

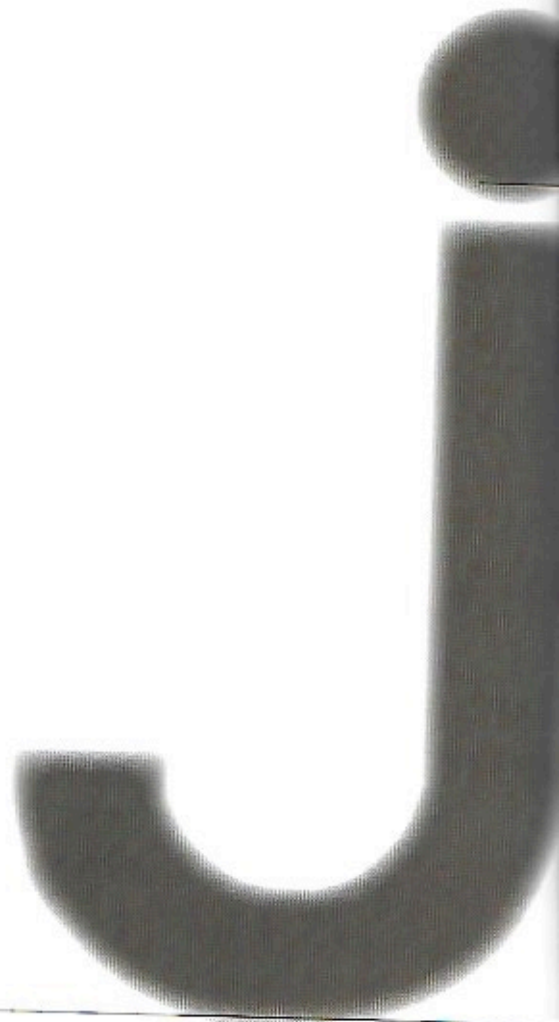
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# Journal of Undergraduate Research



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Issue Two, Spring 2013

## University of Rochester

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

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## From the Editors

As the Journal of Undergraduate Research (JUR) passes its tenth anniversary, we set our sights towards the future of research at the undergraduate level. Specifically, we are interested in questions surrounding the role undergraduates play in increasingly complex fields of study. With groundbreaking research being published every day in a wide range of disciplines, how will undergraduates contribute positively to these ever-evolving fields? How will students manage to conduct research that not only provides them with valuable experience, but also uncovers knowledge previously unknown to current discourse?

The clearest answer to these questions is to work towards developing and strengthening programs that encourage undergraduate research at a higher level of standard. In order for students to create relevant research, they must possess both current knowledge and current tools. Programs focused on teaching information that reflects the consensus of modern scholars will be the ones whose students contribute most significantly to academia. Meanwhile, programs that provide undergraduates with access to state-of-the-art tools in their respective field—whether that field be in the natural sciences, social sciences, or humanities—will be the same programs that cultivate the intellectual leaders of tomorrow.

Here at the University of Rochester, we are motivated by our favorite guideline, “Meliora”, to strive for ever better programs that foster undergraduate research. This effort is evident in the University’s updated course offerings such as our new American Studies major, investments in new research facilities and media centers such as the newly christened Rettner Hall, and grant offerings specifically designated for undergraduate researchers with original ideas, such as our Discover grant. All of these initiatives have already resulted in quality research from our students, as evidenced by the articles in this issue of JUR. We present research from a wide range of academic disciplines, including Political Science, English, History, Brain and Cognitive Science, and American Studies. The Journal of Undergraduate Research is excited to provide a platform for students to present their original research at a professional level, and we look forward to continuing our mission as the future brings even greater possibilities.

Sincerely,

*Corey Garvin*

The logo for the Journal of Undergraduate Research (JUR) features the lowercase letters 'jur' in a bold, black, sans-serif font. The 'j' has a distinctive dot above it, and the 'r' has a small horizontal bar at its base.

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## About the Journal

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humans. Aphids gestate their offspring within their ovaries just like we do and this creates an environment where whatever happens to the mom can actually be transmitted to the offspring. And not only that, but we also know that what happens to the offspring in the aphids has cascading effects through their adulthood, too. That's obviously something we want to understand as humans too- how our maternal environment is having lifelong effects on our offspring, and just the basic environmental versus genetic control. Phenotypic variation is something that is very basic to all organisms as well and isn't as well understood - the nature versus nurture - as well as we would like.

*jur:* How would you suggest that undergraduates get involved in research?

*Brisson:* They just need to contact professors; that is the big thing. But no matter what, get involved in research. That's the most important thing. I attribute my whole career to getting involved with research at a young age, and it wasn't my initiative that did it. I was a very shy person and I never would have approached a professor. I was just really lucky that I was at this state institution where the head of the department cared about people, and he took me aside and said, 'You know, you should really get involved with research. Hey guess what, we'll pay you for it too. Here are all these labs, what sounds good? Now go do research.' And if that hadn't happened, I don't know what the course of my life would have been. I don't know what people have to do these days. I know there's a lot of competition to get into labs, but just try to find somewhere. Try to find a professor who cares about undergrads in their lab, too, because sometimes people just hire people and you don't get much attention. You really want to find a lab that will nurture your interests and not just give you dishwashing duties, for example. You don't want the passion for research burned out of you.

*jur:* Do you have any words of wisdom or advice for undergraduates?

*Brisson:* Do what you love. For me, I had a scary decision because I thought I wanted to do biomedical research up until the last minute, and that's when I realized, 'no, I don't.' And then when you switch over, you don't have any background. I never had an evolution course when I went into a PhD program for evolutionary biology. It just felt like that was the right thing for me. Sometimes you have to take a chance, too.

# THE PARADOX OF PROTEST, PRODUCTION, AND PURCHASE

Julie Elliot, 2015

Adviser: John Rubin

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American modernity has brought with it a consumer culture in its pocket, along with a “commodity fetishism.” Karl Marx defines the term as when humans cast their desires upon external objects<sup>1</sup>, arguing that when something is owned it can only fulfill a projection of desire. The subject becomes reliant on the object to provide an illusion of benefit, such as happiness, utility, or status. Because these “benefits” are merely illusions, the consumer or subject is left with emptiness. A realm often thought to be separate from the frivolousness and meaninglessness of consumer culture is the domain of art. Art is frequently romanticized to be a profession of independent self-expression. However, Dan Zimmerman writes that art in itself is “a commodity [that] embodies intangible concepts and ideas by transforming them into material goods, capable of being marketable, sellable, and collected.”<sup>2</sup> Therefore, if art is designated as a commodity, can artists use art to critique contemporary consumerism without perpetuating what they critique? The answer is no.

In *Rabbit, Run*, John Updike criticizes modern materialism through his character Harry “Rabbit” Angstrom and aims to reveal the ill qualities consumerism propagates. However, Angstrom, a character of fiction, exists only in the domain of a book, an object that can be bought and sold. Hence, what Updike rebels against is also what he himself produces, leading to a paradoxical relationship between message and medium. In a similar fashion, the pseudonymous British street artist Banksy uses painted street art to satirize the toxic and absurd nature of consumer culture, particularly in the art world. His works often mock the people enticed by consumerist seduction and reveal the dangers that accompany that seduction. Yet, as Banksy has developed into a famous contemporary artist, his works that protest consumerism have ironically become commoditized.

Updike begins his book with an overt critique of modern consumerism. At the book’s commencement, protagonist Rabbit Angstrom encounters a Tootsie Roll advertisement on the television. “Then the commercial shows the seven segments of a tootsie roll coming out of the wrapper and turning into the seven letters of ‘Tootsie.’ They, too, sing and dance. Still singing, they climb back into the wrapper. It echoes like an echo chamber. Son

of a bitch: cute. He’s seen it fifty times and it turns his stomach.”<sup>3</sup> Rabbit’s description of the commercial, “son of a bitch: cute,” is contradictory. Stating it is “cute,” a positive yet terse description of the commercial, suggests that the happiness the commercial exudes. Furthermore, the happiness a tootsie roll itself can ostensibly provide, are both ephemeral and simplistic. His angry curse, “Son of a bitch,” reveals Rabbit’s bitterness towards the advertisement, and suggests that his joy is merely an illusion, or “projection” of delight. Updike juxtaposes the seemingly carefree, lightheartedness of the dancing chocolate pieces with Rabbit’s gut wrenching, stomach turning reaction to the commercial. The contrast between viewer and advertisement exposes the displayed cheerfulness as a false pretense, since Rabbit is ultimately left with an emptiness that “echoes.”

Rabbit’s profession likewise reveals Updike’s criticism of modern American materialism. As a salesman for the amazing “Magipeel Fruit and Vegetable peeler,” Rabbit demonstrates the use of the product in local stores throughout the neighborhood. Just as the Magipeel strips off the skin of fruit and vegetables, it too strips Rabbit of his sense of purpose. His career is dedicated to a luxury kitchen tool; the product’s triviality mimics Rabbit’s own perceived triviality. The mockery with which other characters regard Rabbit’s job also hints at Updike’s contempt for consumer culture. His former basketball coach Tothoro states “I’m sure that the Magipeel Board sits down at their annual meeting and ask themselves, ‘now who has done the most to further our cause with the American people?’”<sup>4</sup> He goes on to insist that Rabbit, a hard worker and peeler extraordinaire, *must* be number one on this important candidate list. Updike paints Rabbit’s position in consumer America with sarcastic humor, conveying the futility of man’s role in consumer society. Rabbit becomes a victim of modern materialism as his fruitless, joke-worthy career has driven him into a state of permanent apathy.

While Updike uses his novel to criticize consumerism in modern life, his publishing of a novel, a commodity itself, is proof of his participation in that same consumer society he disdains. His first book *Rabbit, Run*, published in 1960, “sold like hotcakes,”<sup>5</sup> selling 20,000 copies in the first year alone.<sup>6</sup> The relatable nature of Rabbit’s character contributed to the book’s achievements.

Updike took advantage of Rabbit's success by publishing three subsequent novels: *Rabbit is Rich*, *Rabbit Redux*, and *Rabbit at Rest*.<sup>7</sup> Two of those novels were eventually awarded with Pulitzer prizes. Hesitant to end the Rabbit's franchise, Updike added a novella to the sequence in *Rabbit Remembered*. In an interview with the Academy of Achievement Organization, Updike admitted, "[Rabbit] had been so good to me. The books won prizes and they were fairly easy to write."<sup>8</sup> Rabbit's selling ability as a character ironically improved Updike's connection to him, despite Rabbit's hatred for consumer goods.

A variety of other consumer goods sprouted as a result of *Rabbit, Run*'s publishing. For instance, in 1970, director Jack Smight released a movie adaptation of Updike's book.<sup>9</sup> Copies of the movie and its associated goods, such as its movie posters, too became part of the consumerist world that surrounded Updike's book. The movie *8 Mile*, directed by Scott Silver, also incorporated many aspects of *Rabbit, Run*, including a quote from it to begin the film, and featured a song by Eminem called "Rabbit Run," available for purchase on websites such as Amazon and iTunes.<sup>10</sup> Thus, the novel Updike used as a vehicle to protest commoditization, ultimately fell victim to that same commoditization. This proves that Updike's art failed as a means of critiquing consumerist culture without existing as a product itself.

Banksy also openly reveals his loathing for modern industrial society's consumerist spouse through his personal ideological statements and works. His pieces shed light on the evils he believes materialism breeds. He states, "the people who run our cities don't understand graffiti because they think nothing has the right to exist unless it makes a profit..."<sup>11</sup> This reflects his belief that society and government, which are supposed to transcend corporate interest, are in fact centered around the capitalist profit motive. He continues on to say, "the people who truly deface our



Figure 1

neighborhoods are the companies that scrawl giant slogans across buildings and buses trying to make us feel inadequate unless we buy their stuff."<sup>12</sup> Here again, he is attacking the nature of commercialism and advertising, both of which exaggerate the potential satisfaction of people's "projected" desires in order to sell products. Consistent with his philosophy, Banksy produces many works that often use humor to reveal the problems of, and reflect his repugnance toward, consumerism in England and America.

In one specific piece, "I pledge allegiance to the bag" (Figure 1) painted in Islington, London in 2008, Banksy satirizes contemporary consumerist culture.<sup>13</sup> He paints a small dark skinned boy onto a wall, to the left of a telephone pole, reaching out to grab a site specific wire. The boy appears to have just hoisted a "flag" up to the top of a telephone pole. On the opposite side of the pole, stand two other dark skinned children, one girl and one boy, in cargo uniforms, with their hands held boldly over their hearts. While from afar, it appears that a flag rests at the top of the pole, in reality the object the children obediently stand under is a bag from the largest grocery store company in Great Britain, Tesco.<sup>14</sup> Here, Banksy suggests that corporations like Tesco, centered around consumerism, have gained so much power in modern times that they have essentially become the state, the ruling body of modern societies. The children's similar outfits insinuate their unity, rather than conformity, under corporate rule. Through the rigid stances of the children and the cargo material, with which the outfits are made, Banksy alludes to the military, implying Tesco's rule has created an army like state under which self expression is muted and sameness is engendered.

Moreover, the blue stripes and red letters that write the word "Tesco" across the bag are reminiscent of an inverted American flag. This hints that, while originally created in England, the painting's message also applies to American consumer culture. The name of the piece "I pledge allegiance to the bag" alludes to the United States as well, since it warps a line from the American Pledge of Allegiance. Often said daily in schools around the nation, the pledge is a declaration of obedience and loyalty to American democracy and freedoms. In the piece, the children declare their obedience and loyalty to a corporation. Banksy's satire of a pledge promising liberty and freedom also questions modern society's façade of freedom. Milton Friedman in *Capitalism and Freedom* states, "Political freedom means the absence of coercion of a man by his fellow man."<sup>15</sup> If companies implement tools of coercion to persuade people into purchasing luxury goods, consumer actions cannot be considered actions of freedom. In this way, Banksy's piece claims that contemporary materialism counteracts the ideals to which nations such as England and America claim to adhere.

