophesy of Abram's child being the progenitor of nations, Sarai offers Hagar – her handmaiden – as a consort to Abram so that they can have a child together [Genesis 16:1-16, 4]. The child born of the deception of Hagar, who had run away from Sarai only to return upon an angel's command to Abram, was Ishmael. Thirteen years later, Abram received another commandment from God that renamed him Abraham and his wife Sarah with instructions for the implementation of the covenant that had been entered into by Abraham several years ago. These instructions included a promise that a son would be born to Sarah: a promise that came true a year later, leading to the birth of Isaac [Genesis 21:6-7, 4]. Abraham's subsequent dismissal of Hagar and Ishmael, prompted by Sarah's observation of Ishmael mocking Isaac [Genesis 21:8-13, 4], established Isaac as the sole legitimate heir to Abraham's fortunes and therefore the sole inheritor of Abraham's covenant with God.

This determination of Isaac as the receiver of Abraham's covenant with God, and therefore Abraham's only legitimate son, is crucial in the Tanakh's interpretation of the sacrifice made

by Abraham. In Genesis, we see God's commands to Abraham reflecting the status of Isaac as the sacrificial son:

After these things God tested Abraham, and said to him, 'Abraham!' And he said, 'Here am I.' He said, 'Take your son, your only son Isaac, whom you love, and go to the land of Moriah, and offer him there as a burnt offering upon one of the mountains of which I shall tell you'. [Genesis 22:1-2, 4].

The naming of Isaac within the Book of Genesis, combined with the belief that Isaac was the only promised son of Abraham and the only legitimate inheritor of the covenant as promised by God, has been seen as a reflection of Isaac's status as a child of promise and blessings. Although Isaac's name is mentioned only once in the narrative of the determination of the "only son", the conception of Isaac through miraculous means and his mocking by Ishmael – who an angel described in previous passages as being "against every man" – is taken as a further legitimisation of the superiority of Isaac over Ishmael [5].

Islamic scholars, on the other hand, use the argument that it is only in Genesis 22:1 that Isaac is explicitly referred to as the "only son" to put forth the claim that the insertion of Isaac's name into the narrative is a result of subsequent corruption of the Tanakh [6]. Quranic verses, which correspond well with those in the Tanakh in their description of both Ishmael and Isaac and the story of their births, imply instead that Ishmael was the son offered for sacrifice while accepting Isaac as an equal prophet. Surah 37 of the Quran summarises the sacrifice of Abraham in terms distinct from those found in the Tanakh:

He said, 'I will go to my Lord: He is sure to guide me. Lord, grant me a righteous son,' so We gave him the good news that he would have a patient son. When the boy was old enough to work with his father, Abraham said, 'My son, I have seen myself sacrificing you in a dream. What do you think?' He said, 'Father, do as you are commanded and, God willing, you will find me steadfast.' When they had both submitted to God, and he had laid his son down on the side of his face, We called out to him, 'Abraham, you have fulfilled the dream.' This is how We reward those who do good – it was a test to prove [their true characters] – We ransomed his son with a momentous sacrifice, and We let him be praised by succeeding generations: 'Peace be upon Abraham!' This is how We reward those who do good: truly he was one of Our faithful servants. [Surah 37:99-111, 7]

Here, the sacrifice of Abraham is carried out with the consent of he who is to be sacrificed: therefore, it is a test of faith not only of Abraham but of Ishmael too. The depiction of Ishmael as the son who is the righteous one promised by God, and as one of the successors of the devout Abraham, is justified by the argument that Ishmael – having being born before Isaac – was the "only son" referred to in Genesis through the verses immediately following these that describe the declaration of the birth of Isaac [Surah 27:112, 7]. The subsequent passage in the Quran, which contains a description of Ishmael constructing the Ka'ba in Mecca with the sporadic assistance of Abraham, further reinforces the importance given to Ishmael in a Quranic narrative [Surah 2:127, 7].

The sacrifice of Abraham is to be seen as a pillar of faith that is unconnected to lineage in the Quran, as demonstrated by the phrase "some of their offspring were good, but some clearly wronged themselves" that makes it clear that the descendants of Abraham through a particular son are not perfect nor are the only chosen people. Thus, in the Quranic narration of the sacrifice of Abraham, the question of descent from Isaac or Ishamel is less important than within the Tanakhic narration. Moreover, the absence of a sacrificial lamb in the Quranic narrative demonstrates that the test of faith is not a ritual passage but rather a demonstration of devotion that must be continual in order for it to stay in force. This lack of specific lineage-based access to religion and a focus on actions rather than heritage can help explain the broader Quranic framework of an equal access to Allah, irrespective of birth or religion, to those who profess their devotion to Allah: a framework that must be analysed in the context of the birth of Islam in turbulent times of religious uncertainty as compared to the birth of Judaism in the time of a reassurance of faith in the ability of a people to survive.

> **[A] framework that must be analysed in the context of the birth of Islam in turbulent times of religious uncertainty as compared to the birth of Judaism in the time of political conflict that required a reassurance of faith in the ability of a people to survive.**

political conflict that required a reassurance of faith in the ability of a people to survive.

Therefore, the comparison of narratives surrounding the sacrifice of Abraham reveals an intricate connection between the Tanakh and the Quran: while both revere Abraham as an exemplar of devotion and piety, they differ in their interpretations of the implications of Abraham's sacrifice and the agency they confer upon the sacrificial son. These differences, which have been the subject of dispute and argumentations over centuries, have also, however, allowed for a rich literary body of work to emerge from the interpretation of Abraham's sacrifice by creative individuals over the ages. By considering it unnecessary to determine the objective truth behind either narrative, I attempt instead here to understand how the narratives as they are understood today shape the crafting of personal narratives by adherents of either faith. In examining the work of Agha Shahid Ali as a representative of a Muslim reflecting upon the conflict in Kashmir and the works of Haim Gouri and Chava Rosenfarb as representatives of Jewish voices reflecting upon the unleashing of violence during the Holocaust, I want to demonstrate how recourse to the sacrifice of Abraham generates a similar conflict of faith but intriguingly different resolutions in the two religious traditions.

These three poets perform valuable work in the context of this paper because they mobilise the symbolism of the sacrifice made by Abraham in similar yet distinct ways. Ali, an exiled poet from Kashmir, writes at a time of intense political turmoil in the region: Tonight was written (in three versions) between 1997 and 2003, at a time wherein the valley was witnessing an intense military confrontation between the Indian Army and militants demanding independence. As a queer man with strong secular leanings, he is faced with a quest for freedom that resonates with him – but the quest is one that has strong fundamentalist religious overtones that challenge large parts of his own identity. Chava Rosenfarb, transported to Auschwitz after the liquidation of the Lodz ghetto in 1944, memorised her poetry over the course of her internment amidst the Holocaust and chooses to provide

testimony through fiction rather than memoir. She survived the Holocaust and continued to produce a large body of work that echoes Ali's longing for home and the pathos accompanying the realisation that home does not exist anymore. Lastly, Haim Gouri writes of the pain of being an involved witness: as an Israeli poet, he was sent to Hungary to assist Holocaust survivors in 1947 and his poetry taps into mythical and scriptural bodies of work to depict the intense suffering of the Jewish people at the hands of history.

A fundamental tension that emerges between the narratives of the three poets is the contrast between Isaac's ignorance of his sacrifice and Ishmael's inclusion in the execution of God's orders by Abraham. The ignorance of Isaac has been interpreted in several Holocaust narratives as a story of deception that plays out again and again, with God's promises of finally finding a "promised land" being broken through repeated assaults on the Jewish race. Chava Rosenfarb's "Isaac's Dream" reflects this struggle with deception by describing how Isaac, half naked and with "a knife in his loincloth", appears to the narrator, who is presented as being "all set for [her] exile", and claims:

> This rejection of the covenant in the face of an absolute loss of hope can be contrasted with a narrative within Aga Shahid Ali's poetry that almost sees an individual as a perpetrator of the violence being inflicted against themselves.

As Abraham told me, his late-born son:
If you trust in love and love wholly trusting,
Then fear not, nor waver, dear girl, but come.
Though fire will blaze through the wood of the altar,
Flames licking your body, yet you shall see:
The knife will fall from my hand, and a miracle
Will happen to you, as it happened to me. [8]

This positioning of the deceived Isaac in the deceiver Abraham's place, engaging in the act of deception against the narrator, crystallises the inability of Rosenfarb to comprehend the senseless violence that surrounds her and an inability to reconcile the promise made by God to ground realities. The narrator rejects Isaac, claiming that she "heads for places [he has] never dreamed of/ Where altars do smoulder with their unwilling prey" [8]. Originally conceived of in the Lodz ghetto amidst the atrocities committed by the Nazis during the Holocaust, Rosenfarb's poem is heart wrenching in its disillusionment with the "Bible's fairyale land" [8].

This rejection of the covenant in the face of an absolute loss of hope can be contrasted with a narrative within Aga Shahid Ali's poetry that almost sees an individual as a perpetrator of the violence being inflicted against themselves. Therefore, the agency afforded to Ishmael is coloured with a dark and sinister hue: essentially, the believer has a choice to believe everything or to defy God and sacrifice everything. Ali expresses his inability to reconcile his religious yearnings with his personal beliefs in a terrifyingly haunting couplet:

I beg for haven: Prisons, let open your gates—
A refugee from Belief seeks a cell tonight. [1]

Stephen Burt argues that the ghazal, a traditional Arabic and Urdu poetic form used to express the beauty of pain of loss and love, can "reflect inner torment – it can console, or confuse" [9]. Writing in the background of religious conflict in Kashmir conflated with a political struggle for independence that forced him to question his allegiances, Ali uses the story of Abraham's sacrifice to complicate the straightforward narrative of piety and devotion. He asks God to "limit these punishments" because "[he's] a mere sinner, [he's] no infidel tonight" [1]: a stark reflection on the narrative of utter compliance or utter rejection perpetuated by latter readings of Quranic discourse.

An emphasis on the determination of agency within the narrative and on the significance of faith within personal narratives is emblematic of the internal conflict within the faithful when faced by circumstances that challenge the pillars of their faith. Within Rosenfarb's poetry, we see a rejection of faith premised upon the disillusionment with a promise; within Ali's poetry, we see a questioning of faith premised upon the disillusionment with the nature of being faithful. The distinction between the rejection of faith and the questioning of faith can be linked to the question of agency within either narratives by delving into the nature of the agency afforded by religion: for a Tanakhic reading of Abraham's sacrifice, the covenant is permanent and must be honoured by God to protect his chosen people when they are faced with a danger to their very existence, but for a Quranic reading, the promise made by God stands true only as long as one is completely faithful.

The context within which the sacrifice is interpreted too, helps us understand why different narratives are crafted from similar stories: Rosenfarb has no choice in determining her own future or the future of her people while Ali must make a choice between his political ideology and his religion. This brings out another fundamental difference between the interpretation of the sacrifice of Abraham by the two faiths: for the Tanakhic tradition, it is a marker of the continuation of a lineage and the determination of a chosen people, while for the Quranic tradition, the sacrifice is a reminder of the absolute devotion required for the continued blessings of Allah. Haim Gouri traces such a message beautifully in his bitter response to the failure of God to protect the Jewish people:

But he bequeathed that hour to his offspring.
They are born with a knife in their hearts. [2]

Haim Gouri's work, which came after his visits to displaced persons' camps after World War II, can be seen as a reflection of the hypocrisy of calling the Jewish people "the chosen people" – a strange continuation of the mockery of Isaac by Ishmael in the Tanakh itself. Having seen the horrors inflicted upon Jews during the Holocaust, Gouri's disillusionment with God may stem from the tumultuous history of the Jewish people. Tracing a narrative of rejection and displacement that was only marginally alleviated by the founding of the State of Israel, Gouri's poetry demonstrates a frustration with his own predicament – one that involves a constant life on the precipice, a state comparable to that

of Isaac on the altar, infinitely vulnerable and infinitely uncertain of the future.

Within Ali's struggle for coherence in political and religious beliefs, the question of the relevance of Abraham's sacrifice acquires a distinctly different significance: it is a marker of faith, a demonstration of complete subservience, and a command to bow down before the will of the almighty. Yet Ali, the "refugee" who is displaced not just from his country but from his beliefs, does not want to bear witness to the ravages of religion over time – and in his own land – mutely:

And I, Shahid, only am escaped to tell thee –
God sobs in my arms. Call me Ishmael tonight. [1]

He concludes cryptically, and one must uncover dense layers of interpretation to unpack the dynamic contrast between Judeo-Christian and Islamic traditions that he brings out in his last couplet. Stephen Burt points out how the use of "I only am escaped to tell thee" is a clear allusion to the Book of Job. Four witnesses convey the loss of Job's kin and belongings to him in the Tanakh; Shahid (which means witness in Arabic), views the "carnage of the clash of orthodoxies" in Kashmir (Burt) and conveys it to God in a manner that would even make the omniscient and omnipotent being weep. While Burt identifies this as a reflection of Ali's decisive rejection of an omnipotent Judeo-Christian God and a turn to the Islamic tradition through the rejection of the Tanakhic Ishmael (who rebels against God and is exiled) for the Quranic Ishmael (who goes on to form the Ka'ba), I believe that Ali's decision to place himself in Ishmael's position is rather a recreation of the senselessness he sees around him. In an atmosphere where beliefs crumble all around him, Ali's idea of God crumbles too and he seeks solace in the idea of Ishmael – who can merely be faithful and seek protection in God's generosity.

In this manner, the question of the purpose of the sacrifice of Abraham acquires a significance that stretches across centuries and affects the rationale of those seeking recourse in God in times of conflict. The element of choice (or lack thereof) in the covenant, and the notion of wilful self-sacrifice, takes on a sinister hue in the interpretation of this covenant by poets responding to scripture in times of conflict. However, despite the varied nature of the interpretation of the covenant – as one that guarantees the protection of a race or the protection of the faithful – the poetry of Gouri, Rosenfarb, and Ali demonstrates the sheer inability to conform to or believe in a monolithic covenant in the face of senseless violence. These poets, then, turn to the sacrifice of Abraham in times of sheer despair to seek explanations for senselessness, to yearn for hope when all hope seems obscured.

REFERENCES

1. Agha, Shahid Ali. *Call Me Ishmael Tonight: A Book of Ghazals.* New York: W.W. Norton, 2003. Print.

2. Gouri, Haim. "Heritage." *Heritage - Chaim Gouri - Israel.* Poetry International, n.d. Web. 22 Mar. 2017.

3. "Isaac and Ishmael: The Origin of Middle East Conflict and the Foundation for Understanding Eschatology." P2ALM. N.p., 04 Oct. 2014. Web. 12 Dec. 2015.

4. *The Holy Bible: Containing the Old and New Testaments with the Apocryphal/Deuterocanonical Books: New Revised Standard Version.* New York: Oxford UP, 1989. Print.

5. "Abraham and the Child of Sacrifice - Isaac or Ishmael?" *Abraham and the Child of Sacrifice - Isaac or Ishmael?* N.p., n.d. Web. 12 Dec. 2015.

6. Ghawri, Abdus Sattar. *The Only Son Offered for Sacrifice Isaac or Ishmael?: With Zamzam, Al-Marwah and Makkah in the Bible.* Lahore: Al-Mawrid, 2004. Print.

7. A., Abdel Haleem M. *The Qur'an.* Oxford: Oxford UP, 2004. Print.

8. Rosenfarb, Chava, and Goldie Morgentaler. *Exile at Last: Selected Poems.* Toronto: Guernica Editions, 2013. Print.

9. Burt, Stephen. "Agha Shahid Ali: "Tonight"." *Poetry Foundation.* Poetry Foundation, n.d. Web. 12 Dec. 2015.
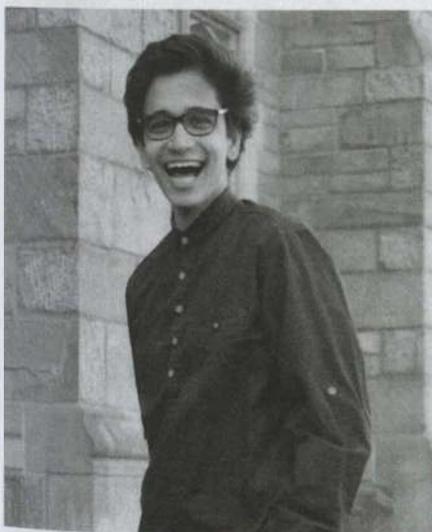
ANISH GAWANDE

Anish Gawande is a rising senior at Columbia University, majoring in Comparative Literature and Society. Focusing on race and ethnic conflict, he uses literature, art, music, and cinema to explore the construction of identities and the interpretation of queerness in contemporary South Asia and the former French colonial empire. He currently serves as the Director for the Dara Shikoh Fellowship and is Senior Editor for the Columbia South Asia Review.

"Who hath remembered me? Who hath forgotten?": The reclamation of culture through melody in Du Bois' *The Souls of Black Folk*

Ella Klahr Bunnell

Stanford University

This article examines W.E.B. Du Bois' setting of Western poetry to the melodies of Sorrow Songs in The Souls of Black Folk. The fusion of Western, white art and African American art is often performed for the purpose of cultural appropriation and reliance on white artists to legitimize African American art. However, an analysis of the melodies of the Sorrow Songs, the Western poems, and their placement within the book shows that Du Bois' usage of Western poetry primarily serves to demonstrate the Sorrow Songs' ability to add complexity and insight into Western, traditionally valued stories. Du Bois thus illustrates the gift of second sight, the ability to critique white America informed by African Americans' historical memory of oppression. Bunnell thereby exposes Du Bois' claim to a rich African American cultural legacy and his advocacy for African American cultural contribution to America rather than assimilation into white America.

In "The Forethought" of The Souls of Black Folk, author W.E.B. Du Bois informs the reader that he will explore "a tale twice told but seldom written" [1]. Indeed, Du Bois recounts stories of African American oppression, a history told many times through oral tradition, yet "seldom written" about in an academic context. However, the book incorporates other retellings, including the telling of history through the Sorrow Songs, an African American art form created communally under slavery, and the retelling of classical Western stories overlaid onto the melodies of Sorrow Songs. In his superimposition of the poetry of white, Western poets onto the melodies of the Sorrow Songs, Du Bois demonstrates the Sorrow Songs' ability to explicate stories in the Western classical tradition that address cultural suppression, enslavement, and the reclamation of memory through song. Rather than allow African American identity to be mediated by whites, Du Bois uses an African American cultural framework in order to add depth and complexity to Western, conventionally-valued stories. He thus illustrates the gift of second sight, the ability to critique white America informed by African Americans' historical memory of oppression. Du Bois thereby lays claim to a rich cultural legacy and asserts the necessity of African American cultural contribution to America rather than assimilation into white America.

DU BOIS AND "THE PROBLEM OF THE COLOR-LINE": THE VEIL, DOUBLE-CONSCIOUSNESS, AND SORROW SONGS

W.E.B. Du Bois (1868-1963) was a leading African American author, historian, and civil rights leader. In 1903, he published The Souls of Black Folk, a seminal work in the African American literary canon. A collection of fourteen essays, The Souls of Black Folk utilizes story, memoir, song, and sociological analysis in order to explicate the African American condition and "the problem of the color-line." In the first essay, "Of Our Spiritual Strivings," Du Bois describes the Veil, a concept central to the structures of African American oppression. The Veil shrouds African American people from the outside world, distorting African Americans' perception of the world outside the Veil and preventing white people from understanding black people. Due to their eternal existence under the Veil, African Americans experience "double consciousness," which forces African Americans to see themselves through the lense of the white, Western world. Hundreds of years of devaluation of black identity and culture render it extremely difficult for African Americans to grapple with their "two-ness," to reconcile their black and American identities, and to understand those identities free of white, Western judgment and oppression. Since their identity is mediated through the eyes of others, African Americans can achieve no true self-consciousness. Yet while the Veil distorts African American identity, it also imbues blacks with the gift of second-sight, a unique insight into American society and capability for social critique. Du Bois uses the singularity of African American cultural gifts in order to situate African American culture within a trajectory of cultural progress, in which "the Negro" possesses "second-sight," a spiritual gift of cultural insight. Du Bois explicates a process of racial development: "After the Egyptian and Indian, the Greek and Roman, the Teuton and Mongolian, the Negro is a sort of seventh son, born with a veil, and gifted with second-sight in this American world" [1]. Du Bois presents "the Negro" as the culmination of the trajectory of cultural progression and utilizes the Biblical trope of the "seventh son of the seventh son," who is typically a prophetic figure gifted with spiritual insight, in order to explicate "second-sight," African Americans' singular capacity for cultural insight. He thus asserts African Americans' role as insightful, divine interpreters of human history and culture.

Du Bois emphasizes the necessity of critiquing white, Western

Of the Passing of the First-Born
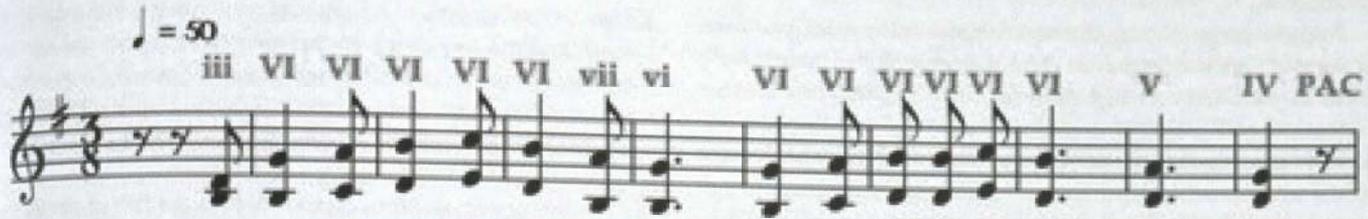
Lyricist

Figure 1. "Of the Passing of the Firstborn" score.

society, yet he does not believe that it should be suppressed for the sake of black culture. Du Bois therefore asserts that the African American "does not wish to Africanize America, for America has too much to teach the world and Africa; he does not wish to bleach his Negro blood in a flood of white Americanism, for he knows that Negro blood has a message for the world. He simply wishes to make it possible for a man to be both a Negro and an American"[1]. Du Bois neither wishes to "Africanize America," suppressing its white, Western culture in the interest of African American cultural superiority, nor does he wish to "bleach his Negro blood in a flood of white Americanism" for the sake of assimilation. Rather, Du Bois argues that both white America and African American culture have much to teach each other, and should coexist in a cultural exchange that allows "a man to be both a Negro and an American."

Sorrow Songs serve as one of the mechanisms that communicate the African American "message for the world" through cultural gifts. Sorrow Songs, developed from folk songs brought over the Middle Passage and shaped by generations of slavery and the black church, serve as a form of collective expression of a communal identity. "The most beautiful expression of human experience born this side the seas" [1], the communally-authored Sorrow Songs express a singularly African American experience. While the Sorrow Songs have historically suffered appropriation by white people, and the white church in particular, the Songs' origins in African rhythm and recreation in the cotton fields render them an authentic expression of African American spirituality and experience; the Songs, therefore, serve as "the single spiritual heritage of the nation and the greatest gift of the Negro people"[1].

"OF THE PASSING OF THE FIRSTBORN"

Du Bois uses a melody from the Sorrow Songs, a cultural framework traditionally used as a mechanism for processing oppression and suffering, in order to convey the ongoing grief of a loss of legacy and the power of communal expression of suffering through song. He thereby demonstrates the potency of "second-sight." For instance, the eleventh section of The Souls of Black Folk, titled "Of the Passing of the First-Born" opens with a melody from the Sorrow Songs set to Swinburne's "Itylus"[1].

"Itylus" recounts a Greek myth in which Aedon, Queen of Thebes, plots to murder he sister-in-law Niobe's son out of jealousy, and accidentally kills her own firstborn son, Itylus. Zeus transforms Aedon into a nightingale in order to allow her to express her grief through song, and turns Niobe into a swallow, free to

sing her happy, carefree songs. In the poem, Aedon addresses her melancholy song to Niobe. She recounts her son's death, and repeats his dying cry: "Who hath remembered me? Who hath forgotten?"[1]. Aedon uses song in order to express her desire to preserve her son's memory and be one who "hath remembered" him and his legacy. While Aedon's story of loss is unique to her, the harmony that accompanies the melody throughout suggests that she does not sing alone, either because others join her on her path to remembrance or because the memory of her deceased loved one accompanies her in her attempt to process her suffering. Despite the fact that she is accompanied by one harmonic line throughout the entire melody, the medians, or middle notes, of the chords are conspicuously absent, rendering the chord incomplete. This continues throughout the entire musical excerpt, leaving the listener with a sense of emptiness at the end of the musical phrase. This, along with the lack of double bar lines marking the end of the piece, suggest that Aedon's quest to preserve her son's legacy is ongoing and incomplete, just as the musical phrase is.

The incomplete chords, combined with the minor resolution of the first phrase, suggest that the grief Aedon experiences due to her son's death and his truncated legacy is ongoing and shapes her musical expression. In contrast to the consonant harmonies which compose most of the excerpt, the resolution of the first phrase in measure 5 emphasizes the Aedon's grief and suffering. The penultimate interval of the first phrase is a minor seventh, a dissonant harmony. When the seventh resolves, the urgent conflict between the notes subsides, but the consequent minor sixth, an imperfect consonance, renders the first phrase resolved, yet melancholy and unsettling. The resolution in measure 5 illustrates that, while the immediate crisis of Itylus' death has passed, Aedon continues to struggle to preserve his memory and process her grief through song.

In contrast to the somber and incomplete resolution of the first phrase, the complete, major resolution in measure 10 suggests that Aedon finds strength and redemption in remembering her son. The final cadence resolves from a V chord, D in the key of G, to a I chord, G in the key of G. This ending is a Perfect Authentic Cadence (PAC), which is the most complete-sounding and strongest way to conclude a musical work. If one assumes that the final lines of the Swinburne excerpt aligns with the cadence, the triumphant-sounding major chords would correspond to Aedon's pleas to her sister: "Thou hast forgotten, O summer swallow, / But the world shall end when I forget"[1]. Niobe, who has not suffered the death of her child, is free to sing the joyful song

of a "summer swallow" and forget the murderous tragedy; in contrast "the world shall end" when Aedon forgets her suffering and her son's truncated legacy. While Aedon continues to hold the loss of her son with her, the cadence's strong, dominant chords imply that there is also strength and beauty in her expression of her son's memory through song, and that others join her in her remembrance.

Aedon's usage of song in order to process her grief parallels the Sorrow Songs' function as "the rhythmic cry of the slave" [1]. Just as the Sorrow Songs serve as a cultural framework that enables African Americans to process their grief and oppression and "cry" in a "rhythmic," musical way, Aedon uses her bird song in order to express her grief. Just as Aedon is accompanied in her quest to remember her son, the Sorrow Songs are communally-created and express the suffering of an entire people. Aedon questions: "who hath remembered" and "who hath forgotten?" her son's legacy; likewise, in his revival of the Sorrow Songs, Du Bois reminds white America that they "hath forgotten" about the rich cultural history and legacy of the African American people. By setting "Itylus" at the beginning of the chapter "Of the Passing of the First-Born, Du Bois frames the consequent discussion of the death of a black child by demonstrating that African American history and culture are inextricably tied up with Western civilization, as they provide insight into themes such as communal mourning, loss of legacy, and expression of grief through song. The reader is therefore reminded of the scope of the following story. The story of the death of the black child represents more than the suffering of African Americans, and the fate of that child has implications that extend beyond the African American community. "Itylus" contextualizes the story of the death of the black child within a larger, cross-cultural conversation about loss and mourning, and does so without detracting from the importance of the story to the African American experience in particular; in other words, prefacing the story with Itylus contributes to the story without "bleach[ing it] in a flood of white Americanism" [1]. Setting "Itylus" to the melody of a Sorrow Song also avoids "Africaniz[ing] America" [1], as it does not suggest that the poem holds value only in the context of the African American experience. This reciprocal dynamic demonstrates both cultures' immense value to each other and the power of cross-cultural communication based on respect for both traditions.

"FROM BIRTH TO DEATH ENSLAVED"

While "Itylus" serves to remind the reader that African American history and art can speak to the themes of communal loss and the expression of grief through song, a Sorrow Song overlaid with excerpts from Lord Byron's "Childe Harold's Pilgrimage" demonstrates the cost of cultural suppression and the necessity of communal revolution against enslavement.

In the poetic excerpts, Byron laments the fate of the Greeks under Turkish tyranny: "From birth till death enslaved; in word, in deed, unmanned!"[1] He asserts that the lifelong enslavement of the Greeks, "from birth till death," is not only "in deed," as their physical actions are controlled, but also "in word," as the Turks' destruction of Greek culture constrains their means of self-expression. The lone, melancholy melody of the first three measures mirrors the bitterness of both physical enslavement and cultural suppression. Akin to the Greeks, African Americans live their entire lives under the Veil, as Du Bois acknowledges when he later asserts that although society should work towards the destruction of the Veil, "I shall die in my bonds"[1]. In this quote, Du Bois also acknowledges that, while he is no longer legally enslaved, he is still "in...bonds." While the Veil does not necessary limit African Americans "in deed" as much so as when they were enslaved, their oppression and distorted self-perception due to the veil shape their forms of expression "in word." Du Bois thus asserts the importance of liberation from both physical slavery and cultural suppression, an enslavement "in word," which African Americans living under the Veil are still bound by.

Du Bois next invokes a Byron quote that calls on the Greeks to rise up and claim their physical and cultural freedom. Byron addresses them: "Hereditary bondsmen! Know ye not/ Who

Figure 2. "From birth till death enslaved" score.

would be free themselves must strike the blow?"[1]. As the first half of the musical excerpt transitions into the second, which would line up approximately with the second quote, the somber, minor melody is supplemented with two harmonic lines that transform the lone melody into forceful major sixth chords. This transposes the music from the key of D minor to its relative major key, F major. The music gains power and transitions into more joyful, major chords when the lone melody is supplemented by others, demonstrating the power of "bondsmen" working for liberation in tandem, versus the solitary power of a lone bondsman. Like the Greeks, African Americans are "hereditary bondsmen," as they inherit the treatment under the Veil by nature of their physical characteristics and familial connections. In "Of the Passing of the First-Born," Du Bois observes his newborn son's features and exclaims, "Within the Veil he was born, said I; and there within he shall live, - a Negro and a Negro's son" [1]. Du Bois recognizes that his son will live his entire life trapped under the Veil, not only because he is "a Negro," but also because he is "a Negro's son." He recognizes that his son inherited not only the physical features that will subject him to a life of distorted self-consciousness, but also the cultural traditions that ensure him a life of double consciousness and of second sight.

> The reciprocity of the relationship between the poem and Sorrow Song exemplify that not only white, Western culture "has too much to teach," but also "that Negro blood has a message for the world".

Byron's use of violent imagery asserts the importance of consistent revolt against discriminatory treatment, and Du Bois' placement of the Byron poem frames the consequent discussion of fighting for equity in education. Byron's reminder that those "who would be free themselves must strike the blow" in this context serves to remind African Americans to work towards their own liberation. The violence of the "strike the blow" metaphor emphasizes the agency and power necessary to revolt against white normativity and suppression of African American culture. The final cadence mirrors this urgency, as the somber minor sixth in measure five transitions into dominant and tonic chords, the strongest chords in F major. They resolve to the I chord at the end of the excerpt, resulting in an Imperfect Authentic Cadence (IAC), a robust and lively resolution. Just as in the musical excerpt that accompanied Swinburne, there are no double bar lines at the end of the excerpt; it has no clear ending, and is presented as an ongoing and constant endeavor. The assertion that African Americans must aggressively seek their cultural liberation frames the consequent discussion in "Of Mr. Booker T. Washington and Others," which advocates for African Americans' rights to equitable political and educational opportunities. Both prominent black scholars taken as "representatives of the race," Washington and Du Bois differed in their philosophy of racial uplift. Unlike his Harvard-educated intellectual counterpart, Washington advocated for vocational education, insisting that, if blacks made themselves indispensable to the industrializing economy, political rights would follow. Washington's message of gradual uplift through hard work and vocational training appealed to African Americans because of its practicality and to whites who feared black economic and political competition. However, in "Of Mr. Booker T Washington and Others," Du Bois expresses his frustration with Booker T. Washington's complacency in settling for vocational education and waiting for full political citizenship.

He argues that "Negroes must insist continually"[1] on their rights, and, in essence, "strike the blow" if they hope to gain cultural autonomy and educational equality. In framing "Of Mr. Booker T. Washington and Others" with the tale of the Greek fight for equality, Du Bois places African Americans within a long tradition of cultures fighting for political equality and cultural autonomy, and thus demonstrates the interconnectedness of Western and African American histories. In positing the Greeks as the political predecessors of the contemporary African American fight for full political citizenship, Du Bois demonstrates his assertion that white, Western culture, which includes white America, "has too much to teach the world"[1], and African Americans in particular, about the fight for political rights. Likewise, setting the poem to the melody of a Sorrow Song reveals insights into the Greek plight that extend beyond its application to African American experience; for instance, the chord progressions and tone of the melody demonstrate the great power of the Greek bondmen working in unison, and the importance of consistent and militant resistance to oppression. The reciprocity of the relationship between the poem and Sorrow Song exemplify that not only white, Western culture "has too much to teach," but also "that Negro blood has a message for the world"[1].