Banksy further comments on commercialism, specifically in the art world, in one piece that was created on indoor walls as opposed to in an urban space. In the work, a gold, elaborate square frame is mounted on a wall (Figure 2). From the bottom of the classically romantic frame hangs a vertical bright, red price tag, reading "€10,000." Inside the frame is a panel on which a cartoon creature is painted with thin limbs and an oval face outlined in black. His white and black eyes stare down toward the price tag, his body leaning as well. A white quote bubble sprouts from the left of the cartoon that reads, "You have got to be kidding me..." In the three dimensional image, Banksy expresses



Figure 2

his overt disgust with the existence of art as a commodity, and a highly priced one at that. The cartoon's anger reflects his own discontentment towards the relationship between money and art. The high price of the artwork further implies that the consumers of art are of a homogenous socioeconomic group, suggesting that consumerism, especially in the art world, is founded on inequality, as wealth directly correlates with purchasing power. This exclusionary aspect of commercial art helps explain Banksy's use of urban walls as his publishing space. He claims that because his works of graffiti are exhibited in public space, "there is no elitism or hype... nobody is put off by the price of admission."<sup>16</sup>

On another note, consumerism in modern America has created a direct association between object and "lifestyle," as this "lifestyle" being described is the product of one's possessions.

Banksy comments on this relationship between daily existence and commodities in his graffiti painted on the side of a warehouse. The piece's text reads, "SORRY! The lifestyle you ordered is out of stock" in bold, black letters (Figure 3). By scribing the words on the side of a warehouse, Banksy directly engages with the source that inspires the work; he comments on consumption on the walls of a place that houses consumer goods. Because his text and the warehouse space are in conversation, the piece's message is stronger. The words themselves too play with the idea of commoditization, painting lifestyle as a tangible, consumer good that can be ordered, bought, and sold out. By stating someone ordered a style of life that the warehouse could not "yield," the piece again hints at the inequity that accompanies purchasing culture. Economist and sociologist Thorstein Veblen states that the leisure class engages in "conspicuous consumption," which the lower classes seek to emulate by buying luxuries to create the illusion of high status despite their lacks of funds. In the piece, the customer did not receive the lifestyle desired, suggesting that

the buyer perhaps was attempting to emulate those lifestyles of the wealthy. Yet, they were already *distributed* to those members of the upper-echelon. Banksy critiques this feat of imitation that accompanies the capitalist and consumer culture of America in his work "Out of Stock."

Banksy's antipathy toward blind admiration of consumerism is provided further evidence through his image of a rat on the side of a wall in Chicago (Figure 4). The rat is stenciled with paint and sits in a position of eagerness. Atop his head sits a burette, while atop his face sit a pair of stars in place of eyes. This rat addresses materialistic culture pertinent in American society in a variety of ways. Firstly, Banksy's subject is a rat, a creature typically thought of as lowly and insignificant. Yet, in "Underestimating the rat's intelligence," Hank Davis claims that rats are extremely successful at portraying cognitive intellect within their own setting,<sup>18</sup> suggesting that Banksy's subject is in reality quite astute. Yet, the rat's mind is trapped within the confines of its body, limiting his "social mobility." Thus to assert himself as an elite, he wears a commodity, a burette to form an illusion of status despite his other blatant, animalistic qualities. In this way, he uses a commodity to heighten his social rank. Banksy's juxtaposition of the rat's forged image of elitism and his standing as a marginalized wild animal proves again Banksy's belief in the truth of Veblen's theory: lower classes often attempt to imitate the goods and styles of the upper classes in order to achieve higher statuses in consumer society.

Banksy further mocks the relationship between commodity and perceived status by painting the rat's eyes not with pupils, but instead with humorous, cartoonish stars. His eyes imply his amazement and wonder by how he peers at the city, with its advertisements and bustling consumer culture. "Her insignificance in the presence of so much magnificence faintly affected her," wrote Theodore Dreiser.<sup>19</sup> This quote that could also be applied to the rat's awe-struck eyes hints at materialism's facade of magnificence, which enables it to seduce. Banksy's cartoonish style of painting, however, mocks those ignorant enough to be seduced by the very consumer culture he so heavily disdains.

Banksy's use of a rat as his subject also, perhaps, references Upton Sinclair's narrative, *The Jungle*, that documents the beginnings of modern consumerism. In it, Sinclair "detail[s] how rats, rat poison, rat feces, and even human body parts often got mixed in with processed meats and marketed to the public."<sup>20</sup> Thus, Banksy is perhaps representing the harms of consumerism



Figure 3

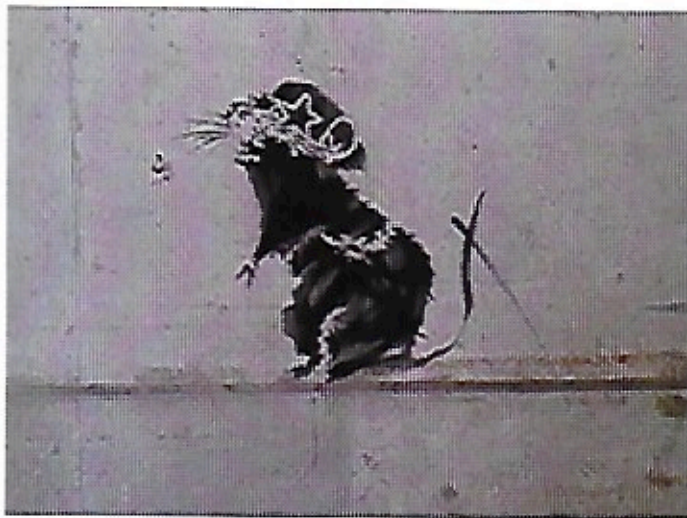


Figure 4

through the rat's representation of gross manipulation. Through this representation, Banksy's assertions against consumerism are strengthened.

Yet, amidst all of his consumerism loathing and materialism resenting, Banksy's works have themselves entered the arena of the elite, contemporary art world. His works that so avidly protest consumption and production end up being protested through consumption and production. After Banksy hosted his own gallery show "Barely Legal" in Los Angeles, his work started to "attract people in the art world establishment."<sup>21</sup> His art slowly shifted from being a tattoo on a wall to being a commodity. BBC reports that "a picture of pensioners bowling with bombs by graffiti artist Banksy has sold in London for £102,000."<sup>22</sup> This hints that the graffiti artist perhaps began to fall victim to the seduction of consumer culture, alongside Carrie and his rat. In addition, the "Vandalized Phone Booth" he created out of a sawed in half phone booth and an axe, sold at an auction for \$550,000.<sup>23</sup> Moreover, his piece "Simple Intelligence Testing," made of oil on canvas laid on board, sold at a similar auction for \$1,093,222. This price tag far exceeds the price tag of what the small cartoon character in Banksy's gold frame was shocked and appalled at. What would the cartoon say to Banksy after hearing such excessive and superfluous numbers? As a result of these figures, Banksy's words that there "is no elitism"<sup>24</sup> invite skepticism. Through the selling of his art to members of the art world, Banksy perpetuates what he despises most. Eva Branscome claims Banksy "questions the convent of the art world while simultaneously colliding with it."<sup>25</sup> Banksy's works too became a commodity through his publishing of multiple books displaying his work, including *Banging Your Head Against a Brick Wall* and *Wall and Piece*, released in 2005. *Wall and Piece* alone sold 90,000 copies and generated a profit of one million dollars.<sup>26</sup> Strangely, the book is chiefly offered at stores, such as skate shops and Urban Outfitters, that cater to a population of homogeneous elite and middle class white urbanites. The population Banksy often mocks, both in his art and ideology, has become his clientele. It seems that Banksy's claim that his art widens audiences and creates a more socioeconomic heterogeneous audience, as there is no entrance fee, is in actuality only partly true.

Furthermore, in 2010, Banksy released a film called "Exit Through the Gift Shop," that was eventually nominated for an

Academy Award in 2011 for Best Documentary.<sup>27</sup> The gross profit from the movie in theaters alone was \$3,291,250.<sup>28</sup> This in itself reveals Banksy's participation in and production directly for the consumer society that he so despises. Likewise, thousands of his prints are for sale on large corporate sites such as eBay, and Amazon. Mouse pads, iPhone cases, T-Shirts, calendars, and wall decals all printed with Banksy's anti-consumerism artwork are available for purchase.

The question then remains, amidst modern society and the ubiquitous consumer culture that seems inescapable, is how does one put forth in society a true satire or critique of consumer culture without employing it as a tool to do so? The experiences of Updike and Banksy suggest that perhaps it is impossible. However, Updike does admit that that "the main enemy is being interviewed,"<sup>29</sup> and suggests that literature like his own, that was formerly an enemy of mainstream culture, has entered the spotlight of that mainstream culture. Similarly he states "celebrity is a mask that eats into the face."<sup>30</sup> This reveals that he does not revel in his celebrity, but rather, it is a consequence of his submission into society as a means of communicating the flaws of said society. Because of his admittance of the hypocritical nature of *Rabbit Run's* production, Updike regains credibility and authenticity in his disapproval with consumer culture.

Banksy too admits his shift from his anti-establishment elusive status to a member of the high society. In one of his works "I Can't Believe You Morons Actually Buy This Shit," (Figure 5) he paints a picture of a black and white auctioneer at a podium in front of an audience, and to his left sits a gold frame on a stand. The frame, which is what the auctioneer is offering to buyers, reads and echoes of the title, saying, "I can't believe you morons actually buy this shit." Here, he simultaneously mocks the consumer culture present in both general modern industrial society and the art world, while also admitting his entrance into the upper echelon's world of art. His acknowledgment of his new persona, that some would deem success and others call a "sell-out," does help him in effect regain credibility, by tying him back to his old roots of anti-consumerism.

In another work, Banksy paints his signature name "Banksy" on the wall in red thin paint (Figure 6). He then stencils in front of his signature, using perspective techniques, a man with his



Figure 5



Figure 6

hand on his chin, turned to the side, in apparent contemplation and admiration of Banksy's work. He is alone, dressed in a suit and thick glasses, hinting that he is perhaps an art collector. On the other side of the work, stands another man with his back to the viewer, with his arm slung around a child's shoulders. The man's suit again suggests his membership of a higher-level class, perhaps thinking of "purchasing" Banksy's work.

Ultimately, art's status as a commodity inevitably forces artist to engage with consumerism to attack consumerism. Updike's and Banksy's acknowledgments of their dependence on commodities to send messages of the anti commoditization seems unavoidable, but restores the integrity and authenticity of their antipathy for consumer culture and the negative qualities it yields.

#### REFERENCES

- <sup>1</sup>Marx, Karl. *Capital: The Process of Capitalist Production*. 3d German edition (tr.), p. 53.
- <sup>2</sup>Dan Zimmerman, "Art as an Autonomous Commodity within the Global Market," *art&education*, accessed December 1, 2012, <http://www.artandeducation.net/paper/art-as-an-autonomous-commodity-within-the-global-market/>.
- <sup>3</sup>John Updike, *Rabbit, Run* (n.p.: Random House Trade Paperbacks, 1960), 9.
- <sup>4</sup>Updike, *Rabbit, Run*, 52.
- <sup>5</sup>"Rabbit, Run Background," GradeSaver, last modified 1999, accessed December 10, 2012, <http://www.gradesaver.com/rabbit-run/study-guide/about/>.
- <sup>6</sup>"Rabbit, Run," Schmoop, last modified 2012, <http://www.schmoop.com/rabbit-run/>.
- <sup>7</sup>*Encyclopedia Britannica Online*, s. v. "Rabbit, Run," accessed December 09, 2012, <http://www.britannica.com/EBchecked/topic/487925/Rabbit-Run>.
- <sup>8</sup>John Updike, interview by Academy of Achievement, Chicago, IL, June 12, 2004.
- <sup>9</sup>"Rabbit, Run (1970)," IMDb, accessed December 8, 2012, <http://www.imdb.com/title/tt0066274/>.
- <sup>10</sup>"8 Mile (2002)," IMDb, accessed December 9, 2012, <http://www.imdb.com/title/tt0298203/>.
- <sup>11</sup>Banksy, *Wall and Piece* (London, UK: Random House Group, 2005).
- <sup>12</sup>Banksy, *Wall and Piece* (London, UK: Random House Group, 2005).
- <sup>13</sup>Eva Beanscome, "The True Counterparts of Banksy Radical Walls of Complicity and Subversion," *Architectural Design* 81, no. 5 (September 13, 2011):PDF.
- <sup>14</sup>Tesco, accessed December 12, 2012, <http://www.tesco.com/>.
- <sup>15</sup>David A. Hollinger and Charles Capper, eds., *Selection from Capitalism and Freedom*, 6th ed., vol. 2, *The American Intellectual Tradition*, To Extend Democracy and Formulate the Modern (New York, NY: Oxford University Press, 2011), 401.
- <sup>16</sup>Banksy, *Wall and Piece* (London, UK: Random House Group, 2005).

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# WESTERN FINANCE AND THE EAST ASIAN PATH TO ECONOMIC MODERNITY

Cameron S. LaPoint, 2013

Adviser: Dahpon D. Ho

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Given the increasing importance of East Asian economic conditions for the global economy, it is worth asking how the historical development of financial institutions in China and Japan helped shape the success of those economies from the late twentieth century into the present. A larger and more fundamental question is the extent to which the increased sophistication of financial mechanisms in East Asia led to the formation of distinct, yet notably similar, modern nation states. To reach any answers to these questions, one must explore the different, but ultimately convergent, paths of China and Japan to the economic hegemony they enjoy today as the world's second and third largest economies, respectively. Underlying this process is a narrative explaining the dramatic modernization of financial and monetary activity in East Asia over the course of a short century: from the first opening up of treaty ports to Western trade in the mid nineteenth century to the beginning of the Pacific War.

At varying speeds across different regions, Asian governments and businesses mimicked the financial conventions of the Western merchants and envoys who nurtured an increasingly insatiable appetite for trade. The transformation of empires into military-backed democracies in China and Japan in the early twentieth century up to the Japanese invasion of China in 1937 further reinforced the expansion of monetary control and functions the state exercised over the private transactions of its citizens. The needs of the state and of the complex trading systems that developed resulted in a bipartite financial system within East Asia today, which is characterized by the interexchange between powerful national banks and private, regionally-based banking corporations backed by long standing relationships with conglomerates of prewar origin. In spite of the different trajectories China and Japan took to achieve their present economic successes, their economies share a common financial history that can be traced to shared experiences responding to Western encroachment and analogous ideologies concerning the

role of citizens and the state in financial markets. The greatest legacies of Western imperialism were its psychic impacts on the East Asian peoples and the rapid transmission of modern economic statecraft that resulted.

The terms 'banking' and 'finance' are often broadly defined. Both banking and finance can refer to saving, money lending, capital investment or currency issuance. To mitigate confusion, in this paper modern banking and finance consists of capital investment, specifically state sponsorship of industry, and management of prevailing currency and payments systems. The analysis is divided into five sections, tracing the chronology of advancements in the financial sector and monetary systems in East Asia up to the present. Section 1 summarizes Western Imperialism in East Asia over the nineteenth and twentieth centuries. Section 2 describes preexisting financial arrangements and the merchant classes in China and Japan before the opening up of East Asia to trade with the West. Section 3 examines the construction of a Western influenced economic ideology in East Asia, with special attention given to the perceived role of the state in financial affairs. Section 4 contains the pith of the argument, detailing the responses of Imperial Japan and the various Chinese governments from 1842-1937 to the primarily *economic* threat posed by foreign powers. Finally, Section 5 concludes with a brief discussion of evidence for the long lasting impact of Western imperialism on the money and banking systems in present day East Asia.

## I. WESTERN IMPERIALISM IN EAST ASIA, A BRIEF CHRONOLOGY

This paper focuses on the impact of Western imperialism in China and Japan in the nineteenth and twentieth centuries. Up until the late eighteenth century, silver specie was the predominant method of payment accepted by the Qing state for exchange with Great Britain. To prevent the outflow of their silver specie, the British began to take advantage of the increasing demand for opium among Chinese elites. Viewing that opium addiction was eroding a deeply entrenched canon of Confucian values, as well as providing a means through which the British were profiting from the addiction of its subjects, the Qing state attempted to centralize and limit the trade to Canton before Emperor

<sup>4</sup>This study was conducted as an undergraduate honors thesis at the Department of History, University of Rochester, Rochester NY. Professor Dahpon D. Ho served as the primary adviser for this project. This paper won the University of Rochester Willson Coates Senior Honors Essay Prize in History (2013) and the Phi Alpha Theta Nels Andrew Cleven Founder's Prize (2013).

Daoguang finally outlawed the opium trade in 1838.<sup>1</sup> This set in motion a series of political conflicts that prompted the British to protect their economic interests in China through military action in the First Opium War (1839-1842).

The resultant Treaty of Nanking (1842), the first of the unequal treaties, established a precedent of Western demands from China, and later from Japan, that was not entirely reversed for almost a full century. Its provisions included the opening of Canton, Fuzhou, Xiamen, Ningbo, and Shanghai to trade with British subjects, the concession of Hong Kong to the British, several indemnity payments, concession of tariff autonomy, freedom for Protestant missionaries to proselytize in the treaty ports, and guarantees of extraterritoriality for British subjects. The Treaty of Wangxia (1844) and Treaty of Huangpu (1844) were accords that extended similar rights to trade and set tariff rates to the Americans and the French, respectively. Increased competition for market shares among the three Western powers led Britain and France to demand additional concessions from the Qing dynasty, including 'most-favored nation status.' Rejection of these demands resulted in the outbreak of the Second Opium War (1856-1860), in which a coalition of British and French ultimately defeated the Qing forces. The Treaties of Tianjin (1858, 1861) established the right of the United States, Britain, France, and Russia to legations in Peking, levied further indemnities, opened eleven more ports to foreign trade, and legalized the opium trade.

Additional accords and treaties in the nineteenth century cemented foreign control of Chinese commodity trade and gave rise to a vibrant community of Western business houses in the international settlements of the treaty ports. At the same time, the Qing government increasingly relied on loans from foreign lenders to pay reparations owed from the Opium Wars and later from the Sino-French (1884-1885) and Sino-Japanese Wars (1894-1895). A flurry of accords and treaties during the second half of the nineteenth century created a system of spheres of influence along the Chinese coast. Latent xenophobia and discontent with the subordination of China to Western influences contributed to an anti-foreign rebellion in June 1900, when the 'Boxers' attacked European legations in Peking; the Boxer Rebellion was finally quelled in 1901 after an eight-nation coalition of Western nations and Japan marched on Peking. The Boxer Protocol (1901) stipulated that China pay an indemnity of 450 million *taels* of silver over a period of thirty-nine years to the eight participating nations.

Western imperialism for Japan involves a much shorter chronology than for China. In the mid-nineteenth century, the Tokugawa Shogunate existed in virtual isolation (*sakoku*), as the only state-sanctioned interactions with a foreign nation were those conducted with Dutch traders at the port of Nagasaki. The Americans were the first to attempt to end Japanese autarky when Commodore Matthew Perry of the U.S. Navy sailed a squadron of warships into Edo and demanded recognition of a trading relationship with the United States. After being initially rebuffed, Perry returned in 1854 with a larger contingent of warships. This renewed show of force prompted the Shogunate to conclude the Convention of Kanagawa (1854), conferring extraterritoriality and opening the ports of Nagasaki, Shimoda and Hakodate to trade. An amity treaty with the British immediately followed, and the Ansei Treaties (1858) between Japan and the United States,

Britain, Russia, the Netherlands, and France confirmed formal diplomatic relations, opened five more treaty ports, extended extraterritoriality to subjects of the involved nations, and fixed low import-export duties at the treaty ports.<sup>2</sup>

What stemmed Western imperialism in Japan was the ability of the new Meiji government to build a state economically and militarily powerful enough to compete with the West in the Pacific region. The Meiji leadership overturned its unequal status with Britain when the Anglo-Japanese Treaty of Commerce and Navigation (1894) became effective in 1899, and the United States accepted Japan's tariff autonomy in 1911 when Japan raised import duties. Comparatively, China did not regain tariff autonomy until the 1920s, and extraterritoriality was not formally abolished until 1943. It is in this context that the attendant study investigates the implications of the Western presence in the Pacific for the development of modern financial institutions and monetary policy in China and Japan.

## II. MONETARY AFFAIRS IN IMPERIAL CHINA AND MEDIEVAL JAPAN

Although concepts of assets and savings existed in East Asia long before the arrival of the United States and Western Europe, the flexibility with which financial institutions transferred and accumulated capital was initially quite limited. These traditional media of wealth exchange may be called financial in that a significant amount of their daily functions either constituted or was supported by internal financial operations. In the regimes of the Qing Empire and the Tokugawa Shogunate, which lacked centralized financial structures, the temples of various Buddhist sects and Shinto shrines invested the donations of the pious in the cultivation of new lands and facilitated the transfer of estates and fortunes among the nobility. Yet the fact that these institutions could hold dual financial and politico-religious roles stunted the development of separate entities devoted entirely to expediting transactions and accumulating capital. As long as the current regime had enough in its coffers to sustain itself and future generations, there was little need to invent new forms of investment and payment.

Yet this is not to say that sophisticated pre-modern financial institutions under the Qing and in Medieval Japan were nonexistent or altogether lacking.<sup>3</sup> Japanese merchants created sophisticated banking and credit instruments to facilitate trade, and urban commoners became prosperous enough to form a consumer class that paid money to shop at stores, eat at restaurants, and attend the theatre.<sup>4</sup> The most prominent groups of medieval merchants in the Muromachi period were storehouse keepers (*mikura*), *sake* brewers and bean paste merchants, pawnbrokers, and cleric-merchants associated with the politically powerful Tendai Buddhist temple *Enryaku-ji*.<sup>5</sup> Moneylenders also stored cash and valuables for a deposit fee, managed landed income, provided transport for goods across long distances, and managed the finances of the Muromachi *bakufu*.

The development of moneylending institutions in Japan was preceded by the long history of pawn brokering Chinese monasteries first referenced in the fifth century. In the Southern Song it became common for wealthy laymen to form partnerships with clerics and open pawnshops on monastery grounds. Similarly, in Kyoto merchant guilds paid yearly dues to the *Enryaku-ji* in exchange for tax exemption, help in monopolizing the sale of

sake, and assistance in collecting outstanding debts. Attesting to the scale of merchant activity in Imperial China using 1843 as an anchor, William Skinner estimates town populations in China at about 20 million, and of these people, he identifies 12 million as belonging to a merchant class.<sup>6</sup> Many of these merchants belonged to regional guilds (*huiguan*), which eventually developed into professional guilds (*gongsuo*) to reflect the specialized economic functions of the entrepreneurs involved. As in Japan, these merchant guilds began to expand their functions in extending services such as fire-fighting, merchant militia protection, and public health projects.<sup>7</sup>

Taxes in both Medieval Japan and Imperial China were predominantly collected in kind, but for centuries before the introduction of foreign currencies both governments relied on complex monetary systems and lending institutions. By the nineteenth century, there were essentially three forms of currency circulating within the borders of the Qing Empire: copper cash, silver *liang* (more commonly known as *tael*) and copper cash notes (*qianpiao*) circulated by local merchants. The dynasty was only involved in the issue of copper cash, but the unit of account of the government currency was set by groups of local merchants in what are commonly called 'currency circuits.' The *liang* was a unit of account based on a highly variable measure of the weight, purity of an ingot, and a common divisor that differed by region and by the commodity being transacted.<sup>8</sup> Although there was some official *liang* used to settle payments, there was little legal control over any of these three currencies in the late Qing.

Both the Muromachi and Tokugawa *bakufu* issued their own notes at various times throughout their respective rules, but the most persistent currencies circulating in Medieval Japan were the Chinese copper coins (*gen*) characterized by a square hole in the center, which were usually traded in strings of one hundred coins, and *kawase* or *saifu* (bills of exchange) used for long-distance money remittance. In the Muromachi period local merchants promoted the use of these two forms of currency instead of the shogunal notes because the use of coins and bills reduced transactions costs.<sup>9</sup> The wide use of these alternative currencies on the level of the township (*machi*) ensured that coins imported from China in the Muromachi period remained in circulation well into the Tokugawa period, thus facilitating dynamic markets in typical castle towns. This trend towards monetization in the late seventeenth century was supported by the proliferation of local banks issuing their own paper currencies and providing secure remittance facilities, so that by the early nineteenth century paper notes may have been up to one-third of the total circulating money volume.<sup>10</sup>

Even though the financial systems described above did not contain institutions that may be called banks in the modern sense of the term, China under the Qing and Tokugawa Japan each had a prototypical banking unit that would continue to evolve long after the acceleration of trade with foreign nations. As early as the twelfth century, the Song dynasty scholar Zhu Xi (1130-1200) provided the justification for the community granary (*shaso*) prevalent throughout Tokugawa Japan, a storehouse that provided famine relief, offered commercial loans, and underwrote public and private development projects.<sup>11</sup> Since the *shaso* were run by a combination of governmental and commoner authorities, they took on a semi-official, local development bank character similar

to that of the rural *qianzhuang* in China. The *qianzhuang*, or 'native banks' in English, relied on family connections and were prepared to offer unsecured, confidential loans on trust (*xinyong*).<sup>12</sup> It was these kinship and close knit ties within the merchant communities of major treaty ports on the eve of the 1911 Revolution that made the *qianzhuang* a cornerstone of the emerging modern Chinese financial system based on foreign trade discussed in Section 4.

China and Japan were subject to preexisting and complex financial systems on the local level that operated on the level of the Empire only as a consequence of the incentives individual merchants and their families faced. Confucian morality debased profit seeking activity as a trademark of social inferiority in both China and Japan; however, in Japan powerful merchant families, either with ties to the samurai class or established Buddhist temples, provided myriad financial services to the *daimyo* and their kin. Yet in both cases, until the arrival of the Western powers in the Pacific presented a new set of challenges and imperatives to the governments of East Asia, there is virtually nothing pointing to the independent evolution of centralized banking structures serving both the needs of the state as a monetary policy organ and those of private households with disposable income.

### III. The Formation of Economic Ideology in East Asia

In Qing China, the state did not view commerce as an important source of revenue – indeed the largest sources of revenue were through improving agricultural productivity and conquering new territory – and consequently no strong relationship between wealthy profiteers and the state developed. While the Shogunate had often relied on powerful merchant families in Edo and Osaka for management of the long distance tributary rice trade and lending, in Tokugawa Japan too the Shogunate did not generate revenue from the burgeoning commercial sector. What then caused the sudden emergence of *keizai*, or 'political-economic' thought among academics and statesmen in East Asia?

Certainly, ideas related to how money ought to be used in an enlightened society and what the role of the state should be in market transactions predated the coming of Commodore Perry and the *kuroi fune* in 1853 and the unequal treaties that followed the Opium Wars. Yet, virtually all extant tracts related to economics from scholars and merchants of the Tokugawa period reflect ancient Confucian values. For instance Ishida Baigan (1685-1744) promulgated a 'way of the merchant' (*shonindō* or *chonindō*) similar to the Confucian-influenced samurai code of *bushidō*. Osaka financier Kusama Naokata (1753-1831) conceived of money as an amoral force of heaven when it was allowed to circulate freely in transaction markets, but as a force of evil when humans attempted to manipulate circulation for political or personal ends. The Ming period scholar Li Zhi (1527-1602) presaged these links between markets and the natural order by insisting that "all personal relations resembled market relations."<sup>13</sup> To the extent that such ideas had already been considered within Western philosophy, the advent of Western modern economic thought did not supplant previously existing East Asian economic thought, but merely replaced now superfluous Confucian tinges with European Enlightenment ideals.