CONCLUSION

Setting "Itylus" and Byron excerpts to melodies of Sorrow Songs illuminates insights into both Western works. For instance, the interaction between "Itylus" and the chord progressions that underlie it underscore a parallel between Aedon's expression of grief through song and the Sorrow Songs as "the most beautiful form of human expression" [1], used by African Americans in order to express communal experience, suffering, and hope. The empty harmonies upon which the poem is overlaid demonstrate the beauty, yet emptiness of Aedon's journey to preserve her son's legacy, and that others join her in her remembrance. Likewise, the transition from a lone melody to repetitive, forceful major chords in the musical excerpt that supplements "Childe Harold's Pilgrimage" exemplifies the immense power of communal, militant, and ceaseless resistance against oppressive forces. It situates the African American struggle for freedom within a cross-cultural, ancient tradition of resistance to oppression, positing the ancient Greeks as African Americans' political predecessors and African Americans as a part of the Greeks' cultural legacy.

While the melodies of the Sorrow Songs offer insights into the stories expressed in the Western poetry, the poetry and melody are not entirely compatible, and their coexistence reflects Du Bois' advocacy for African American integration, rather than assimilation, into American culture. Until the "Sorrow Songs" section of The Souls of Black Folk, in which Du Bois presents the melodies of the Sorrow Songs with their original lyrics, Du Bois does not align the Western poets' words with the notes; indeed, none of the poetic lines have a syllable count that fits the melodic phrase. The application of the poetry is contrived and mismatched; although the melodies mirror the sentiment of the poems, forcing them to align perfectly would require the distortion of both melody and lyric. Rather than perform this modification,

Du Bois allows the lyrics and melody to coexist, complementing and offering insights on one another. His reluctance to alter either the Western poetry or the melodies of the Sorrow Songs exemplifies his assertion that the goal of the elimination of the Veil is "to make it possible for a man to be both a Negro and an American" without "Africaniz[ing] America" or "bleach[ing] his soul in a flood of white Americanism"[1]. Du Bois does not "Africanize" the Western, white poetry by changing the dialect or meter in order to make it fit the melody, nor does he "bleach" the melody white by adapting it to accommodate the poetry. Rather, he allows the compilation of lyric and melody to reflect both the Negro and white America. This willingness to allow both whites and African Americans to offer their cultural gifts without dismissing either in the name of assimilation demonstrates Du Bois' conviction that the goal of the eradication of the Veil is to integrate African Americans into a new America, rather than assimilate into white America.

Du Bois demonstrates the power of "second-sight" in his illustration of the Sorrow Songs' ability to provide insight into Western poetry and assertion that African American cultural gifts are an integral part of an integrated, rather than assimilated, America. However, the Western poetry may fulfill other functions in the book that may run contrary to Du Bois' mission. For instance, what differentiates Du Bois' usage of "Negro melody" from the appropriation of white artists who "incorporated whole phrases of Negro melody" to the point at which one could "never find the real Negro melodies"[1]? Do the Western poems serve to legitimize his essays to the white community as did the "Attestation" (xl) that prefaced Phyllis Wheatley's poetry and assured the world that an African American artist could be capable of profundity and insight? To what degree do his poetic allusions make his work less accessible to the "black folk" whose souls he describes? Maybe all of these dangers could be avoided in a society that makes accessible and legitimizes all cultural gifts, but until then, perhaps one must hold onto the hope that "breathes" [1] in the Sorrow Songs, that America will one day be that integrated and equal society.

REFERENCES

1. Du Bois, W.E.B. *The Norton Anthology of African American Literature.* New York: W.W. Norton, 1996. Print.

2. Swinburne, AC. "Itylus." *Poetry Foundation.* N.p., 2016. Web.

3. Byron, L. "Childe Harold's Pilgrimage." Http://knarf.english.upenn.edu. University of Pennsylvania. Web.

ELLA KLAHR BUNNELL

Ella is a sophomore at Stanford University majoring in American Studies. On campus, she is involved in East Palo Alto Stanford Academy (EPASA), Challah for Hunger, J Street U, Jewish Social Justice Collective (JewSoJuCo), and Women and Youth Supporting Each Other (WYSE). She also serves as an Undergraduate Research Assistant in the Department of Sociology, assisting with a project on police violence. In her free time, she loves to bake, sing, and read British novels.

Unequal Opportunity: Rural Communities and a Four-Year College Education

Madeline Musante

Stanford University, International Relations

Rural students continue to be disproportionately represented at four-year universities. However, relatively few people have explored this topic in depth since the 1970s-'80s. While countless sources talk about barriers faced by low-income and first-generation college students, very few deal specifically with rural communities. This paper seeks to fill a gap in modern research by exploring the barriers rural students face to entering university. The findings stem from a comparison of rural and urban student patterns. Rural economies' reliance on low-skilled labor offers few college-oriented role models and limits the revenue stream into these areas [5]. Because population density is lower outside of urban centers, sparser resources are available to rural youths. Their isolation also leads to fewer visits from college outreach staff [5,7]. Rural students are left with less information about college and the opportunities available to them. Lastly, rural students generally suffer greater levels of anxiety when leaving home [5,8,12]. This is not to say that rural residents are less intelligent or qualified than urban ones. Expanding rural students' access to university will expand universities' diversity of thought and provide greater opportunities to a wider portion of the U.S. population.

Education is a means of socioeconomic mobility. Richard Reeves, an economics scholar at the Brookings Institute states that if you come from the "bottom fifth, but you're one of the few who manage to get a four-year college degree, it transforms your chances of moving up the income distribution. Go to college"[1]. If the United States wants to be a nation of opportunity, then a four-year education must be within everyone's reasonable reach. However, rural communities face greater challenges in achieving this dream.

Two towns, Eureka, California and Irvine, Kentucky, illustrate some of the barriers faced by the greater rural United States. Established in 1896, Eureka Senior High School (EHS) remains the town's only public high school[2]. A six hour drive from San Francisco, Eureka represents a forgotten part of California; it's fitting that the town resides in the region known as "the lost coast." Only 24% of EHS's 2014 graduating class enrolled in four-year universities, and even fewer went to a UC or private school[2]. In Irvine, Kentucky, students lack access to wifi, and often gather in McDonald's parking lots in search of internet [3]. The experiences of these two towns are not unique but rather represent a trend across the United States. In rural areas, only 29% of 18-24 year olds enroll in college, compared to 47% in urban areas[3]. What factors have contributed to this achievement gap?

Until the recent political upheaval of the Trump election, little attention was granted to rural communities[3]. Accordingly, this paper seeks to fill an information gap. The first two sections outline the methods and research process as well as the statistical disparity amongst urban and rural students. The following three sections each explore a different barrier rural students face when applying to four year universities.. The location of an individual's birth should not determine their future. In discerning what barriers rural youth face, the United States can come closer to ensuring equitable odds for all.

METHODS

This paper's definition of the term "rural" follows the definition put forth in The National Education Longitudinal Study of 1988. The study defines rural schools as towns removed from urban areas that are made up of 50,000 people or less. This includes Native American reservations and remains the national standard[6]. In their article, The Missing "One-Offs": The Hidden Supply of High-Achieving Low-Income Students, Avery and Hoxby compare high-achieving low-income students with high-achieving high-income students[7]. In doing so, they disprove the idea that fewer low-income students are qualified to attend elite universities. Furthermore, they demonstrate the flaws in current admissions recruiting amongst low-income areas. Similarly, this paper compares statistics from low-income rural areas with those of high- and low-income urban ones.

This paper draws on statistical data from Avery and Hoxby as well as several other studies[7]. The 2013 High School Benchmarks study run by StudentTracker and Koricich's findings are of particular importance to this paper. The High School Benchmark Study examines the high school graduating class of 2012 and compares low-/high-income, urban/rural, and high/low minority school statistics. It defines low-income as schools in which 50% or more are eligible for free or reduced price lunch. High minority schools are defined as being composed of 40% or more Black or Hispanic students[4]. College-attendance rates amongst low-income, high minority, urban schools and low-income, low minority, urban schools are nearly identical (within one percentage point), so for the sake of simplicity, this paper compares their combined statistics with low-income rural schools.

Directly comparing urban and rural students' performance isolates barriers caused specifically by geography.

RURAL COLLEGE ATTENDANCE RATES BY THE NUMBERS

When looking at enrollment rates in two-year institutions rural students do not lag so far behind their urban counterparts. Both low-income rural and urban schools saw 44-45% of their students enroll in two-year institutions such as community colleges while 30% and 34% of individuals from high-income urban and high-income rural schools enrolled in two-year institutions respectively[4].

However, as Richard Reeves states, a four-year degree is the true key to social mobility[1]. It is therefore necessary to examine the rate at which individuals attend four-year universities. As stated earlier, nationally, 28%-29% of students from low-income rural communities attend four-year institutions in the first fall after graduation while 30% of individuals from low-income urban areas do so[3,4]. In contrast, 48% of high-income urban students and 44% of high-income rural students attended a four-year in the first fall after their graduation[4]. This means that twice as many urban students go on to university. Because this split is also seen between low- and high-income schools, not just rural and urban ones, a cursory glance at the data could rule that the problem does not arise from an urban/rural divide but from wealth inequality. Upon further examination, this is not the case.

Two separate studies found that rural communities lag even further behind urban ones in terms of college attendance. In his thesis, Koricich, "found that about 64 percent of rural students pursue postsecondary education, compared to nearly 70 percent of students who live in metro areas," meaning that rural attendance rates lag far behind urban averages[5,8]. They are below the national average of 66%[5,8]. Another study found that, "rural high school graduates had the lowest postsecondary participation rate [...] particularly those from low-income families"[5,9]. There are unique obstacles to college attendance from rural communities' that are exacerbated by economic factors.

RURAL COMMUNITIES AND INCOME LEVELS

Students from low-income families in urban and rural areas face greater challenges than high-income groups. Both demographics depend on financial aid programs – especially given colleges' increasing price tag – but isolated areas with few college graduates are not always aware of the need-based programs offered by Stanford and other private schools. Additionally, a National Longitudinal Survey of Youth found that rural communities' median income was 13% below urban areas' median income, "and that income was positively associated with college attendance"[5]. In short, the income level of a student's family is a huge predictor of whether or not that individual will attend a four-year university. This is true in both rural and urban settings, but it is especially true in rural communities that tend to be even poorer and more distant from social welfare programs.

Rural economies are often based on raw materials industries like farming or mining causing them to be less stable.

Lowered government agricultural subsidies have made farming communities more vulnerable to swings in the economy[10,5,11]. The Center on Rural Education found that rural areas have much greater instances of poverty and fewer college graduates. Additionally, they reported that rural schools educate only 18% of the United States' public school students putting them at a lower priority for funding[3]. Due to distance from city centers, rural areas also have few tech firms and other skilled industries. With fewer high-skilled positions available in rural communities, individuals that do obtain a four-year degree are unlikely to return to their rural hometowns creating a "brain drain" and preventing rural communities from growing as much as urban areas[5].

Rural students are often surrounded by low-skilled occupations that do not directly demonstrate the benefit of pursuing an advanced degree. A vicious cycle results. In general, fewer firms requiring high-skilled workers operate in rural communities. High-tech firms often choose urban centers instead, due to their connection to national markets and greater number of skilled workers. In Koricich's words, this means that, "low-skilled occupations persist, providing little incentive for completing postsecondary education and forcing highly educated residents to migrate to more prosperous communities"[5]. Without taxes from high-paid workers, rural communities cannot put money into education and other public services. With few high-skilled career options around them, rural students are left with fewer role models.

FEW AND FAR BETWEEN: THE EFFECTS OF LOWERED POPULATION

Lowered population density in rural areas equates to lowered levels of all demographics within a population. This means there are sparser levels of high-achieving students[7]. Avery and Hoxby mapped out population density across the United States and found that high-achieving students are most densely gathered in the Bay Area, Southern California, and New England[7]. The lowest levels of high-achieving students occur in the Midwest and a few Deep South counties while the midrange level falls mainly Northern California[7]. What do these findings tell us about the implications of lower population density?

Before answering that question, it's important to clarify that lower concentrations of high-achieving students does not equate to lower levels of IQ. Rather it reflects fewer qualified individuals seeking to attend and qualified for a four-year institution, which is proportional to the lower population[7]. Further statistical data also demonstrates that rural students are not less likely to graduate or perform well in high school; 80% of rural students graduate high school compared to 81% of suburban students[3]. Additionally, rural students "perform at or above other students on the National Assessment for Educational Progress" despite having fewer resources[3].

Fewer high-achieving students in a region lead to fewer services for those individuals. For example, as Avery and Hoxby state, "if one's goal were to visit every county where one could gather at least 100 high achievers, one could concentrate entirely on a limited number of cities on the East and West Coasts and

> **"The income level of a student's family is a huge predictor of whether or not that individual will attend a four-year university."**

a few cities in between"[7]. In other words, colleges are less likely to recruit in areas with low population densities because they will receive fewer returns. Few in number, high-achieving students in rural areas are not as exposed to elite universities and the opportunities they offer. High schools that serve only a small population have fewer incentives to offer advanced classes for the same reasons, and students are left with fewer ambitious peers.

UNPREPARED BUT NOT UNQUALIFIED

With lower income and fewer residents, rural schools are underfunded and under resourced when compared to their urban counterparts[12]. This disadvantage is particularly apparent in rural schools' course offering. A 2002 study found that the number of science classes completed in high school was a predictor of university-completion rate. It claimed that rural students, who on average had taken fewer science classes, were under-prepared for colleges' academic rigor and dropped out[12,13]. Rural schools tend to offer fewer advanced placement (AP) classes as well[3]. The effects of lower course offerings are, however, disputed[12].

The Idea that fewer advanced classes in high school leads to failure in college has since been disproved. In their article, Predicators of Bachelor's Degree Completion among Rural Students at Four-Year Institutions, Soo-yong Byun and his colleagues show that rural- and urban-raised students both completed college at roughly the same rates. In fact, in some areas, "rural students who attended college persisted at rates even higher than the national average"[12]. Although it may seem as though an advanced course load in high school would better prepare a student for college, the data does not back it up[12]. After enrolling in college, the academic playing field for rural and urban students is leveled. However, the lack of advanced classes can lead rural students to feel unprepared for college lowering their application rates. In Kentucky, there has been a push since 2013 to offer more advanced placement classes in order to help "students realize they are capable of doing college work — countering [...] the natural concern that you may not be able to be competitive with kids who have grown up in suburban or larger communities"[3]. In sum, rural students' high school education does not under prepare them for college, but a lack of college-level classes makes them believe they will not succeed.

It would be a mistake to look only at academic preparedness. Adjusting to college is difficult no matter one's background, but rural students often face particularly heightened stress in transitioning from high school to college. Byun, Irvin, and Meece report that, "studies conducted in the 1970s documented that college students from rural areas showed higher levels of stress, alienation, and attrition than students from urban areas"[12]. After leaving their communities, rural students are able to graduate at the same rates as their urban counterparts. Many of the barriers to a four-year university degree lie not at the university but on the road to matriculation.

Anxiety amongst rural students has been documented today. Koricich found that of the rural students who went on to four-year institutions, they were more likely to choose public colleges and specifically those considered less rigorous[5]. He attributed this not to a lack of ability but rather to a lack of information and

confidence[5]. This sentiment is echoed by Jackie Mader's Higher Education article. Mader writes, "The University of Illinois has seen a sharp decline in rural students over the past 20 years [... because] Some students may feel uncomfortable or intimidated transitioning from small communities to a large university in a big town. Others may shy away from the higher tuitions" [8]. She goes on to say that similar trends have been observed at other universities as well. Interviews conducted in the Kentucky Appalachian Mountains found that many students either believed that college would not help them in life or that they were not qualified, and "The belief that college is for other people, not country folk, is hard to break"[3]. The lack of successful college graduates around them and a feeling of unpreparedness causes rural college students to simply not apply to advanced universities.

BRIDGING THE GAP

What can be done to include more rural students in four-year institutions? Combatting economic disadvantages in rural communities extends beyond the scope of this paper. However, smaller scale steps can go a long way in bridging the urban-rural gap. For example, universities could more broadly advertise their financial aid programs. Financial aid brochures should be sent to high school administrators and teachers in rural or isolated areas. Organizations like the College Board have begun to develop such programs. College Board is experimenting with a virtual college counselor program to reach more isolated students[3]. Expanded efforts to reach out to rural students could have a huge impact by negating some of the barriers to matriculation.

Secondly, research has shown that encouragement from a student's family tremendously aids students from all backgrounds[12]. "In this vein, encouragement from high school teachers and counselors, as well as college faculty and counselors," Byun et al write, "may offer additional social support for rural students to persist through college to degree attainment," meaning that action needs to be

> "Many of the barriers to a four-year university lie not at the university but on the road tomatriculaion."

taken by both high school and university faculty[12]. Universities should look into providing support systems specific to students from rural areas just as they already do for low-income and other groups.

Some institutions are already altering their applications to better encompass a variety of backgrounds. Stanford University and other universities that function through the common application employ the School Profile in which they judge a student's coursework based on what was offered at their school and not based on what is offered across the nation[15]. Additionally, a recent Harvard report has called institutions to look for compassion in students rather than overachieving[16]. The report also recommended universities account for the different ways students contribute to those around them. A summary states, "Current applications often disadvantage students from less affluent backgrounds who may make important but overlooked contributions, such as working part-time to help support their families or taking care of a family member"[16]. If colleges are able to advertise these changes to rural communities in a way that make students feel as though they have a chance, they may be able to help lower the gap between rural and urban college applicants.

CONCLUSIONS

In comparison to their urban counterparts, rural high school students are less likely to attend four-year universities. Rural economies' reliance on low-skilled labor offers few college-oriented role models and limits the revenue stream into these areas[5]. Furthermore, because population density is lower outside of urban centers, sparser resources are available to rural youths. Their isolation also leads to fewer visits from college outreach staff[5,7]. Rural students are left with less information about college and the opportunities available to them. Lastly, rural students generally suffer greater levels of anxiety when leaving home[5,8,12]. None of this is to say that rural residents are less intelligent or qualified than urban ones.

In the United States, over 60 million people live in areas categorized as rural[4], yet institutions like four-year universities continue to overlook their merits. A significant portion of the population has been left behind, and this exclusion is detrimental to all Americans. The purpose of universities is to provide education, and a large part of that comes from student interaction and the colliding of a multitude of beliefs and cultures. In failing to recruit rural students, universities fail to make their campuses truly diverse. In a recent New York Times article, the Director of Admissions at Texas A&M suggests that "Rural students bring 'a unique perspective' to campus [...and] In terms of diversity, geography is just as important as racial and ethnic"[3]. The rural United States deserves a voice, and rural Americans deserve opportunity. It's time for universities to expand their horizons. In doing so, all will benefit from hearing a new perspective.

REFERENCES

1. R. Reeves, [Brookings Institute]. (2014, August 19). *Is America Dreaming?: Understanding Social Mobility*. [Video file]. File: https://www.youtube.com/watch?v=t2XFh_tD2RA

2. Eureka City Schools. (2015). *School Profile*. [Website]. File: http://www.eurekacityschools.org/index.php?option=com_content&view=article&id=66&Itemid=240

3. L. Pappano, "Colleges Discover the Rural Student," *The New York Times*. [Web]. Jan. 31, 2017.

4. *High School Benchmarks*. "National College Progression Rates for high schools participating in the National Student Clearinghouse StudentTracker service" (2013). File: http://nscresearchcenter.org/wp-content/uploads/HighSchoolBenchmarks2013.pdf

5. A. Koricich, "The Effects of Rurality on College Access and Choice," Ph.D dissertation, Dept. Educ. Psych., Texas Tech Univ., Lubbock, TX,2014.

6. L. Lippman, S. Burns, & E. McArthur, "Urban schools: The challenge of location and poverty," Washington, DC: *U.S. Department of Education*, National Center for Education Statistics, NCES 96-184. June 1996.

7. C. Avery & C. Hoxby, "The Missing "One-Offs": The Hidden Supply of High-Achieving Low-Income Students," *Brookings Papers on Economic Activity*. Spring 2013.

8. J. Mader, "Students from rural areas less likely to go to four-year colleges, top universities," *The Hechinger Report*. [Web]. April 11, 2014.

9. C. Adelman. "The relationship between urbanicity and educational outcomes." In W. Tierney & L. S. Hagedorn (Eds.), *Increasing access to college: Extending possibilities for all students*. Albany, NY: State University of New York Press. 2002: 35-60.

10. G. Elder Jr., & R.D. Conger, "Children of the land: Adversity and success in rural America," Chicago: *The University of Chicago Press*. 2000.

11. A.E. Luloff, "Small town demographics: Current patterns of community change," In A. E. Luloff & L. Swanson (Eds.), *American Rural Communities*, New York City: Westview Press. 1990.

12. S. Byun, M.J. Irvin, & J.L. Meece, "Predicators of Bachelor's Degree Completion among Rural Students at Four-Year Institutions," *Review of Higher Education*, vol. 35, pp. 463-484. 2012.

13. W. Yan, "Postsecondary enrollment and persistence of students from rural Pennsylvania," *Center for Rural Pennsylvania*. Jan. 2002.

14. Big Future (2016). University of California: Los Angeles. [Website]. File: https://bigfuture.collegeboard.org/college-university-search/university-of-california-los-angeles

15. Stanford University, "Our Selection Process," *Stanford Undergraduate Admission*. [Website]. File: http://admission.stanford.edu/basics/selection/index.html

16. L. Heffernam & J. Wallace, "To get into college, Harvard report advocates for kindness instead of overachieving," *The Washington Post*. Jan. 20, 2016.

17. P.M. McDonough, "Choosing colleges: How social class and schools structure opportunity," Albany, NY: *State University of New York Press*. 1997.

MADELINE MUSANTE

Madeline Musante is a junior studying international relations with a minor in creative writing. She is writing a thesis in the Ethics in Society department on refugee policy over time; she hopes to pursue a career in human rights law. Madeline was born and raised in Eureka, California and enjoys reading, swimming, and weight lifting in her spare time.

DIVING FOR SOCIOCULTURAL STORIES
A CONVERSATION WITH JUSTIN LEIDWANGER

by Amalia Saladriga

We have little routines that make up our lives: going to the supermarket, mailing letters in the post office, visiting that one coffee shop... Thanks to modern-day technology, and barring any cataclysms that destroy our record-keeping systems, it's hard to imagine how future archaeologists will ever have to struggle to piece together what our daily lives are like. Unfortunately, or fortunately for Dr. Justin Leidwanger, people in the past did not enjoy such a privilege. An Assistant Professor of Classics and member of the Stanford Archaeology Center, Dr. Leidwanger researches Roman socioeconomic life. He uses bits of ceramics to uncover what commercial and community relationships looked like in Burgaz, a site on the Datça peninsula in southwest Turkey that has been under investigation by Middle East Technical University in Ankara (Turkey) for more than two decades.

"If it's from outside the peninsula, in some ways it doesn't matter whether it's from Athens or from across the Mediterranean," he says, referring to goods imported by the population in Burgaz, such as oil or wine. "In some ways, how far your import comes from is immaterial if it's beyond your own human reach." What was the commerce that shaped everyday life in this Turkish peninsula like? How much of what its population consumed came from within the community?

The site at Burgaz, one of the projects Dr. Leidwanger has been working on as co-director since 2011, is probably the site of "Old Knidos." The name might sound familiar because of a famous statue, the Aphrodite of Knidos, but the statue is from the 4th century BC or later, when Knidos became a major urban center at the western tip of the Datça peninsula. Before that, the major civic center was in Burgaz, a town about 35km away, nestled closer to the mainland and to the fertile interior of the peninsula.

Through comprehensive survey and excavation in the site's port complex, the Burgaz Harbors Project—run by Dr. Leidwanger together with Dr. Elizabeth S. Greene of Brock University—tries to piece together what happened in Burgaz, which used to be the main civic and economic center of Datça, after "New Knidos," the city known later on for its Aphrodite, emerged as a major urban center. How did the emergence of New Knidos transform the maritime landscape, the harbors, the relationship and the interactions between the people and Burgaz?

"What happens with human behavior when they're no longer the civic center?" Dr. Leidwanger asks, raising his eyebrows. "If you're really tied to a site, and it has symbolic importance, you might continue to work with that harbor, whereas as soon as the civic center moves towards the tip of the peninsula, the old site may simply become a functional space."

As it turns out, rather than letting the town fade away, the people in Burgaz took the change in stride: they built bigger harbors and became much more industrial. The walls were simpler and the structure was not grandiose or monumental, which suggests that, while the harbor remains important, the population was using the space and the foundations that were already there and adapting to the environment and changing economic networks.

When I ask him what part of the project he currently enjoys the most, Dr. Leidwanger pulls up a map of the Datça peninsula on his computer, with little blue dots marking the location of ports and shades of gray and black differentiating what might have once been farm land.

"What you're looking at, what I've been playing around with and modeling is a kind of environmental analysis," he begins, pointing excitedly. "The farm land is actually all the grey. And we're estimating that if farmers live on this land, if this is where all the grain, and the wine, and the oil are being produced, and we can understand terracing and how that changes the landscape... A lot of it is indirect, and a lot of it is related to ceramics. But if we think of this as potential farm land, we can look at how far people are from ports."

The idea is that using evidence from ceramic analysis, the researchers can determine the location of some ceramic centers and producers, and they know that no one in the Datça peninsula was more than a few hours away from some port. That helps to paint the picture of what comes from 20km away or from 5km away or from 1km away, not only what comes from across the Mediterranean. Those are the micro-relationships that Dr. Leidwanger finds fascinating: the community relationships that drove the everyday lives of people in the Datça peninsula more than 2000 years ago.

The Marzamemi "Church Wreck"

The other main project that Dr. Leidwanger has been working on is the Marzamemi Maritime Heritage Project in southeast Sicily. The shipwreck site was being looted and the superintendent was interested in protecting it: he was interested not only in doing research on it, but also bringing attention to the site and making sure that it survived. There are other shipwrecks in the area that his team hopes to address eventually under the project's umbrella, but so far the focus has been the famous 6th century AD Marzamemi "church wreck."

"This one shipwreck became a very obvious place to start because even between when I first showed up in 2010 and returned in 2012, the coast guard had confiscated various objects that people had swiped from the site," Dr. Leidwanger explains. When it sank, the ship's cargo included some prefabricated and decorative elements that were probably intended as pieces for a church. In the fall of 2014, after the excavation team had left, somebody reported several pieces of decorated marble architecture that had been dragged halfway to the shore and then abandoned. "I don't know how people dragged it there, these things are heavy," jokes Dr. Leidwanger.

The urgency was clearly there, but another central driving factor for the project was the development of a new museum in Marzamemi. The town's new museum allowed the archaeologists and researchers to do a more superficial study of some areas, leave pieces of the wrecks underwater if they were not threatened, and bring those materials that were to the museum. It has provided the space not only to study the pieces, but also to use them in various educational approaches, working between the museum and the seabed. Part of the importance of community archaeology is immersing people in a past and a history that they may not have been aware of. "For me," Dr. Leidwanger explains, "it's a matter of bringing people face to face with their own past, and understanding the relevance of the past to the present."

Collaboration with the town is crucial: the team spent a fair amount of time crafting projects that ensured the protection of the town's maritime heritage while also engaging the community, respecting and incorporating their knowledge of the space. "It's about understanding that we each bring something to the table," he says, stressing the importance of finding a balance between the ideal scenario for archaeologists and what is sustainable for the town. "I can tell you more about this material than many people can but, at the same time, you can tell me more about its modern world and the viability of some ideas."

Community Archaeology and Conservation

One of the reasons Dr. Leidwanger enjoys working on the site is because the Sicilians are among the best in the world when it comes to progressive heritage management. They are willing to explore interesting, experimental ideas when it comes to handling and preserving objects and sites, and the project's main collaborators have a long-term view for the site that evidences this forward thinking. As Dr. Leidwanger explains, Italian high school kids spend a few weeks of the summer in the sea and at the museum, working with the local archaeologists and learning about their cultural heritage. The local diving shops have been fully supportive, even though the excavations are essentially deconstructing an attractive dive site. But they are interested in it being preserved, and in the benefits of potentially reconstructing the site. After careful study, some shipwrecks are opened for diving and, hopefully, replicas of those that were excavated could become part of a dive trail.

"Development and tourism are going to happen, so how can you sustain cultural heritage while also recognizing that this is just one component of a broader trend, that development needs to be addressed through sustainability?" Dr. Leidwanger chuckles. "I think archaeology is critically important, but so are our sustainable livelihoods. So is letting people keep the flavor of their town." For Dr. Leidwanger, this balance is one of the tightropes current and future archaeologists should learn to manage and it's part of the advice he has for future students interested in the field.

"Be flexible. Try sketching something even if you can't draw worth a damn. Learn how to write and communicate. Learn a foreign language. Recognize that you work at the good graces of not just the authority, but the public as a whole. We are charged with and have the opportunity to work with material culture that belongs in many different parts of the world. Recognize that that comes with a great responsibility to incorporate actively what other people think about this material… well, I could go on and on.

A Media Mediation: Countering the Implications of Digital Communication on Conflict in Romantic Relationships

Angela Lee

Stanford University

This study qualitatively explores how the increased access to information allowed by social media can psychologically exacerbate existing romantic relationship problems by amplifying negative emotions (e.g., jealousy, anxiety) and enabling dysfunctional tendencies (e.g., deceit, partner monitoring behavior). The ambiguity of online communication, role of confirmation bias, and opportunity for discreet partner monitoring can incite and aggravate conflict. Thirty-two undergraduate students were interviewed about how social media and online communication affected conflicts in their romantic relationships. All participants reported an inability to recognize "warning signs" of dysfunctional behavior in relationships in online contexts and a lack of available resources. Results, drawn from qualitative interviews and surveys, were used to shape an empirically-informed intervention. The proposal addresses how to manage online privacy settings, understand the impact of technology use on relationships, and effectively resolve conflicts. The study reveals several key mechanisms for media use that can worsen conflicts in romantic relationships and identified media-centered conflict as a pertinent and widespread issue. Potential directions for future research include analysis of the impact of specific social media platforms on relationship problems.

I watched my friend cry and laugh because of her phone. She was so happy one second, showing me all the cute and romantic things her boyfriend texted her. But then she would freak out if he didn't respond to her for an hour because she thought he didn't like her anymore, and was cheating. . She would count how long he took to reply, then wait an extra hour, because she didn't want to respond fast when he didn't. Then, of course, when he finally did text back, she was so happy and totally fine and 'in love again.' But I hated seeing her like that... Living and dying based on how fast a guy texts you back."(Interviewee 11)

"She just wanted to know everything. Like literally, everything. And I loved her, so I just wanted to make her stop being so suspicious, so I let her use my [Facebook] account and my phone and all that stuff. You know, to prove she didn't have anything to worry about. [...] But that just made it worse. Every [picture] I was ever in with other girls meant that I was into them, and that I was cheating. Every conversation I ever had [with other girls] had some kind of awful double-meaning to her [...] I don't know. I just couldn't live like that anymore." (Interviewee 3)

"He was always asking me – no, actually, yelling at me. Why the f*** won't you show me what's on your phone? What are you hiding from me? Are you cheating on me? I know you're cheating on me. If you really loved me, you wouldn't hide anything from me. You wouldn't keep your messages from me. If you didn't do anything wrong, you wouldn't care if I went through your phone.' But when I did, it just made everything a million times worse. He was so paranoid and vicious and he used to be so sweet. He would say, 'I can't trust you, why are you talking to all these guys?' I stopped talking to so many people for him, but nothing I did could make him happy." (Interviewee 4)

Social media has become an ever-present part of modern social interactions and relationships, shaping the way that individuals talk, share, laugh, love, and fight. Today, there are over

2.8 billion users on social media throughout the world and this number has increased by 20% year-over-year over the last decade [1]. There are websites, apps, and startups dedicated to helping individuals find, build, and maintain relationships - just look at Tinder, OkCupid, Couple, and Thumbkiss. Today's couples are more than just two people who enjoy spending time with each other romantically - they are also Facebook friends, recipients of continuous texts and direct messages, and mutual "followers" of one another's posts online. The bonds formed with romantic partners can be incredibly strong and meaningful; however, in today's technologically saturated world, navigating the complex conflicts and relationships threats that arise has now been expanded to include interactions in the digital realm.