The immediate military threat posed by the American navy, soon to be followed by requests to trade from Great Britain, France, Russia, and Holland, prompted the architects of the Meiji

Restoration to look inward and attempt to rationalize the reasons for Japan's apparent military and economic weaknesses. Among these pro-Imperial political leaders, the man who is credited as the first importer of economic ideas from Western philosophy to Japan is Fukuzawa Yukichi (1835-1901). Fukuzawa quickly established his importance to the emerging Meiji state by participating in the Shogunate's first diplomatic mission to the United States in 1859 and then by becoming an official translator for the *bakufu* upon his return in 1860. In his preliminary remarks to *Conditions in the West* (1865) Fukuzawa addressed the importance of tax policy, trading companies, and paper currency to the success of Western civilization, and particularly to the United States, Great Britain, and France.<sup>14</sup>

One of Fukuzawa's most influential works was his word-by-word translation of Bryant and Stratton College's *Bookkeeping* (1873), which described how a modern joint-stock company should keep its books and account statements. The release of the translation came within the same month of the founding of the First National Bank of Tokyo: a state-backed venture of powerful exchange merchant families (*ryogae*) whom Meiji officials sought out in trying to create a modern banking system. What made Fukuzawa's translation such a profound achievement was the paucity of financial and commercial technical terms in the Japanese language to describe the functions of a joint-stock company up until that point. In his preface to *Bookkeeping* he lamented the history of economic conditions in Japan: "From ancient times in Japan scholars have invariably been poor and rich men invariably ignorant...Therefore, if I let the scholar and the rich man learn bookkeeping now, they will know for the first time the best of the genuine western learning."<sup>15</sup>

In other words, Fukuzawa saw the key to realizing the lofty ideal of *bunmei kaika* ("civilization and enlightenment") - one of the many government-sponsored slogans that sprung up during the major thrust of Meiji reforms - in the dissemination of Western business practices. To this end, he constructed a curriculum for his students at Keio College in 1869 that emphasized the role of economics in Western studies, arguing, "Japan could become rich through the effective, competent and efficient guidance of economics."<sup>16</sup> Even though there had been a long tradition of economic learning among the samurai scholars and Imperial elites in Japan, and the elites who held office in Imperial China, the classical Confucian texts upon which civil service examinations were conducted treated economics as a peripheral, albeit necessary, component of effective statecraft.

Fukuzawa's contributions to Japanese economic intellectualism in the late nineteenth century were considerable, but they were by no means anomalous. Mori Arinori, residing in Washington D.C. during his term as the first Japanese Ambassador to the United States, wrote to several prominent American scholars soliciting advice as to courses of action that the new Meiji government ought to follow in linking education in Western thought to political economy:

In a general way, I wish to have your views with reference to the elevation of the education of Japan, intellectually, morally, and physically...but the particular points to which I invite your attention are as follows: The effect of education... upon its commerce and...The influences upon the laws and

government.<sup>17</sup>

Professor J.H. Steele of Amherst College in response:

All the mistakes which governments have ever made in their financial legislation, or which individuals make in their business transactions, come from ignorance of the fundamental truths of this science [of public, or political economy]. Knowledge of this, therefore, is all important for any nation, but such knowledge is not easily gained. The science, though now in its main principles well established, is very intricate, and demands well-trained intellects to master it.<sup>18</sup>

From this exchange and other similar responses Mori received, it is clear that the Japanese intellectual elite (*Meirokusha*) believed that the successful modern state they were trying to build must not only have a significant role in commerce, but also a role in promoting the study of economics as a scientific set of laws governing human behavior. The prospectus of Japan's first modern joint-stock company, *Maruya Shosha* or *Maruzen* (1869), reflected a more systematic approach for managing the competing incentives of business partners than the rudimentary forms of joint stock ownership that existed previously. One is also struck by the nationalistic ethos of its author:

With independence once lost, neither learnings nor arts and techniques would be of any use. Thus, leaving those studies to other scholars and politics to those who are in government offices, I for one, as a free Japanese, consider it to be my duty to engage myself in trade and to make the business of Japan stand on an independent footing, thereby endeavoring to ensure that my compatriots keep their peace of mind.<sup>19</sup>

In referencing the unequal treaties (1858) with the phrase "stand on an independent footing," the author asserts that citizens had a nationalist duty to promote trade and commerce to help Japan compete with the increased Western presence in Japanese waters. It is this belief that informed the establishment of national banks and state directed monetary policy before the Pacific War.

Even after the treaties that concluded the Opium Wars (1842, 1860), the Sino-French War (1885) the Sino Japanese War (1895), and the Boxer Rebellion (1901), the economic links between the Qing state and agents in the commercial sector were not as strong in the late nineteenth century as they were in early Meiji Japan. Yet multiple factors forced Qing statesmen to ameliorate economic conditions before the almost three-hundred-year-old regime finally fell in 1912. Since the Qing state had perennially relied on income from agricultural taxes, the dynasty was ill equipped to repay the heavy indemnities stipulated by the unequal treaties. Between 1851 and 1937, China incurred 274.8 million pounds sterling (1913 prices) in loans to finance these reparations.<sup>20</sup>

The ideological goals of the Self-Strengthening Movement (*xiqiang*) that immediately followed China's defeat by an Anglo-French coalition in the Second Opium War were self-evident - only by strengthening China militarily and economically, and promoting domestic industry could the Chinese people hope to stem the tide of Western imperialism. To address the immediate issue of these rapidly accruing debts that the Republican, Nationalist,

and even the Communist regimes would later inherit from the Qing, self-strengtheners such as governor general Li Hongzhang conceived of foreign affairs offices (*zongli yamen*) and new state bureaux entirely concerned with matters of foreign commerce and investment. Up until this point, virtually all of China's trade with foreign entities was conducted via merchant intermediaries called *compradores*, many of whom were hired by foreign trading houses in treaty ports and ports under Portuguese influence. Li Hongzhang hoped to mobilize merchant savings to support early state-sponsored enterprises like the China Merchants' Steam Navigation Company (1873), the Kaiping Mines (1877), and the Shanghai Cotton Company (1873). Li's efforts were ultimately thwarted by inept officials who resorted to bribery and insisted on a degree of enterprise control that made such investments too risky for merchants to undertake.<sup>21</sup>

Western economic ideology did not begin to take root in China until the Republican (Beiyang) era. The greatest surge in scholarly interest in European schools of political economic thought followed the May Fourth Crisis (1919).<sup>22</sup> Yet the Self-Strengthening Movement had produced the intellectual foundation for the May Fourth Movement, for Yan Fu brought the concepts of economic 'survival of the fittest' to China in the late nineteenth century with his translations of Herbert Spencer and Thomas Huxley's sociological theories, Adam Smith's *The Wealth of Nations*, and John Stuart Mill's *On Liberty*.<sup>23</sup> Chen Duxiu, Li Dazhao, Zhou Enlai, Deng Xiaoping, and Mao Zedong, among other notable May Fourth intellectuals, formed the nucleus of budding Marxist philosophical thought under the Nationalist regime. Many of these scholars, who would later become important figures in the Chinese Communist Party (CCP) after 1949, studied abroad around the time of the fall of the Qing and became exposed to the Western debate between socialism and capitalism.

An intellectual contemporary of the CCP founders, Zhang Dongsun, believed that China was allowing itself to be easily exploited by the West with its unwillingness to adopt foreign products and to secure an independent capital base. In particular, "Zhang had been pondering the poverty problem for a long time and had long held that lack of capital formation and failure to develop productive capacity were the main causes of China's social problems."<sup>24</sup> Reducing poverty was the main moral justification for capitalist production and financial deepening during the Nanking Decade (1927-1937). This debate as to the sources of China's deficiencies began a philosophical tradition of simultaneously viewing capitalism as both a solution to wide-scale Chinese poverty and a step towards the ultimate salvation of the Chinese people in achieving the socialist ideal. These twin roles of socialism and capitalism as economic systems and as guidelines for state management reflect the power vacuum left behind when the Qing regime toppled. Conversely, in Meiji Japan the government accelerated the adoption of capitalist thought by embedding ideas borrowed from Western philosophy within its financial institutions. Yet to the extent that the arrival of the West in the Pacific revealed to China and Japan their apparent socioeconomic deficiencies, modern East Asian economic ideology undoubtedly has a common origin.

#### IV. RESPONSES OF THE EAST ASIAN FINANCIAL SYSTEMS TO WESTERN ENCROACHMENT

Even if the relationship between political-economic ideology and banking and finance in China was slower to develop than in Meiji Japan, China's financial system had been undergoing steady changes as a result of several centuries of vested trade (primarily in tea and opium) with Great Britain. Due to lack of Chinese language skills and knowledge of the nuanced bimetallic currency system, Western merchant houses were initially forced to turn to Chinese intermediaries (*compradores*) to act as guarantors and tap into existing merchant and financial networks.<sup>25</sup> In the 1860s these intermediaries began to adopt Western business practices and gained access to Western financial resources and services. To compete with the treaty ports and the dominance of merchants in Guangzhou in controlling foreign trade, Ningbo merchants from Zhejiang created native banks (*qianzhuang*).<sup>26</sup> These native banks formed the crux of nascent financial modernization in China before the 1911 Revolution.

The center of gravity for the *qianzhuang* shifted from Guangzhou to Shanghai in the 1850s, as affluent landlords and officials sought refuge from the turmoil of the Taiping Rebellion in the interior (1851-1864) within Shanghai's international settlements. The *qianzhuang* propagated and branched off to invest in real estate and stock exchange speculation. Increasingly the *qianzhuang* borrowed their capital from foreign banks to provide Chinese wholesalers of imported goods with short-term loans that gave the wholesalers a few weeks to sell their stock and pay off the debt. These on-call foreign bank credits came to be known as chop loans, or *chao piao*. As security for chop loans, British banks often accepted *zhuangpiao*, or scrip against individual deposits that the native banks issued to creditors.<sup>27</sup>

Following the opening of the treaty ports, foreign banks and the localized *qianzhuang* formed a natural partnership, wherein the foreign banks supplied liquid funds (in the form of short-term unsecured credits) that the local Chinese banks sorely lacked, and the local banks provided the foreign banks with commercial intelligence to facilitate the flow of trade goods between port cities.<sup>28</sup> Many entrepreneurs also profited by acting as brokers and selling stocks in foreign trading enterprises to merchants in the interior. Asset trading became so profitable that the number of local *qianzhuang* in Shanghai increased from 56 in 1886 to 113 in 1906. A handful of families from the Zhenhai Ningbo area who first started up native banks in the 1850s and 1860s continued to dominate the local Shanghai banking sector in the last two decades of the nineteenth century.

This *qianzhuang* foreign bank nexus collapsed beginning with the Shanghai foreign stock exchange crashing in 1910 largely due to volatility in rubber prices. The crash made many moneyshops insolvent and weighed down foreign banks with now worthless *zhuangpiao*. The speculative boom in rubber shares of 1908-1910 is one example of how the Imperial banking complex was also subject to a great deal of risk; bankruptcy of an owner or major customer of a single bank could lead to widespread business failure. Diversification in business interests of the typical merchant and the importance of credit in financing commercial flows enhanced the spread of financial contagion.<sup>29</sup> Increasingly thereafter, foreign banks relied on their own *compradores* to collect information about domestic merchants.<sup>30</sup> In spite of the financial collapse of many native banks, in 1911 the Shanghai General Chamber of Commerce had seven *compradores* among its directors

(out of the 16 individuals for which an occupation is known), reflecting the rising social prominence of agents in the private financial sector in the late Qing.<sup>31</sup>

For Japan, in contrast, the late nineteenth century financial narrative depicts a greater degree of direction from the Meiji government in the modernization process. However, it would be inaccurate to conclude that the smoother transition from feudal private banking to nationalized monetary institutions came as a result of a greater degree of incipient financial market sophistication. Rather, as Rawski asserts,

Although historians often point to the Japanese tradition of borrowing from abroad, it was perhaps the accumulation of recent experience in coping with relatively rapid change rather than the historic legacy of cultural borrowing that predisposed the Japanese to embrace new economic patterns while their Chinese counterparts chose to maintain existing operations, often reinforced with infusions of foreign methods, against the inroads of novel economic forms.<sup>32</sup>

The previous sections make clear that both China and Japan possessed similarly intricate financial systems before the imposition of the unequal treaties. But the difference was that Meiji statesmen used the coming of the United States as a catalyst to overthrow the Tokugawa state. In so doing, Japan's leaders were better poised to embrace Western economic philosophy and techniques than leaders in the morally conservative and agriculturally based Qing state.

This distinction is easily demonstrated in the adoption of joint stock companies in each country. The founding shareholders of the Yokohama Specie Bank (1880-1946) represented the established *ryogae* of the Mitsui, Konoike, Sumitomo, and Mitsubishi trading dynasties as well as government interests.<sup>33</sup> Similarly, the Bank of Japan Act (1882) originated as a modified joint stock corporation with one half of the initial capital for the Bank of Japan provided by the Meiji government.<sup>34</sup> In China, the first wave of economic modernization that the Imperial bureaucracy initiated at the end of the nineteenth century emphasized heavy industry and relied on public investment and foreign credit rather than on government capitalization. Niv Horesh succinctly states this distinction:

But while Japanese scholars have, for example, traced the first Chinese joint stock partnerships as far back as the tenth century, these have often sprung in the face of government policy, rather than as a result of it. Furthermore, the sources that point to the occurrence of joint-stock enterprise in late-Imperial China do not come near the degree of legal detail and stakeholding transparency that characterize documents surrounding the establishment of British joint-stock firms, from their very inception in the early sixteenth century...<sup>35</sup>

To shield their shareholders from economic shocks, the first incorporated businesses in Japan founded companion banks that relied on state or official-backed funds. For instance, inflation in the late 1870s, resulting from the war finances accrued by the new Meiji government in suppressing the Satsuma Rebellion, depreciated paper money and placed stress on Maruzen's securities holding company, Sairyusha. To protect his investments, Fukuzawa

created the Maruya Bank (1879) in Tokyo near the local Maruzen branch.<sup>36</sup> Many of the *ryogae* that morphed into the *zaibatsu* of the early twentieth century followed this trend of establishing a banking wing with close ties to the parent corporation. This dual structure of companies and partner banks to preserve financial security would have its analog under the Communist regime in postwar China.<sup>37</sup>

One advantage to the greater role of the state in banking in Japan was that national banks were in an auspicious position to simplify a metallic-based currency system and provide standardized paper notes with a specie-backed value. After Itō Hirobumi visited the United States to study financial reorganization, the Bank Act (1872) established national banks, and the National Bank Act (1876) prescribed only a currency reserve, effectively invalidating the earlier bank notes of 1872. Prior to the Ansei Treaties gold and silver were undervalued, so that foreign merchants quickly bought the cheap specie, leading to an outflow of specie from Japan. In addition, Japanese households began to hoard specie once the price appreciated with the introduction to international currency markets.

All of these factors contributed to the need for a Japanese specie bank, but the main impetus was the competition presented by the American-backed Mexican dollars, which were the preferred transaction currency in East Asia at the time. A rise in the value of the Mexican dollar harmed proto-industrial firms in Japan that were not well equipped to meet the demand for cheap yen-based exports. It is in this context that Fukuzawa prompted Maruzen's financial analysts for information on monetary systems in Western countries so that he could convincingly propose a specie bank to Minister of Finance Okuma Shigenobu.<sup>38</sup> By 1901 the Specie Bank had established a branch in London, to which the Bank of England awarded an account in 1903 following the receipt of indemnity money from China via the Treaty of Shimonoseki (1895). Thus, the Yokohama Specie Bank enabled Japan to join the Western powers on the gold standard after it gained the requisite gold reserves from the Sino-Japanese War indemnity.

Observing the condition of Chinese Money and Banking in 1930, Dickson Leavens remarked, "In China, laws covering [regulations similar to American laws for the issuance of currency] have been promulgated from time to time in recent years, *but there never has been a government strong enough* [emphasis added] to enforce them throughout the country."<sup>39</sup> Leavens was writing on the eve of the Guomindang-led 1933 abolition of the Shanghai tael and the eventual monetary unification in November 1935, when the worldwide rise in the price of silver forced China to adopt a legal *fabri* currency to be minted exclusively by four great government banks under the control of a Monetary Reserve Fund. Silver at the time was the medium of exchange for large transactions, often taking the form of dollars coined by government mints, but large amounts of it circulated in other forms with the market determining currency conversions. Copper was used for small transactions, and various banks and warlord governments issued paper currency, again with the conversion rate being determined by financial confidence in the issuers. Because of the difficulties in establishing monetary conversion between the silver-based Shanghai *taels* used by Chinese merchandisers for foreign trade and the gold used by most foreign merchants, Leavens noted,

"the business man perforce becomes a speculator in exchange; his thought and interest are almost inevitably diverted to this and cannot be given whole heartedly to problems of merchandising and management."<sup>40</sup>

There had been earlier attempts during the Qing Restoration to simplify the bimetallic system and improve the efficiency of trade with foreign houses. Among the first monetary penetrations of China's currency markets were the Carolus silver dollar and the later Mexican dollar; to Chinese traders these were a welcome addition because they presented a convenient and easily negotiable monetary instrument that was not tied to a subjective weight-based value. The scarcity of copper cash used to pay tea farmers in Hankou led the provincial governor of Hubei, Zhang Zhidong, to issue a silver dollar to both supplement the circulation of copper cash and to expel the American backed Mexican silver dollars. Also under Zhang's direction, provincial mint branches were established in the three treaty ports of Hankou, Shashi, and Yichang, with local financiers instituted as the mint managers. This resulted in the extension of official currency to the entire province and undermined the local currency circuits.<sup>41</sup> Hence, the increasing demand for peasant produce and the need to pay farmers who produced hallmark commodities of international trade required the introduction of new, abundant, and reliable currencies.<sup>42</sup>

The First World War caused the collapse of provincial currencies in China. Commodity exports stagnated and could no longer accommodate regional circulation. Following the resumption of normal export volumes, notes that were highly convertible, such as the paper Yuan Shikai dollar, replaced the provincial copper-based currencies. Zhang's efforts, however, started a trend towards interregional currencies in the 1920s, as the Hankou branch of the China Bank adopted the "Five Province Mutual Use Currency" (*wusheng Tongyongquan*) in 1925. After the crackdown of the Wuhan National Government in 1927, Shanghai bank notes began to circulate in Hankou, thus uniting the two largest centers for international trade in China.<sup>43</sup> In 1928 the Central Bank of China became the official bank of the new Nanking Government under Chiang Kai-shek; the earlier Bank of China (1912) and the Bank of Communications (1912) became semiofficial. All these events reflect a greater tendency towards government capitalization. For the first time in China there was a profound Western influence on the structure of a state-controlled financial institution - the banking and issue departments of the Central Bank of China were separate as in the Bank of England. Further, on the eve of monetary unification, the Nationalist government invited many Western economists to assess the country's financial structure and the merits of the silver versus the gold standard.<sup>44</sup>

Two worldwide events in the early twentieth century hastened the importance of the thrust towards financial modernization in China and Japan: the First World War and the international economic depression. A few factors made the war a turning point for the economic modernization process in China. First, a large proportion of foreign business staff left China to aid in the European war effort. Many companies closed down or reduced their activities, and this decline in foreign activities in China was reflected in a sharp drop in imports, particularly in imports of cotton products. The war also increased the world demand for

raw materials and foodstuffs, which reinforced the rise in the price of silver on the international market. An increase in buying power of Chinese currency on the world market made it easier to repay foreign debts and reparations, all of which were tabulated in foreign currencies pegged to the gold standard.<sup>45</sup> However, initially the Chinese financial structure was poorly equipped to handle this reversal of fortunes, and new financial organizations were deemed necessary to take advantage of the wartime opportunity.

The *qianzhuang* expanded rapidly during the war years - in Shanghai alone the total capitalization among these banks quintupled and the number of banks increased from 31 to 71 between 1913 and 1920. This increased capitalization came as a result of *compradores* shifting their funds from foreign banks to the *qianzhuang* as the war progressed.<sup>46</sup> Before the war there was no Chinese stock exchange or produce exchange, although there was a stock exchange in the International Settlement dealing exclusively in foreign securities. The founding of the Shanghai Stock and Commodity Exchange in February 1920 spurred the creation of 140 similar establishments in Shanghai by the end of 1921 that dealt exclusively in their own shares. To finance business modern banks had to resort to direct loans, but because modern banks were obliged to demand guarantees from their clients, usually in the form of property mortgages or physical deposits, the *qianzhuang* had a competitive advantage. Even though the major native banks had branches in treaty ports, the branches did not operate as a network cohesive enough to guarantee reliable financial backing for expansion on a national level. Still,

In contrast to the entrepreneurs of the preceding generation, the great bankers and industrialists of the 1920s for the most part no longer regarded business simply as a source of income and a step-up in the direction of the other, more prestigious activities. They approached business as a profession and when they sent their children abroad for costly further education, it was not so as to enable them to escape from the world of their origins but, on the contrary, to prepare them to manage the family business better.<sup>47</sup>

Native bank development might not have attained the semi-official level of the Bank of China and the Bank of Communications in the Nanking Decade, but the formation of a capitalist class at this time paralleled the rise of the modern businessman in Meiji and Taishō Japan.

Key to the development of the commercial banking sector during the Republican and Nationalist periods was that loans to commerce and industry never exceeded the trade in government bonds in investment portfolios of the major banks. Even from the inception of modern banking in China the distinction between public and private funds was nebulous, and the fortunes of the State were intimately linked to those of households and enterprises; the local banks and the modern banking sector were tied together by common investors and employees, as well as by large mutual deposits.<sup>48</sup> The association of the *qianzhuang* with those prewar industries experiencing the largest growth (cotton, silk, woolen textiles, iron, flour, chemical plants, cement producers) facilitated the centralization of the banking system into a monobank during the Mao regime, since strong monetary

links between industrial sectors integral to the Soviet-styled Five-Year Plans and proximate native banks long predated the 1949 Revolution.

Western influence on Japanese fiscal and monetary policy is most apparent in the Ministry of Finance's palliatives for the depression-ridden economy in the 1930s. Minister of Finance Takahashi Korekiyo instituted expenditure increases during his tenure from 1932 to 1934 to fund rural relief and public works projects (*jikyoku kyokuyū*). With his 'geisha analogy,' published in November 1929, Takahashi showed his implicit understanding of what was later attributed to John Maynard Keynes as the 'theory of effective demand.'<sup>49</sup> That is, allowing individuals to increase their personal consumption via short-term government expenditure, even if they spent their money at a geisha house, would have a multiplicative, or income-generating effect on the rest of the economy. To pay for these spending increases the Japanese central and local governments floated a total of 2 billion yen in bonds at drastically reduced interest rates in 1933. Most crucially, the Ministry of Finance used the Bank of Japan's underwriting (*hikinuke*) powers to issue 2.8 billion yen in bonds to the central bank from the end of 1932 to 1935 to fund the induced expansion in the economy.<sup>50</sup> Such a combination of fiscal and monetary policy for providing national economic relief was novel in its magnitude and focus on rural production. These actions set a precedent for the quantitative easing measures that the Bank of Japan adopted to combat the malaise of the 1990s and of the post-2007 recession.

A prominent part of the spring 1935 Chinese governmental relief package to combat the depression suggested government-backed loans and the establishment of a bill market. Up until this point, prominent Chinese bankers did not view it as their duty to aid industry in times of economic decline. Instead, they concentrated their investments in government bonds. Wharton educated financier Chen Guangfu complained, "Some people have the mistaken notion that a bank's function is to help... industry" and argued, "the business motive is basic, not the idea of helping people... The idea of helping industry is not very strong."<sup>51</sup> Nonetheless, others such as Zhang Jiao of the Bank of China recognized the responsibility of central banks to take the lead in helping industry weather financial crises. By the late 1920s modern Chinese banks were already a major source of funds for existing enterprises that had fallen on hard times.

Banks such as T.V. Soong's China Development Finance Corporation took on a broader entrepreneurial role that focused on advancing national economic interests via support of smaller businesses in key industries such as cotton and coal. A vigorous program of relief loans to the silk industry (1933), the coal industry (1933, 1935), and finally a Ministry of Finance loan of 100 million silver dollars in March 1935 culminated in the purchasing of majority shares in the Bank of China and the Bank of Communications, which gave the Nationalist government control of two of the largest private banks.<sup>52</sup> In this way, the world depression gave the East Asian nations occasion to solidify state control over the financial health of their polities. And most notably, these new monetary policies became exceedingly influenced by reactions of the financial system to challenges imposed by the arrival of the Western powers in East Asia over the preceding century.

## V. CONCLUSION: POSTWAR CONTINUITY

Today one can consult the table of contents of any news publication such as *The Economist* to witness the importance of the East Asian economic bloc to global affairs. While at first glance it may not appear that the regular functions of the Bank of Japan or the People's Bank of China (PBC) have any direct relevance to East Asia's past relationship with imperialism, careful analysis of the postwar period in light of the narrative of this paper demonstrates the continuing influence of the West on the current political economy of the region. As alluded to in the previous section, the Communist Chinese Party (CCP) brought financial and monetary authority under the control of the Soviet-modeled monobank.<sup>53</sup> The need for a strong central monetary institution came from an unwillingness to repeat the hyperinflation generated by the Nationalists' attempts to finance wartime military operations and campaigns against the Communist guerrillas (1945-1949). Besides the Western precedent of centralized banks directing monetary and fiscal policy, the pairing of certain regional *qianzhuang* with domestic industry in the aftermath of the First World War eased the transition from a dual track of small localized private sector banks (*qianzhuang*) and many semiofficial banks during the Nanking Decade to a monobank. Such pairings would not have existed without the presence of foreign banking competition in the treaty ports and the economic threat posed by the Americans, Europeans, and Japan in the prewar period.

The phrase 'dual-track system' (*shuangguizhi*) is taken directly from the policy playbook of the market reform period following Mao's death (1979-1992); it refers to the coexistence of a traditional planned economy and a market channel for the allocation of a given good. The CCP extended this dual-track system to the financial infrastructure with the establishment of the new People's Bank of China in 1983, later organized congruently to the U.S. Federal Reserve Board, with nine regional branches created in 1998.<sup>54</sup> In this reform process, the government paired state run commercial banks with what were previously state-owned enterprises (SOEs). During the Mao regime the state-owned enterprises faced virtually unlimited credit constraints, with easy access to government money according to the growth levels that the Five-Year Plans prescribed. Perhaps the most obvious successor to the *qianzhuang* are the 'Big Four' state-owned commercial banks, which control over half of China's financial assets, with each of the four banks specializing in one major sector (industrial and commercial, agricultural, construction, foreign trade).<sup>55</sup>

Inflation in pre 1979 China has been a cardinal indicator of the health of the political regime and a gauge for the welfare of the Chinese people. Before the CCP no Chinese authority had been powerful enough to quell wide-scale economic discontent via modern monetary policy. In the waning days of the Nationalist regime, the government financed debts incurred during the Long March and war with Japan by printing money to such an extent that hyperinflation forced urban and rural incomes to plummet. Under Mao, inflationary episodes in 1953 and 1956 coincided with budgetary expansions and fiscal deterioration associated with the first Five-Year Plan and the early initiatives of the Great Leap Forward.<sup>56</sup> The most severe instance of inflation during the Mao-era directly followed from the deleterious repercussions of the Great Leap Forward and subsequent famine.<sup>57</sup> The Chinese state's



historical fear of the masses of the poor and disenfranchised make it particularly attuned to the moral economy of inflation, which is why policy initiatives often make explicit mention of price level stability as a major goal.<sup>58</sup> Hence, the need for a monobank, or for an omnipotent central banking apparatus, rose from the CCP's objectives to prevent popular revolution.