Although the convenience of online communication platforms allows many couples to maintain conversation and emotional intimacy across geographical and temporal distance, social media usage can blur the line between partners' public and private lives. Information like past relationships, personal interests, and photos are now instantly discoverable with a quick Facebook search and a click of a button. Now that 65% of American adults are online, and 74% of online adults use social media, this unprecedented availability of information has changed the dynamic of modern interpersonal relationships – especially when combined with the ability to stay constantly in contact afforded by digital media[1].

In his IPO letter describing Facebook's purpose and social mission, Mark Zuckerberg states that he intended to "make the world more open and connected" by "rewiring the way" people spread and consume information[2]. Though Facebook continues

to remain as the most widely used social media platform, it is only one of many applications seeking to "rewire" the flow of information between acquaintances, friends, and partners[3]. The implications of these changes must be considered. Partners can now potentially access, track, and monitor their significant others' activities online without their knowledge with little more than a well-executed search on social media. The lack of emotional and nonverbal cues in written online communication – such as texts, direct messages, and status updates – also creates greater opportunities for miscommunication[4]. Based on the findings from my present study, this increased access to personal information coupled with higher rates of miscommunication, can incite and aggravate conflict; amplify negative emotions like jealousy, anxiety, and anger; and enable dysfunctional behaviors like partner monitoring, deceit, and infidelity.

The current literature has predominantly focused on cyberbullying among classmates and employee relations in corporate contexts[5,6]. The question of how conflict in romantic relationships is affected by social media and online communication has not yet been explored. While digital abuse is currently recognized as a form of relationship abuse by several nonprofit organizations focusing on relationship abuse like Break the Cycle, it has not been studied empirically[7]. At the moment, digital abuse is listed as a "warning sign" of relationship abuse; however, the distinct components and mechanisms of digital abuse have not yet been studied. The present study is the first to qualitatively examine the impact of media usage and online communication on conflict in romantic relationships and identify how escalation of dysfunctional tendencies occurs.

In order to understand the impact of online communication on conflict in romantic relationships, thirty-two undergraduate students (25 female; 31 heterosexual) completed a demographic survey and participated in an interview responding to the question, "Have you or a friend ever experienced conflict in a romantic relationship related to social media use?" Participants were recruited through a social media survey where they filled out contact information and preference for interview medium. Interviews were conducted over Skype, phone call, Facebook messenger, or in-person depending on participants' preference and subsequently transcribed. Interviews were semi-structured, beginning with questions about the participant's experience with relationship conflict relating to social media use and continuing with follow-up questions in order to allow their experience to comprise the core of the conversation.

Qualitative analyses were conducted to identify the relative frequency and patterns of recurring themes, which were in turn used to shape an empirically-based intervention to address relationship conflict in online contexts through preventative education. Several social media platforms emerged as the most likely to be mentioned in the context of online conflict, including Facebook, Instagram, Snapchat, Twitter, and direct-messaging apps like Kik. Interviews were coded for the inclusion or exclusion of the above social media sites in conflicts. Conflicts were coded for whether they were initiated because of social media or escalated because of social media. In addition, the subject of the conflicts were recorded and analyzed. The most common topics of conflict included the interpretation of online activities involving a member of the preferred sex as indicative of romantic instead of platonic interest, disagreement over partner monitoring behavior, and conversation maintenance and messaging habits. In addition, interviews were coded to see if participants felt that they were able to identify the warning signs of abuse or dysfunction or access helpful resources.

A program model is proposed to teach young adults to identify dysfunctional relationship behaviors in online settings, encourage understanding of how social media can impact conflict, and to improve interpersonal communication skills relating to social media.

INITIATING THE BREAKDOWN OF TRUST

"Facebook sucks. It's just a collection of sh** that makes old things show up and come back to haunt you... My girlfriend started going through stuff on my Facebook from my account. She was always worrying about photos I had with other people and conversations I had with other girls from before we were going out." (Interviewee 6)

Online communication lacks many of the social referencing cues that are present in face-to-face interactions and help clarify the meaning, intention, and emotional content of a person's message. As a result, a small gesture online can have can leave a disproportionately large impact because there is greater ambiguity in how others will interpret it. Of the 32 interviews conducted, 76% reported that a primary source of conflict was differences in interpreting online activities or texts as platonic versus indicative of interest. According to psychiatrist Marlynn Wei's work, seemingly insignificant gestures like "liking" a friend's photo or commenting an emoticon on someone's Facebook post can "communicate a whole range of meaning, whether the person meant it that way or not" and these miscommunications can ignite arguments and lead to charges of infidelity[5]. For example, the text message in Figure 1 is ambiguous and can be interpreted in a wide variety of ways depending on the recipient's judgments and beliefs about the sender and the social context.

After asking 50 participants about how they would respond if they received this message from a member of the preferred sex, 34 perceived it as "indicative of romantic or sexual interest", 18 perceived it as "platonic", and 8 were "uncertain." This variation of responses highlights how different people can interpret the same message in different ways, and these responses can then shape their later actions. However, it is important to note that 42 participants requested more information about the context of the message. Questions such as "How well do I know this person?" and "How close am I to this person?" greatly shaped their answers. Sixty-four percent of participants felt that they would perceive the message as platonic if they had a strong pre-existing relationship or were emotionally close with the sender, but would perceive the same message as indicative of interest if the sender were only an "acquaintance." This desire to know more about the social context of the message

> **The present study is the first to qualitatively examine the impact of media usage and online communication on conflict in romantic relationships and identify how escalation of dysfunctional tendencies occurs.**
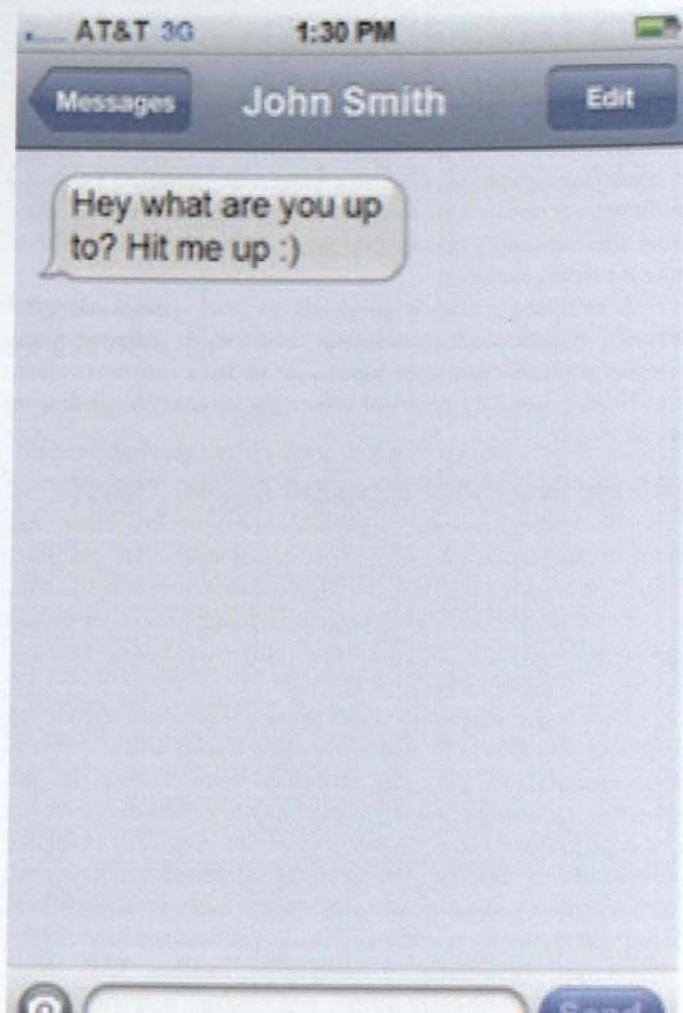
Figure 1. Figure 1. A window displaying the text message "Hey what are you up to? Hit me up :)" The name of the sender was changed to reflect the preferred gender of the participants surveyed. The screenshot was generated using iphonetextgenerator.com

demonstrates how interpretation of online communication can be highly individual, and can be subject to a variety of interpretations. These differences in interpretation of the same message have power implications for romantic conflict; when one partner sees a text or a "like" sent to a member of the preferred sex as platonic and the other views it as indicative of interest, there is a high potential for conflict.

Another prominent example of how small gestures on social media can amplify negative emotions and contribute towards negative relationship outcomes is partners' responses to a lack of communication online. Of the 32 interviews I conducted, 53% reported that a primary source of conflict and negative emotion was one partner's lack of response to online communication. Some partners view their significant other's texting habits to be more broadly representative of relationship maintenance habits[6]. If one partner believes that he or she is putting in more effort into sustaining conversation through chat or texts, they may believe that symbolically they are putting more effort into sustaining the relationship itself. Tendencies to read "symbolic" meaning into communication habits generalize judgments about communication into judgments about the partner. Along dimensions of message length, frequency, depth, and response rate, communication via digital media allows concepts of "effort" and "commitment" to be symbolically quantified. Media

technologies give partners the ability to either broaden or shor[ten] the "emotional distance" between one another by changing h[ow] they engage in online communication.

How long a partner takes to respond to a text can also [be] construed as a measure of how "eager" they were to talk to th[eir] partner, and subsequently how much they enjoy the conversatio[n]. Conversely, a failure to respond to a text for extended amoun[ts] of time can be perceived as a deliberate effort to avoid cont[act] with a partner, potentially leading to feelings of anxiety a[nd] insecurities about relationship stability[7]. Perceptions [of] intentional distancing can cause partners to question the cause [of] this behavior, which can cause negative emotions and cogniti[ve] patterns such as rumination and internalization of insecuriti[es]. However, it is also important to note that there is also t[he] possibility of false positives, where one partner may perceive t[he] other to be intentionally avoiding communication during perio[ds] of "chat silence", when in reality their partner was only bus[y], asleep, or away from social media.

Other potential sources of conflict involve concerns abo[ut] relationship threats and infidelity. Seventy-five percent [of] interview participants listed concerns about infidelity as a prima[ry] cause of conflict in their relationships, with 43.75% mentionin[g] feelings of anxiety and 37.5% mentioning feelings of jealous[y] or possessiveness. Higher use of social networking sites li[ke] Facebook can serve as indirect temptation for infidelity because [it] supposedly exposes partners to more members of the preferr[ed] sex[8]. However, more specifically, high frequencies of viewin[g] photos or direct messaging individuals who could be perceive[d] as potential romantic interests makes conflict between coupl[es] highly likely[8]. Though no breach of trust need occur physicall[y], being in contact with potential partners creates a realist[ic] relationship threat for the other partner if it is interpreted as a[n] increased interest in exploring potential romantic partners an[d] a loss of interest in the existing relationship. Partners may the[n] become jealous of the time their significant other spends talkin[g] to members of the preferred sex in online contexts, leading t[o] negative relationship outcomes like lack of trust, argument[s] and separation[8]. Perceptions of relationship threats are tied t[o] differences in individuals' personalities and attachment styles[9]. Individuals with low self-esteem, in particular, are more likel[y] to worry about relationship threats; seeing partners in constan[t] communication with others can trigger feelings of persona[l] inadequacy and create concerns about being "good enough" to keep their partner's attention and affection[9]. Partners wit[h] low self-esteem are especially vulnerable to rejection sensitivit[y], wherein the expectation or fear of rejection can result i[n] behaviors that result in rejection[10]. In addition, individuals wh[o] have an anxious attachment style are particularly sensitive t[o] perceived relationship threats, potentially because they are alread[y] predisposed to being worried about rejection and abandonment. Though individuals may differ in their propensity to perceiv[e] threats to their relationship, these interpretations can incit[e] conflict and result in consequential outcomes.

EXACERBATING EXISTING RELATIONSHIP PROBLEMS: A CYCLE OF DYSFUNCTION

"I broke up with him because [social media] became a battlegroun[d] between us. I mean, he was always possessive. I knew that. Bu[t] who I texted, whose pictures I 'liked' on Facebook and Instagram[,] who I was [Facebook] friends with even [...] All of these stupi[d]

things that are supposed to make you closer to people, they just gave him more ammunition, things to blame and suspect me for." (Interviewee 22)

A recurring theme in the interviews was how social media could aggravate pre-existing problems within the relationship. Sixty-two percent of participants described an escalation of an existing conflict because of social media, and 47% of all participants mentioned some form of partner monitoring behavior – which is the use of digital media to look at a significant other's online activities, colloquially known as "stalking"[11]. Media technologies make more information more widely available to more people – with the added potential of leaving less evidence behind. Partners who had already harbored suspicions about a significant other's fidelity or reliability often resort to monitoring online activities by looking at likes, recent photos, comments, tags and more on various social media platforms. As reported by 15.6% of the interviewed participants, more extreme versions of partner monitoring can involve the nonconsensual use of a partner's own social media account, coercive demands or requests to view personal conversations, or attempts to obtain personal passwords. Partner monitoring behavior is often a symptom of existing jealousy, anxiety, and possessiveness – and often results in a breakdown of trust on both sides. In fact, partner monitoring is correlated with other dysfunctional relationship behaviors such as emotional manipulation, passive-aggressive conflict, and deceit[12].

Understanding the motivations behind partner monitoring is key to understanding how it can damage relationships. Small gestures online can have accumulating effects – an innocuous comment saying "You look great! :)" on a friend's profile picture could be written with the intention of being platonic, but a partner who is already anxious or jealous could interpret the message as an attempt to flirt. The tensions and insecurities generated by small aggravations can accumulate and damage a relationship's foundation of trust[12]. Individuals may then turn to partner monitoring methods in an effort to seek reassurance that this behavior is not repeated and disprove their fears of infidelity or betrayal. However, they are susceptible to confirmation bias, which is a psychological tendency to interpret information in a way that confirms one's pre-existing views[13]. In the scenario of an anxious or jealous partner looking through social media posts relating to their significant other, they may unconsciously selectively interpret the evidence they find online to align with their pre-existing fears. This behavior has adverse effects on relationship strength and satisfaction, as confirmation of perceptions of relationship threats tend to generate more fear, anxiety, and jealousy[14].

In addition to creating and feeding a cycle of dysfunction, such behavior serves to exacerbate existing problems by breaking down both trust and communication within a relationship[15]. Of the 47% of interviewed participants who discussed partner monitoring, all said that it negatively impacted their relationship. The act of monitoring a partner's behavior can create a sense of distrust in a couple, as it may be perceived to be an invasion of privacy[16]. Partner monitoring also can damage healthy relationship communication by posing an alternative to direct confrontation of discussion of issues, which is an essential part of healthy relationship maintenance[17]. Instead of speaking frankly and honestly with their partner about difficult topics like fears and insecurities, social media offers an easy way out in which partners can try to privately investigate potential threats online without telling their significant others. This can result in repressed negative emotions, resentment, a failure to resolve concerns, and grounds for miscommunication.

MEDIATION: A PROPOSAL FOR INTERVENTION

"I didn't know how bad [the situation] was until it got really abusive, really terrifying. I didn't even want to text anyone because I was too scared of how he was going to react [...] But the one good thing I got out of it was that now I know what the red flags are. I helped my friend get out of a similar situation, where the guy seemed just like [my ex-partner] did when he started getting really bad. I mean, I'm so, so happy that I was able to get her out of that situation, you know? But something in me just really wishes I could have gotten out earlier too." (Interviewee 4)

Conflict in today's relationship spans a much larger variety of forms of interaction than it did before; as institutions and communities seek to prepare teenagers and young adults to navigate relationships, it is imperative that these changes are recognized. A study conducted by the Urban Institute's Justice Policy Center found that 26 percent of teens in romantic relationships said that they have been "controlled, degraded, or frightened" by their partners through social media, email, and text messages[18]. More than one in twelve said that their partner used one of their social media accounts without their permission[18]. In addition, all of the interview participants reported an inability to recognize "warning signs" of dysfunctional behavior in relationships in online context and a lack of relevant, available resources. There is a clear disparity between the need for effective education on this topic and what is currently available.

Institutions – such as high schools, colleges, and community centers – should take steps to include healthy relationship education into their curricula while accounting for online contexts. Though several programs and guides such as the National Center for Victims of Crime's "Guide to Survivors of Abuse: Privacy and Safety on Facebook" have been developed to help individuals and survivors better protect themselves online, but preventative action must be taken[19]. Educational programs could be established to teach young adults about staying safe in online contexts, recognizing abuse across dimensions and settings, and healthy conflict resolution – before they become survivors.

Though some schools such as Stanford have mandatory classes that include examples of digital abuse, more work can be done to teach students to recognize abuse in its many manifestations. As part of Stanford's Haven course on relationships, developed by EverFi, all students must complete a section called "Red Flags" where several activities are used to emphasize the importance of recognizing the signs of relationship abuse and intimate partner violence[20]. One scenario, shown in Figure 2, highlights partner monitoring as a "sign of distrust and insecurity" and ties this back to a lack of core relationship values like "communication, trust, and respect."

Examples such as those shown in Figure 2 stress the need to teach teenagers and young adults to identify the red flags of relationship abuse and dysfunction in their own lives and romantic relationships. Because widespread digital communication use is still relatively new, it has been difficult to clearly define and identify "red flags" of abuse in digital conflicts. Now that 92% of teens report going online daily and 24% report going online" almost constantly, it is more important than ever that institutions and communities equip them with the skills to recognize abuse, resolve conflict, and safely manage their relationships online[21]. Haven
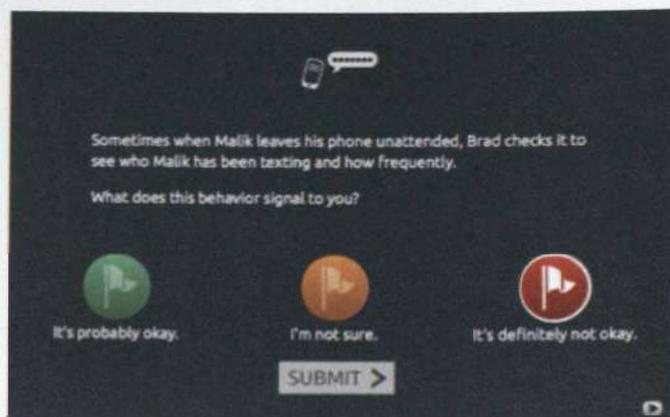
Figure 2. A screenshot from Stanford's mandatory "Haven" course on healthy relationships.

Figure 3. A screenshot showing how partner monitoring is highlighted as an example of boundary violation.

provides an effective model for healthy relationship education by emphasizing identification of unhealthy behaviors, teaching bystander interventions to support survivors, and increase understanding about sexual and relationship violence. These educational goals should be adopted by other universities and communities in order to better prepare their students for real-life situations and foster their well-being. However, future educational programs could benefit from discussing how to effectively resolve conflicts in romantic relationships – particularly regarding digital communication and social media.

LIMITATIONS

The current present study faces limitations in its recruitment of participants and use of qualitative analyses. I chose to recruit participants by placing a survey on social media and allowing them to contact me if they were interested. Although this recruitment technique guarantees that all participants will relate to the relevant experience, it does present a potential for selection bias. Another limitation of this study is the use of qualitative analyses, which can be subject to more subjective interpretation on the part of the researcher when identifying recurring or relevant themes.

CONCLUSIONS

"It was hard at first. It was stressful and kind of annoying not being able to know exactly what [my girlfriend] meant on texts when I was so used to talking to her in person. Sometimes things come out different than what you mean, or sometimes you'll say something and they'll take it the wrong way and it's just really awful. But we learned to work around it […] If I don't know what she means, I'll just ask her to clarify it more […] I think the reason social media hasn't become a problem for us is because […] we knew how it changed the way we communicated and we made up for that change by communicating more honestly." (Interviewee 30)

In today's technologically connected society, social media and digital communication play a crucial role in determining the dynamic of a romantic relationship. In many ways, digital media have redefined what it means to "connect" with and "talk to" another person. In fact, the anonymity and increased unprecedented availability of once-private information on public profiles exacerbate and amplify pre-existing anxiety, stress, abuse, and sensitivity towards perceived relationship threats by creating more opportunities for conflict. The differences in interpretation of ambiguous posts or gestures
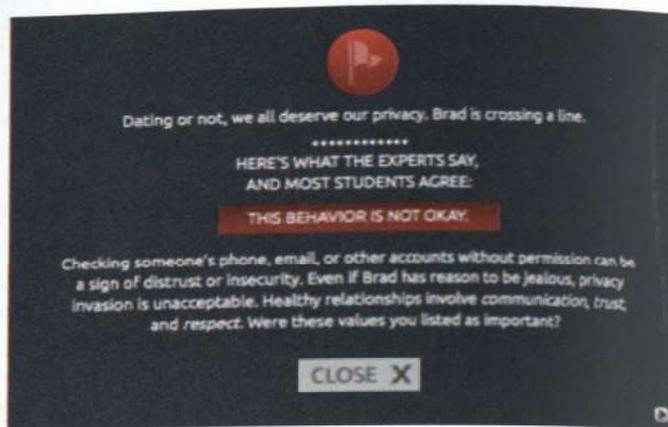
online and the use of media like texting frequency to quantify once-abstract concepts of "commitment" in a relationship can cause conflict. While many conflicts online can be remedied with greater communication skills, sometimes the more drastic manifestations of the same anxious and possessive tendencies can emerge as partner monitoring behavior. Typically triggered by relationship fears or threats, partner monitoring backfires by exacerbating these fears and causing greater conflict. Detrimental in both breaking down trust between partners and pathways for communication and healthy discussion about relationship concerns, partner monitoring and other forms of digital abuse must continue to be addressed in an educational and prevention oriented context. To address this issue, educational interventions can be constructed to incorporate lessons on recognizing "red flags" of dysfunctional relationship behavior in digital settings. Understanding how social media can shape behavior and learning to communicate effectively given changing online communication media can also help address this growing and pressing issue. Social media is an ever-present force in our lives, in our communities, and in our relationships; it is inextricably linked to the ways we connect and clash with the important people in our lives. Communication is changing – our responses, and the way we resolve these conflicts, must change as well.

REFERENCES

1. "Social Networking Fact Sheet." *Pew Research Center Internet Science Tech RSS.* Pew Research Center, 27 Dec. 2013.

2. Facebook, Inc. Registration S-1 Form. *United States Securities and Exchange Commission.* 12 February 2012.

3. Byron, Kristin. *Carrying too heavy a load? The communication and miscommunication of emotion by email.* Academic Management Review. 2008; 33, 309-327.

4. Wei, Marylyn. How to keep social media from complicating your relationship. *Psychology Today.* 25 Nov. 2015.

5. Kowalski, Robin M., et al. "Bullying in the digital age: A critical review and meta-analysis of cyberbullying research among youth." (2014): 1073.

6. De Dreu, C. K. W., & Weingart, L. R. (2003). Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis. *Journal of Applied Psychology,* 88(4), 741-749. doi:10.1037/0021-9010.88.4.74.

7. "Warning Signs of Dating Abuse." Break the Cycle.

8. Luo, Shanhong. *Effects of texting on satisfaction in romantic relationships: The role of attachment.* Computers in Human Behavior. 14 Jan. 2014.

9. Morey, J, Gentzler, A, Creasy, B, Oberhauser, A, Westerman, D. "Young adults' use of communication technology within their romantic relationships and associations with attachment style." *Computers in Human Behavior.* 2013; 29, 1771-1778.

10. Downey, G., Freitas, A. L., Michaelis, B., & Khouri, H. (1998). The self-fulfilling prophecy in close relationships: Rejection sensitivity and rejection by romantic partners. *Journal of Personality and Social Psychology,* 75(2), 545-560. doi:10.1037/0022-3514.75.2.545

11. "Types of Abuse." Love is Respect.

12. Russell, C, Nagurney, A, Smith, J. *Cheating, breakup, and divorce: Is Facebook use to blame?* Cyberpsychology, Behavior, and Social Networking. 22 Oct. 2013.

13. Muise, Amy. 'Creeping' or just information seeking? Gender differences in partner monitoring in response to jealousy on Facebook. *Journal of Personal Relationships.* 29 July 2013.

14. Happy couples: How to keep your relationship healthy. *American Psychological Association.* 4 Dec. 2015.

15. Confirmation bias. ScienceDaily. 1 Dec. 2015.

16. Managing conflict and resolving disagreements. *The Couples Center.* 29 Nov. 2015.

17. Utz, S, Beukeboom, C. The role of social network sites in romantic relationships: Effects on jealousy and relationship happiness. *Journal of Computer-Mediated Communication.* 5 July 2011.

18. Teen Digital Abuse. *Urban Institute's Justice Policy Center.* 2014.

19. Guide for Survivors of Abuse: Privacy and Safety on Facebook. *National Center for Victims of Crime.* 2014.

20. Haven. EverFi.

21. Teens, Social Media, and the Internet. *Pew Research Center.* 2015.

ANGELA LEE

Angela Lee is a sophomore at Stanford University studying Psychology and Communication. Her academic interests include interpersonal interactions, conflict and conflict resolution, empathy, social media, and using empirical data to shape effective interventions. She is fascinated by humans and relationships, and plans to continue pursuing her passion for understanding human behavior in graduate school. In her free time, Angela loves driving, exploring new places, and writing.

Capitalism and Globalization: Fuelling the Commodification of Women Through the Sex Trade

Lucia Nalbandian

University of Toronto

This article argues that the nexus formed by globalization and capitalism is accompanied by negative implications for women in the developing world. This essay consists of four parts. Part I provides an examination of the commodification of women, drawing parallels between the modern sex trade and the historical slave trade to demonstrate a system of superiority exists in the global sex trade. Part II evaluates sex sales in the developing world and analyzes prostitution in the developed world to emphasize that women in the sex trade industry are amongst the poorest and most vulnerable in both developing and developed countries. This provides an explanation for how sex sells more and differently in the developing world. Then, Part III considers voluntary and involuntary entry into the sex trade, focusing on the roles of individuals who hire and ensure the cooperation of trafficked women to further support the claim that a system of superiority exists in the global sex trade. Finally, Part IV describes the reality of the sex trade and the implications of commoditizing sex, focusing on medical, social, and economic implications.

INTRODUCTION

Through the rise of the global capitalist system and multinational markets, prostitution has emerged as a flourishing industry[1]. The commodification of women has created an oppressive system of subordination in which the developed world dominates the developing world. At the macro-level, selling sex is a service industry, with a supply and demand. At the micro-level, the individuals involved connect the developed world with the developing world, through globalization processes, including travel and tourism. In what follows, I argue the nexus formed by globalization and capitalism – while favored by the developed world – is accompanied by negative implications for women in the developing world. These implications are captured by the reality of women's lives in the sex trade industry.[1]

While existing scholarship on the exploitation of women in the developing world exists, the topic has not yet been sufficiently examined. This essay provides an unprecedented study based on data not previously used pertaining to the legalization and actual sale of sex in countries across the world. This data has not been used as it is not readily available. More specifically, the quantitative data that supports the claims made throughout the following text was collected from published articles from newspapers, magazines and online websites reporting on the realities of prostitution and the sex trade. Governments do not particularly collect data nor report on the sale of sex, whether legal and regulated or not.

This essay consists of four parts. In Part I, I consider the commodification of women, drawing parallels between the modern sex trade and the historical slave trade to demonstrate a system of superiority exists in the global sex trade. In Part II, I evaluate sex sales in the developing world and analyze prostitution in the developed world to emphasize that women in the sex trade industry are amongst the poorest and most vulnerable in both developing and developed countries. By doing so, I will provide an explanation for how sex sells more and differently in the developing world. Then, in Part III, I consider voluntary and involuntary entry into the sex trade, focusing on the roles of individuals who hire and ensure the cooperation of trafficked women to further support the claim that a system of superiority exists in the global sex trade. Finally, in Part IV, I describe the reality of the sex trade and the implications of commoditizing sex, focusing on medical, social, and economic implications.

THE COMMODIFICATION OF WOMEN

A commodity is a useful or valuable material thing that can be bought and sold. According to Marx, a commodity is "any good or service" ("products" or "activities")[2] produced by human labour and offered as a product for general sale on a market (ibid., 36). In turn, the demand that exists for the good or service – the commodity – composes 'the market.' As Marx noted, a commodity has two values[2]; use value, in that it can satisfy human needs or wants, and exchange value, in that it can be traded for other commodities. The latter of these two types of values is often expressed through monetary value.

The slave trade is a historical example of a commodity-based market. Essentially, slaves were attributed value for the service (labour) they provided, but also individually as goods themselves (the supply). An example of a slave market is the Trans-Atlantic Slave Trade, where slaves gained a use value because they satisfied human needs or wants – primarily that of labour – and were traded for other commodities or money. These slaves were highly desired commodities that created a demand and thus, established a market.

Similarly, a woman, through her body, becomes a useful and valuable 'thing' that can be bought and sold. Comparable to

the aforementioned Marxist perspective, a woman is produced by human labour – the act of sexual intercourse, a period of pregnancy, and the process of childbirth – and, in turn, offered as a product for general sale on a market. On this market, the body of a woman is the 'good' that has value. Her body is prescribed both a use value because it satisfies the human want or 'need' for sexual gratification and an exchange value because it is traded for "other" benefits[3] (such as a good job, education, citizenship in a foreign country or a false marriage proposal[4]) and thus, gains monetary value. Additionally, women are also commoditized through the provision of sexual services in trade for money or other benefits, otherwise known as prostitution.[2]

Moreover, women under the control of a trafficker are bought and sold at different prices, depending on factors like age, appearance, and performance. To the trafficker, these characteristics matter. However, apart from the mentality that the younger the girl[3], the more likely "they [are] free of sexually transmitted diseases"[3], pursuers[4] seldom distinguish between girls[3][5]. Trafficked women are bought and sold, moving from pimp to pimp, crossing borders, and being housed in different cities around the world. In the process of being sold, women are stripped naked in apartments, houses[3], or in "sex slave auctions," across nightclubs and markets[3]. According to Anna Radicetti, the manager of the Counter-Trafficking Return and Reintegration Project of the International Organization for Migration in Kosovo, "potential buyers often 'test-drive' [women], much like the way we test-drive new cars. They are sex-tested by each [pursuer, who wants] to see for [himself] what the girls can do in terms of sex performance"'[3].

Like most goods and services, the flesh trade has also developed a technological platform. Through the click of a few buttons, pursuers around the world are able to access "the biggest whorehouse on the planet"[3], where pictures of girls are accompanied by descriptions such as "virgin, bride, sex tours, online escort services, live interactive sex shows"[3]. Often, these girls are auctioned off like livestock.[6]

Finally, and most notably, this market is completely different from any other because it is based on a re-use cycle. In this sense, women and girls are essentially dispensable; they are used repeatedly and eventually discarded. However, as Deshpande and Nour outline, unlike narcotics, these girls are sold into sex trafficking to earn profits for their traffickers and are used repeatedly, over the course of several years[4]. Their traffickers, during 'hours of operation,' often remain in the operating area to "keep a watchful eye on their merchandise and collect the money [their 'belongings'] make"[4]. Women, thus, become dispensable products that are sold on a market for a price value.

CONCENTRATION IN POVERTY

As outlined in Figure 1, 56% of developed countries have legalized the sale of sex, and therefore categorize it as "prostitution." Additionally, 16% of these countries have legalized certain components of the transaction, while the sale of sex remains illegal (and is considered sex trafficking) in 28% of developed countries. However, regardless of legality, the sale of sex occurs in every country (Table 1), amongst two categories of women: the agent prostitute and the trafficked victim.

Regarding the first category, a prevalence of illiteracy, homelessness and societal isolation breeds prostitution. Therefore, it is unsurprising that prostitutes commonly emerge from the relative poor in countries around the world, seeking some form of income to ensure their survival. More specifically, in Canada, an estimated 30-70% of sex workers use prostitution to support their children[5]; in the U.S., prostitutes who "leave" the industry often return as a result of needing money to support their family[6]. Interestingly, as over half of the developed countries in which women sell sex have legalized prostitution, many women view themselves as having agency, regardless of the outsider lens that portrays them as victims (7; 8; 9; 10; 11). This agency becomes problematic when those trafficked blend with those who voluntarily sell sex. Only "if [a pursuer pauses] long enough, while reaching [his][7] climax… might [he] see the frustration, revulsion, fear, depression, resignation, anger, shame," the "bruises peeking under cheap flesh-coloured makeup, whip marks on the buttocks, cigarette burns on the arms"[3] that may aid in distinguishing the agent prostitute from the trafficked victim, who is trapped in a market that commodifies her body.

As indicated in Figure 2, only 30% of developing countries have legalized the sale of sex, and therefore categorize it as "prostitution." Additionally, 5% of developing countries have legalized certain components of the sale of sex, while such a transaction remains illegal (and is considered sex trafficking) in 65% of developing countries. As poverty rates are higher in the developing world, women are more likely to turn to the sex trade willingly, like the relative poor in the developed world. As a result, the rate of prostitution in the developing world is significantly higher[8].

> **The sex trade industry in the developing world is not only fuelled by the developed world, it is also partly constructed by it – both physically, and online.**

A remarkable (and regrettable) aspect of the nexus of poverty and prostitution is the way it recruits generations of women, as women involved, whether voluntarily or through trafficking, often bear children who remain with them or become orphans[12]. When children become orphans, they are more likely to fall into similar cycles of poverty and violence, and as Malarek notes, are preyed upon by sex traffickers, straight from the orphanages[3]. This cycle of generations of prostitution is referred to as legacy prostitution[4].