For Japan the foregoing argument is much more apparent. The actions of the Ministry of Finance and the Bank of Japan over the postwar period have more or less mimicked the types of monetary and fiscal policy that the U.S. Federal Reserve adopted in response to various economic shocks. Elucidating refinements to the Japanese financial structure after the American occupation can be done by comparing the Japanese Main Bank System (MBS) to the development of what is often referred to as the Principal Transactions Bank System (PTBS) in South Korea. It is easy to examine Korea as an extension of Japan's financial administration given Korea's status as a Japanese colony from 1910 to 1945. And indeed, the PTBS is apparently following the path of financial regulations upon which the MBS was built in Japan. Much like the original *zaibatsu* of prewar Japan, the PTBS served to hasten the consolidation of economic power in the *chaebol*.<sup>59</sup>

Korea's system continues to struggle with many of the regulations for which the Main Bank System has since corrected in Japan. Major corrections include the supervisory role of semiofficial banks in Japan in evaluating the investment portfolios of lesser banks, a mutual equity relationship between corporations and their partner main banks, and the fact that Japanese main banks act as both lenders and shareholders.<sup>60</sup> Japan successfully merged the corporation-main bank partner structure with banking regulations characteristic of the Federal Reserve System, while South Korea is gradually moving towards the Main Bank System. Such constructions of state control over monetary affairs would have been inconceivable to officials in Imperial Korea or Shogunal Japan without extensive knowledge of Western political economy.

After 1949 there have been two prevailing analytical frameworks among studies of China's economic history: the feudalism and the imperialism framework. Chinese scholars prefer the feudalism framework, which claims that the pre-capitalist economy of China centered on the relationship between the extraction of surplus value from peasant producers by an exploitative ruling landlord class and the subsistence economy of handicraft and agricultural production. In this paradigm, "Western Imperialism served both to reinforce feudal institutions and to undermine the handicraft basis of the 'natural' economy." Western scholars prefer the imperialism framework, in which incipient capitalism in China is identified in certain elements of commercialization and capitalist production, but the presence of foreigners seeking to profit from the exploitation of Chinese economic resources prevented the advancement of industrial capitalism in China. The approach taken in this paper represents a more conciliatory model in that the 'feudal,' agricultural attitude of the Qing government is recognized as an impediment to the creation of a modern financial infrastructure, yet also as a reason for the growth of a private financial sector and the continuous influence of private banking into the current period. To the extent that it considers both paradigms, my argument is consistent with Philip Richardson's conclusion that,

The Western impact, in short, could not have influenced the overall economic performance [of China] significantly one way or the other. It seemed that the major Western influence on China was on its psyche rather than in its pocket and that China's responses remained overwhelmingly directed towards solving problems in Chinese ways.<sup>61</sup>

In sum, the most important contribution of Western imperialism to East Asia was ideological, and no quantitative estimate can convey the counterfactual impact of the absence of Western-styled financial institutions on the socioeconomic development of China and Japan. Scholars can only speculate that without the introduction of political-economic thought that accompanied the trauma of imperialism, China and Japan might have faded into global obsolescence.

#### REFERENCES

- <sup>1</sup>Jonathan D. Spence, *The Search for Modern China* (New York: WW Norton, 1999), 150-154.
- <sup>2</sup>For further summary of trade agreements and amity treaties concluded between Japan and Western powers, see Christopher S. Goto-Jones, *Modern Japan: A Very Short Introduction* (Oxford: Oxford University Press, 2009).
- <sup>3</sup>Although scholars conventionally use 'Medieval Japan' to refer to the Muromachi period (1337-1573), in this section I use the phrase more broadly to refer to the entire span of the Muromachi and Tokugawa periods (1337-1867).
- <sup>4</sup>Ethan Segal, "Money and the State: Medieval Precursors of the Early Modern Economy," in *Economic Thought in Early Modern Japan*, ed. Bettina Gramlich-Oka and Gregory Smits (Leiden, Netherlands: Koninklijke Brill, 2010), 22.
- <sup>5</sup>A list of brewer lenders from 1425-1426 in Kyoto indicates that of the 347 names listed, 70 percent had a clerical seal. Most of these cleric-merchants were low-ranking members of their patron Buddhist temple. See Suzanne Gay, *The Moneylenders of Late Medieval Kyoto* (Honolulu: University of Hawaii Press, 2001), 225-228.
- <sup>6</sup>William G. Skinner, "Regional Urbanization in Nineteenth Century China," in *The City in Late Imperial China*, ed. William G. Skinner (Stanford: Stanford University Press, 1977).
- <sup>7</sup>Marie-Claire Bergère, *The Golden Age of the Chinese Bourgeoisie, 1911-1937*, trans. Janet Lloyd (Cambridge: Cambridge University Press, 2009 reissue), 20-24. The most powerful of these guilds were concentrated in the lower Yangzi, and their regional threat to the economic hegemony of the Qing government prompted the State to divide the sub region into the three provinces of Zhejiang, Jiangsu, and Anhui.
- <sup>8</sup>Akinobu Kuroda, "The Collapse of the Chinese Imperial Monetary System," in *Japan, China, and the Growth of the Asian International Economy, 1850-1949* Volume 1, ed. Kaoru Sugihara (Oxford: Oxford University Press, 2005), 103-105.
- <sup>9</sup>Segal, "Money and the State: Medieval Precursors of the Early Modern Economy," 24.
- <sup>10</sup>Hubert P. Schiffer, *The Modern Japanese Banking System* (New York: University Publishers, 1962), 19.
- <sup>11</sup>Mark J. Ravina, "Confucian Banking: The Community Granary (Shasō) in Rhetoric and Practice," in *Economic Thought in Early Modern Japan*, ed. Bettina Gramlich-Oka and Gregory Smits (Leiden, Netherlands: Koninklijke Brill, 2010), 180. The variance in principal functions of the *shasō* is evident in a 1915-1916 survey conducted by the Japanese Ministry of Agriculture that identified at least twelve different possible functions.
- <sup>12</sup>Bergère, *The Golden Age of the Chinese Bourgeoisie*, 80.
- <sup>13</sup>Mark Metzler and Gregory Smits, "The Autonomy of Market Activity and the Emergence of *Keizai* Thought," in *Economic Thought in Early Modern Japan*, ed. Bettina Gramlich-Oka and Gregory Smits (Leiden, Netherlands: Koninklijke Brill, 2010), 12-16.
- <sup>14</sup>Nozō Tamaki, *Yukichi Fukuzawa, 1835-1901: The Spirit of Enterprise in Modern Japan* (New York: Palgrave, 2001), 70.
- <sup>15</sup>Yukichi Fukuzawa, *Chōai no ho* (Bookkeeping) in *Collected Works of Yukichi Fukuzawa*, vol. 3, 1983.
- <sup>16</sup>Tamaki, *Yukichi Fukuzawa*, 83. Keio College would later become Keio University: the first private university in Japan and still to this day one of the most prestigious universities in the country.
- <sup>17</sup>Arimori Mori, *Mori Arimori Zenshu* (Complete Works of Mori Arimori), vol. 3 (Tokyo: Tokyo University Press, 1972), 272.
- <sup>18</sup>Quoted in Chuhei Sugiyama, *Origins of Economic Thought in Modern Japan* (London: Routledge, 1994), 64-65. Similar responses to Moxi's letter by other prominent American intellectuals such as James McCosh, president of Princeton University and W.I. Campbell, professor at Rutgers University reinforced the importance of

education in economics as a science through which fundamental laws might be established and indicated how those laws might directly be applied to statecraft.

<sup>19</sup>Maruya Shōsha no Ki," in *Maruzen Hyakunenishi (A Hundred Years of Maruzen c. 1858-1958)*. Tokyo: Tokyo University Press, 1980-1981. There is very little documentation to suggest or prove Fukuzawa's direct involvement in the launching of Maruzen. The available records point to Hayashi Yuteki, a Yokohama medical practitioner who enrolled in Keio College as a student of Fukuzawa, as the original book-importing entrepreneur. However, the tone and writing style of the prospectus are consistent with Fukuzawa's other writings, so he is the supposed author.

<sup>20</sup>Ramon H. Myers, *The Chinese Economy, Past and Present* (Belmont, CA: Wadsworth, 1980), 146-147.

<sup>21</sup>*Ibid.*, 128. Consequently, Chinese merchants readily preferred investing in new foreign enterprises instead of state-sponsored industry. By 1900 Chinese merchants held about 60 percent of the shares of all foreign run companies in the treaty ports, and many of these firms were involved in the lucrative tea and silk trades.

<sup>22</sup>In spite of its adoption of a nominally republican form of government after the toppling of the Qing, China was still spurned at the Paris Peace Conference when Japan was allowed to retain possession of Shandong from Germany through the Treaty of Versailles. This sparked a large-scale, student-led protest in Peking on May 4, 1919 of China's acquiescence to the terms of the Treaty of Versailles. In addition to allowing Japan to occupy Shandong, these terms did not rescind the 'Twenty-One Demands' of Japan (1915).

<sup>23</sup>Spence, *The Search for Modern China*, 290-292.

<sup>24</sup>Edmund S.K. Fung, "Socialism, Capitalism, and Democracy in Republican China: The Political Thought of Zhang Dongsun," *Modern China* 28, no. 4 (2002): 406. Unlike his contemporaries, Zhang was not originally a Marxist. His sympathies towards socialism reflected a growing disenchantment with the applicability of Western democracy to uniquely Chinese problems.

<sup>25</sup>The Portuguese word 'compradores' was originally used to denote Chinese servants of the earliest foreign merchants in Canton and Macao, who acted as intermediaries between Chinese employees for foreign banks and trading companies and Chinese banks.

<sup>26</sup>Philip Richardson, *Economic Change in China c. 1800-1950* (Cambridge: Cambridge University Press, 1999), 42.

<sup>27</sup>Niv Horesh, *Shanghai's Band and Beyond: British Banks, Banknote Issuance, and Monetary Policy in China, 1842-1937* (New Haven: Yale University Press, 2009), 31-32.

<sup>28</sup>Thomas G. Rawski, *Economic Growth in Prewar China* (Berkeley: University of California, 1989), 130-131.

<sup>29</sup>*Ibid.*, 128.

<sup>30</sup>It is important to note the lack of direct contact between foreign bankers and diplomats and their Chinese counterparts in carrying out transactions. Most investments constituted public works such as railroads, and the strength and security of these investments were gauged not by the efficacy of Chinese agents in completing the project but by the potential ability of foreign governments in preventing default or forcing payment from the Chinese. See Clarence B. Davis, "Financing Imperialism: British and American Bankers as Vectors of Imperial Expansion in China, 1908-1920," *The Business History Review* 56, no. 2 (1982): 236-264 for a summary of interactions between domestic and foreign financiers.

<sup>31</sup>Bergère, *The Golden Age of the Chinese Bourgeoisie*, 39-41.

<sup>32</sup>Rawski, *Economic Growth in Prewar China*, xxvii.

<sup>33</sup>Tamaki, *Yakichi Fukuzawa*, 109. Three of these four trading dynasties would grow into monopoly conglomerates, or zaibatsu, of the prewar era.

<sup>34</sup>Schiffer, *The Modern Japanese Banking System*, 16-17.

<sup>35</sup>Horesh, *Shanghai's Band and Beyond*, 20.

<sup>36</sup>Tamaki, *Yakichi Fukuzawa*, 107.

<sup>37</sup>The 'dual structure' referred to here should not be confused with the phenomenon of a dual wage structure in traditional and modern industry that economic historians often ascribe to early twentieth century Japan. See for instance, Takafusa Nakamura, *Economic Growth in Prewar Japan*, trans. Robert A. Feldman (New Haven: Yale University Press, 1983).

<sup>38</sup>*Ibid.*, 113-119.

<sup>39</sup>Dickson H. Leavens, "Chinese Money and Banking," *Annals of the American Academy of Political and Social Science* 152 (1930): 206.

<sup>40</sup>*Ibid.*, 210.

<sup>41</sup>Akinobu Kuzoda, "The Collapse of the Chinese Imperial Monetary System," 108-113. The establishment of county level (*xian*) chambers of commerce coincided with the collapse of the Qing in 1911 and further diminished the power of local currency circuits, which had previously issued local copper cash notes to earn seigniorage profits under conditions of local scarcity.

<sup>42</sup>Since foreign and domestic economic interests had become linked after over 50 years since the opening of treaty ports, the British had a vested interest in the strengthening of China's monetary policy. The Mackay Treaty of 1902, signed between Chinese statesman Sheng Xuanhuai and the British Earl James Mackay, formalized the idea of establishing banking institutions to control government revenues and to support a unified currency. This objective was anticipated in the prospectus of Sheng's Imperial Bank of China, which opened in 1897 after the first public proposal for a modern Chinese commercial bank. Following this imperative, the Bank of China and the Bank

of Communications came to eclipse the traditional intermediaries and foreign banks in handling central government revenues.

<sup>43</sup>*Ibid.*, 116.

<sup>44</sup>Leavens, "Chinese money and Banking," 213.

<sup>45</sup>Bergère, *The Golden Age of the Chinese Bourgeoisie*, 65-66.

<sup>46</sup>The more prominent of these investors were opium merchants and owners of dyeing businesses. In spite of a series of imperial prohibitions of the opium trade, the illegal trade continued to flourish and the opium merchants used their ill-begotten profits to branch out into banking. The dyeing businessmen made large profits at the beginning of the First World War by speculating on the increasing scarcity of foreign chemical products and turned to credit banks as an outlet for their increased fortunes.

<sup>47</sup>*Ibid.*, 129.

<sup>48</sup>Rawski, *Economic Growth in Prewar China*, 143.

<sup>49</sup>Mark Metzler, "Woman's Place in Japan's Great Depression: Reflections on the Moral Economy of Deflation," *Journal of Japanese Studies* 30, no. 2 (Summer 2004): 324.

<sup>50</sup>J. Smethurst, *From Foot Soldier to Finance Minister: Yakabashi Korekijo, Japan's Keynes* (Cambridge: Harvard University Asia Center, 2007), 263.

<sup>51</sup>Tim Wright, "Coping with the World Depression: The Nationalist Government's Relations with Chinese Industry and Commerce, 1932-1936," *Modern Asian Studies* 25, no. 4 (1991): 659.

<sup>52</sup>*Ibid.*, 660-661. Additionally, the 1930s marked a period of increased cooperation between British and Chinese companies and banks in many areas of business. With the Nationalist government extending and solidifying its control over the economy, Chinese modern banking grew substantially, introducing domestic competition with British firms. In particular, Chinese insurance business expanded rapidly after 1929, so that Chinese and foreign companies keenly competed outside the treaty ports for contracts. The British firm Butterfield & Swires and the Shanghai Commercial and Savings Bank, headed by the politically well-connected Chen Guangfu, jointly formed the China Assurance Corporation Ltd. Reflecting a growing trend, the British side only subscribed 40 percent of the capital and consented to a Chinese majority on the board of directors. See Jürgen Osterhammel, "Imperialism in Transition: British Business and the Chinese Authorities, 1931-37," *The China Quarterly* 98 (1984): 260-286.

<sup>53</sup>Katherine H.Y. Huang Hsiao, "Money and Banking in the People's Republic of China: Recent Developments," *The China Quarterly* 91 (1982): 462-463. The Soviet monobank model can be described as follows: the People's Bank of China acted as the center of cash, credit, and settlement through which inter-state payments were effected and currency held in the state sector was deposited. It provided currency flow to enterprises within the state sector and to households and collectives in the non-state sector. Creation of money began with bank loans to state-owned enterprises, which immediately became deposits in the PBC. The deposits would be withdrawn in the form of payments to households and collectives via wages or agricultural products.

<sup>54</sup>Barry Naughton, *The Chinese Economy: Transitions and Growth* (Cambridge: MIT Press, 2007), 91-92.

<sup>55</sup>*Ibid.*, 454-459. Other major banking entities include joint-stock commercial banks (owned by a combination of SOEs, government agencies, and private enterprises), city banks, and banks whose primary mission is to support policy objectives via loans. In 2003, 72% of assets were contained within the three classes of institutions from the planned economy: the Big Four, policy banks, and rural credit cooperatives.

<sup>56</sup>Richard C.K. Burdekin, "Ending Inflation in China: From Mao to the 21st Century," *Cato Journal* 20, no. 2 (2000): 226-227. The sharp price increase in 1961 can also be linked to a large expansion in the size of the state's budget in 1958-1960.

<sup>57</sup>Iroyuki Imai, "Inflationary Pressure in China's Consumption Goods Market Estimation and Analysis," *The Developing Economies* 32 (1994): 127-154. Imai estimates that there was another price level spike, linked with the end of the Red Guard stage of the Cultural Revolution, peaking at 9.6 percent in 1968.

<sup>58</sup>Other large uprisings of the masses in China's modern history include the Taiping Rebellion (1850-1864) and the Boxer Rebellion (1899-1901). More recently, the eruption of political expression at Tiananmen Square in April 1989 reflected the government's violation of an implicit bargain it had made with the people. Urban Chinese workers were among the first groups to join the recalcitrant student protestors because their wages could not keep pace with inflation.

<sup>59</sup>A *chaebol* is a group of large corporations holding controlling shares in each other. This differs from the Japanese keiretsu that originated from the zaibatsu after SCAP; the *chaebol* are tightly controlled by a single owner and his family (similar to the old *zaibatsu*), whereas a *keiretsu* is a loosely connected group of corporations who cooperate on business operations but lack a single controlling shareholder. Principal transactions banks would extend seemingly limitless lines of credit to large corporations in the 1970s to carry out government-inspired development projects.

<sup>60</sup>Sang Wno Nam and Dong-Won Kim, "The Principal Transactions Bank System in Korea," in *The Japanese Main Bank System: Its Relevance for Developing and Transforming Economies*, ed. Masahiko Aoki and Hugh Patrick (Oxford: Oxford University Press, 1994), 485-487.

<sup>61</sup>Richardson, *Economic Change in China*, 9.

# TRANSLATING TRAUMA: PHILOMENA, LEDA, AND THE APORIA OF REPRESENTATION

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## I. TEXT OF THE POEMS TO BE ANALYZED

### 1. Matthew Arnold: "Philomela"

Hark! ah, the Nightingale!  
The tawny-throated!  
Hark! from that moonlit cedar what a burst!  
What triumph! hark--what pain!

O wanderer from a Grecian shore,  
Still, after many years, in distant lands,  
Still nourishing in thy bewilder'd brain  
That wild, unquench'd, deep sunken, old-world pain--  
Say, will it never heal?  
And can this fragrant lawn  
With its cool trees, and night,  
And the sweet, tranquil Thames,  
And moonshine, and the dew,  
To thy rack'd heart and brain  
Afford no balm?

Dost thou to-night behold  
Here, through the moonlight on this English grass,  
The unfriendly palace in the Thracian wild?  
Dost thou again peruse  
With hot cheeks and scar'd eyes  
The too clear web, and thy dumb Sister's shame?  
Dost thou once more assay  
Thy flight, and feel come over thee,  
Poor Fugitive, the feathery change  
Once more, and once more seem to make resound  
With love and hate, triumph and agony,  
Lone Daulis, and the high Cephissian vale?  
Listen, Eugenia--

How thick the bursts come crowding through the leaves!  
Again--thou hearest!  
Eternal Passion!  
Eternal Pain!

### 2. W.B. Yeats: "Leda and the Swan"

A sudden blow: the great wings beating still  
Above the staggering girl, her thighs caressed  
By the dark webs, her nape caught in his bill,  
He holds her helpless breast upon his breast.

How can those terrified vague fingers push  
The feathered glory from her loosening thighs?  
And how can body, laid in that white rush,  
But feel the strange heart beating where it lies?

A shudder in the loins engenders there  
The broken wall, the burning roof and tower  
And Agamemnon dead.

Being so caught up,

So mastered by the brute blood of the air,  
Did she put on his knowledge with his power  
Before the indifferent beak could let her drop?

## II. ANALYSIS

How can one put words on a wound? How can one give form to the formless? In a culture in which literature, film, and photography vertiginously and constantly multiply works of suffering for instant perusal, questions about the nature of representing trauma have gained an increasingly urgent tone. As Traverso and Broderick note in *Interrogating Trauma: Towards a Critical Trauma Studies*, "During the past 100 years or so, traumatic historical events and experiences have been re-imagined and re-enacted for us to witness over and over by constantly evolving media and art forms. Perhaps due to the ubiquity and multiplication of such images and narratives in modern and post-modern culture, questions about the impulse to behold and depict both the suffering of others and of the self, as well as more general questions about the ontological and moral status of the representation of trauma, have increasingly been raised within

intersecting, inter-disciplinary fields of study over the past two decades."<sup>1</sup>

In spite of this contemporary discursive explosion, Cathy Caruth posits that the reigning narrative of cultural trauma centers on *aporia* – that is, an unresolvable paradox, an “inability of knowing,” a speaking of the unspeakable.<sup>2</sup> In *Unclaimed Experience*, Caruth writes that “[Trauma] is always the story of a wound that cries out . . . in its delayed appearance and its belated address, [it] cannot be linked only to what is known, but also to what remains unknown in our very actions and our language.”<sup>3</sup> The modern era is therefore a time that at once discourses ardently about trauma and must acknowledge its irresolvability. By extension, literary representations of trauma are tasked with simultaneously registering the need to speak about suffering and the limits of language to fully convey these moments of pain. As Modlinger and Sonntag note in the Introduction to *Other People's Pain: Narratives of Trauma and the Question of Ethics*, “Where cultural work engages with other people’s trauma, it does so with a double emphasis on contradictory terms: the impossibility of fully grasping the traumatic moment and of translating it into language (especially in regard to the Holocaust), and the necessity to transmit knowledge of these traumas and to translate them for new audiences.”<sup>4</sup>

In this study, I will revisit two poems which invoke (and translate) traumatic Greco Roman myths in order to study the workings of an aesthetic of trauma in each instance. Both authors attempt to access the paradox of trauma via diverse poetic means: Arnold’s “Philomela” through self interruption, narrative repetition, and persistent flashback; Yeats’s “Leda and the Swan” through verbal ambiguity, form content strain, and fragmented image and narrative. In both instances, the attempt to make sense of trauma inevitably generates more senselessness. In this regard, syntactic structure is telling: the question is the grammatical device to which both poems resort in order to shape a central narrative. The only way to “see” these iconic traumas, it seems, is through a profound contradiction of sight; the only way to “know” is to admit uncertainty and limitation; the only way to “say” is to question. And it seems to me that poetry is the appropriate outlet for these trials, as poetry does not try to extinguish the *aporia* of traumatic experience, but to *sustain* it so as to gather its questions and its fragments without simplification or trivialization. Having looked out over the abyss of experience, these poems nervously rest on the edge, inhabiting the fraught space between the speakable and the unspeakable, the tractable and the intractable.

Matthew Arnold’s “Philomela” was composed in 1848 and published in 1853. This poem draws on a myth whose most complete extant version appears in Book VI of Roman poet Ovid’s *Metamorphoses*, composed between 1 and 8 A.D.<sup>5</sup> In this tale, King Pandion of Athens gives his daughter, Procne, as a wife to King Tereus of Thrace. This alliance is not so much a love-match as it is a political move: as James Heffernan asserts, “Procne was given to Tereus by her father in exchange for the peace and security of Athens. When Tereus repelled the barbarian hordes that threatened to breach the walls of Athens, Pandion bound this powerful man to himself by Procne’s marriage to him.”<sup>6</sup> As soon as the two are married, the new bride pines for her sister Philomela, and begs Tereus to voyage back to Athens to procure

her. Upon arriving in Athens, however, King Tereus experiences overwhelming desire for Philomela: “When he first saw her, Tereus caught fire/ as instantly as ripe grain or dry leaves,/ or as hay stored in a barn goes up in flames.”<sup>7</sup>

Philomela’s father unknowingly seals her fate when he allows her to board the Thrace bound ship, where Tereus rapes her violently as soon as she comes aboard. Tereus then hides her in a hut deep in the Thracian woods and removes her tongue, thus robbing her of the verbal capacity to reveal his crime. (Ovid is quite graphic here, asserting that “Its stump throbs in her mouth, while the tongue itself/ falls to the black earth trembling and murmuring . . . They say/ that even after this, the man continued/ to violate her mutilated body.”<sup>8</sup>) In this act, Tereus quickly metamorphoses into exactly the kind of monster that Pandion sought protection against. Heffernan notes that “. . . as king of Thrace, Tereus himself is a barbarian, and proves it when he rapes Philomela . . . He has breached the wall that not only defines and contains virginity but also signifies the border between political order and barbarous upheaval.”<sup>9</sup> Returning home, Tereus feigns grief and tells everyone that Philomela tragically died on the return journey.

Meanwhile, Philomela recreates her trauma in visual form, since she cannot speak. She weaves a cloth that depicts Tereus’ rape, thus critiquing his violent acts and perhaps engaging in a kind of self-administered art therapy, forcing herself to re-experience pain in order to gain agency and control over her fate. Susan Brison speaks of the way that building narrative or text out of trauma can sometimes allow a recovery of selfhood: “Narrative memory is not passively endured; rather, it is an act on the part of the narrator, a speech act that defuses traumatic memory, giving shape and a temporal order to the events recalled, establishing more control over their recalling, and helping the survivor to remake a self.”<sup>10</sup> Philomela’s web may be conceived as a speech-act that enlists Procne’s help through its mimetic reproduction of events; when Procne receives this image from a servant, she immediately rescues Philomela from the forest. Together the sisters plot their revenge, which involves the murder of Pandion and Procne’s son, Itys, who will be served to his father as a gourmet meal. At the grisly feast, Tereus contentedly “stuffs his gut with flesh and blood that he begot” (lines 944-945) until disheveled Philomela enters the room, flinging Itys’ bloody head at his father’s face. Rage, violence, and transformation ensue, as the three turn into birds for their foul deeds. Some versions hold that Philomela turns into a nightingale and her sister into a swallow, but in other versions it is the reverse. Tereus himself turns into the crested hoopoe.<sup>11</sup>

Though Ovid’s remains the most complete extant text of the myth, a variety of ancient authors allude to Philomela’s trauma in poems, plays, and prose. She appears in Greek works such as Apollodorus’ *Library*, Sophocles’ now-fragmented play *Tereus*, and Aeschylus’ *Agamemnon*, as well as in Latin works such as Horace’s *Odes* and Virgil’s *Ecloques*. Because Matthew Arnold received a rigorous classical education at the Rugby School and at Balliol College, Oxford, he would have repeatedly encountered Philomela in a general way through his years of reading classical works. However, it is also possible to track the direct inspiration of Arnold’s “Philomela” from a specific work in the canon: in *Matthew Arnold and the Classical Tradition*, Warren Anderson speculates that this version draws from lines five through nine of Horace’s twelfth ode in the fourth book.<sup>12</sup> This hypothesis

is supported both by records of the works that Arnold read as a student, and by direct comparison of “Philomela” with the lines from Horace’s ode.<sup>13</sup> As an accomplished classical scholar, Arnold would no doubt have read this poem in its original Latin, but even the English verse-translations from the Victorian and contemporary periods still bear strong resemblance to his poem in both tone and sentiment (though they lack the riddling questions present in Arnold’s text). Following are two representative verse-translations, the first by George Whyte Melville (1850) and the second by David West (2008):

Now builds the restless bird, whose piteous shriek  
Still Itys mourns, and Shame eternal flings  
On Cecrops’ house, such dire revenge to seek  
For brutal lust of kings.<sup>14</sup>

The unhappy swallow builds her nest, mourning  
For Itys, and the undying shame brought on the house  
Of Cecrops by the barbarous lust of kings  
And by her cruel revenge.<sup>15</sup>

Though separated by a century and a half, both versions convey several common elements: dark emotional cast (*the restless bird*, or *the unhappy swallow*); Philomela’s deep mourning; *undying* or *eternal* shame; the kings’ lust; and Philomela’s revenge.