The sale of sex in the developing world is substantially different from its counterpart in the developed world, as the former has been propelled forward with a thriving market developed in response to the developed world's demands. Men gather information through websites online to get a better sense of what kind of services are available in different countries around the world, and plan their travels – business or otherwise – accordingly. Malarek highlights this by outlining how the principles often structure behaviour in the developed world drive men to seek fulfilment of their desires outside of the borders of their country of origin[3]. Amongst these limiting principles are community norms and legality:

[S]ex tours are flourishing for all sorts of reasons. Foremost, they give men a sense of freedom. By traveling to a foreign land for sex, they feel at liberty to do things they may [would] never dare otherwise, whether because of community norms, family ties or, more to the point, criminal sanctions. The featured attraction for many of these men is the prospect of bedding a young girl, preferably a beautiful teenager. They know that if they were ever to try that at home, they'd (sic) find themselves behind bars. At home, no always means no[3].

Additionally, the sale of sex in the developing world has increased in response to developed world demands within the developing world. Sex sells in the developing world as a result of the developed world's "initiatives" to encourage and guide development in otherwise poverty-stricken, underdeveloped areas. Trafficked women in the developing world service "huge numbers of foreigners who make up the international peacekeeping and reconstruction forces"[3]. The sex industry does not discriminate amongst pursuers:

All types of men [seek to buy sex] … Married, single, soldiers, businessmen and the religious…A lot of single men go for necessity. A lot of men are insecure… They're (sic) shy or they may have a physical problem, a mental problem or a medical problem. They can be fat and ugly or not the right age… Many men also [leave home to buy sex] because it is a well-known fact in Israel that Jewish women do not like to do certain things. The men know they can get that here. For them, prostitution is their savior[3].

The sex trade industry in the developing world is not only fuelled by the developed world, it is also partly constructed by it – both physically, and online. Alongside the Arizona Highway, in northwest Bosnia, is the Arizona Market. While during the day the Market is filled with shoppers and otherwise normal goods – knock off brand-name products, dried fruit and other bargains, at night, the "most valuable goods are the ones with a pulse – young women and girls trafficked from Eastern Europe"[3]. At the entrance of the Arizona Market, a large sign pays "homage" to the Americans: "our thanks to the U.S. Army for supporting the development of this market"[3].

The perpetuation and propulsion of the sex trade and the trafficking of women is also captured by the impact of humanitarian intervention in conflict areas. While one of the purposes of humanitarian interventions is often to liberate an oppressed society, "women's experiences of military intervention have been far from liberating"[13]. The deployment of the United Nations (UN) Kosovo Force (KFOR) in July 1999 immediately created a sex industry where one did not exist[13]. This lead to a massive demand for sexual services in a region where demand was previously negligible. This demand remained, even after the mission was complete, encouraging the establishment and growth of crime, violence and poverty. As a result, brothels were developed around military bases servicing US military personnel, alongside the German KFOR soldiers, Italian KFOR soldiers and French KFOR soldiers[13]. By 2004, 200 locations were established with the intent of satisfying the demand for sexual services were identified as harbouring trafficked women[14]. Most importantly,

"the militarization of a society has been linked to increased impunity for gender-based violence – the greater the military presence, the greater the possibility that [men] may violate women without consequences"[15]. Furthermore, the societal disruption caused by the KFOR peacekeeping mission lead large numbers of women to turn to the sex trade industry for work, thereby creating a large supply for the industry.

Women from the developing world are often transported across borders, physically moving from the developing world to the developed world, where their travel documents are stripped, and they become physically available for pursuers across the world. Regardless of this availability, across oceans and over hundreds of miles, pursuers in the developed world continue to exacerbate the exploitative sex trafficking system online. Women trafficked into the sex trade industry are advertised to pursuers in the developed world over the Internet, allowing "[pursuers] to [fly] in specifically to use [girls]"[3]. Websites have emerged encouraging individuals to plan their trips abroad accordingly. These pursuers, through the use of the Internet and web-based forums, have exacerbated the kidnaping and forcible confinement of millions of women around the world[3], as it is through their insatiable demands that pimps and traffickers seek the supply – women.

Finally, and most notably, the developed world acts as a promising guise for women looking for legitimate employment. Some recruiting ads appear to be "officially sanctioned, bearing logos of the American Stars and Stripes or the Canadian Maple Leaf. Others are decked out in the enticing tricolours of Germany, Belgium, the Netherlands, Italy or France"[3].

ENTERING THE SEX TRADE: VOLUNTARY VERSUS INVOLUNTARY

While women in the developed world are more likely to have entered the sex trade on their own, the developing world enslaves women through a vast array of tactics. Deshpande and Nour note that "most commonly, victims are promised [an array of benefits]" not involving sex work[4]. Often, women believe they are applying to jobs, and crossing borders to fill "positions [such as] waitresses, models, nannies, dishwashers and maids"[3]. The job advertisements promise high monthly salaries, and living accommodations. Recruiting agencies even go so far as to set up booths at career days in some Russian universities[3]. Women are sometimes recruited in groups, fooled by the thought that there is safety in numbers.

More often than not, women do not willingly enter the sex trade. Rather, they are manipulated, coerced and preyed upon. In the developing world, many victims are sold into sex slavery by their families, convinced by traffickers that those being sold will live a better life in a developed country, working a modest job. Women who are involved in the sex trade industry domestically are often approached by traffickers to be transported overseas with the false promise of better working conditions and living standards[4]. Women also enter the system through traumatic bonding, which involves the instilment of deep rooted fear and gratitude for being allowed to live[4]. Because traffickers often recruit women who are economically and socially vulnerable, finesse pimping, the use of "compassion, kindness and psychological games such as luring victims through small gifts of cash, clothes, shelter, food and drugs [make those recruited] feel obligated or indebted to the pimp"[4]. The tactic of guerrilla pimping is also used, which involves violence, threatening and aggression to recruit and

enslave women.

Even more disturbing is the role of people in positions of authority and trust in luring women into the sex trade. As Malarek observes, "the first link into the trafficking chain is more often a relative, a neighbor or a friend of a friend"[3]. Boyfriends, fathers, brothers and cousins, amongst many familial members and familiar faces in these women's lives, are cited as contributing to their enslavement[3]. "Some orphanage directors [even sell] information… to traffickers"[3], abusing their position of authority for some small stipend.

Women are also traffickers. Oksana Ryniekska, a Ukrainian doctor, established a brothel over a London dry-cleaning shop in 1994, and after accumulating in $210,000 in only eight months through the exploitation of nine young women from her homeland, was sentenced to "a mere three months in prison, and a recommendation for deportation immediately upon release"[3]. Additionally, trafficked women themselves are often used as lure for new victims – who make up the 'second wave' of trafficked women, and sometimes traffic women themselves. Agustín recounts the case of "one Dominican woman [who] had first [gone] to Spain to visit her sister who sold sex in a bar, later worked the sex-club circuit all over the north of Spain and finally set up her own flat where migrants [sold] sex, [lived] and [left] from for escort jobs. She [now runs] her sixth flat in the same northern city"[11]. The sex, while primarily provided by women, is sometimes *sold* by women who do not sell themselves.

> The development and acceleration of the sex trade has serious social implications for the world.

THE REALITY OF THE SEX TRADE: IMPLICATIONS OF COMMODITIZING SEX

While in both the developed and developing world women involved in the sex trade are often treated as perpetrators of crime, as opposed to victims of it, the implications of commoditizing sex are often long-lasting and grave, and arise as a result of the commodification of the female body, sold on a market driven by capitalism and globalization. The reality of the sex trade is terrifying; servicing several hundreds of pursuers before "being retired" is accompanied by several medical, sexual and economic risks and detriments.

Whether women enter the sex trade willingly or are lured into it, the act of sexual intercourse with several people a day, over a long period of time, is accompanied by several physical health implications. While in the industry, many women and young girls are required to perform sex without a condom, perform sex while pregnant, and perform sex while menstruating[3]. These women are often subdued into consenting through the use of drugs, which more often than not leads to severe drug addictions[3]. They are gang raped, and proof of mutilation covers their bodies in the form of cigarette burns and whipping scars[3]. If these women are not murdered, they often commit suicide[3].

Additionally, women working in the sex trade are susceptible to a multitude of sexually transmitted infections, like gonorrhea, syphilis, urinary tract infections (UTIs), and pubic lice[4]. Several women are often kept together in small rooms, isolated and seldom fed, leading to several medical problems, including eating disorders and malnutrition (ibid.), and further exacerbating the transfer of infections.

Moreover, women caught in the sex trade are also susceptible to pregnancy and pregnancy-related infection. Performing sex while pregnant and without a condom is extremely damaging, as these two "services" lead to several future detriments on both a micro-level – involving the lives of both women and children – and a macro-level, further fuelling violence, crime and poverty in lives of the upcoming generation in the developing world. Women who are pregnant while actively involved in the industry and under the influence of drugs and alcohol put their unborn babies at risk of several life-threatening and altering medical problems. "Many of the babies are born with syphilis or are HIV-positive. Some are drug-addicted… and many of the women work right up to the day they go into labor"[4].

In response to their health issues, many women employ culturally specific/ recommended procedures that do not adhere to "western" ideologies of hygiene. These women make use of herbal remedies, self-injecting cures bought in drug stores[11]. They typically do not possess a thorough understanding of the medical problems with which they are dealing, and have been taught (if at all) – by people who spoke unfamiliar languages –different and often incorrect theories of (the treatment of) AIDS and sexually transmitted illnesses[11].

Additionally, the legality of the sale of sex leads to the exacerbation of sexually transmitted infections for both the individual, and the population at large. As previously mentioned, men who reside in the developed world (72% of which is composed of countries where the sale of sex is legalized and regulated) travel to the developing world to purchase sex. This is extremely problematic for the developing world, as it encourages the sale of sex, which, in turn, perpetuates the prevalence of HIV/AIDS. As indicated in Figure 3, the highest rates of HIV/ AIDS prevalence are mostly in the developing world. In fact, of the top 22 countries in which HIV/AIDS is the most prevalent, all but one fall into the "developing" category.[8] Additionally, in 13 of these 22 countries, the sale of sex is illegal,[9] in two of these countries the sale of sex is limited in legality,[10] and in only five of these countries, the sale of sex is illegal.[11] This represents only the top 22 countries in which HIV/AIDS has a high prevalence rate. While this situates the role of the developed world in aggravating the transfer of HIV/AIDS in the developing world, it also sheds light on the manner in which the developed world fuels crime, poverty and violence in the developing world.

The legality of the sale of sex also influences the services available to women who are involved in the industry. As Miller et al. note, "trafficked women engaging in [illegal] sex work tend to have fewer resources, limited options, and increased vulnerability to violence and abuse than women who are not trafficked"[16]. Women illegally involved in the industry seldom seek assistance or resources to aid in preventing infection or pregnancy, as they are often stigmatized, seldom described as victims and usually face prostitution charges[3]. This sort of wrongful accusation and blame are the result of the social implications that derive from involvement in the sex trade.

SOCIAL IMPLICATIONS

As if it is not enough that these women undergo physical harm, their time as trafficked slaves is also filled with ridicule[3] and emotional harm. Through words, they are devalued as human beings, and stripped of their right to their own body and their own self. Women are thrown to the bottom of the social hierarchy, and dominated. They are called "prostitutes," "whores," "hookers," "sluts," "harlots," – terms laced with opprobrium and distaste[3]. Women are often humiliated, as their bodies are put on display, often ridiculed by pursuers. Malarek's "The Natashas" describes this sort of humiliation and ridicule: "at that moment, another young woman took to the stage. She was obese and clearly on display for the sport and ridicule of the [pursuers]. Holding on to a brass pole, she bounced to the music while a phalanx of men at the edge of the stage whistled and laughed"[3]. In contrast, the men who use these women go by gentler names – 'patrons,' 'clients,' 'johns' – making them sound refined by comparison"[3]. Such a practice fails to reflect and clearly belittles the severe mental and physical pain suffered by their victims, whose experiences often haunt them in their sleep on nights when they are out of the system, or walking the streets awaiting their next exploitative encounter. The development and acceleration of the sex trade has serious social implications for the world. The involvement of both the developing world, and the developed world in sex trafficking hinders and degrades efforts to ensure human rights and women's rights[4].

Finally, and most importantly, the stigmatization of women trafficked into the sex industry further fuels the lack of resources and help available to them. As women trafficked blend in with agent prostitutes, all are thought to have willingly entered the sex trade, and those who are there against their will, held captive by their traffickers, and bonded to their debt, are seldom offered any help, whether from casual passersby or pursuers (including the religious ones [3, xv]).

ECONOMIC AND DEVELOPMENTAL IMPLICATIONS

While the sex trade industry is, as previously mentioned, the third most profitable business for organized crime, the returns do not benefit the societies in which they occur. Instead, they perpetuate a cycle of poverty, and hinder progress in developing countries. In contrast, the international sex trade can also be viewed as encouraging development. Malarek writes

> The sex industry has been a prime catalyst behind many of the major advances in computer technology since the net's inception, including privacy services, secure payment schemes and online database management. Pimps and pornographers have provided the impetus and cash for computer techno-wizards to come up with faster ways of delivering salacious products to an ever-expanding clientele[3].

Moreover, the role of the developed world in capitalizing on the developing world is captured well in the manner in which pharmaceutical companies from the developed world make drugs intended to fight HIV/AIDS inaccessible to the developing world. The World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) prohibited states from allowing companies to make generic versions of

pharmaceuticals to help with the HIV and AIDs disease[17]. While the involvement of non-governmental organizations has led to the adoption of Doha Declaration on the TRIPs Agreement and Public Health, which has been slowly encouraging certain exclusions and alterations to the TRIPs agreement[17], this only serves as one example of the major role of developed countries in hindering the progress of developing countries.

CONCLUSION

The nexus formed by globalization and capitalism – while favored by the developed world – is accompanied by negative implications for the developing world, captured by the reality of the lives of women in the sex trade industry. The commodification of women through the modern sex trade shares many similarities with the historical slave trade. Women, whether through the sale of sex in the developing world and prostitution in the developed world are products on a thriving market.

Data-collection efforts in developed countries are insufficient. This is clear when one reviews the data listed in Table 2, which illustrates the lack of data on the sex trade and sex work available in developed countries. This is a failure on behalf of these developed countries. Regardless of whether the data is falsified, there needs to be a greater effort directed to gathering data, interpreting it, and using it in policy development.

Current efforts to stop the trafficking of women are insufficient; the role of the state must be emphasized, people must be organized, and a great effort must be made to respond effectively to these abhorrent violations of human rights. Developed countries must actively respond to this issue, rather than turning a blind eye to the role their citizens play in further exacerbating the system of sex trafficking. Governments must stop blaming the countries from which the pursuers emerge and instead realize "the trade is driven by the lust of [the pursuers]; it is fueled by the bars, brothels and bordellos dotting their streets; and it thrives because of their complacency and inaction"[4]. By recognizing how the dynamic between capitalism and globalization has contributed to the commodification of women, states and individuals alike can make more appropriate, well-informed decisions in preventing the purchase and sale of women. For now, what is currently being done is not enough. An individual's body should not be available for sale by another; it should not be owned by another. No amount of money should enable one to purchase women, without whom the generations of pursuers who use and abuse those trafficked into sex, would not exist.

AUTHOR NOTES

As one of the defining factors distinguishing this paper from the rest of the literature that exist on the topic is the manner in which it tangles with quantitative data to support the claims made within the preceding text, sources for the information provided in Table 1 and Table 2 are cited following Citation 17.

1. While this paper exclusively focuses on women in the areas of prostitution and sex trafficking, these are not areas exclusive to women. Sex trafficking and prostitution involves children, men, transgender and transsexual individuals. Human ("Human trafficking" captures more than "sex" trafficking) trafficking, "the recruiting, transporting, harbouring or receiving [of] a person through the use of force, coercion or other means, for the purpose of exploiting them," is the

third most profitable business for organized crime, following the drugs and arms trades[18]. It is widespread, transcending borders, and flourishing rapidly. The lack of research and focus on the trafficking of men, transgender and transsexual individuals is disturbing, and is a subject that warrants further research and action.

2. "Sex trafficking and prostitution are not synonymous… prostitution is simply one type of work performed by victims of sex trafficking. Sex trafficking (sic) is an umbrella term that may include commercial sex work such as prostitution, but also pornography, exotic dancing, stripping, live sex shows, mail-order brides, military prostitution, and sexual tourism"[4].

3. "Young" meaning 10-12 years old[3].

4. In order to defy the wordsmithing that characterizes discussions surrounding sex trafficking and places buyers of sex in a dominant position thereby "[making] it easier for men and society to objectify, commoditize and dismiss the victims [of sex trafficking]," I will use the term "pursuers" to refer to individuals who purchase sex. Terms like "clients," "johns," and "patrons" conceal the severity of what their "consumption" leads to and the implications it has.

5. Different sexual services, such as sex without a condom or sex with a pregnant woman are priced differently[3]. Additionally, sometimes different prices are placed on touching different parts of the body: "like a meat chart. The going price was $2 for the breast, $3 for the buttock and $5 for genital contact"[3].

6. As in early March 2002, when a Ukrainian virgin was auctioned off by the Ukrainian Exotic Escort Agency in Odessa, to a man in France, for $3,000[3].

7. Notably, pursuers in the sex trade are not exclusively males. However, this passage is amended to reflect the context in which Malarek describes it.

8. With the exception of the Bahamas.

9. Swaziland, Botswana, Lesotho, South Africa, Zimbabwe, Uganda, Tanzania, Kenya, Cameroon, Gabon, Guinea-Bissau, Nigeria and Rwanda, in accordance with the highest rates of HIV/AIDS prevalence.

10. Mozambique and the Republic of Congo, in accordance with the highest rates of HIV/AIDS prevalence.

11. Namibia, Zambia, Malawi, Central African Republic, Cote D'Ivoire.

12. Traffickers often place a debt on the women they purchase by insisting that they must pay for the food and amenities (however insufficient) that their captors provide them with. This debt is placed at a high amount that is difficult to pay, as the money these women make completely and directly goes to their traffickers. Additionally, for any disobedience and divergence from what they are told to do, a fine is often added to the debt that these women owe their captors (Malarek 2004, xvi).

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REFERENCES

1. McNally, David. "The Colours of Money: Race, Gender and the Many Oppressions of Global Capital," in *Another World is Possible: Globalisation and Anti-Capitalism*. Canada: Arbeiter Ring Publishing, 2002.

2. Marx, Karl. *Capital, Volume I*. New York: International Publishers, 1967.

3. Malarek, Victor. *The Natashas: The New Global Sex Trade*. Canada: Penguin Books Canada, 2004.

4. Deshpande, Neha A, and Nawal M. Nour. "Sex Trafficking of Women and Girls." Reviews in Obstetrics & Gynecology 6, 1 (2013): e22-e27. Accessed March 10, 2016. Doi: 10.3909/riog0214.

5. "Quick Facts: Prostitution in Canada." *640 Toronto*. Published June 10, 2014. Accessed March 22, 2016. http://www.640toronto.com/syn/123/2260/quick-facts-prostitution-in-canada.

6. Dank, Meredith, Bilal Khan, P. Mitchell Downey, Cybele Kotonias, Deborah Mayer, Colleen Owens, Laura Pacifici, and Lilly Yu. *Estimating the Size and Structure of the Underground Sex Economy in Eight Major US Cities*. n.p.: The Urban Institute, 2014.

7. Agustín, Laura, "They Speak, But Who Listens?" in *Women@Internet: Creating New Cultures in Cyberspace*, ed. W. Harcourt (London: Zed Books 1999).

8. Agustín, Laura. *Trabajar en la industria del sexo, y otros tópicos migratorios*. San Sebastián: Gakoa Editores, 2004a.

9. Agustín, Laura "Daring Border-Crossers: A Different Vision of Migrant Women" in *Sex Work in a Changing Europe*, ed. S. Day and H. Ward (London: Kegan Paul 2004b).

10. Agustín, Laura. "Migrants in the Mistress's House: Other Voices in the "Trafficking" Debate." Social Politics 12, 1 (2005a): 96–117. Accessed March 10, 2016. Doi: 10.1093/sp/jxi003.

11. Agustín, Laura. "The Disappearing of a Migration Category: Migrants Who Sell Sex." Journal of Ethnic and Migration Studies 32, 1 (2006): 29–47. Accessed March 10, 2016. Doi: 10.1080/13691830500335325.

12. Hance, Danielle. "14 Surprising Facts About Prostitution in America." *The Richest*. Published June 8, 2015. Accessed March 28, 2016. http://www.therichest.com/rich-list/11-surprising-facts-about-american-prostitution/?view=all.

13. Godec, Samantha T. "Between rhetoric and reality: exploring the impact of military humanitarian intervention upon sexual violence – post-conflict sex trafficking in Kosovo." International Review of the Red Cross 96, 877 (2010): 235-258. Accessed March 12, 2016. Doi: 10.1017/S18166383110000159.

14. "No safe place: an assessment of violence against women in Kosovo." *UNIFEM*. Published 2000. Accessed March 29, 2016. http://www.iknowpolitics.org/en/node/50.

15. Rees, Madeleine. "International intervention in Bosnia-Herzegovina: the cost of ignoring gender" in *The Post-War Moment: Militaries, Masculinities and International Peacekeeping*, eds. Cynthia Cockburn and Dubravka Zarkov. (London: Lawrence and Wishart 2002).

16. Miller, Elizabeth, Michele R. Decker, Jay G. Silverman and Anita Raj. "Migration, Sexual Exploitation and Women's Health: A Case Report From a Community Health Center." *Violence Against Women* 13, 5 (2007): 486-497. Accessed March 30, 2016. Doi: 10.1177/1077801207301614.

17. 't Hoen, Ellen. "TRIPS, Pharmaceutical Patents, and Access to Essential Medicines: A Long Way from Seattle to Doha." Chicago Journal of International Law 3.1 (2002): 27-46. ProQuest. Web. Accessed March 23, 2016.

18. Baral, Stefan, Chris Beyrer, Kathryn Muessig, Tonia Poteat, Andrea L. Wirtz,

Michele R. Decker, Susan G. Sherman, Deanna Kerrigan. "Burden of HIV among female sex workers in low-income and middle-income countries: a systematic review and meta-analysis." *The Lancet Infectious Diseases* 12, 7 (2012): 538-549. Accessed March 12, 2016. Doi: 10.1016/S1473-3099(12)70066-X.

19. "Algeria." *U.S. Department of State.* Published March 8, 2006. Accessed March 17, 2016. http://go.usa.gov/3dqCC.

20. "The Legal Status of Prostitution by Country." *Charts Bin.* Published 2010. Accessed March 16, 2016. chartsbin.com/views/bnb.

21. "100 Countries and Their Prostitution Policies." *Procon.org.* Published April 1, 2015. Accessed March 17, 2016. prostitution.procon.org/view.resource. php?resourceID=000772.

22. "Antigua and Barbadu – 2015 Trafficking in Persons Report." *U.S. Department of State.* Published July 2015. Accessed March 18, 2016. http://www.state. gov/documents/organization/245365.pdf.

23. "Azerbaijan – 2014 Trafficking in Persons Report." *U.S. Department of State.* Published 2014. Accessed March 17, 2016. http://go.usa.gov/3mE5G.

24. "The Bahamas – 2015 Trafficking in Persons Report." *U.S. Department of State.* Published July 2015. Accessed March 18, 2016. http://www.state.gov/ documents/organization/245365.pdf.

25. Trofimov, Yaroslav. "Upon Sober Reflection, Bahrain Reconsiders the Wages of Sin." *The Wall Street Journal.* June 9, 2009. Accessed March 17, 2016. http://www.wsj.com/articles/SB124450701841896319.

26. "Belarus – 2015 Trafficking in Persons Report." *U.S. Department of State.* Published July 2015. Accessed March 17, 2016. http://go.usa.gov/37Pzd.

27. "Brunei." *U.S. Department of State.* Published March 4, 2002. Accessed March 16, 2016. http://go.usa.gov/3d8A2.

28. "Burundi – 2015 Trafficking in Persons Report." *U.S. Department of State.* Published July 2015. Accessed March 17, 2016. http://go.usa.gov/37ET9.

29. Beyner, Chris, Anna-Louis Crago, Linda-Gail Bekker, Jenny Butler, Kate Shannon, Deanna Kerrigan, Michele R. Decker, Stefan D. Baral, Tonia Poteat, Andrea L Wirtz, Brian W. Weir, Françoise Barré-Sinnousi, Michel Kazatchkine, Michel Sidibé, Karl-Lorenz Dehne, Marie-Claude Boily, Steffanie A. Strathdee. "An Action Agenda for HIV and Sex Workers." *The Lancet* 385, 9964 (2015): 287-301. Accessed March 16, 2016. Doi: 10.1016. S010-6736(14)60933-8.

30. "Djibouti – 2013 Trafficking in Persons Report." *U.S. Department of State.* Published 2013. Accessed March 17, 2016. http://go.usa.gov/3y4xm.

31. "Equatorial Guinea – 2013 Trafficking in Persons Report." *U.S. Department of State.* Published 2013. Accessed March 17, 2016. http://go.usa.gov/3y4C5.

32. "2008 Human Rights Report: Guyana." *U.S. Department of State.* Published February 25, 2009. Accessed March 16, 2016. http://go.usa.gov/3pEDx.

33. "Grenada." *U.S. Department of State.* Published March 6, 2007. Accessed March 17, 2016. http://go.usa.gov/3pMtJ.

34. Vernashci, Marco. "Guinea Bissau: Crack and prostitution, cocaine's other face." *Huffington Post.* Published August 8, 2009. Updated May 25, 2011. Accessed March 16, 2016. http://www.huffingtonpost.com/ wires/2009/07/01/guinea-bissau-crack-and-p_ws_224537.html.

35. "2008 Human Rights Report: Iraq." *U.S. Department of State.* Published February 25, 2009. Accessed March 25, 2016. http://go.usa.gov/3pEXA.

36. "China Deports North Korean Workers Forced Into Sex Trade." *Radio Free Asia.* Published July 12, 2014. Accessed March 17, 2016. http://www.rfa. org/english/news/korea/deportation-06122014162010.html.

37. Ashraf, Wahab. "Top 10 List of Countries With Highest Sex Workers: Guess Where Malaysia is Ranked?" *Malaysian Digest.* Published December 16, 2014. Accessed March 17, 2016. http://www.malaysiandigest.com/ features/533048-top-10-list-of-countries-with-highest-sex-workers-guess-where-malaysia-is-ranked.html.

38. "Kosovo: Prostitution as a New Organized Crime Sideline." *Organized Crime and Corruption Reporting Project.* Published June 21, 2013. Accessed March 16, 2016. https://www.occrp.org/index.php/en/ccwatch/cc-watch-briefs/1998-kosovo-prostitution-as-a-new-organized-crime-sideline.

39. "Kuwait." *U.S. Department of State.* Published March 8, 2006. Accessed March 16, 2016. http://go.usa.gov/3dqaz.

40. Nolan, Crea. "10 Countries Engaged in Sex Trafficking." *The Richest.* Published July 6, 2014. Accessed March 16, 2016. http://www.therichest. com/rich-list/10-countries-engaged-in-sex-trafficking/?view=all.

41. "Mauritania – 2014 Trafficking in Persons Report." *U.S. Department of State.* Published 2014. Accessed March 17, 2016. http://go.usa.gov/3mEqA.

42. "Malta – 2015 Trafficking in Persons Report." *U.S. Department of State.* Published July 2015. Accessed March 17, 2016. http://go.usa.gov/37PpC.

43. "Sex Work Law – Countries." *Sexuality, Poverty and Law Programme.* Accessed March 16, 2016. spl.ids.ac.uk/sexworklaw/countries.

44. "Palau – 2015 Trafficking in Persons Report." *U.S. Department of State.* Published July 2015. Accessed March 17, 2016. http://go.usa.gov/37EZJ.

45. "Trafficking and Forced Prostitution of Palestinian Women and Girls: Forms of Modern Day Slavery." *UN Development Fund for Women (UNIFEM).* Published June 2008. Accessed March 17, 2016. http://www.refworld.org/ docid/4bcc13862.html.

46. "Country Narratives – Countries Q through Z: Trafficking in Persons Report." *U.S. Department of State.* Published June 12, 2007. Accessed March 17, 2016. http://go.usa.gov/3pF2E.

47. "Rwanda – 2015 Trafficking in Persons Report." *U.S. Department of State.* Published July 2015. Accessed March 17, 2016. http://go.usa.gov/37PE9.

48. "2008 Human Rights Report: Sao Tome and Principe." *U.S. Department of State.* Published February 25, 2009. Accessed March 17, 2016. http://go.usa. gov/3pE7z.

49. "Seychelles – 2014 Trafficking in Persons Report." *U.S. Department of State.* Published 2014. Accessed March 17, 2016. http://go.usa.gov/3mPz9.

50. "South Sudan – 2014 Trafficking in Persons Report." *U.S. Department of State.* Published 2014. Accessed March 17, 2016. http://go.usa.gov/3mPtn.

51. "Sri Lanka – 2014 Trafficking in Persons Report." *U.S. Department of State.* Published 2014. Accessed March 17, 2016. http://go.usa.gov/3mPHM.

52. Archibald, Washington. "Douglas Prostitutes." *St. Kitts & Nevis Observer.* Published June 21, 2013. Accessed March 17, 2016. http://www. thestkittsnevisobserver.com/2013/06/21/washie.html

53. "St. Vincent and the Grenadines – 2013 Trafficking in Persons Report." *U.S. Department of State.* Published 2013. Accessed March 17, 2016. http:// go.usa.gov/3ygyT.

54. "Nearly 4,000 Dominican women are prostitutes in Suriname." *Dominican Today.* Published May 11, 2008. Accessed March 16, 2016. http://www.

dominicantoday.com/dr/poverty/2008/5/11/27942/Nearly-4000-Dominican-women-are-prostitutes-in-Suriname.

55. "2008 Human Rights Report: Trinidad and Tobago." *U.S. Department of State.* Published February 25, 2009. Accessed March 16, 2016. http://www.state.gov/j/drl/rls/hrrpt/2008/wha/119175.htm.

56. Kinnear, Karen L. *Women in developing countries: a reference handbook.* Santa Barbara, Calif: ABC-CLIO, 2011.

57. "Anecdotal evidence points to prostitution increase." *Radio Australia.* Updated March 22, 2012. Accessed March 17, 2016. http://www.radioaustralia.net.au/international/radio/onairhighlights/anecdotal-evidence-points-to-prostitution-increase.

58. "2008 Human Rights Report: Togo." *U.S. Department of State.* Published February 25, 2009. Accessed March 25, 2016. http://go.usa.gov/3pE74.

59. "South Sudan child prostitution on the rise." *Aljazeera.* Published June 29, 2014. Accessed March 16, 2016. http://www.aljazeera.com/indepth/features/2014/06/south-sudan-child-prostitution-rise-201462881543120146.html.

60. "Countries Where Sex Work ('Prostitution') is Deemed Illegal." *HIV and the Law.* Accessed March 17, 2016. http://www.hivandthelaw.com/countries-where-sex-work-prostitution-deemed-illegal.

61. "Legalising Prostitution would be a suicidal mission." *Lesotho Times.* Published June 15, 2011. Accessed March 17, 2016. http://lestimes.com/legalising-prostitution-would-be-a-suicidal-mission/.

62. "The World Factbook." *Central Intelligence Agency.* Accessed March 28, 2016. https://www.cia.gov/library/publications/the-world-factbook/rankorder/2155rank.html.

63. "UNAIDS." *UNAIDS.* Accessed March 31, 2016. http://www.unaids.org/en/regionscountries/countries

64. "List of Countries by Population." *Statistics Times.* Published April 8, 2015. Accessed March 29, 2016. http://statisticstimes.com/population/countries-by-population.php

65. "Botswana mulls legalising prostitution to fight HIV." *BBC News.* Published December 1, 2010. Accessed March 20, 2016. http://www.bbc.com/news/world-africa-11888992

66. "Sex work in separatist Cabinda." *IRIN News.* Accessed March 17, 2016. http://www.irinnews.org/report/77724/angola-sex-work-separatist-cabinda.

67. "Sex Work Law – Countries." *Sexuality, Poverty and Law Programme.* Accessed March 16, 2016. spl.ids.ac.uk/sexworklaw/countries

LUCIA NALBANDIAN

Lucia Nalbandian is a recent graduate of the University of Toronto, where she studied Political Science and Public Law. Lucia currently resides in Toronto, working for a mid-size law firm and preparing to apply to graduate programs in global justice and international development. She is interested in exploring international politics and development in relation to societies around the world and their governments.

Sources of Trafficking Victims in Early Imperial Rome and the Modern United States

Jenny M. Vo-Phamhi

Stanford University

Both the early Roman Empire and the modern United States have been lucrative destinations for human trafficking. While slavery was legal in early imperial Rome, illegally sourced slaves contributed significantly to the vast servile workforce fulfilling the demands of the crescent empire. In many cases, the human trafficking pathways into early imperial Rome resemble those of the modern United States, where the profitability of modern slavery has kept the slave trade thriving underground. While differing in magnitude and in proportion relative to contemporary legal alternatives, the sources of humans trafficked into these two superpowers two thousand years apart may be comparable in their exploitations of wars, maritime crime, minors, and trade networks.

I. INTRODUCTION

America in 2017 and early imperial Rome have both been popular destinations for trafficking victims.[1][2] What it means to be a slave today has not changed since early imperial Rome. In Aspects of Antiquity, M. I. Finley characterizes a slave as follows:

"The slave is brought into a new society violently and traumatically... torn from his kin, from his fellows, from his religious institutions, and in their place he is given no new focus of relations other than his master, and, in a very unreliable way, his fellow slaves. Nor can he expect support from other depressed groups... He has lost control not only over his labor but also over his person (and his personality)."[2]

The circumstances of the victim described by Finley are echoed word for word in all fifty states, and the illegal sources of these victims share many similarities. While differing in magnitude and in proportion relative to contemporary legal alternatives, the illegal viaducts that traffic victims into early imperial Rome and modern America may be comparable in their exploitations of wars, maritime crime, minors, and trade networks.

II. DEFINITIONS

In this paper, the terms "trafficking victim" and "slave" will be used interchangeably. The Trafficking Victims Protection Act (TVPA) of 2000 defines "trafficking" as "the recruitment, harboring, transportation, provision, or obtaining of a person" for labor, commercial sex, or other services "through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage, or slavery."[3] Contemporary scholars have used three criteria to describe slaves: (1) complete dominance of the slaveholder through physical and psychological violence, (2) labor for little to no pay, and (3) profit to the slaveholder.[4]

III. MAGNITUDE

Early imperial Rome had a vast slave workforce and a constant demand for new slaves. With the advent of the Roman Empire, "the extent of slave labor in agriculture and pastoral farming increased dramatically, while simultaneously the rise of competitive social ostentation in the upper classes produced a demand for large slave retinues in individual urban households."[5] By the end of the 1st century BCE, there were perhaps two million slaves in Italy, out of a total population of six million people; alternative models estimate three million slaves out of a total population of seven point five million people. Between the mid 60s and 30 BCE, Italy required an estimated 100,000 new slaves per year, and the Roman empire in its entirety between the 50s BCE and 150 CE required at least 500,000 new slaves per year. Whether the slaves had been legally or illegally sourced and traded, slaveholding was a legal institution governed by clear codifications.[5]

Human trafficking in America began similarly. Slavery was an institutionalized practice of the antebellum South, where the owning of slaves was not only legal, but also indicative of prosperity and prestige.[6] The abolition of this slavery could be considered the birth of modern American slavery; now illegal in the United States,[1] human trafficking has since gone entirely subterranean and evolved into a complex entity convoluted by the legal, social, and geopolitical mechanisms of the modern world. The proportion of slaves in modern America appears to differ from that in early imperial Rome; estimates for the enslaved population within the modern U.S. consistently run in the "millions" [7][8] out of a current national population of 323,995,528.[9] As with early imperial Rome, no single demographic comprises this modern American "melting pot of slaves."[4]

IV. ENTERING THE PIPELINE

Similar viaducts into the pipeline of human trafficking existed in early imperial Rome and exist in modern America. This paper will focus on those relating to warzones, maritime crime, minors, and trade networks.

ENTERING THE PIPELINE PART 1: SLAVES FROM WARZONES.

In early imperial Rome, the enslavement of war prisoners was a legal and well-established means of sourcing large quantities of new slaves. Although war was "irregular and could not guarantee a steady flow of merchandise,"[2] it was clearly a major source of new slave labor. Bradley notes that according to ius gentium, Romans considered prisoners of war to be fair game for enslavement.[5] According to Finley, "The accepted rule was that the victor had absolute rights over the persons and property of his captives, without distinction between soldiers and civilians," and while slave acquisition was typically a side effect rather than object of war, operations were occasionally executed specifically as slave raids.[2] Bradley has tabulated the mass enslavements brought about by conquests between 262 BCE and 142 BCE as recorded by Diodorus, Polybius, Livy, Orosius, and Appian. According to this data, 354,632 people were enslaved over this time period, averaging 20,861 on each occasion. Upon capturing these war prisoners, Roman commanders had multiple options: take the captives to Rome for a triumph, as Scipio Aemilianus did in 133 BCE; distribute the captives among his troops, as Caesar did after the Battle of Alesia in 52 BCE; or have a quaestor effect the sale of the prisoners on the spot.[5]

Unlike the Roman military, the American military as an institution does not traffic humans. However, the modern United States may be as much as early imperial Rome a destination for humans trafficked from war-ravaged regions, even though the trafficking pathways from warzones into the United States are criminal. As stated by the 2016 TIP Report, "Armed conflict amplifies the risks of human trafficking for vulnerable populations by increasing economic desperation, weakening rule of law, decreasing the availability of social services, and forcing people to flee for their safety." Military groups (such as local militias) not operating under UN standards of human justice have the same options enjoyed by imperial Roman soldiers: victims can be used personally by commanders for sex or labor, exploited to entice new combat recruits, or injected into trade networks whose outlets inevitably include American cities.[8]

ENTERING THE PIPELINE PART 2: MARITIME CRIME AS A SOURCE OF SLAVES.

Although much of the Roman network of trade in trafficking victims operated within the bounds of legitimacy, one illegal facet with a modern analog was maritime crime (i.e. piracy). Finley describes a network of pirates, kidnappers, and slave dealers beginning around 150 BCE with particularly active hubs at Side and on Delos, where rebuilt and extended docks made it possible to turn over as many as 10,000 slaves in a day.[2]

Piracy today continues to function as a viaduct of human trafficking. The United Nations Office on Drugs and Crime (UNODC) defines modern maritime crime to include not only criminal activity directed at vessels or maritime structures, but also the use of the high seas to perpetrate transnational organized crimes such as smuggling of persons or illicit substances.[1] In its 2016 Annual Report, the Maritime Crime Programme (MCP),

formerly known as the Counter Piracy Programme (CPP), of the UNODC highlighted human trafficking as one of its highest priorities.[10]

ENTERING THE PIPELINE PART 3: MINORS BORN OR CAPTURED INTO SLAVERY.

Hereditary slavery can be an important source of slaves; evidence exists that this was the case in early imperial Rome, but is lacking for today's United States. Reproduction was a slave source that was both legal, by Rome's "civil law,"[5] and significant: Scheidel demonstrates by demographic models that "for purely statistical reasons, natural reproduction… was in all probability several times as important as any other single source."[11] Systems were in place to ensure the continuity of slave lines: Bradley shows that slave owners demonstrated interest in rearing the children of slaves to adulthood, perhaps for their crescent value as slaves;[5] Crook notes that the emperor "wanted a hereditary service – sons born as slaves of the imperial household, vernae Caesaris."[12] Evidence could not be found for hereditary slaves in the modern United States, although locations exist outside the United States where "children are still born into slavery."[13]

> **[The] modern United States may be as much as early imperial Rome a destination for humans trafficked from war-ravaged regions, even though the trafficking pathways from warzones into the United States are criminal.**

The capture of free children, who typically present lower physical and psychological resistance and more potentially productive years than adults, could have been as much a source of trafficking victims in antiquity as it is for America today. Finley makes it clear that children were among the millions of foreign prisoners of war trafficked into Classical Greece and Rome, although he does not indicate what proportion of these victims were children.[2] Today, the United Nations International Children's Emergency Fund (UNICEF) likewise states that "the invisible and clandestine nature of trafficking and the lack of strong data collection" pose challenges to estimating the number of trafficked children,[14] but the number of children trafficked illegally in the United States for sex and labor is estimated to be in the thousands.[15] To better imagine the potential quantity of trafficked free-born children, it may help to note that as of December 31, 2016, "juveniles under the age of 18 accounted for 33,706 … missing person files in the United States;"[16] an estimated one in three children is "solicited for sex within 48 hours of running away or becoming homeless in the US;"[17] and "of the more than 18,500 endangered runaways reported to the National Center for Missing and Exploited Children in 2016, one in six were likely victims of child sex trafficking."[18]

Taking youth to the extreme, infants have been targets of abductions within the modern United States – with diverse motives and illegally – and in early imperial Rome – typically for enslavement and sometimes illegally. Like self-enslavement, a legal practice by which free people could voluntarily sell themselves into slavery,[12] the enslavement of exposed infants served as a pathway by which a freeborn could become a slave.[19] While widespread,[19] this practice could be criminal; an infant born of a citizen mother could not be legally enslaved.[20] The fact that motherhood could be indeterminable (and, in all likelihood, pragmatically irrelevant) to someone picking up a foundling was acknowledged by the Pandect of Roman law, which recognized

that the enslaved person may have been unaware that he was meant to be free: "Where anyone who is a foundling does not know who his parents are, and serves another as a slave, thinking that he himself is a slave, he is mistaken rather as to the fact than as to the law" (D. 22.6.1.2). Knowingly holding a free Roman citizen in slavery, however, was definitely a crime – specifically, plagium.[12]

Estimates on the prevalence of infant plagium are debated. Scheidel has proposed a reckoning that if one third of all new slaves came from within the Empire, "under prevailing levels of fertility," with six babies born per woman and the majority of exposed babies dying, then every other mother who reached menopause "would have exposed at least one of her children." However, he comments that this figure "strains credulity."[11] Harris defends the potentially high degree of prevalence, stating that "even higher rates of child abandonment than this are well-attested for a number of milieux and are

> **Like Rome's, the trade network of humans trafficked into the United States is often built on personal connections within and outside the destination country, from the recruiters to the middlemen to the eventual customers.**

likely to have been obtained among many other populations," but takes "the disastrous mortality experience of foundling hospitals as strong evidence that few expositi survived."[19] Here again is a topic for which data could not be found for a specific modern American analog of infants illegally captured for eventual labor or sex trafficking. However, the prevalence of infant abductions is likely much different; the National Center for Missing and Exploited Children reports only 308 abductions of infants from 1983 to January 2017 in the United States.[21]

ENTERING THE PIPELINE PART 4: THE TRADE NETWORK AS A SOURCE OF SLAVES.
The early imperial Roman trading network stretched beyond Rome proper, and its merchandise included trafficking victims. During the late 2nd and 1st centuries BCE, perhaps 15,000 Gallic slaves were exchanged for Italian wine each year, until Augustus reorganized Gaul and ended this activity.[5] For several reasons, it is difficult for historians to piece together a complete picture of the slave trading network. A typical trafficking victim on the frontiers of the empire could be kidnapped or enslaved by a local enemy and pass from one dealer to another without ever showing up on a registry. Additionally, since traders typically dealt in diverse merchandise, modern scholars of antiquity would rarely see such a specific label as "slave trader."[5] Bradley comments that as a low esteem profession, slave trading was likely not seen as a worthwhile topic for contemporary Roman commentators, even though these men of high social status were "not averse to profits to be made from slave trading."[5]

It is known that early imperial Roman slave trading was legal, looked down upon, and lucrative. Bradley describes some of the marketplaces where slaves could be traded by auction in broad daylight – "Apparently in the larger cities there were a few shops where slaves could be bought: in Rome in Nero's time they were concentrated near the Temple of Castor in the Forum" – as well as several ports infamous for slave trading, such as Byzantium, Ephesus, Chios, and Side.[5] Finley writes that while "contempt of the slaver was not uncommon," slave trading was seen as a necessary occupation, just as slavery was a necessary fact of life.[2]

The spoils went to the ruthlessly ambitious; Finley tells the story of Aulus Kapreilius Timotheus, a former slave who obtained his freedom and himself became a slave trader, amassing enough wealth for a marble tombstone seven feet tall.[2]

However well the laws are actually enforced, the trade network of trafficking victims in the modern United States is completely illegal.[1] Therefore, traffickers must employ workarounds with which Roman slave traders need not have bothered. Most pipelining of victims into the United States is executed such that victims initially think they are pursuing legitimate opportunities. Some captors maintain to their captives the fiction that they are legally bound. "They have no idea that they are, in fact, slaves."[4]

So while the human trafficking networks and marketplaces of early imperial Rome operated in broad daylight, the modern American trade network of trafficking victims must strike a balance to be accessible to customers yet also under the radar of the law, keeping the victims isolated from possible help. Physical venues for trading of trafficking victims commonly include private spaces as varied as karaoke bars, brothels of large cities, and hotels. One of the most common, convenient ways traders of trafficking victims reach their customers is via digital marketplaces— websites and social networks of varying legitimacy where fingerprints and signatures are more difficult to trace.[8]

Despite these differences, the similarities between the early imperial Roman and modern American slave trading networks are plural. Like Rome's, the trade network of humans trafficked into the United States is often built on personal connections within and outside the destination country, from the recruiters to the middlemen to the eventual customers. We can point to individual slave traders only for the few who get caught and put through the criminal justice system.[8] The economic gain – giving meaning to the term "filthy rich" – is appreciable on both personal and global scales. Profits vary with labor sectors, but to give some perspective, here is what a convicted modern trafficker said about his experience: "I had girls from the whole country. I had a guy… and he was looking for the girls for me. He was asking for 500 euros [about $750 at the time] per girl…In the worst night, a woman would make you 300 euros. There were some nights when a woman made 1,500 to 2,000 euros."[8] UNICEF summarizes the global scale: "Human trafficking and forced labor are extremely profitable, generating an estimated $150 billion in yearly profits."[17]

V. CONCLUSIONS

Assessing the pathways by which humans have been illegally trafficked into early imperial Rome and the modern United States, many aspects have remained eerily unchanged. Perhaps less surprising than the quantity of characteristics shared by early imperial Rome and modern America as destinations for trafficking victims is the fact that despite these similarities, the network of the former operates in the open as an inescapable aspect of daily life while the network of the latter can be ignored by people their entire lives. In modern America, the fact that slavery is illegal, along with the prevalence of organizations that combat

human trafficking, indicates that progress has been made since early imperial Rome. While the illegality of modern slavery, in driving the networks underground, makes victim extrication and perpetrator pursuance more difficult, the same illegality represents a common belief in universal emancipation that would have been alien to early imperial Rome – a belief proclaimed on a global scale of policy only as recently as 1948 in Article 4 of the United Nations' Universal Declaration on Human Rights.[22] Perhaps the most startling revelation is that the available knowledge of human trafficking trade networks in not only early imperial Rome, but also modern America, is largely qualitative. For example, most of the publicly available government sources tend to offer qualitative observations and action plans rather than hard numbers. Perhaps this reflects the difficulty of acquiring reliable quantitative data for a system carefully hidden beneath layers of convolution and designed, as Finley said, to strip a human's person and personality such that a profitable new slave might be created. A more quantitative understanding of those networks in modern America — one of the world's top destinations for trafficking victims — might help to achieve the ultimate goal, an objective compulsory to the integrity of every human's fundamental rights: the total, global eradication of human trafficking.

ACKNOWLEDGEMENTS

REFERENCES

1. "UNODC on Human Trafficking and Migrant Smuggling." *UNODC.org*. United Nations Office on Drugs and Crime, n.d. Web. 8 Nov. 2016.

2. Finley, M. I. *Aspects of Antiquity: Discoveries and Controversies*. New York: Viking, 1968. Print. 22 U.S.C. § 7102 (2000).

3. Bales, Kevin, and Ron Soodalter. *The Slave Next Door: Human Trafficking and Slavery in America Today*. Berkeley, CA: U of California, 2010. Print.

4. Bradley, K. R. "On the Roman Slave Supply and Slave Breeding." *Classical Slavery*. Ed. M. I. Finley. London: Frank Cass, 1987. 42-64. Print.

5. Woods, Betty. Mellon Lecture. Tulane University. 11 Nov. 1998. Lecture. Cited in Travis, Mary Ann. "Sister, Sister, Not In Carolina." Archive. Tulane University, 1 Dec. 1998. Web. 10 Dec. 2016.

6. "Presidential Proclamation -- National Slavery and Human Trafficking Prevention Month, 2017." The White House. The United States Government, 38 Dec. 2016. Web. 21 Mar. 2017.

7. Trafficking in Persons Report 2016. Washington, D.C.: *U.S. Department of State*, 2016. PDF.

8. "United States." *The World Factbook*. Central Intelligence Agency, n.d. Web. 21 Mar. 2017.

9. *Global Maritime Crime Programme Annual Report 2016*. Vienna: United Nations Office on Drugs and Crime, 2016. PDF.

10. Scheidel, Walter. "Quantifying the Sources of Slaves in the Early Roman Empire." *The Journal of Roman Studies 87* (1997): 156-69. Web. 4 Nov. 2016.

11. Crook, J. A. *Law and Life of Rome*. Ithaca, NY: Cornell UP, 1967. Print.

12. Kristof, Nicholas. "Slavery Isn't a Thing of the Past." *The New York Times*. The New York Times, 6 Nov. 2013. Web. 8 Nov. 2016.

13. Trafficking: *Child Protection Information Sheet*. NY: United Nations Children's Fund, May 2006. PDF.

14. "End Trafficking." *UNICEF USA*. United Nations Children's Fund, 2016. Web. 11 Nov. 2016.

15. 2016 NCIC Missing Person and Unidentified Person Statistics. Clarksburg, VA: *National Crime Information Center of the Federal Bureau of Investigation*, 10 Jan. 2017. PDF.

16. End Trafficking: Fast Facts. NY: *United Nations Children's Fund*, May 2006. PDF.

17. "Key Facts." Missing Kids. National Center for Missing and Exploited Children, n.d. Web. 21 Mar. 2017.

18. Harris, W. V. "Demography, Geography, and the Sources of Roman Slaves." Rome's Imperial Economy (2011): 88-110. Web. 29 Nov. 2016.

19. Saller, Richard. Lecture for Classics 26N. Stanford University. 2 Nov. 2016. Lecture.

20. "Analysis of Infant Abduction Trends." Missing Kids. National Center for Missing and Exploited Children, n.d. Web. 21 Mar. 2017.

21. United Nations. "Universal Declaration on Human Rights." General Assembly of the United Nations. 1948.

JENNY VO-PHAMHI

Jenny Vo-Phamhi is an undergraduate at Stanford University. Her interests include Roman social and economic history, ancient literature and engineering, and innovative technological applications for the preservation of world heritage, especially archaeological photogrammetry for the documentation of at-risk sites. This summer, Jenny will spend six weeks scuba diving to help excavate and survey a sixth century CE shipwreck off the coast of Sicily as a team member of the Marzamemi Maritime Heritage Project. Jenny is an accomplished classical musician (harp, piano) and plays the harp with the San Francisco Symphony Youth Orchestra.

Hysteria In the Hunting Ground: Luce Irigaray and College Trigger Warnings

Megan Ferguson

Seton Hall University

This essay applies Luce Irigaray's symbolic difference feminism to mainstream media portrayals of college students advocating for trigger warnings in college classes so as to better understand how these students and their calls to action are de-legitimized through rhetorical feminization. This research relies on both primary texts from Irigaray and feminist analyses of her work. It also draws upon feature-oriented mainstream media outlets, including NPR, The Atlantic, The New Republic, and Pacific Standard Magazine, in order to capture in-depth media analyses of college students and trigger warnings. Ultimately, mainstream media portrayals of trigger warning activism on college campuses deny women and rape survivors their agency over their identity by defining them as other than men, and categorizing trigger warnings as a new set of rights exclusively for women. Mainstream news outlets are then able to use this portrayal to suggest trigger warnings are only necessary for those who are weak, or feminine, and therefore detrimental to college culture, despite the warnings' potential benefits for rape survivors.

Trigger warnings became mainstream media discussion in early 2014, with news outlets from the New York Times to the Atlantic proclaiming a new pro-censorship student movement from those accused of fearing to grow up. However, these stories not only ignored the rhetorical history and psychological definition of trigger warnings, which were first used on feminist websites to alert rape survivors to material which may instigate a flashback; they also ignored questions of the warnings' benefits for students with post-traumatic stress disorder, or PTSD.

The data supporting much of the mainstream media critiques of trigger warnings are based on anecdotal, qualitative evidence, rather than methodologically-sound studies and quantifiable data. This occurs both when demonstrating the existence of a campus push for trigger warnings and their claimed adverse effects on teaching. While sixty percent of college professors surveyed by the National Coalition Against Censorship asserted that trigger warnings actively "pose a threat to academic freedom," only fifteen percent reported having had even one student ask for the warnings[1]. The disconnection between described hysteria from weak and immature students and actuality demonstrates a construction of millennial students as the irrational, mirror inverse of adults and professors; not coincidentally, many of the anecdotes supporting this construction portray young women fighting male professors for what the professors claim to be academic censorship. The rhetoric matches Luce Irigaray's description of the historical construction of women's identities: "the feminine occurs only within models and laws devised by male subjects;" in other words, women are nothing more than not men[2].

Each generation has often been accused of being immature, lazy, and inexperienced by the generation preceding it. However, with one in five collegiate women experiencing rape or sexual assault during their undergraduate career, and one in three of those developing PTSD, the feminization of millennials pushing for trigger warnings not only reduces the political power of students— especially women—but also increases academic resistance to what

could be an important means of giving one woman in a college classroom of thirty students access to the education necessary for recovering her agency, both psychologically and politically[3, 4]. A re-assessment of the dialogue involving trigger warnings in college classes is desperately needed because rather than pushing students over the precipice of adulthood, "exposing students to triggering material without warning seems more akin to occasionally throwing a spider at an arachnophobe,"[5]. It is therefore essential to consider how the mainstream media's discussions of trigger warnings in college classes rhetorically feminizes trigger warning activists through the lens of symbolic difference feminism. Luce Irigaray's symbolic difference feminism illuminates how mainstream media's discussions of trigger warnings in college classes thereby rhetorically feminize trigger warning activists by positioning the call for a specific set of rights for collegiate women as simply not-man, denying students, women, and rape survivors' agency over their own identity.

The mainstream media describes the call for trigger warnings in college classrooms as a demand for a set of rights designed particularly for women. This matches Luce Irigaray's demand that women "constitute a place to be among themselves" to create systemic change both protecting and privileging women in ways patriarchal institutions do not[2]. For instance, Irigary asks women to "create a woman's culture," replacing patriarchal images of the female body with positive images of mother-daughter relations and establishing legal rights on the basis of sexual difference[6]. This culture would not dismantle previous institutions from which women are systemically excluded, but rather, would change them to place women in positions of privilege and power, while functionally fulfilling the same social and political purposes as the original institution. The systemic shift would be founded in a revaluation of women as a sex, and the new culture would allow men to interact with women as women, rather than as the mirror inverse of men. This revaluation would therefore give women the freedom to advocate for a specific and unique set of rights and privileges that do not assist the traditionally masculine, such as

trigger warnings.

Some journalists then believe trigger warnings are an attempt to institute this revaluation in academia, as colleges began limiting offensive speech, "especially speech that might be harmful to women or minority groups," as early as 1993[7]. These restrictions on offensive speech are then linked to trigger warnings, despite having come from administrators, rather than students. Limits on offensive discourse were also designed to prevent speech, rather than to provide information about the speech. Instead of being linked through intention or origin, trigger warnings and initial constraints on students' speech are therefore linked by their potential to keep "young adults shielded from words and ideas that make them uncomfortable"[7]. A quotation in Pacific Standard Magazine, from December, 2015, provides a clear example:

> Some claim that such warnings are not censorship since they only give notice for a person to choose to avoid exposure. However, anytime a person is telling others what cannot be said, read, or watched, it is censorship[8].

The warnings, however, do not tell others what cannot be said. By definition, they provide warnings about what will be said, without regard to the views of the student. The connection between trigger warnings and the restriction of student speech is assumed and implicit to the journalist: trigger warnings acknowledge trauma, which might unintentionally encourage others to limit their own speech, while censorship explicitly limits others' speech. In other words, trigger warnings may be grouped with speech restrictions because both legitimize avoiding what Irigaray would consider phallogocentric signifiers – namely the acceptance of unanalyzed sexist speech as normal – inherent to college as an institution.

Additionally, trigger warnings and restrictions on speech are connected because both establish pseudo-legal protection on the basis of gender or minority status in college culture. Since restricted speech would be particularly harmful to women and minorities, any institutional change which reduces that harm is privileging women and minorities in a new way, transforming the patriarchal institution to encourage men to see women as more than simply the opposing other. In allowing trigger warnings, colleges must acknowledge the women who may be raped on campus, and the resulting trauma, as both legitimate and serious enough issues to require institutional change, an acknowledgement much more easily given to collegiate men. As men in particular face less rape, these specific dangers seem less serious to them and, as a result, face dismissal within the academic setting.

The speech restrictions journalists quickly tie to trigger warnings only partially meet Irigaray's criteria for creating a women's culture, as they do not replace harmful speech with positive images of mother-daughter relationships, and trigger warnings do not prevent the speech from occurring at all. However, mainstream journalists critiquing trigger warnings often overlook this failure when arguing that the warnings constitute a separate set of rights for women and censorship of free speech, focusing instead on their protective purpose, which implies an institutional protection for which journalists' construction of men have no need and therefore exists solely for women.

Mainstream journalists also portray those who call for trigger warnings as the mirror negative of men, rhetorically feminizing both those who advocate for the warnings and those with PTSD. Irigarary defines sex linguistically: the term "feminine" does not refer to a set of genitals or a social construction, but is instead used to designate the person it refers to as "the opposite of man"[9]. Identity is predicated from communication with a set "other;" according to Irigaray, the initial other for men was women, whose sexual difference necessitated a new name and a new linguistic means of separation[9]. "Feminine," "woman," and "female" were therefore intended to describe anything different from men. This delineation obscures general experiential, emotional or epistemological difference beneath sexual difference from men.

Similarly, media discussions of trigger warnings obscure the experiential, emotional, and epistemological potential benefits of the warnings by describing those who call for their implementation as other from men. For example, despite mentioning record numbers of college students with mental health disorders, trigger warnings are framed as preventing students from feeling "uncomfortable," implying those who call for them have a lower threshold for emotional pain[7]. In rhetorically reducing retraumatization from potentially triggering material to mere discomfort, the journalists

> **Mainstream journalists also portray those who call for trigger warnings as the mirror negative of men, rhetorically feminizing both those who advocate for the warnings and those with PTSD.**

also suggest those who call for trigger warnings are engaging in an overtly emotional overreaction, or hysteria. As a result, those without PTSD in mainstream media evaluate students' pain for them. They are differentiating between "legitimate" flashbacks and simple discomfort while marginalizing the now-feminized voices of both activists and those with PTSD. Since those calling for trigger warnings do not have the emotional pain tolerance of an idealized man, they are simply not-men, and therefore also lack the rationality to evaluate policy changes which may lessen their pain.

Both emotional and experiential difference are obscured by a linguistic delineation predicated on sexual difference. The distinction is particularly notable given the prevalence of PTSD from rape, an already gendered and sexual violence, among college women. Furthermore, rather than displaying aggression, assertiveness or strength, the force with which some students call for trigger warnings is "vindictive," a term which implies passive-aggressive, reactionary tendencies that are rarely ascribed to men[7]. Finally, the terms "swaddled" and "coddled" are often applied to students pushing for trigger warnings, and both suggest a strong connection to and reliance on mother figures: those who push for trigger warnings crave the nurturing and safety of a mother while lacking the authority and punishment delivered by fathers that are required to grow to adulthood[10,7]. In this instance, immaturity is not only contrasted with the presumed maturity of men, but accepting and receiving nurturing is viewed as opposed to the structures men provide. By choosing this rhetoric, journalists suggest men would deny the safety offered by trigger warnings as a means of rejecting a nurturing other, conflating the difference in care with sexual difference. In these ways, those who call for

trigger warnings are framed as hysterical and passive-aggressive children attached too strongly to their mothers—each of which are framed as the opposite of rational, adult men.

The rhetorical feminization of those advocating for trigger warnings strips college students, women and rape survivors with PTSD of their control over their identity. Irigaray describes "hysteria as 'the contradiction between [women's] desire to live and the conditions that are forced upon us'"[11]. Once identified as not-men, those who look like women are expected to match the meaning behind "feminine" as a signifier with docility, motherhood, and passive sexuality. Those who do not act according to their linguistic category are deemed insane: "'women have no decision-making power over these conditions' and often the only 'path that remains open to us is madness'"[11]. Assertive descriptions of one's own identity are marginalized as hysteria by default, as one cannot be assertive and docile simultaneously. In other words, a woman who proclaims she is not hysterical is hysterical; any attempt to reassert control over her identity is unwomanly. She is an example of an insanity which may only be cured with rational, more masculine voices persistently assigning her a new identity.

After rhetorically feminizing students who call for trigger warnings and those with PTSD, mainstream journalists position themselves as the masculine arbitrators of students' correct identities, stripping them of both their voices and their autonomy in identity construction. For instance, although her past experience with sexual assault differentiates Bailey Loverin, after describing her inspiration to push for trigger warnings in college classrooms, her story is immediately followed by a description of the books other unnamed students have marked for warnings, including "books considered suitable for high-schoolers"[12]. Loverin is not connected to the anonymous anecdotes mentioned later in the feature by anything other than her PTSD and activism, but the journalist writing her story assumes she would also place a warning on lower level books and equates reading difficulty with the potential to instigate a flashback in sexual assault survivors. These maneuvers are done without bothering to ask either Loverin or another student why the books were considered for a trigger warning in the first place. Additionally, when describing exactly what might create a flashback and how it is caused, students' voices are overridden by administrators and journalists alike, who claim it is impossible to predict what may cause a flashback because of the breadth of material which might do so—despite students' explicit descriptions of the material they find triggering[13]. Loverin's and other students' voices and identities are blended into a construction of "trigger warning activists" created by the journalist, and their ability to evaluate their pain is stripped away by the more rational writer. Her story matches that of other students who either have PTSD or who have pushed for trigger warnings. This creates a double-bind for collegiate women who have PTSD from rape: remain silent or be silenced as more "rational" voices recreate and re-explain your experiences and identity for you.

When Luce Irigaray's symbolic difference feminism is applied to mainstream media critiques of college activism pushing for trigger warnings, it is clear journalists rhetorically feminize student activists, marginalizing their complaints while stripping students and those with PTSD of their agency over their identity. The rhetorical feminization is created by distinguishing between those who exhibit an unmasculine trait and those who do not,

obscuring the initial difference beneath sexual difference and therefore undermining the legitimacy of the newly- feminized voices. Although mainstream media identify trigger warnings as a set of rights and protections exclusive to women, journalists do not accept the potential for the warnings to fully initiate the revaluation of women necessary for the creation of a "woman's culture." Thus, they differ with Irigaray on the benefits of rights awarded on the basis of gender. Despite acknowledging the prevalence of rape on college campuses, mainstream media outlets also feminize and marginalize one of the most important tools for allowing rape survivors with PTSD to continue learning, silencing those with the experience necessary for fully understanding why and how change is vital. Removing the shame of being viewed as feminine, and therefore the stigma of asking for trigger warnings, may allow women and rape survivors an equal foundation upon which to build their education—empowering women as fully defined equals not only in their classrooms, but as integral components of their communities after college.

REFERENCES

1. Valenti, Jessica. (2015, December 08). "Trigger Warnings Aren't the Campus Censorship Woe Opponents Believe [Online].Available:http://www.theguardian.com/commentisfree/2015/dec/08/trigger-warnings-arent-the-campus-censorship-woe-opponents-believe.

2. Irigaray L. *The Sex Which Is Not One*. Ithaca, NY: Cornell UP, 1985: 86-127.

3. Anderson N, Clement S. (2015, June 12) "Poll Shows That 20 Percent of Women Are Sexually Assaulted in College." [Online]. Available: http://www.washingtonpost.com/sf/local/2015/06/12/1-in-5-women-say-they-were-violated/

4. "PTSD: National Center for PTSD." [Online]. Available: http://www.ptsd.va.gov/public/PTSD-overview/women/sexual-assault-females.asp.

5. Manne K. (2015, September 19). "Why I Use Trigger Warnings." [Online]. Available: http://www.nytimes.com/2015/09/20/opinion/sunday/why-i-use-trigger-warnings.html.

6. Lorraine TE. Irigaray & Deleuze: *Experiments in Visceral Philosophy. Ithaca:* Cornell UP, 1999: 110.

7. Lukainoff G, Haidt J. (2015, September) "The Coddling of the American Mind." [Online]. Available: http://www.theatlantic.com/magazine/archive/2015/09/the-coddling-of-the-american-mind/399356/.

8. Klugman C. (2015, December 22). "Trigger Warnings on College Campuses Are Nothing but Censorship - Pacific Standard." [Online]. Available: https://psmag.com/trigger-warnings-on-college-campuses-are-nothing-but-censorship-a71cf8de272e#.lfjcjx3za.

9. Butler J. *Undoing Gender*. New York: Routledge, 2004: 36-228

10. Parker K. (2015, May 19). "Trigger Warnings, Colleges, and the 'Swaddled Generation'" [Online]. Available: https://www.washingtonpost.com/opinions/the-swaddled-generation/2015/05/19/162ea17a-fe6a-11e4-805c-c3f407e5a9e9_story.html.

11. Cook LB. *Dancing in the Flames: Spiritual Journey in the Novels of Lee Smith. Jefferson*, NC: McFarland, 2009: 103.

12. Jarvie J. (2014, March 4) "Trigger Happy." [Online]. Available: https://newrepublic.com/article/116842/trigger-warnings-have-spread-blogs-college-classes-thats-bad.

13. King B. (2014, August 21). "Grappling With Trigger Warnings And Trauma On Campus." [Online]. Available: http://www.npr.org/sections/13.7/2014/08/21/342096499/grappling-with-trigger-warnings-and-trauma-on-campus.

MEGAN FERGUSON

Megan Ferguson graduated from Seton Hall University in 2016 with honors and majors in International Relations and Philosophy. She credits her coaches from the Brownson speech team and her honors professors with her love of communication studies, and her interest in feminist rhetorical analysis. This year, Megan is a Fulbright English Teaching Assistant in Kin Hu Village, Kinmen, Taiwan, for fifth and sixth grade students. Next year, she will attend Washington University School of Law, where she hopes to study national security and American civil liberties law. In her spare time, Megan loves reading, practicing Chinese, photography, cooking, and of course, eating.

Wizardry Without Wires

THOMAS LEE AND THE ONGOING REVOLUTION OF WIRELESS TECHNOLOGY

by Chloe Leblanc

"Why did you think this would be interesting?"

This is what Professor Thomas Lee's elementary school teacher asked when she saw him proudly present a pair of broken walkie-talkies for Show-and-Tell. Since his early childhood, Professor Lee has always been drawn towards electrical objects. Today an award-winning researcher in CMOS wireless communication circuits and author of seven books, he has contributed to revolutions in the world of wireless technology. However, his journey into this field has not always been easy.

Right Place at The Right Time

At a young age, Professor Lee was fascinated by sounds that could be conveyed wirelessly some distance away. He kept this passion all the way through college, where he decided to major in electrical engineering. Professor Lee wanted to continue pursuing wireless communication, but in the 1980s, this type of technology was considered to be a dying field. After radio and walkie-talkies, what was left to be invented? Luckily, Professor Lee's PhD advisor at MIT, James Roberge, let him delve into this "wireless passion."

As Professor Lee puts it, his advisor asserted that "if you're passionate about it, you're more likely to come up with something interesting. You like it for whatever weird reason, so go ahead, feel free to indulge in it." This unique opportunity allowed Professor Lee to work on wireless circuits using a particular technology called CMOS, or Complementary Metal-Oxide-Semiconductor, which is used inside computer chips, the source of computers' overall power.

At the time, CMOS was still viewed as the low-cost, low-performance chip technology that it had been when it was developed for wristwatches and calculators; yet Professor Lee saw potential in the technology, believing it could somehow contribute to wireless communication systems. With each new generation, transistors become smaller and denser, allowing them to do more. So it seemed as though this CMOS could one day satisfy the needs of wireless technology, even though most researchers, including Professor Lee himself, were skeptical. Nonetheless, this was not a reason to give up. "I just wanted to push it more," he says.

Professor Lee's perseverance finally paid off when cellphones appeared. This new, revolutionary wireless technology, gave CMOS a "killer app" to drive development and Professor Lee's field of study was suddenly brought center stage. In his opinion, this was just a matter of luck: "I just got in on the next historical trend."

The Rise of GPS

Professor Lee arrived at Stanford as a substitute lecturer in 1993, and joined the faculty the following year. He has led many innovative research projects since then, which notably brought him to create the world's first single-chip GPS receiver. This achievement, a culmination of four years of hard work, was the first to prove how CMOS could be an outstanding alternative to more expensive technologies.

Explaining his accomplishment, Professor Lee quipped, "I have a tragically poor sense of direction, so I had an interest in building a navigational device!"

When he started working on GPS, only multiple-chip products were on the market. Given their rising recognition, dropping the cost meant it would become an almost ubiquitous technology.

Professor Lee recognized the challenges of the project. It involved twelve students from multiple groups, ranging from digital to analog and wireless. "Every day was a new 'uh-oh.' This isn't going to work, what do we do next?" The team would reach a dead end very often. As he points out, "the probability of at least one student having a crisis was nearly 100% per day."

However, to his surprise, the students pulled together. This experience, which ultimately secured their research breakthrough, was an invaluable lesson for him about the value of self-confidence: "It's ok to feel ignorant about something. That's the natural state, so get used to that," he explains. "Luckily, it doesn't have be a permanent state."

Outside the Laboratory

Professor Lee is not just a researcher. The first time he applied for a patent was during his senior year of high school. He was seeking to invent an anti-pollution device for cars, and actually found himself learning more about patent law than inventing. This informal lesson
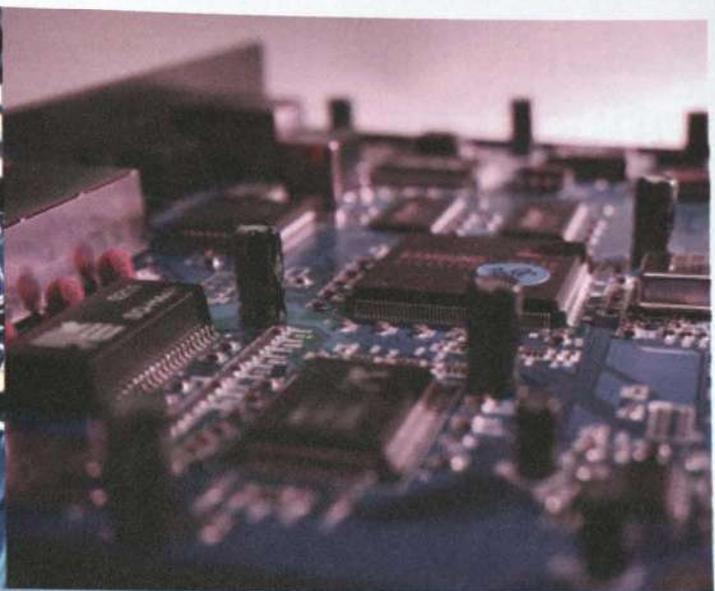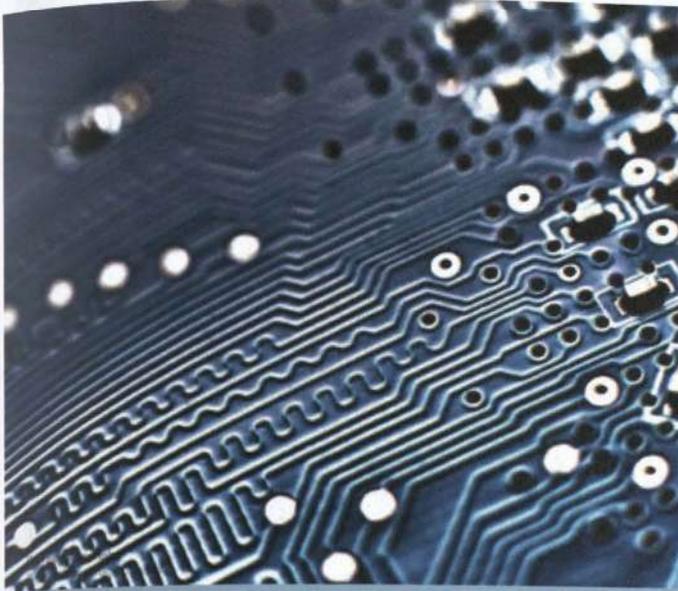
on patents revealed itself to be very useful later on: "I had friends; they're smart friends. So instead of doing sports, we said, 'let's start a company!'"

Today, Professor Lee is the founder or co-founder of four companies and the owner of 65 US patents.

He believes the best part of creating a startup is the spirit of comradery that emerges. "We all learned from each other. These folks are the ones that will be my friends until the day I die; these are just great people."

Not all of Professor Lee's companies have been successful, but in his eyes, what's important is to be daring. "Try something, and reach for the moon. Sometimes it won't make it out of San Jose, but that's okay."

From History to Everything

Looking beyond his past laurels, Professor Lee often spends time pondering the future of wireless.

When discussing his interest in the history of innovations, he muses, "I can put people to sleep by talking about the history of technology, and the deepest comas will be induced among engineering students."

Professor Lee believes that even though technology changes, humans remain the same from generation to generation. So his love of History stems from an effort to understand what motivates people to come up with their ideas, as well as what role accident and chance play in success. According to him, a lot of ideas have floated by people throughout History, but very rarely would an individual happen to have had the right circumstances and knowledge to take advantage of it.

Nowadays, more and more people have been wondering "What is the next step for wireless?" While struggling for an answer, Professor Lee looked into his History books and noticed an interesting pattern that had previously eluded him and everyone else: the history of wireless can be broken down into three revolutionary phases. The first one was the establishment of station-to-station wireless telegraphy, a form of wireless technology comprised of "dots-and-dashes Morse code." It was not a people-to-people technology: messages had to be passed on to professionally trained telegraphers in order to be both sent and received. Then broadcasting was invented, which enabled voices to be spread out to passive listeners, thus expanding the number of people being connected from thousands to millions. The third revolution arrived with the invention of the cellular network, which today connects almost the entirety of the Earth's population.

How can this exponential increase in connectivity be repeated? How can we go from billions to trillions? For Professor Lee, the answer lies in the "Internet of Everything." The Internet of Everything would to allow us to connect the web to our world: our valuable things, our children and friends, our homes, and even our cities. It would enable us to understand and control our environment wirelessly. Such a project is conceivable, for the cost of implementing sophisticated sensing communication systems has dropped significantly. However, increasing the number of communications between humans and technology up to trillions remains audacious. This is why Professor Lee is currently working with his team to remove those scaling barriers, in the prospect of increasing connectivity by a factor of one thousand within the next two decades.

"Basically what's at the core of technology is to make our lives better [...] The Internet of Everything is going to allow us now to connect everything about our lives that we can possibly care about. [...] What's the temperature in that room that I'm going to? How can I find a good parking space? All sorts of intelligent decisions can be made if you can sense these things."

Helping the Heroes: Exploring the Influences on Congressional Veterans' Legislation

Timothy Davis[1,2] & Alexander Farrow[1]

[1]Harvard University, [2]Albany University

Our study focuses on revealing the differences in support for veterans-related legislation in Congress. This study is important to policymakers, scholars, and the American public because it may be used as a predictor of congressional representatives' behaviors towards future veterans, especially if the United States engages in more direct military conflict in the Middle East against terrorist organizations such as ISIS and al Qaeda. Our research analyzes congressional representatives' partisan and ideological factors in relation to roll-call votes on veterans' legislation from the years 1941 – 2001. Our findings are two-fold. Firstly, there is no *significant* difference in support between Republicans and Democrats in issues that pertain to veterans. In other words, support is not a factor of party. Secondly, there is a *significant* difference in support between conservative and liberal representatives. Conservatives, on average, support veterans' legislation about 3% more than liberals.

It has become commonplace for political science theorists to state that Congress is becoming more polarized. There have been multiple studies that detect an overall trend toward congressional polarization. Polarization is prominent on certain highly contentious issues. Theorists thus conclude that members of Congress appear to be drifting farther and farther apart in both ideology and the polarization between Republicans and Democrats (Hare et al., 2014). The direct factors causing the current trend towards polarization are unclear. Throughout America's history, the ideology of political parties has changed as various issues, both social and political, have dominated both America's political and social agendas. Despite the differences in ideology, there are moments in our nation's history when Democrats and Republicans set aside their differences and work together to achieve bipartisan consensus. For example, after the September 11th terrorist attacks, Democrats and Republicans joined forces to defend America from global terrorism and passed the Patriot Act.

While the rights, wrongs, and strategies of the various wars America has fought may be the subject of contention and argument -- and the development of multi-billion-dollar defense projects is a perennially divisive issue filled with contention -- issues that relate to United States military personnel often escape most of the partisan bickering. There is a notable exception with the hostility that initially greeted veterans of the unpopular Vietnam War, but for the most part, Americans respect the men and women of the armed services. As the possibility of American involvement in the conflicts raging across the Middle East comes closer to reality, it is important to examine whether or not the highly polarized nature of Congress extends to veterans-related legislation. Furthermore, more military personnel may be veterans soon after serving time in the Middle East; therefore, congressional veterans' legislation today and in the immediate future may affect many more Americans over the next several decades. At a time when confidence in Congress is at an all-time low, it is important

to examine whether or not the gridlock that affects many major pieces of legislation in Congress will extend to legislation that seeks to support America's veterans (Riffkin, 2014). Our study will analyze the influences on congressional support for veterans' legislation. We seek to illustrate which members of Congress are more likely to put aside partisan and ideological differences to support legislation aimed at helping America's veterans.

THEORY

Our hypothesis is twofold: In Congress, (1) there is no significant difference between how Republicans and Democrats vote on veterans' legislation and (2) there is no difference between how conservatives and liberals vote on veterans' legislation. It is important to establish that the two concepts are not always related. There may be cases, for example, where a Republican representative is more liberal than a Democratic representative. Such examples include Rep. Watkins Abbott of Virginia, a conservative Democrat and Rep. Sherwood Boehlert of New York, a liberal Republican.

Our hypothesis is rooted in the belief that veterans' legislation should be a nonpartisan and non-polarizing issue. Party or ideological lines divide only a handful of bills, most of them major pieces of legislation dealing with multiple aspects of the government, such as abortion, government spending, the Affordable Care Act ("Obamacare") and raising the national debt. It was over these issues that the government shutdown in 2013 because Republicans and Democrats could not overcome their differences and create legislation to fund the federal government (Kirell, 2013). Furthermore, lack of reconciliation plays a significant role in current political speculation regarding congressional willingness to work in unison, including uncertainty as to whether or not the next stopgap spending bill may create the potential of a shutdown throughout 2017. However, these disagreements should be seen as the exception, not the rule. Overall, Congress still functions by passing the necessary

legislation to fund the government and provide required services and programs. Most legislation in the course of a year might be "minor" legislation that might not affect the fate of the country, but it is still important to certain segments of the nation. Veterans' legislation falls into this category because it does not affect the entire federal government, only a comparatively small portion of it. Furthermore, there are few generally recognized negative political consequences in voting for legislation for veterans, as veterans make up a small percentage of the constituency nationally and there are no large-scale groups actively opposing benefits and services for veterans. For this reason, we believe that polarization should not significantly influence veterans' legislation.

METHODOLOGY

DATA COMPILATION

To modernize the relevance of this study, the data contains points from the beginning of World War II to immediately before the Global War on Terrorism (1941 - 2001); in other words, the data spans from the 78th Congress to the 106th Congress. We analyzed the entire time period. The logic behind this decision lies with the fact that war is not simple to define from scholarly, public, and governmental perspectives. Some scholars define periods of U.S. war as substantial conflicts with definite proclamations of ceasefires - WWII, Korea, and Vietnam. But, the United States has been involved in a multitude of smaller conflicts that did not have as explicit end. Some of these conflicts include American actions in Grenada, Panama, Kuwait, Bosnia, and Kosovo. Many Americans define war simply as times when America has a significant number of troops deployed in a conflict zone. For example, it is common to reference the "Korean War" or the "Vietnam War," even though a formal declaration of war was never made. Some in the public refer to all military engagements of the United States as *conflicts* or *military engagements* in order to have unanimity when discussing conflicts. Even the federal government has a hard time defining what a conflict or war zone means. For example, President Obama has constantly stated that the United States will not put "boots on the ground" in Iraq and Syria to combat ISIS, yet America has special forces teams in the area conducting raids against ISIS, some of which have resulted in the death of at least one American serviceman (Korte, 2015). There are many discrepancies when defining military engagements, such as size, duration, and number of troops involved, etc., which makes categorization of war not a useful segmentation to adopt before running the analyses. Therefore, we analyzed the entire period of 1941 – 2001.

Within the chosen time frame, we identified all of the relevant legislation that pertained to veteran affairs. Professor James Snyder of the Harvard University Department of Government provided us a compiled database of all legislation from a grouping of congresses; the database was collected using the website Voteview.com. After loading our dataset into Stata, we collapsed the distinct pieces of legislation that pertained to "Military Pensions/Veterans Benefits". Furthermore, we eliminated from consideration all pieces of legislation that were merely procedural votes. These were votes such as votes to end debate, votes to suspend rules, etc. These were eliminated because we felt that including them in our data set would not be an accurate representation of a congressional representative's support for tangible veterans' legislation; for example, a legislator could vote against continuing to debate a piece of legislation not because they are against it, but because they want the vote for the legislation held quickly because they support it. After these procedural votes were eliminated from our data set, we retained exactly 332 pieces of legislation from 1941 - 2001.

After identifying the relevant legislation, we compiled a database of all the congressional votes on the legislation. Again, we downloaded from Voteview.com the individual databases for roll call votes on all of the relevant congresses. We individually selected the relevant veterans' legislation from each Congress and merged all of the votes for every relevant piece of legislation into an expansive database. This compiled database contains some key identifying information, such as the congress number and chamber as well as each representative's identification number, party, state, name and vote on each of that congress's veterans' legislation. We coded 1 for every yay vote and 0 for every nay and other vote (such as a vote of "present"). In this way, we were able to identify only those members who supported the legislation.

After compiling our complete dataset, we computed the average number of affirmative ("yay") votes by party per Congress. To do this, we added the number of affirmative votes by a specific party in each of the congressional sessions. Then, we multiplied these totals by the amount of relevant veterans' legislation per Congress both in the House and the Senate. Finally, we divided these amounts by the number of representatives per party in each Congress. The few members who listed themselves with affiliations other than Republicans and Democrats were eliminated from the study. This was because the analysis required a large sample size per party, and these two most prominent parties best fit that condition. Therefore, we obtained a variable for the average affirmative votes for Republicans and Democrats in each congressional session.

We then analyzed the effect of representatives' ideology on the affirmative votes in Congress. We downloaded from Voteview.com an exhaustive list of various measures of each representative's ideology. Ideology is measured in a variable *dwnom1* from [-1,1], with -1 representing the most liberal and 1 representing the most conservative. Instead of analyzing overall ideology, we split ideology into two distinct categories: conservative [0,1] and liberal [-1,0]. This choice was inspired by the desire to mirror a binary conservatism/liberalism variable with a binary party variable (see above). Note importantly that many representatives had multiple estimates for ideology, especially if they served in multiple congressional sessions. This is because their preferences had changed in each polling. Therefore, our smallest unit of measure is the unique ideological score(s) for each representative. For each measurement, we computed an average level of support.

Statistical tests were then conducted on our two binary variables. There are several appropriate statistical analyses to use in order to estimate the influences on support for veterans' legislation. We used a t-test for the party and ideological variables to analyze the significance of the difference between the mean voting of two categories. For the party variable, we measured the difference in mean support between Republicans and Democrats. For the ideology variable, we measured the difference in mean support between conservatives and liberals. We hypothesized that there is no difference in voting for veteran legislation between the Republicans and Democrats as well as conservatives and liberals, and expected a p-value greater than 0.05 for each test.

Additionally, our study analyzed several regressions. We

regressed the average support for veterans' legislation on party and ideology. A regression determines the estimated relationship between the independent and dependent variables. The regression should reveal a relationship between both the party and the ideology with the average level of support. In order to prove our hypotheses, we will need to see regressions that yield no statistical difference, or a minimal statistical difference, for the relationship produced.
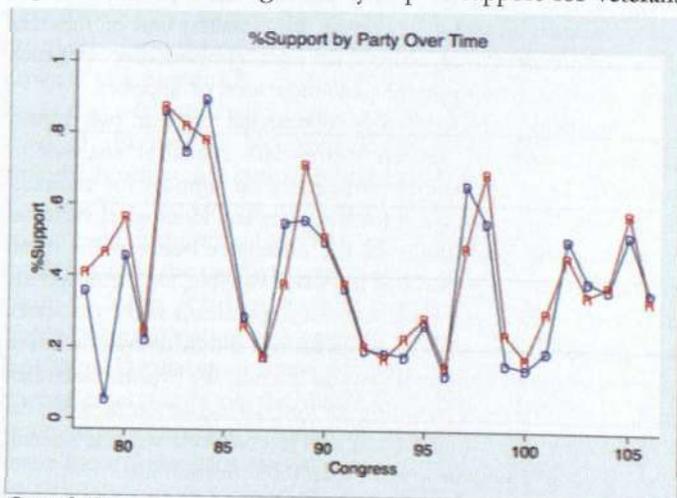
RESULTS

GRAPHS
Before conducting statistical analyses, we visually analyzed the levels of support for veterans' legislation throughout time. Graph 1 represents the inter-temporal progression of support. The x-axis represents the distinct Congress, our variable factor of time. The y-axis represents the average support per party from 0-1. A level of support closer to 1 represents that on average a majority of the party supported veterans' legislation for that specific congress. As you can see from the graph below, the amount of support for veterans-related legislation rises and falls in a cyclical pattern over time. The periods when support is low are correlated to periods when there is very little large-scale U.S. military action or the American public does not perceive a global threat. This can be seen at the end of the graph, just before the war on terror began. The periods when support is high correlate to periods when the United States had troops in combat situations overseas, such as the Korean War. While this is not the focus of our study, we recommend more qualitative analysis on this phenomenon, as it may be interesting if future research determines a correlation between support for veterans' legislation and the presence of military interventions in which there are large number of troops deployed in the field.

Graph 2 shows that as the number of votes per piece of legislation increases, the amount of support decreases. This is true of both parties. This was a very interesting find, one that we did not expect to see. This result could be caused by a number of variables such as legislators growing tired of voting on the same bill over and over again. Determining why this trend occurs could be a potential source of further research.
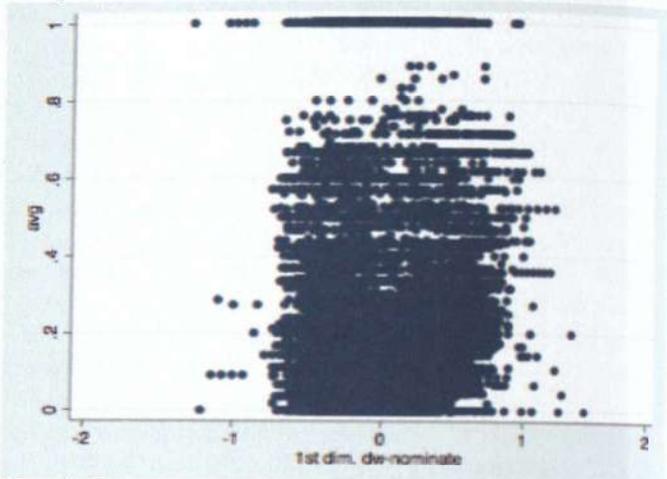
PARTISAN SUPPORT
Our hypothesis is that the difference in party enrollment by legislators would not significantly impact support for veterans'
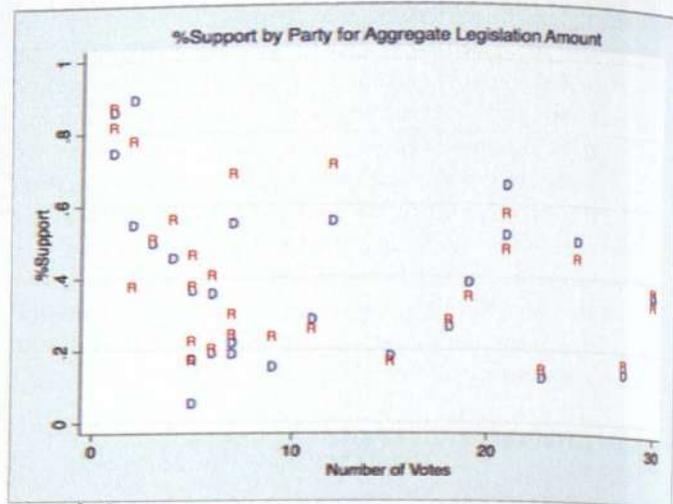
Graph 2

Graph 3

legislation. We initially ran a t-test to determine whether or not the differences in support were significant. The result was a p-value of 0.6191, which is significantly above 0.05. As a result, this suggests that there is no significant difference between the level of support for veterans-related legislation between Democrats and Republicans at the 95% confidence level.

IDEOLOGICAL SUPPORT
After confirming that our hypothesis was correct and there is no statistical difference between support of Republicans and Democrats, we performed the same analysis on the ideological spectrum - conservatism vs. liberalism. The t-test tested the difference of average support between conservatives and liberals. The test returned a p-value of 0.0015, revealing a statistically significant difference in means for veterans' legislation support between conservatives and liberals.

A regression further revealed the relationship between conservatives and liberals and support. The regression takes the following form:

Average support = 0.031194 (Conservative) + 0.2209

In other words, a conservative representative - solely based on the fact that he or she is a conservative - will have on average a 3.1% greater average level of support for veterans' legislation than will a liberal representative. This result is significant at the .05 level and supports the hypothesis of a difference between a conservative and liberal in terms of average support. In order to

Graph 1

visualize this difference, we also created a scatter plot (Graph 3) showing the percentage of support for veterans-related legislation of a representative, compared to his or her *dwnom-1 score*. Recall that we defined conservative as a representative with a *dwnom-1* score greater than 0 and a liberal as a representative with a *dwnom-1* score less than 0.

As you can see from the graph, the amount of support for veterans' related legislation is higher among conservatives (towards the right of the graph) than among liberals (towards the left of the graph).

CONCLUSIONS

DISCUSSION

Our paper found that from the World War II era to the beginning of the War on Terror, congressional representatives of the two main political parties do not vote in statistically different patterns when it comes to veterans' legislation. In other words, Democrats and Republicans were able to put aside their differences and pass legislation that was aimed at helping America's veterans. Additionally, our data revealed a significant difference in the amount of support between those who identify as conservative and liberal. On average, a conservative will vote yay 3.6% more than a liberal on issues related to veterans' legislation. This is especially surprising considering that it has only been recently (i.e. within the past 8 years) that members of Congress have begun to identify strongly as conservative and liberal, not merely Democrat or Republican. Evidence for this can be seen in the growing strength of the so-called "House Freedom Caucus," a group of Congressmen who identify as extremely conservative (DeSilver 2015). As a result of this large difference between conservatives and liberals being shown before 2001, it can be logically assumed that as more and more Congressmen identify themselves as conservative and liberal, it could well become harder and harder to pass veterans' related legislation because of the difference between the two sides. We can already see that this is becoming the case as various important pieces of veterans' related legislation have died in the Senate because of gridlock (Barrett, 2014).

FUTURE RESEARCH

Our data did not take into account the overlapping effects of increasing partisanship in Congress. For example, Republicans (or Democrats) could attempt to use a piece of veterans' legislation to influence voting on other issues in Congress. Making political connections between unrelated pieces of legislation that impacts the passage of them both is not an uncommon practice in Congress, and one that would be very difficult to measure in order to perform tests on it. However, this is an area where additional research should be conducted to control for this variable.

Additionally, our data did not take into account the changing nature of legislation in Congress. Increasingly, Congress is passing exceptionally large so-called "omnibus" bills instead of passing small bills focusing on specific parts of the government. The idea behind these large bills is that various pieces of legislation that the party in power wants to get through will be "forced" through even though the minority party fiercely opposes those things. In 2013, a bill that would have kept the federal government funded was constantly delayed because Republicans put in wording in the bills that would have effectively defunded Obamacare. This was something Democrats would refuse to pass, and as a result the entire government was shut down over something that arguably had nothing to do with funding the federal government. This could potentially affect veterans-related legislation because it could be used as a bargaining chip in negotiations for unrelated legislation or as part of a massive bill that is held up for political reasons unrelated to veterans. This again is an area that could be tested further.

Ideally we would continue to test the data using results from more current congresses (i.e. after the 106th Congress). However, the data for those congresses was not readily available in a format that would have been usable. It would also be interesting to test whether or not the number of veterans in a representative's state has any influence on how they vote regarding veterans-related legislation. Again, the data for this was not readily available as the only data we could find relies on the United States Census, which is only conducted every 10 years.

Therefore, the focus of future data should be two-fold. Firstly, future research should expand the temporal scope of this study through present day. This would allow us to analyze the data more thoroughly over time, especially as shifts take place in the composition of Congress and the ideology new members bring to Washington. Secondly, other factors should be considered in the multiple regressions. In this way, we can analyze partisan and ideological variables as well as other variables on the percentage support for relevant legislation.

CONCLUDING REMARKS

The increasing division in Congress between hard-line Republicans and Democrats has many political experts worried that it will become so counterproductive that it will begin to negatively affect the everyday lives of Americans. Veterans would be particularly susceptible to these negative effects because many veterans rely on the federal government for healthcare and medical treatment for injuries sustained while serving. By showing that the increasing partisanship between Republicans and Democrats has not spread to veterans related legislation, or at the very least has not showed any signs of becoming excessively partisan, America's veterans can have a sense of relief knowing that legislation that could potentially affect their lives is relatively safe for the time being.

However, because our results show the increasing difference between conservatives and liberals, the optimism about the future of veterans' related legislation should be tempered with the knowledge that the deep ideological divisions between congressmen and women exist and have a statistically significant difference when dealing with veterans' related legislation. This is something that should be watched carefully as the political makeup of Congress continues to change with the times.

ACKNOWLEDGEMENTS

REFERENCES

1. Hare, Christopher, Keith T. Poole, and Howard Rosenthal (2014). "Polarization in Congress Has Risen Sharply. Where is it going next?". *The Washington Post.* https://www.washingtonpost.com/news/monkey-cage/wp/2014/02/13/polarization-in-congress-has-risen-sharply-where-is-it-going-next/

2. Vote Smart, https://votesmart.org/bill/votes/8289#.VmoHcbz-_UE

3. Riffkin, Rebecca (2014). "Public Faith in Congress Falls Again, Hits Historic Low". Gallup. http://www.gallup.com/poll/171710/public-faith-congress-falls-again-hits-historic-low.aspx

4. See dataset below, from voteview.com

5. Kirell, Andrew (2013). "A Brief History of the 2013 Government Shutdown". Mediaite. http://www.mediaite.com/tv/a-brief-history-of-the-2013-government-shutdown/

6. Korte, Gregory (2015), "16 Times Obama said there would be no boots on the ground in Syria". *USA Today.* http://www.usatoday.com/story/news/politics/onpolitics/2015/10/30/16-times-obama-said-there-would-no-boots-ground-syria/74869884/

7. DeSilver, Drew (2015). "What is the House Freedom Caucus, and who's in it?". *Pew Research.* http://www.pewresearch.org/fact-tank/2015/10/20/house-freedom-caucus-what-is-it-and-whos-in-it/

8. Barrett, Ted (2014). "Vets Bill fails in Senate, victim of Election-year gridlock". *Political Ticker.* http://politicalticker.blogs.cnn.com/2014/02/27/vets-bill-fails-in-senate-victim-of-election-year-gridlock/

TIMOTHY DAVIS

Timothy Davis is a recent graduate of Harvard University, where he studied political science, with a focus on International Affairs. Originally from Utica, NY, Davis currently resides in Albany, NY where he is attending Albany University, working on his Master in International Affairs, with a concentration in Global and Homeland Security. After graduating, Davis ultimately hopes to pursue a career in the field of intelligence.
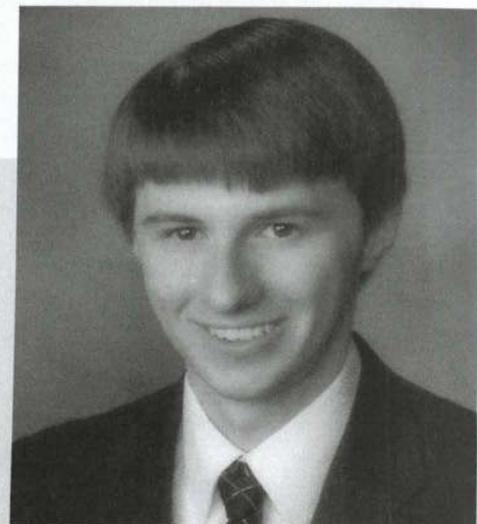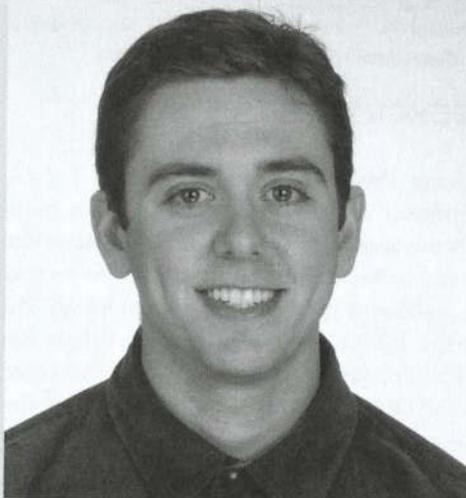
ALEXANDER FARROW

Alexander Farrow graduated cum laude from Harvard University with a degree in Government and a secondary in Economics, focusing on national security. From drone warfare to game theory and counterterrorism, his passion is analyzing how unconventional warfare changes the modern battlefield. He currently serves as an officer in the United States Air Force.

Measuring Human Resource Discrimination: An Index

Viren Singh Rehal

Panjab University, Chandigarh, India

The analysis of discrimination is important as discrimination is a worldwide phenomenon. It poses a major problem for both humanity and for economic development because of its negative impact on growth and quality of life. To tackle this problem effectively, it is necessary to first understand the exact magnitude and degree of various forms of discrimination. This paper, hence, proposes an Index of Human Discrimination (IHD) to quantify the extent of different types of discrimination on the basis of race, gender, religion, language or caste. Further, this paper presents a case study that analyzes gender discrimination across developed and developing countries around the world based on measurements gathered from the Index of Human Discrimination.

INTRODUCTION

Discrimination is considered to be a major social problem around the world. Apart from having negative effects on self-confidence and self-esteem of individuals, it has negative impacts on society and the economy as a whole. Discrimination leads to diminishing quality of life and unequal opportunities. In addition, it acts as an obstruction to growth for both human and economic development. The resolution of this problem requires an insight into the precise extent of discrimination and how it manifests, rather than a vague understanding. Hence, in this paper, an attempt has been made to measure or quantify the extent of discrimination on the basis of race, gender, caste, religion etc., among the groups under consideration.

The Index of Human Discrimination, the method developed in this paper, uses social indicators from three important sectors of society- education, employment, and healthcare. Education, employment, and healthcare are all important for human as well as economic development. Hence, opportunities within these sectors for different groups have been used to evaluate discrimination.

Equal opportunity and availability of education, employment opportunities, and availability of healthcare to all groups represents a non-discriminating society. On the other hand, preference for one group and distaste for another resulting in unequal opportunities represents a discriminating society. The index uses these inequalities to estimate and quantify how much discrimination exists against a certain group (race, gender, caste, religion etc.) within a society, state, country, or any region.

Generally, a higher degree of gender equality and a lesser degree of discrimination is expected from developed regions as compared to developing and underdeveloped regions[1]. Using the IHD, a study on gender discrimination was conducted for developed and developing countries across the world. The index of human discrimination was used to measure gender discrimination in 57 countries. The study was conducted to evaluate the reliability and validity of the index in real world situations

REVIEW OF RELATED LITERATURE

The existing literature and research on the measurement of discrimination is unsubstantial. One of the reasons for this might be the psychological element involved in the subject, which is difficult to quantify. Most of the literature and research available on discrimination focuses on its causes, consequences, types or remedial measures.

Gary Becker[2] is considered to be a pioneer in the field of discrimination and its measurement. Becker proposed a discrimination coefficient to measure the psychological costs of interacting with the group which is discriminated against. However, the discrimination coefficient is subjective in nature and it is difficult and inappropriate to determine discrimination in monetary terms, as put forward by Becker.

Another important measure of discrimination and inequality is the Gender Inequality Index or GII[3]. The Gender Inequality Index uses several indicators from the fields of reproductive health of women, women empowerment and labor market participation to determine gender disparities. However, the GII cannot be used to measure other forms of inequalities and discrimination except gender, such as on the basis of race, caste, language, country and so on.

The IHD tries to overcome the drawbacks of GII and Becker's discrimination coefficient. It attempts to measure all forms or types of discrimination, and eliminate the subjectivity as well as monetary element associated with discrimination coefficient.

METHODOLOGY

Discrimination is subjective to every individual. This means that the extent of discrimination varies from person to person. Furthermore, discrimination is a psychological phenomenon and no direct data is available on discrimination that can be used to measure its extent. These problems pose a major challenge to accurate measurement and evaluation of discrimination.

The index of human discrimination uses social indicators to overcome the challenges and problems with measurement of discrimination. Social indicators used in the index are spread across three sectors- education, employment and healthcare.

These sectors were selected because all kinds of discrimination surely manifests itself in these sectors through inequalities existing in educational opportunities, employment opportunities and healthcare availability. Moreover, data on these sectors is easily available.

The index uses a total of six indicators- two indicators each for education, employment and healthcare. Inequalities in education are represented by social indicators of adult literacy rate and gross enrolment ratio in secondary education. Inequalities in employment are represented by labor force participation rate and unemployment rate. Healthcare inequalities are depicted by infant mortality rate and life expectancy at birth. These indicators, as used in the index, can be defined as follows:

1. Adult literacy rate: Adult literacy rate is the percentage of people ages 15 and above who can both read and write with understanding a short simple statement about their everyday life.

2. Gross enrolment ratio at secondary level: Gross enrollment ratio is the ratio of total enrollment to secondary level education, regardless of age, to the population of the age group that officially corresponds to the level of secondary education. Please note that secondary education, in this paper, is defined according to the standards set forth by the World Bank[3]. Secondary education has been chosen over primary or graduate level because it completes the requirements of basic education starting at the primary level, and lays the foundations for lifelong learning.

3. Labor force participation rate: Labor force participation rate is the proportion of the population ages 15 and older that is economically active: all people who supply labor for the production of goods and services during a specified period.

4. Unemployment rate: Unemployment refers to the share of the labor force that is without work but available for and seeking employment.

5. Infant mortality rate: infant mortality rate refers to the total number of infant deaths (less than 1 year of age) per 100 live births. Usually, infant mortality rate is calculated per 1000 live births. However, in IHD, it is calculated per 100 live births.

6. Life expectancy at birth: Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

IHD has been constructed in such a manner that its value ranges from -100 to 100. All the indicators in education and employment are calculated as percentages. In the case of healthcare indicators, infant mortality rate is computed per 100 live births. Life expectancy is, generally, calculated with open ended age interval above 80 years; however, the number of individuals above 100 years of age are negligible compared to the population below a 100 years of age. No country has a life expectancy above 100, but it is theoretically possible to achieve this level. This may violate the limits (-100 and 100) of the index if life expectancy is exceptionally above 100. Hence, life expectancy has been assumed to have an upper limit of 100 in IHD.

Gross enrolment ratio at secondary level for a group can be above 100 because of secondary level repeaters and individuals above or below the normal secondary age joining secondary level education. Since, the index of human discrimination uses inequalities between groups to calculate discrimination, the difference in gross enrolment ratio of two groups is practically always less than 100. However, it is theoretically possible that this difference can exceed 100, which might result in breach of limits (-100 and 100) of the index. . Hence, the difference between gross enrolment ratios of groups must be less than 100.

MODEL

Equation 1:

$$IHD = \frac{1}{3} \frac{(L_A - L_B) + (GER_A - GER_B)}{2} + \frac{1}{3}[\frac{(LFP_A - LFP_B) + (U_B - U_A)}{2}] + \frac{1}{3}[\frac{(IMR_B - IMR_A) + (LE_A - LE_B)}{2}]$$

Equation 2:

$$Education = \frac{1}{3} \frac{(L_A - L_B) + (GER_A - GER_B)}{2}$$

Equation 3:

$$Employment = \frac{1}{3}[\frac{(LFP_A - LFP_B) + (U_B - U_A)}{2}]$$

Equation 4 :

$$Healthcare = \frac{1}{3}[\frac{(IMR_B - IMR_A) + (LE_A - LE_B)}{2}]$$

Where,

1. 'IHD' is Index of Human Discrimination.
2. 'A' and 'B' are two different groups (males and females, Caucasians and African-Americans, Christians and Muslims etc.).
3. 'L' represents adult literacy rate.
4. 'GER' is gross enrolment ratio at secondary level.
5. 'LFP' represents labor force participation rate.
6. 'U' shows unemployment rate.
7. 'IMR' is infant mortality rate (per 100 live births).
8. 'LE' represents life expectancy at birth.

Equal weightage has been given to the sectors of education, employment and healthcare, each represented by two different indicators. Each sectors has been given equal one-third (1/3) weightage because one sector cannot be favored over another. Unbiased and equitable importance must be given to every sector.

Further, every indicator within education, employment and healthcare has been given equal weightage because it is not appropriate to favor one indicator over another. Hence, all indicators must be given equal importance. In education, adult literacy rate and gross enrolment ratio at secondary level are given equal weightage. Similarly, labor force participation rate and unemployment rate in employment sector and infant mortality rate and life expectancy at birth in healthcare sector have been given equal weightage.

INTERPRETATION

The value of the Index of Human Discrimination or 'IHD' ranges from -100 to 100. Depending on the values of 'IHD', there are 3 possible scenarios:

1. IHD = 0; There is no discrimination.
2. IHD > 0 i.e. positive; Discrimination exists against group 'B'.
3. IHD < 0 i.e. negative; Discrimination exists against group 'A'.

The closer the value of 'IHD' to any of its limits (-100 or 100), the greater is the extent of discrimination. On the other hand, the closer the value of 'IHD' to 0, the lower the extent of discrimination. IHD values very close to zero show existence of high equality and no discrimination among the concerned groups.

In IHD, the indicators of literacy rate, gross enrollment ratio, labor force participation and life expectancy have a negative relation with discrimination while the indicators of unemployment rate and infant mortality rate have a positive relation with discrimination. Thus, the indicators of unemployment rate and infant mortality rate are expressed as (UB-UA) and (IMRB-IMRA) respectively, unlike other indicators. Suppose, we are studying racial discrimination against African-Americans as compared to Caucasians. Let Caucasians be group 'A' and African-Americans be group 'B'. The value of index of human discrimination will be positive if LA, GERA, LFPA and LEA are higher as compared to LB, GERB, LFPB and LEB. However, in case of unemployment rate and infant mortality rate, the value of 'IHD' will be positive if UA and IMRA are lower as compared to UB and IMRB.

Therefore, higher values of literacy rate, gross enrollment, labor force participation and life expectancy for any group show less discrimination against that group. However, in case of unemployment and infant mortality, higher values of these indicators show higher discrimination against the group. Therefore, for group 'A', higher values of literacy rate, gross enrollment ratio, labor force participation and life expectancy as compared to 'B', lead to positive value of IHD. For example, $(L_A - L_B) > 0$, gives positive value of IHD. Lower values of unemployment rate and infant mortality rate for group 'A', as compared to group 'B', i.e. $(U_B - U_A) > 0$ and $(IMR_B - IMR_A) > 0$, give a positive value of IHD showing discrimination against 'B'. On the other hand, for group 'B', higher values of literacy rate, gross enrollment ratio, labor force participation, life expectancy and lower values of unemployment and infant mortality rate, as compared to 'A', give a negative value of IHD showing discrimination against 'A'. Hence, unemployment and infant mortality rate are expressed in such manner.

The positive and negative signs of IHD merely depict discrimination against one group or the other and have no other purpose. Negative sign shows discrimination against group 'A' and positive sign shows discrimination against 'B'. The magnitude of discrimination is represented by the value of IHD and is not affected by the sign.

CASE STUDY: SITUATION OF GENDER DISCRIMINATION ACROSS THE WORLD

The suggested index has been tested on gender discrimination for a group of nations. The study was conducted to assess the validity of the index in real world applications. The present study uses the Index of Human Discrimination to estimate the extent of gender discrimination in 57 countries- 20 developed countries and 37 developing countries from across the world for the year 2010. Data used in the study has been obtained from The World

$$IHR = \frac{1}{3}|(GER_A - GER_B)| + \frac{1}{3}|\frac{(LFP_A - LFP_B) + (U_B - U_A)}{2}| + \frac{1}{3}|\frac{(IMR_B - IMR_A) + (LE_A - LE_B)}{2}|$$

Bank[4][5][6][7][8][9][10][11], UNICEF[12] and UNESCO[13] publications and databases. The country classification into developed and developing countries is in accordance with World Economic Situation and Prospects, 2016[14].
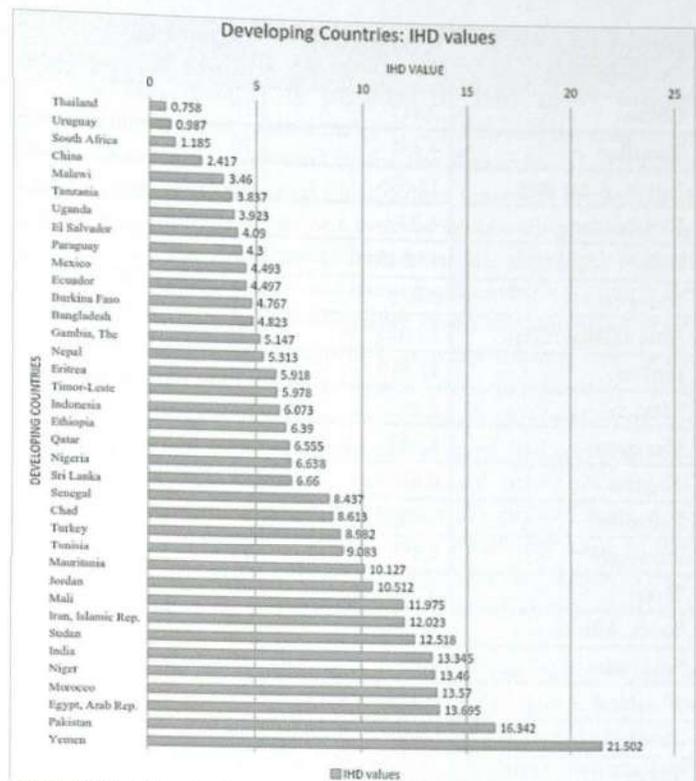

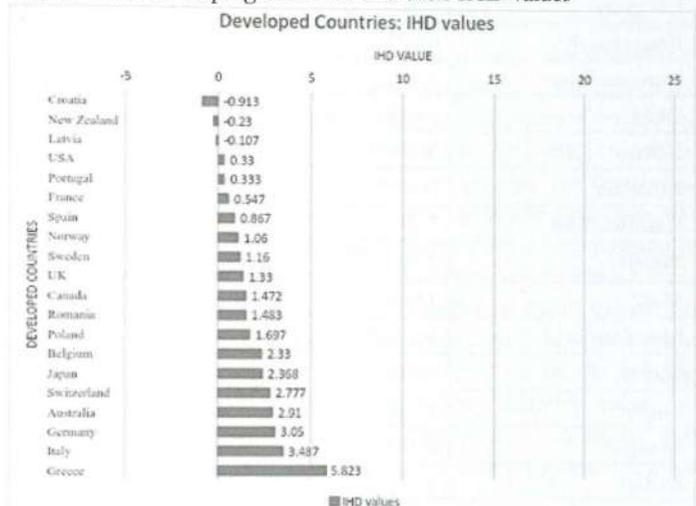**Figure 1.** Developing countries and their IHD values

Figure 2. Developed countries and their IHD values.

The estimates for developed countries do not include the indicator of adult literacy rate due to the unavailability of data. The modified formula excluding adult literacy rate used to calculate IHD for developed countries is as follows:

Where,
- 'A' represents males.
- 'B' represents females.

Hence, if IHD is greater than 0 i.e. positive, discrimination exists against females. If IHD is less than 0 i.e. negative, discrimination exists against males. Since, the negative or positive sign of IHD shows only the category (male or female) against which discrimination exists, the ranks have been assigned ignoring the sign, i.e. the ranks represent the extent of gender discrimination irrespective of gender category.

DEVELOPING COUNTRIES	IHD VALUE	IHD RANK (out of 57 countries)
China	2.417	19
Ecuador	4.497	30
Egypt, Arab Rep.	13.695	55
El Salvador	4.09	27
India	13.345	52
Indonesia	6.073	38
Iran, Islamic Rep.	12.023	50
Jordan	10.512	48
Mexico	4.493	29
Morocco	13.57	54
Nigeria	6.638	41
Pakistan	16.342	56
Paraguay	4.3	28
Qatar	6.555	40
South Africa	1.185	12
Sri Lanka	6.66	42
Thailand	0.758	6
Tunisia	9.083	46
Turkey	8.982	45
Uruguay	0.987	9
Bangladesh	4.823	32
Burkina Faso	4.767	31
Chad	8.613	44
Eritrea	5.918	36
Ethiopia	6.39	39
Gambia, The	5.147	33
Malawi	3.46	23
Mali	11.975	49
Mauritania	10.127	47
Nepal	5.313	34
Niger	13.46	53
Senegal	8.437	43
Sudan	12.518	51
Tanzania	3.837	25
Timor-Leste	5.978	37
Uganda	3.923	26
Yemen, Rep.	21.502	57

DEVELOPED COUNTRIES	IHD VALUE	IHD RANK (out of 57 countries)
Australia	2.91	21
Belgium	2.33	17
Canada	1.472	14
Croatia	-0.913	8
France	0.547	5
Germany	3.05	22
Greece	5.823	35
Italy	3.487	24
Japan	2.368	18
Latvia	-0.107	1
New Zealand	-0.23	2
Norway	1.06	10
Poland	1.697	16
Portugal	0.333	4
Romania	1.483	15
Spain	0.867	7
Sweden	1.16	11
Switzerland	2.777	20
UK	1.33	13
USA	0.33	3

Table 1 (left). Developing countries and their IHD values and ranks.
[1]See APPENDIX D for data used to calculate IHD values.w

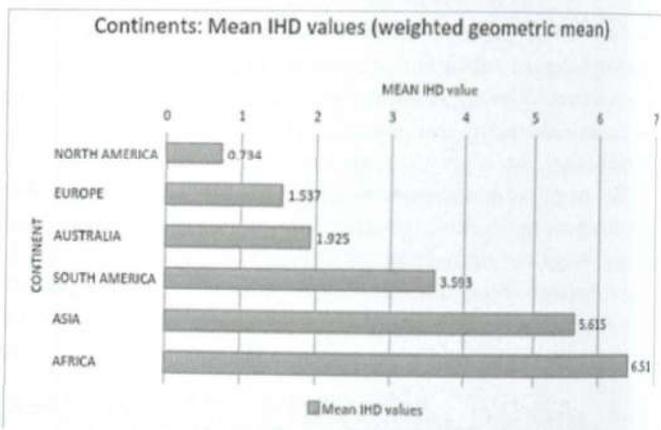**Table 2 (above).** Developed countries and their IHD values and ranks.

Figure 3. Continents and their mean IHD values (weighted geometric mean).

Table 3 (below). Two sample unpaired t-test with unequal variances

VARIABLE	OBS	MEAN	STD. ERR.	STD. DEV.	[95% CONF. INTERVAL]	
Developing	37	7.632243	.7644458	4.649943	6.081875	9.182611
Developed	20	1.5887	.3470112	1.551881	.8623971	2.315003
Combined	57	5.511702	.6377646	4.815017	4.234106	6.789298
Diff.		6.043543	.8395202		4.355994	7.731093

diff = mean(developing) - mean(developed)

Ho: diff = 0

			t = 7.1988

Satterthwaite's degrees of freedom = 48.4657

Ha: diff < 0	Ha: diff! = 0	Ha: diff > 0
Pr(T < t) = 1.0000	Pr(T > t) = 0.000000001732	Pr(T > t) = 0.0000

RESULTS

The study shows that gender discrimination exists against females in most of the countries. A total number of 54 countries out of 57 show discrimination against females. The only exceptions are 3 countries – New Zealand, Latvia and Croatia with IHD values of -0.230, -0.107 and -0.913 respectively. Even in these 3 countries, the IHD values are very close to 0, showing the existence of high equality. Countries with highest discrimination against females are Yemen (21.502), Pakistan (16.342) and Egypt (13.695).

A total number of 11 countries have IHD values greater than 10, all of which are developing countries, showing the highest prevalence of gender discrimination against females. These countries, in descending order of IHD, are Yemen, Pakistan, Egypt, Morocco, Niger, India, Sudan, Iran, Mali, Jordan and Mauritania. Another 14 countries have IHD values ranging from 5 to 10, out of which only one is a developed country (Greece) and the rest are developing countries. Moderate levels of discrimination with IHD values of 1 to 5 are shown by 23 countries—12 developed and 11 developing countries. Countries with the highest equality levels and IHD values ranging between -1 and 1 include 9 countries, 7 of which are developed countries and 2 of which are developing countries.

Developed regions are expected to have greater gender equality and lesser discrimination as compared to developing regions[1]. To determine this, the mean value of IHD was calculated for developed and developing countries using weighted geometric mean. The weights were determined by the population of the countries in such a manner that the countries with higher populations were given higher weightage and countries with lower population were given less weightage. The weighted geometric mean of IHD for developed countries was 0.983 and for developing countries, it was estimated at 5.839. In addition, an unpaired t-test was used to determine whether there was a significant difference in discrimination between developed and developing countries. For this calculation, each nation was treated as an individual data point and the IHD values were not weighted by population.

From Table 3, we can observe that alternate hypothesis is accepted because $\Pr(T > t) = 0.000000001732$. This shows that the mean IHD of developing and developed countries are indeed significantly different. There is a huge difference between the situation of gender discrimination in developed and developing countries.

Out of 20 developed countries, 19 countries have an IHD value below 5 and are ranked within the top 25 countries for lowest IHD values. The only exception is Greece, having IHD value of 5.823 and ranked as 35th. In case of developing countries, only 6 countries are in the top 25 – South Africa (1.185), Uruguay (0.987), China (2.417), Thailand (0.758), Tanzania (3.837) and Malawi (3.460).

Similar to developed and developing countries, the mean value of IHD was calculated for different continents using weighted geometric mean with population of each country as weights. It was observed that North America has the least gender discrimination with a mean IHD at 0.734. North America is followed by Europe (1.537), Australia (1.925), South America (3.593), Asia (5.615) and Africa (6.510).

These observations correspond to the fact that most of the developed countries belong to North America, Europe and Australia, hence, explaining the low mean value of IHD. On the other hand, most of the developing countries are in Asia, Africa and South America, thus, explain the higher mean value of IHD.

The sign (positive or negative) of IHD shows whether discrimination exists against males or females, and the magnitude of discrimination is depicted by the absolute value of IHD. It is worth noting that calculated mean values represent the extent of gender discrimination and not male or female discrimination in particular, i.e. the mean values have been calculated ignoring the sign of IHD values and do not show discrimination against males or females, but show overall gender discrimination irrespective of a particular gender category. This was necessary due to the problem of indeterminacy of signs (+/-) for negative values while calculating weighted geometric mean. Either the negative observations had to be dropped or the signs had to be ignored because weighted geometric mean could not be calculated for negative values. Hence, the signs were ignored instead of dropping negative values. These values were important as they represented high equality because they were very close to zero, i.e. no discrimination (New Zealand= -0.230, Latvia= -0.107 and Croatia= -0.913).

One of the most interesting results of the study is that the healthcare component of IHD is negative, i.e. against males, for all the countries. This can be explained by the fact that females are naturally more enduring and tend to live longer than males[15]. This means that females have a biological advantage over males in case of the healthcare component. However, healthcare component is still a representative of behavioral discrimination. This is evident from the fact that the mean value of the healthcare component of developed countries is more in favor of females as compared to the healthcare component of developing countries. The mean value of the healthcare component for developed countries was estimated to be -2.729 and for developing countries it was estimated to be -1.539. The biological advantage to females is most likely to be similar for all females irrespective of their country of origin, therefore, this difference in mean values can still be explained by behavioral discrimination. This means that the biological advantage of females is opposed by the existing discrimination against them, hence, higher negative values of healthcare component in case of developed countries and negative values closer to zero in case of developing countries due to higher discrimination against females.

The results of the study prove that IHD is successful in capturing the real life situation of discrimination. The findings of the study were as expected, showing higher gender discrimination against females in developing countries as compared to developed countries. Hence, results of IHD are a suitable representative of existing discrimination around the world.

CONCLUSION

The Index of Human Discrimination can be a useful tool for analyzing the inequalities and discrimination that exist in our world. Quantifying discrimination accurately can be a difficult endeavor due to its subjective nature. However, the study on gender discrimination using IHD gives a fairly accurate picture of situation of gender discrimination in developing and developed nations as well as different continents.

The index can be used to measure discrimination not only in case of gender, but for all types of groups such as racial groups, religious groups, different classes and caste groups. Hence, this index is not limited to gender discrimination, but can be applied

in the analysis of various kinds of discrimination. It can also be used to assess the changing scenario of discrimination with time by comparing IHD values of groups at different time periods. Hence, a combination of analysis on discrimination for different groups and time periods can provide a detailed investigation into the existing conditions of discrimination. The index uses various social indicators to estimate discrimination. Thus, the index gives a view of existing and changing human development as well as standard of living of the groups under consideration. Hopefully, armed with this information, mankind can begin to strategically tackle discrimination and work towards improving the world for future generations to come.

AUTHOR NOTES

1. See APPENDIX A for weighted geometric mean calculations for developing and developed countries.
2. See APPENDIX B for weighted geometric mean calculations for continents.
3. See APPENDIX C for calculations of weighted geometric mean of the healthcare component for developing and developed countries.
4. Due to unavailability of data, weighted geometric mean of South America is on the basis of 3 countries- Ecuador, Paraguay and Uruguay.

All appendices can be found online at www.surj.stanford.edu

REFERENCES

1. J. P. Jütting, C. Morrisson, J. Dayton-Johnson and D. Dreschler, "MEASURING GENDER (IN)EQUALITY: Introducing the Gender, Institutions and Development Data Base (GID)," *OECD DEVELOPMENT CENTRE*, Working Paper No. 247, France, 2006.

2. G. S. Becker, *The Economics of Discrimination*, 1st,2nd ed., The University of Chicago Press, 1951,1971.

3. Human Development Report, "Human Development Report 2010, 20th Anniversary Edition," *United Nations Development Programme*, 2010.

4. The World Bank, "World Databank- World Development Indicators," [Online]. Available: http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators. [Accessed 25 June 2016].

5. The World Bank, "Unemployment, male (% of male labor force)," [Online]. Available: http://data.worldbank.org/indicator/SL.UEM.TOTL.MA.ZS?name_desc=false. [Accessed 27 June 2016].

6. The World Bank, "Unemployment, female (% of female labor force)," [Online]. Available: http://data.worldbank.org/indicator/SL.UEM.TOTL.FE.ZS?end=2014&name_desc=false&start=1991&view=chart. [Accessed 27 June 2016].

7. The World Bank, "Population, total," [Online]. Available: http://data.worldbank.org/indicator/SP.POP.TOTL?name_desc=false. [Accessed 28 July 2016].

8. The World Bank, "Life expectancy at birth, male (years)," [Online]. Available: http://data.worldbank.org/indicator/SP.DYN.LE00.MA.IN?name_desc=false. [Accessed 27 June 2016].

9. The World Bank, "Life expectancy at birth, female (years)," [Online]. Available: http://data.worldbank.org/indicator/SP.DYN.LE00.FE.IN?name_desc=false. [Accessed 27 June 2016].

10. The World Bank, "Labor force participation rate, male (% of male population ages 15+)," [Online]. Available: http://data.worldbank.org/indicator/SL.TLF.CACT.MA.ZS?name_desc=false. [Accessed 25 June 2016].

11. The World Bank, "Labor force participation rate, female (% of female population ages 15+)," [Online]. Available: http://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS?name_desc=false. [Accessed 25 June 2016].

12. UNICEF, "Child Mortality Estimates, Sex Specific Infant Mortality Rate," [Online]. Available: http://data.unicef.org/topic/child-survival/under-five-mortality/. [Accessed 18 June 2016].

13. UNESCO Institute for Statistics, "Adult and Youth Literacy, 1990-2015," UNESCO Institute for Statistics, 2012.

14. United Nations, "World Economic Situation and Prospects 2016," United Nations, New York, 2016.

15. S. N. Austad, "Why women live longer than men: Sex differences in longevity," *Gender Medicine*, vol. 3, no. 2, pp. 79-92, 2006.
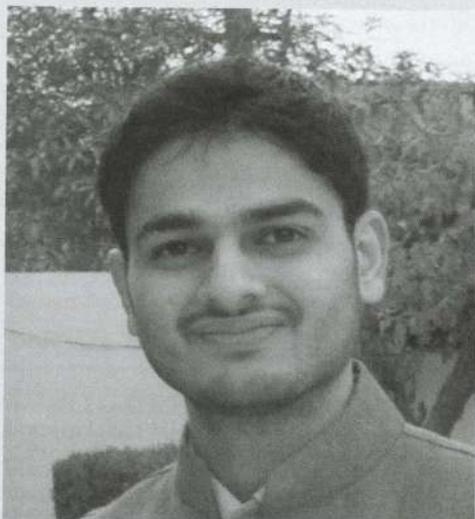
VIREN SINGH REHAL

Viren Singh Rehal graduated in May 2016 with BA honors in economics and is currently a student of post-graduate honors in economics at Panjab University, Chandigarh, India. He is interested in exploring the various concepts and issues related to the fields of economic growth and development, human resource discrimination and labor economics with special focus on labor productivity and efficiency. He intends to pursue economic research related to these fields after post-graduation.

Real-time Visual Subject Tracking and Classification:
combining motion signal analysis and tridimensional-shape feature classifiers with group-induction boosting algorithms

Lucas Agudiez Roitman

Stanford Artificial Intelligence Laboratory, Department of Computer Science

This paper provides a novel and unprecedented approach for integrating motion features in the detection and classification of moving subjects in a static environment. More specifically, we measure the impact of the use of trajectory history, rotation history, blob orientation, motion frequency in the three axes, motion acceleration, segmentation errors, and flickering scores, and how they can influence classification of moving people, pets, and other objects. We apply our method to data captured by a combined color and depth camera sensor. We find that, while some motion descriptors slightly improve accuracy, the use of them in conjunction outperforms previous approaches in the classification and tracking of real-world moving subjects in real-time.

INTRODUCTION

Many home security products that are available on the market promise to detect intruders at home and notify users via text messages. However, these home surveillance platforms often have high rates of false-positives and low tolerance for them. In other words, the user often receives messages because their pet walked in front of the camera or the wind moved the curtains. The user then grows accustomed to these false alarms and therefore ignores any future alarms that could be real threats. Furthermore, when a user wants to play back and watch all indoor moving subject activities, he has to watch all of the false-positive parts of the footage as well, wasting countless hours of time. Other potential uses of home cameras are harmed by the fact that the recognition technology is solely based on naive movement detection.

Our approach uses depth cameras, as well as accelerometers and gyroscopes to easily place the camera on the wall and detect its orientation, create a point cloud or tridimensional representation of the moving subjects, and use statistics and machine learning to more accurately detect and predict the nature of the moving object.

We also use a group induction[1] method (inferring object type based on close similarity to a labelled object, or geographical proximity to it), which allows us to use smaller amounts of human labelling than similar conventional approaches. Moreover, our results are compatible with semi-supervised learning techniques (meaning we can allow a user to label only a few examples, and we infer the rest from that) [2]. This method enables the user to train the algorithm in a more practical manner, since a customer will often not take the time to label all

data, but will agree to label a few of the data points (for example, the false-positives or false-negatives).

Yoctopus accelerometer + gyroscope sensor. We added this accelerometer and gyroscope to the depth camera sensor, in order to programmatically determine its orientation with respect to the horizontal ground plane.

This is what the depth camera and the IMU sensor look together[3]. The project also involved a heat sensor (green) but the results of the heat descriptors are reported in a separate paper.

MACHINE LEARNING ALGORITHM

The classification technique we have decided to use for this experiment was that of the boosting technique.[6] "Boosting refers to a general and provably effective method of producing a very accurate prediction rule by combining rough and moderately inaccurate rules of thumb" in the following manner:

Where "in the simplest case, the range of each ht" is binary:

$$H(x) = \text{sign}\left(\sum_{t=1}^{T} \alpha_t h_t(x)\right).$$

For "binary alpha t", we normally set:

$$\alpha_t = \frac{1}{2}\ln\left(\frac{1 - \epsilon_t}{\epsilon_t}\right)$$

This algorithm is fast and has many tweakable parameters. It is also suitable for the processing of a large list of descriptors. The technique uses an array of weak learners that complement each other to improve overall performance.

DESCRIPTOR PIPELINE

Our descriptor pipeline takes the point cloud animations, which consist of a series of frames that represent moving objects. These frames have point cloud stills in them. Together, all point clouds for all frames in the animation constitute one instance.

Each frame of the instance (each point cloud) is pushed through the descriptor pipeline individually, even if these individual images correspond to the same instance of the object being observed.

As seen on Figure 1, the data travels from BlobEntryPoint, the input node, then goes into BlobProjector, which projects the RGBD data from a pixel matrix containing depth and color values into a 3D point cloud, a list of points (X, Y, Z pairs) with color values (R, G, B). Then, the data is sent into two different pods (nodes):

HSVHistogram, where the RGB colors are converted into the HSV space[8], and then a color histogram is computed. The color histogram has H, S, V values for each bin in the histogram.

All these individual scalar values are then sent as a list to the descriptor aggregator, which appends them to a list of values for other descriptors.

ProjectedSize, a pod in which the 3D size is measured and sent to the DescriptorAggregator pod (at the bottom) in order to append it to the list of descriptors to be computed by the machine learning algorithm[9]. This existing pipeline allows us to add more descriptors and experiment with how they affect classification results.

Other pods/nodes are found as well. We can see another node is CloudOrienter, which transforms the point-cloud and orients it based on its longest axis using the PCA algorithm[10]. Once oriented into its principal components (X is the longest axis, Y the second longest, and Z the last one), the point cloud can be better aligned with previous images of that object. For example, if the camera is observing a pen, it will be aligned on its longest axis, so that it can be compared with other images of a pen no matter their perceived orientation.

Then, the oriented pointcloud is projected onto multiple 2D images (different planes: XY, YZ, and XZ) so that we can run a HOG algorithm on each of them[11][12].

Then, the results are condensed into a lower-density vector so that the values can be aggregated and sent to the machine learning algorithm.

METHOD

We placed a PrimeSense RGBD camera near the roof of a room and recorded dozens of hours of footage of activity in the room. We attached an accelerometer and a gyroscope sensor to the camera so that we could later re-orient the point clouds based on the gravity vector measured by the sensors. People, pets and other objects moved throughout the room and were recorded and extracted from the background. These blobs were then separately saved into an SD card. The data was then manually labeled (per instance) using a C++ tool. The data was then passed through the descriptor pipeline.

Then, we continued in the process to perform k-fold cross-validation (this process that enables us to reduce overfitting, so that our classifier can generize better - learn to recognize objects that are not that similar to the training examples). The training data was divided into K chunks and the classifiers were trained on K-1 chunks. Then, the classification and predictions for the remaining chunk were compared against the ground truth that was manually assigned to each instance, and the accuracy values, among others, were computed and saved.

We divided moving objects into multiple classes: cat, person, door, bush, and background, and then we performed 5-way classification. As we can see in the results, there were generally mild improvements as we kept computing new descriptors.

PIPELINES STUDIED

As seen in Figure 1, the Base was the previously existing descriptor pipeline, which orients the point clouds for objects based on their major components and aligns every object on such axes. The Gravity pipeline is the same as the Base descriptor pipeline, but we started aligning objects vertically, based on the camera orientation (measured by the accelerometer and gyroscope). As we can see, performance increases after aligning objects based on the gravity-vector measurement. We can see the Gravity pipeline in Figure 2. Then, OrientedTrajectory is a pipeline to which we also added a trajectory pod, which computes the object velocity and acceleration in X, Y and Z coordinates, aligned with the gravity vector as Z-down. This pipeline can be seen in Figure 3. Finally, since the X and Y orientation is based on the object shape rather than its environment, its use is irrelevant to motion statistics, and thus it cannot be reliably used. Therefore, we added the PlaneTrajectory descriptors, which add a vertical speed feature, a horizontal speed feature (on the XY plane), and it also computes and sends the vertical acceleration and horizontal acceleration scalars to the machine learning algorithm. This pipeline can be found in Figure 4. Then, we added mean angular velocity and acceleration, in Figure 5 (Rotation Statistics). Later, we included a change rate estimator that measures the change of the pointcloud between different frames of the moving object (Figure 6). And finally, we added a Fourier transform node to filter the spectrum of these motion statistics (Figure 7).

BASE PIPELINE

The base pipeline provides a functioning machine learning architecture that very accurately predicts the class of the moving object. However, in our studies, we will modify and add to this pipeline. As we can see here, the point cloud is sent through the CloudOrienter for most subsequent operations. This will be different in the following modified pipelines. The CloudOrienter rotates a point cloud in order to align its longest component with the X axis, and the following longest orthogonal axis on Y, leaving the remaining orthogonal axis to Z. [13]

GRAVITY PIPELINE:

The Gravity pipeline is an enhanced version of the Base pipeline, and includes a GravitationalCloudOrienter as the main node. Instead of orienting pointclouds based on the object's dimensions, this node orients them based on their real-world orientation with respect to the environment's vertical axis. In other words, it uses the measured gravity vector (via accelerometer+gyroscope) to orient the clouds vertically.

The object is oriented vertically based on the IMU sensor that we attached to the depth camera. The Z axis aligns vertically, with the measured gravity vector.

It is also rotated so that its principal component aligns with the X axis.
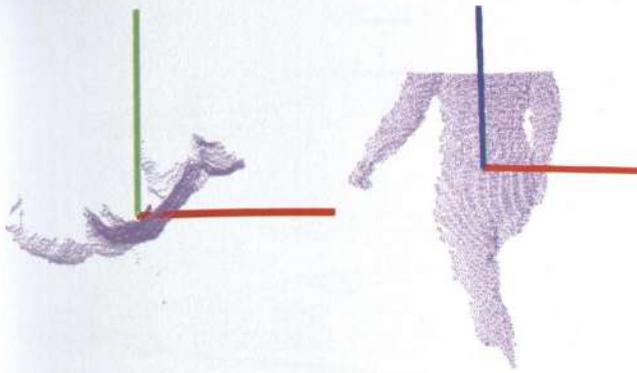
ORIENTED TRAJECTORY PIPELINE

In this pipeline, besides the SimpleTrajectoryStatistics nodes, which accumulated average speed (in any direction), there is a new node called OrientedTrajectoryStatistics, which sends separate X, Y, and Z values for velocity and acceleration in those axes.

PLANE TRAJECTORY PIPELINE

The trajectory pipeline modifies the OrientedTrajectoryStatistics node and adds a couple different computed values. Besides simply separating into X, Y and Z, the node now computes a horizontal speed (in the 2D horizontal plane), a vertical speed (different from vertical velocity), and a horizontal and vertical acceleration, as well.

ROTATION PIPELINE

The rotation pipeline also aggregates data about the pointcloud's rotation in each frame, and the object's rotation acceleration as well, using the PCA algorithm to compute orientations in individual frames.[14] This helps the detection technique differentiate between objects that rotate a lot in the 2D horizontal plane at different speeds and acceleration. This happens in the RotationStatistics node.

CHANGE PIPELINE

The change pipeline adds a descriptor that computes a score representing how much a point cloud changes among different timestamps or frames in the animation. The object might change in size or position greatly among multiple frames due to segmentation errors, overlapping objects or simply because the object is moving or changing at high speeds. This descriptor was made to help us detect background noise instances, or objects that are very badly segmented, and easily exclude them from our other classes.

FOURIER PIPELINE

The fourier pipeline adds a node that performs the fourier transform, changing the basis of the computed descriptor data (such as horizontal speed, vertical speed, velocities, accelerations, angular acceleration, change scores, and rotation statistics.[15]

RESULTS

We first trained our classifier on a dataset recorded indoors, where the only observed objects that moved were cats and people. Some false-positives involved a moving curtain, background noise, or segmentation errors. Here, we can see that by using the measured gravity vector and aligning detected objects relative to gravity can improve performance.

Following this experiment, the new features and enhanced pipeline were applied to a multi-class problem, with data recorded outdoors, this time.

Following the experiments with the 5 classes, another set of experiments were performed, after removing the "bush" class, since most instances of bushes were marked as background and viceversa. It was hard for the person labelling to discern between a moving bush and random noise in the static background. As we can see, this different labelling scheme increased accuracy on the same dataset. Furthermore, we can tell that improvements were seen when adding more descriptors.

	Base	Gravity
Total test examples (number of objects):	1986	1986
Total accuracy (2-way classification):	0.93001	0.941591
Mean logistic score (max is 0, higher is better):	-0.18789	-0.146692
Mean exponential loss (min is 0, lower is better):	0.478102	0.323899
Test examples:	995	995
Average response:	3.0194	4.14704
True positives:	922	946
True negatives:	925	924
False positives:	66	67
False negatives:	73	49
Accuracy:	0.93001	0.941591
Aggregate precision (tp/(tp+fp)):	0.933198	0.93386
Aggregate recall (tp/(tp+fn)):	0.926633	0.950754
Per-class precision (tp/(tp+fp)):	0.933198	0.93386
Per-class recall (tp/(tp+fn)):	0.926633	0.950754

For this set of experiments, we also added a Rotation pod, which computes the object's angular velocity and angular acceleration. This pipeline can be found in Figure 5. Finally, we added the "ChangeEstimator" pod, which computes a flickering score, a descriptor that evaluates how much the object's shape changes between multiple frames. If it flickers a lot, it is likely a segmentation error or background noise, and therefore will not count as a moving subject. As we can tell, this descriptor significantly improves classification accuracy. Its pipeline can be seen in Figure 6.
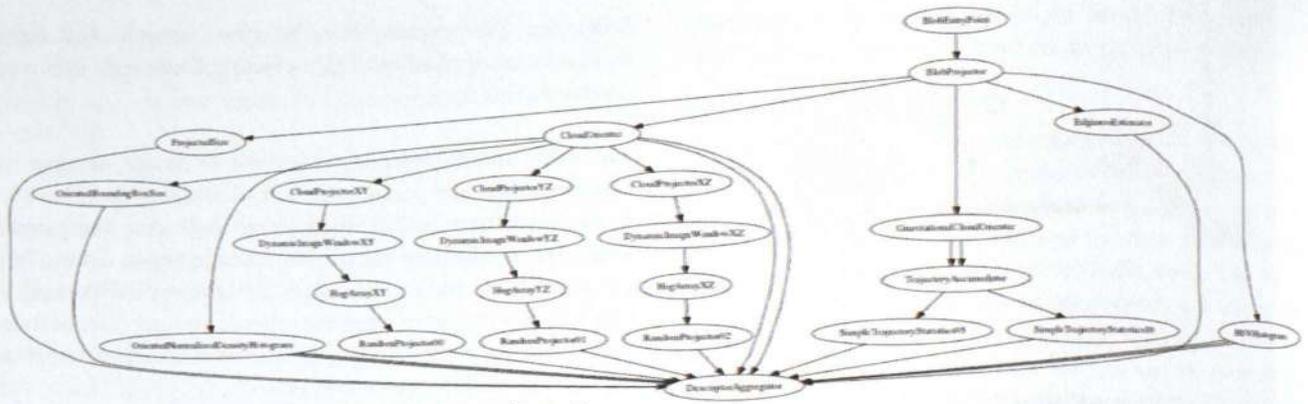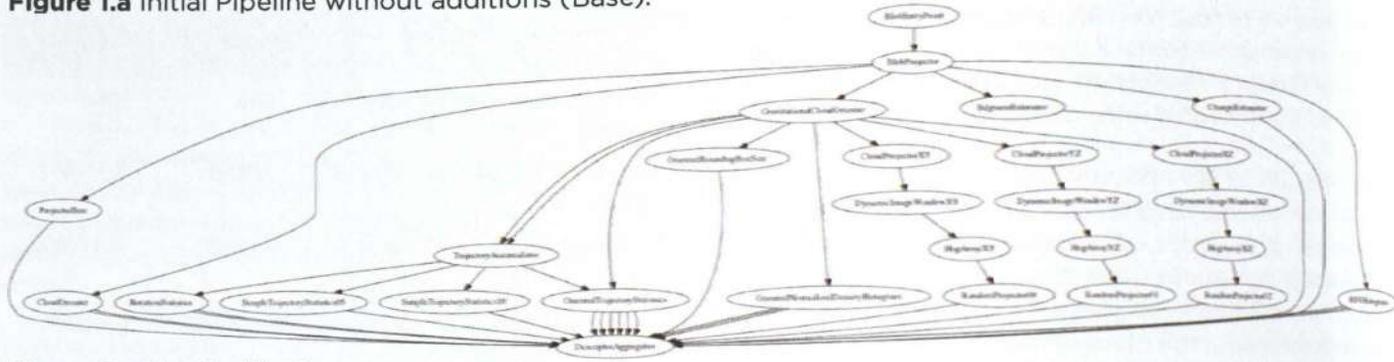
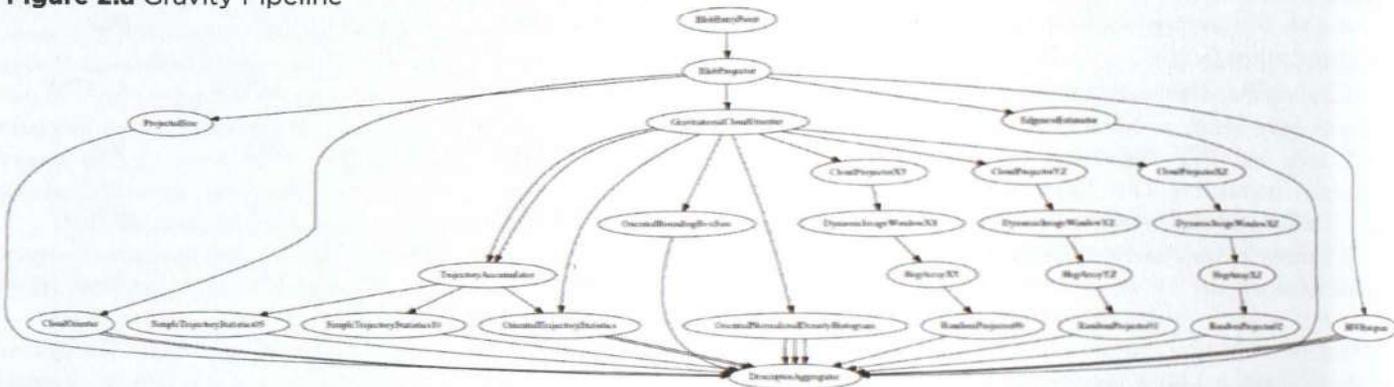**Figure 1.a** Initial Pipeline without additions (Base).

Figure 2.a Gravity Pipeline
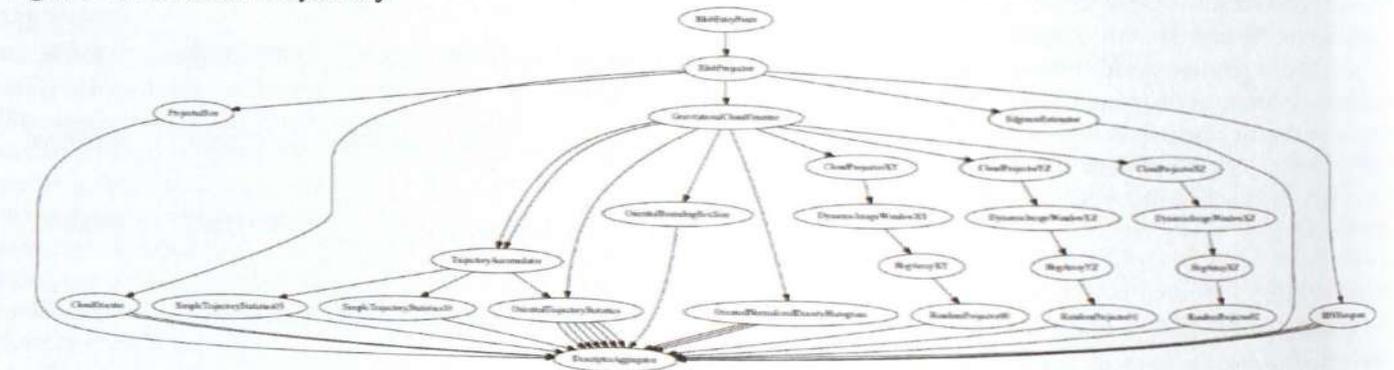

Figure 3.a Oriented Trajectory
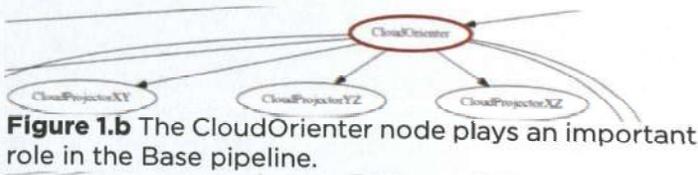

Figure 4.a Plane Trajectory

Figure 1.b The CloudOrienter node plays an important role in the Base pipeline.

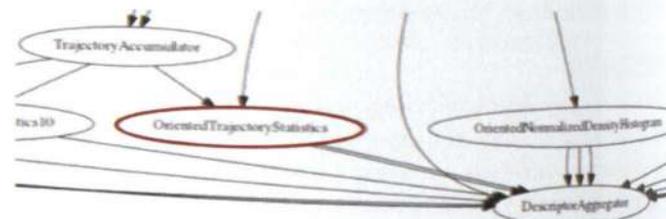**Figure 2.b** The GravitationalCloudOrienter node plays an important role this time.

Figure 3.b The OrientedTrajectory pipeline adds a new statistics node, which is useful for classifying objects with differential vertical and horizontal motion behaviours.
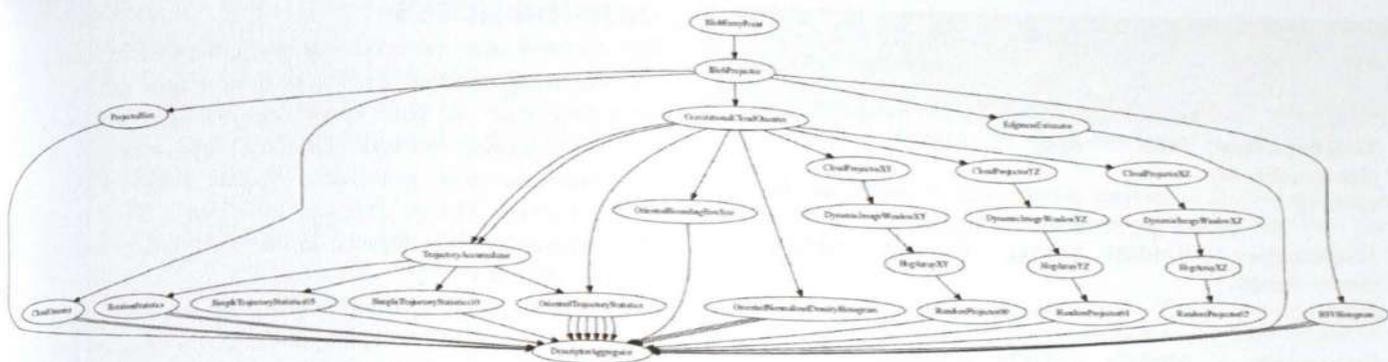
Figure 5.a Oriented Trajectory
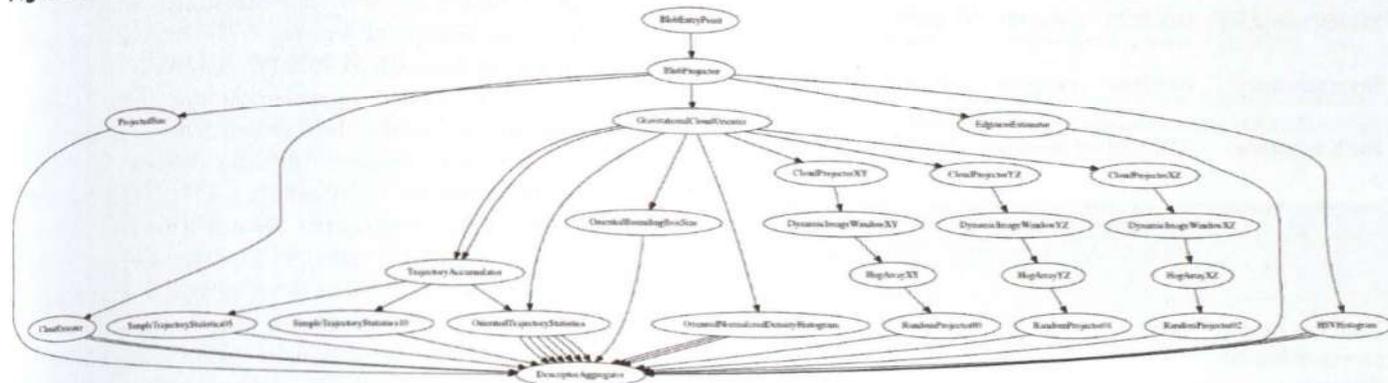
Figure 6 Change
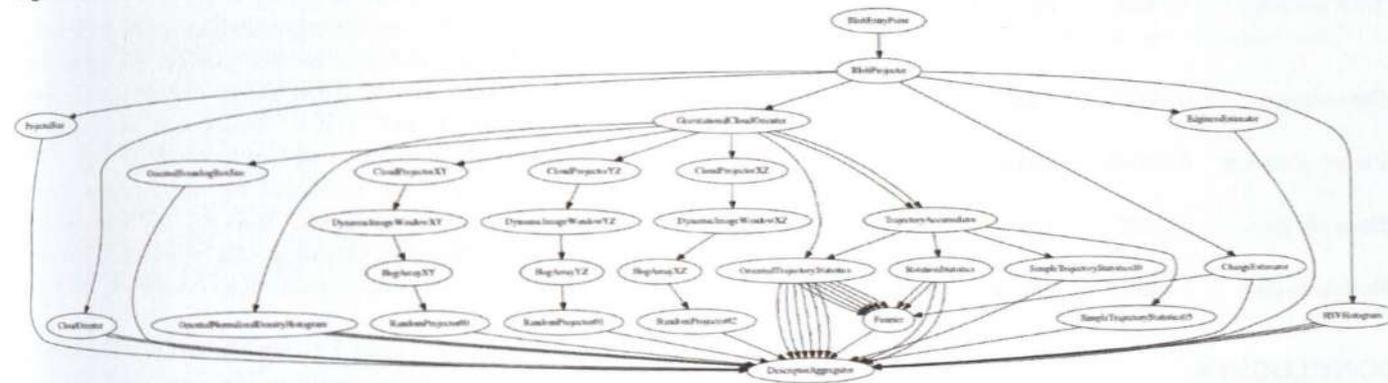
Figure 7 Fourier
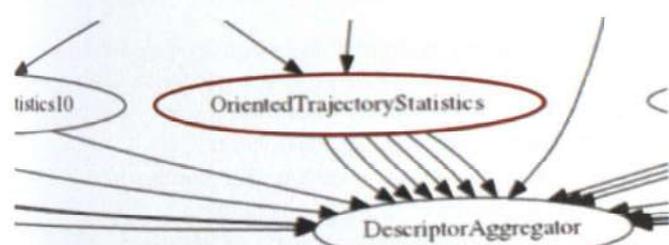
Figure 4.b The OrientedTrajectoryStatistics node is modified and sends more values to the DescriptorAggregator.
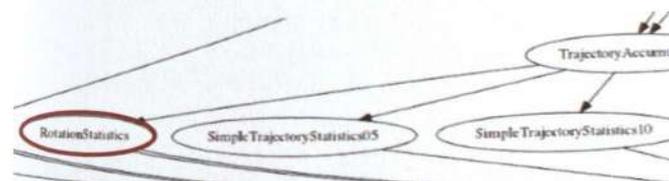

Figure 5.b The rotation statistics node was added to compute the mean angular velocity and mean angular acceleration values of the moving object.
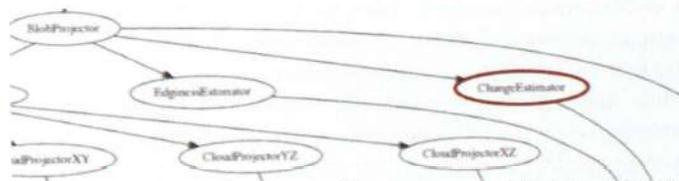

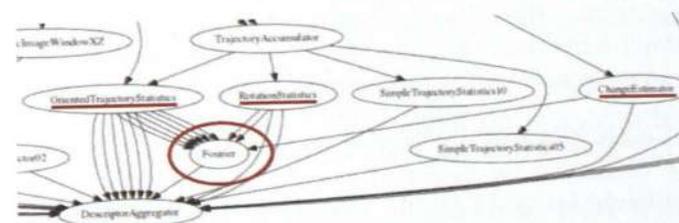**Figure 6.b** The change estimator was added as an independant descriptor

Figure 7.b The fourier node receives data from other nodes and computes their fourier transform, in order to create descriptors that better adjust to objects that move in different frequencies.

	Base	Gravity	Oriented Trajectory	Plane-Trajectory
Total test examples (number of objects):	6468	6468	6468	6468
Total accuracy (5-way classification):	0.910637	0.91141	0.911565	0.912647
Cat accuracy	0.992424	0.992579	0.993352	0.993197
Person accuracy	0.965523	0.964904	0.96475	0.964286
Door accuracy	0.982684	0.982684	0.982993	0.982993
Bush accuracy	0.963358	0.964904	0.963513	0.965213

	Oriented Trajectory	Plane Trajectory	Rotation	Change
Total test examples (number of objects):	6468	6468	6468	6468
Total accuracy	0.94666	0.946815	0.94697	0.949134
Cat accuracy	0.99227	0.992579	0.992733	0.993352
Person accuracy	0.965368	0.96444	0.965213	0.965832
Door accuracy	0.98222	0.982993	0.981911	0.983302
Bush accuracy	0.963358	0.964904	0.963513	0.965213

CONCLUSION

Although some additional descriptors offered mild improvements, in combination, they have delivered consistent improvement in learning accuracy. Additionally, descriptors such as the change-rate descriptor prove very useful to clean up segmentation errors. While aligning objects vertically proves helpful, this should probably be done additionally and not in place of aligning objects on the basis of their principal components (PCA). Future studies should measure the impact of having descriptors using both approaches, combined into the same boosting algorithm's input. The model explained in this paper can be useful for security agencies as well as other applications. It can be used to better identify intruders, differentiate them from other moving objects or subjects, and to create a more robust subject tracking system.
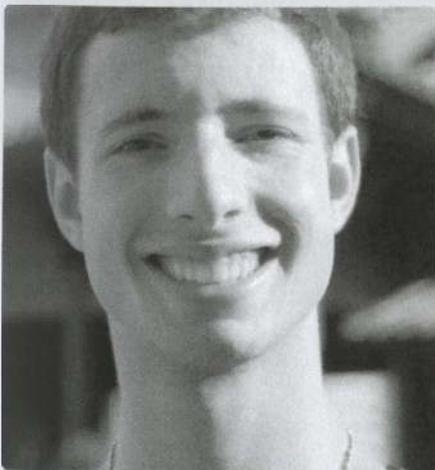
ACKNOWLEDGEMENTS

AUTHOR NOTES

1. Because our point clouds are grouped into animations, including multiple frames, all those frames can be labelled as part of the same object, assuming that the object was appropriately tracked. This can help with training the predictors with more data. Source: Teichman, Alex, and Sebastian Thrun. "Group induction." 2013 IEEE/RSJ International Conference on Intelligent Robots and Systems. IEEE, 2013.

2. Although our research results are compatible with this semi-supervised boosting, we have preferred to use fully supervised learning to generate the results for this paper. Source: Teichman, Alex, and Sebastian Thrun. "Tracking-based semi-supervised learning." The International Journal of Robotics Research 31.7 (2012): 804-818.

3. We used an inertial measurement unit, which performs sensor fusion of the data gathered by an accelerometer and gyroscope. Source: Morrison, Melvin M. "Inertial measurement unit." U.S. Patent No. 4,711,125. 8 Dec. 1987.

4. We are using the algorithm developed by Alex Teichman in order to classify tracks of all moving objects, instead of tracking a specific class. This method is non-specific to object class. Source: Teichman, Alex, and Sebastian Thrun. "Practical object recognition in autonomous driving and beyond." Advanced Robotics and its Social Impacts (ARSO), 2011 IEEE Workshop on. IEEE, 2011.

5. We use the depth-image segmentation method created by Alex Teichman and Jake Lussier. Source: Teichman, Alex, Jake T. Lussier, and Sebastian Thrun. "Learning to Segment and Track in RGBD." IEEE Transactions on Automation Science and Engineering 10.4 (2013): 841-852.

6. We use the boosting technique for our machine learning purposes. Source: Schapire, Robert E. "The boosting approach to machine learning: An overview." Nonlinear estimation and classification. Springer New York, 2003. 149-171.

7. From this paper Source: Schapire, Robert E. "The boosting approach to machine learning: An overview." Nonlinear estimation and classification. Springer New York, 2003. 149-171.

8. Data in the <red, green, blue> vector space are converted into <hue, saturation and value> space. Source: Smith, Alvy Ray. "Color gamut transform pairs." ACM Siggraph Computer Graphics 12.3 (1978): 12-19.

9. We use the boosting technique for our machine learning purposes. Source: Schapire, Robert E. "The boosting approach to machine learning: An overview." Nonlinear estimation and classification. Springer New York, 2003. 149-171.

10. Principal component analysis is an algorithm that transforms data points that seem to be correlated into linearly uncorrelated sets of values (principal components). Thus, the variables that are most correlated for the main axis, with other orthogonal axes accommodating the following most correlated sets of variables. Source: Wold, Svante, Kim Esbensen, and Paul Geladi. "Principal component analysis." Chemometrics and intelligent laboratory systems 2.1-3 (1987): 37-52.

11. Histogram of Oriented Gradiates is an algorithm that is often used as a feature descriptor for computer vision tasks

in order to detect objects. It was used with a lot of success to detect humans in 2D images. Source: Dalal, Navneet, and Bill Triggs. "Histograms of oriented gradients for human detection." 2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05). Vol. 1. IEEE, 2005.

12. HOG algorithm steps.

13. Principal component analysis is an algorithm that transforms data points that seem to be correlated into linearly uncorrelated sets of values (principal components). Thus, the variables that are most correlated for the main axis, with other orthogonal axes accommodating the following most correlated sets of variables. Source: Wold, Svante, Kim Esbensen, and Paul Geladi. "Principal component analysis." Chemometrics and intelligent laboratory systems 2.1-3 (1987): 37-52.

14. Principal component analysis is an algorithm that transforms data points that seem to be correlated into linearly uncorrelated sets of values (principal components). Thus, the variables that are most correlated for the main axis, with other orthogonal axes accommodating the following most correlated sets of variables. Source: Wold, Svante, Kim Esbensen, and Paul Geladi. "Principal component analysis." Chemometrics and intelligent laboratory systems 2.1-3 (1987): 37-52.

15. We used the fast fourier transform in order to convert the motion signal in time into a spectral representation of each motion frequency and their amplitudes. Source: Weisstein, Eric W. "Fast fourier transform." (2015).

REFERENCES

1. Teichman, Alex, Jesse Levinson, and Sebastian Thrun. "Towards 3D object recognition via classification of arbitrary object tracks." *Robotics and Automation (ICRA)*, 2011 IEEE International Conference on. IEEE, 2011.

2. Smith, Alvy Ray. "Color gamut transform pairs." *ACM Siggraph Computer Graphics* 12.3 (1978): 12-19.

3. Teichman, Alex, and Sebastian Thrun. "Tracking-based semi-supervised learning." *The International Journal of Robotics Research* 31.7 (2012): 804-818.

4. Schapire, Robert E. "The boosting approach to machine learning: An overview." *Nonlinear estimation and classification.* Springer New York, 2003. 149-171.

5. Teichman, Alex, Jake T. Lussier, and Sebastian Thrun. "Learning to Segment and Track in RGBD." *IEEE Transactions on Automation Science and Engineering* 10.4 (2013): 841-852.

6. Wold, Svante, Kim Esbensen, and Paul Geladi. "Principal component analysis." *Chemometrics and intelligent laboratory systems* 2.1-3 (1987): 37-52.

7. Teichman, Alex, and Sebastian Thrun. "Practical object recognition in autonomous driving and beyond." *Advanced Robotics and its Social Impacts (ARSO)*, 2011 IEEE Workshop on. IEEE, 2011.

8. Dalal, Navneet, and Bill Triggs. "Histograms of oriented gradients for human detection." *2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition* (CVPR'05). Vol. 1. IEEE, 2005.

9. Teichman, Alex, and Sebastian Thrun. "Group induction." *2013 IEEE/RSJ International Conference on Intelligent Robots and Systems.* IEEE, 2013.

10. Weisstein, Eric W. "Fast fourier transform." (2015).

11. Morrison, Melvin M. "Inertial measurement unit." U.S. Patent No. 4,711,125. 8 Dec. 1987.

LUCAS AGUDIEZ ROITMAN

Lucas is a researcher in Artificial Intelligence. He has worked in Sebastian Thrun's lab (from Google X), on computer vision and machine learning. He's worked on Augmented Reality with David Kelley (founder of the design school at Stanford and IDEO), and also with Jeff Shrager and Terry Winograd (the advisor for Google's original Pagerank algorithm).

He has published dozens of papers on different topics, on the Journal of biosensors and Bioelectronics, the International Journal of Economics and Management Sciences, the Journal of Computer Engineering & Information Technology, and others.

He has done research on Robotics and drones with Mykel Kochenderfer in the department of Aero/Astro. He has studied in Beijing University (top University in China), as well as Humboldt Universität (where Karl Marx and Hegel studied, in Berlin). He also studied in ORT School of Technology in Argentina, and in Instituto Tecnológico de Buenos Aires.