Arnold’s poem itself can be considered a kind of translation of these poetic forebears – the Latin version of Horace, the Victorian translation, or both – all of which participate in a long history of nightingale-poems. The figure of Philomela conventionally represents the melancholy poet-singer, the de-gendered lyric voice itself, who weaves words into webs of verse. As Elizabeth Robertson and Christine M. Rose assert, “the lyric voice is itself often identified with the lamenting and sometimes vengeful voice of the raped and transformed body of Philomela, the nightingale . . . Perhaps because of its ambiguous classical history, the nightingale loses its strict gender association and becomes interchangeably male or female, simply a voice . . . [which] is more often than not associated with melancholy.”<sup>16</sup> For Arnold, the most canonically portentous example of this nightingale-poet conflation would have been Keats’s 1819 “Ode to a Nightingale.” Robert Donovan believes that Arnold’s poem invokes the nightingale in much the same way as Keats’s “Ode”: “. . . Philomela may accordingly be thought of as an archetype of the poet in whom the keenest delight in his own power of song is inextricably linked to the bitterest sorrow, and in whom pleasure and pain derive from the same source.”<sup>17</sup>

Yet even in this (subtextual) yearning for aesthetic remove, something *trembles*, even  *fissures*, in Arnold’s language. The poem overflows with unanswered questions, curtailed poetic waxings, and vague and allusive adjectives, which prevent a certain closure for the reader. Arnold’s poem does conserve the primary emotional cast of mourning and melancholy found in traditional representations of Philomela: it is rife with images of women weeping, crying out, shamed. However, these visions are now narrated in the interrogative mode, filled with anxiety and bewilderment. Staple tokens of the past, such as plaintive tone, sylvan imagery, and classical allusion, now “shore” the poet against the “ruins” of trauma. The emotional tenor of the

utterance comes from its rising uncertainty, its splintered cries, and its five questions that constitute the many ways of asking the same idea.

Unlike Keats’s poem with its English singer, Arnold’s “Philomela” invokes a *specific* traumatic mythical history with its title, thus resisting the archetypal frame to which Donovan assigns it. Robertson and Rose point out that although the *nightingale* has come to signify general grief in Western culture, *Philomela’s* trauma carries more specific implications: “. . . the voice evoked in the figure of the nightingale is inescapably the voice of Philomela, a woman brutally raped and whose tongue is torn from her mouth.”<sup>18</sup> As readers have repeatedly noted, Philomela is more than a melancholy muse: she is a survivor of incestuous rape, a plotter who engineers her own fate, a mute and mutilated woman who recovers expression. It is quite possible that in this poem Arnold again iterates a characteristic sense of un-belonging, utilizing Philomela as another figure “wandering between two worlds, one dead/ The other powerless to be born.”<sup>19</sup> Yet while its mournful tone may suggest “universal”, general suffering, the poem’s distinctive imagery also articulates Philomela’s specific suffering: the Thracian palace; the crystal clear web; the feathery change. If Philomela is a sign of human pain, it is because of the original specificity of her own trauma.

Matthew Arnold’s poem recounts this trauma not with plot-based narrative, but instead with dense allusion and apostrophic questioning, all of which seem to take place post-trauma. Such a narrative mode reflects the way that Caruth describes the simultaneously elusive and visceral nature of trauma: “The pathology consists, rather, *solely in the structure of its experience* or reception: the event is not assimilated or experienced fully at the time, but only belatedly, in its repeated *possession* of the one who experiences it.”<sup>20</sup> Philomela’s repeated and specific flashbacks form the subject of lines five through fifteen, as the event returns to possess her. The speaker does not presume to witness the event as though it were happening in the contemporary present, but instead interrogates the nightingale about what he imagines she sees in her phantasms:

O wanderer from a Grecian shore,  
Still, after many years, in distant lands,  
Still nourishing in thy bewilder’d brain  
That wild, unquench’d, deep-sunken, old-world pain—  
Say, will it never heal? (5-9)

Philomela belatedly and persistently receives this event over and over, its haunting force transcending time and space to travel from ancient Greece to mid-Victorian England. The poet suggests repetitive traumatic vision via repetitive syntax: note the anaphora in lines six and seven, with the word “Still” receiving emphatic stress in both instances. Additionally, the crammed-in adjectives and long pentameters in these lines contrast sharply with the impulsive trimeter question in line nine: “Say, will it never heal?” The m dash in line eight and the opening trochee and anapestic foot in line nine bluster turbulently in the midst of prior poetic surety. It is as though in the act of shaping a literary setting, the poet suddenly awakens from aesthetic reverie to attend to Philomela’s mental tortures. The same blunt metrical deviance occurs in line fifteen, with a dimeter line that follows five lines

of trimeter. The reader sees something here that one cannot see – what does “wild, unquench’d, deep-sunken, old-world pain” actually look like or signify? These adjectives *suggest* evocatively and provocatively, but do not *declare*, that they are conceptual rather than perceptual. By infusing the poem with suggestive language and by using questions rather than statements, the speaker reflects the simultaneously ephemeral and palpable nature of trauma’s re-visitation.

In encountering the poem, the reader also experiences a dilemma of tangibility: how can a poem, a constructed falsity, simulate or even surpass reality? How can an English speaking reader “re-live” an act of fictional violence from the ancient past? Michael Bell paraphrases myth’s central contradiction with the following formulation: “[Myth] means a supremely significant foundational story and a falsehood.”<sup>21</sup> “Philomela” is important and foundational: it re-tells the story of rape, a narrative equally persistent in the ancient past and the contemporary present. Yet if the poem simulates reality, it does so because it builds upon this shared cultural knowledge, language, and memory, not because Philomela’s myth is verifiably “true.”

Caruth’s statements about trauma show this same paradox working in reverse. Though traumatic events are actual, empirical, perceptible occurrences, their historical advent may be experienced as impossible or fictional, and the victim’s mental representations may sometimes constitute the more visceral or concrete form. As Caruth states, “the most direct seeing of a violent event may occur as an absolute inability to know it; that immediacy, paradoxically, may take the form of belatedness.”<sup>22</sup> Traumatic flashback is double: bodiless, and viscerally embodied, at once; originating in the past, but embedded in the present, like a splinter or scar beneath the surface. Although this phenomenon is not necessarily universal, traumatic re-visitations often occur as markedly literal visions: “Indeed, modern analysts as well have remarked on the surprising *literality* and non symbolic nature of traumatic dreams and flashbacks, which resist cure to the extent that they remain, precisely, literal. It is this literality and its insistent return which thus constitutes trauma and points towards its enigmatic core . . . it is not a pathology, that is, of falsehood or displacement of meaning, but of history itself. . . . The traumatized person, we might say, carries an impossible history within [himself], or [he] become the symptom of a history that [he] cannot entirely possess.”<sup>23</sup> History possesses Philomela in this poem, causing her to involuntarily envision and re-envision this trauma; yet Philomela also must possess her story, in order to repeat its historical material on a web that she herself creates. The reader may also find him- or herself in a similar bind: perhaps she is possessed by this text of trauma if it inhabits her mind, but she can simultaneously possess the text and its knowledge as objects of discourse. Myths as “foundational falsehoods” gain a new dimension of *aporia* in the context of trauma: fictiveness, insubstantiality, falseness, and memory must interact with literality, substance, foundationalism, and history.

Though the poem does not explicitly discuss the text of Philomela’s body, it analyzes her mental state and even presciently predicts a sort of post-traumatic stress disorder. According to Luckhurst, PTSD as defined by the American Psychiatric Association “disrupts memory, and therefore identity, in peculiar ways. The first cluster of symptoms relate to the ways in which ‘the traumatic event is persistently re-experienced’ – through

intrusive flashbacks, recurring dreams, or later situations that repeat or echo the original.”<sup>24</sup> It is as though Philomela cannot help but re-experience her trauma over and over again, even in a new setting and time period. Additionally, strings of readers will witness and re-witness this event as the poem offers its mimetic art. The poet captures the intrusive repetition of post-traumatic stress disorder again in the third stanza:

Dost thou to-night behold  
Here, through the moonlight on this English grass,  
The unfriendly palace in the Thracian wild?  
Dost thou again peruse  
With hot cheeks and sear’d eyes  
The too clear web, and thy dumb Sister’s shame?  
Dost thou once more assay  
Thy flight, and feel come over thee,  
Poor Fugitive, the feathery change  
Once more, and once more seem to make resound  
With love and hate, triumph and agony,  
Lone Daulis, and the high Cepheissian vale?  
Listen, Eugenia— (16-28)

The repetition of “again” and “once more” emphasizes Philomela’s eternal travail, her changeless torment, and the paradoxical immediacy of her surreal flashbacks. Time and again she feels the “feathery change” consume her human form; time and again she mentally undergoes Tereus’ rape. Anaphora catches the ceaselessness of psychic trauma (note the repetition of “Dost thou” in lines sixteen, nineteen, and twenty-two). And because rising vocal pitch signifies a grammatical question, the reader’s voice accumulates a frenzied quality by the end of the stanza, causing the listener to experience the trauma’s urgency at the level of poetic form.

The answer to these questions, if there is one, must be “no”: as Arthur Culler puts it, Philomela’s pain “will not be healed by the Wordsworthian expedient of a forest glade.”<sup>25</sup> Romantic restoratives can no longer soothe the sufferer, as in Coleridge’s “This Lime Tree Bower My Prison.” Indeed, perhaps this is part and parcel of the poem’s tragedy: is this *Arnold’s* own lament in the breakdown of Romantic idealism, with its faith in nature? Can the English grass and the moonlit glade no longer afford any balm to *his* heart? Culler states that Arnold’s poem implies that “nature as a reality is no solution to human problems, and that the forest glade is no symbol of the human condition. The true symbol is the burning plain, and if we ever find ourselves in a forest glade and look at it penetratingly, as Philomela did, our eyes will pierce through the comely exterior to the harsh reality which lies beneath.”<sup>26</sup>

At the end of the third stanza, the poet’s linguistic faculties suddenly deteriorate. Metrical control fails as the speaker invokes an imaginary mistress to affirm his aural hallucinations: “Listen, Eugenia—” he cries (28). This line seems devoid of poetic rhythm, simply interrupting the poem’s blank verse with an outburst of spoken torment. If it is metrical at all, this line juxtaposes a strange opening trochee (LJSten) with two iambs (euGFENiA). Though it seems at times that the poet strives for – even yearns for – a blessed aesthetic unity, he falters here, concluding the poem in the only way that he can. The appeal to Eugenia may

even invite another re-visitation of the trauma: does the speaker alert her so that she, too, can witness this event unfolding on English grass? Will hearing the nightingale lead to another poem? Lacking any response to his queries – besides imminent birdsong which seems to “mean,” though in some indefinite, inhuman way – the poet resorts to self-referentiality; desperately apprising his own language by circling back to stanza one’s passion and pain. This utterance gains only the semblance of authority with newly capitalized forms (*passion* and *pain* become *Passion* and *Pain*) – yet these are only heuristics to finality. What lingers is an infinite repetition, a questioning which does not subsume the aporia of sexual violence, but which instead generates more questioning as the text falls into the hands of its readers, offering poetic imaginative space as a respite from the literal, the temporal, and the definite.

## II. LEDA AND THE SWAN

Yeats’s “Leda and the Swan,” rejected as too racy by *The Irish Statesman*, was first printed by the radical new magazine *To-Morrow* in its inaugural issue in August 1924.<sup>27</sup> Though Yeats’s version is certainly not the first text of the Leda myth, it is now the most well known version to students of English literature. Leda appears in the works of major and minor Greek and Roman authors, including Homer, Euripides, Pindar and others.<sup>28</sup> Like the story of Philomela, the myth of Leda is also recorded in Book VI of Ovid’s *Metamorphoses*. In this section of Ovid’s poem, the goddess Arachne weaves a web displaying a catalogue of rapes enacted upon humans by the gods: “Asterie is shown in an eagle’s grip, / and Leda, lying under a swan’s wing. . .” (lines 152–153). In Leda’s story, the Greek god Zeus adopts the guise of a swan and then seduces and rapes the mortal woman Leda. The progeny from this coupling are Helen, the *femme fatale* of the Trojan War, and Polydeuces, a famous warrior and boxer. Simultaneously, Leda also gives birth to Castor and Clytemnestra, who were fathered by her own husband.<sup>29</sup> In Aeschylus’ *Oresteia*, Clytemnestra murders her husband Agamemnon, and then dies at the hands of her own vengeful son. Leda’s pregnancy, then, initiates a saga of violent histories that would shape Greco-Roman mythology for millennia.

The inspiration for Yeats’s poem, however, came from a visual rather than a textual source.<sup>30</sup> Yeats purportedly owned a copy of Elie Faure’s *History of Art* (1921), which contains a reproduction of a Greek bas-relief from roughly the first century B.C.<sup>31</sup> As Cullingford and Madge note, the positioning of woman and bird in the poem matches up to the arrangement in this image (see Figure 1). As in the picture, Yeats’s swan holds Leda’s “helpless breast upon his breast” (4), with “her nape caught in his bill” (3). Yeats’s first stanza is nearly literal in its translation of this visual source, ekphrastically mimicking the violence that the unspeaking picture so powerfully evokes:

A sudden blow: the great wings beating still  
Above the staggering girl, her thighs caressed  
By the dark webs, her nape caught in his bill,  
He holds her helpless breast upon his breast.<sup>32</sup>

Much like Philomela’s web, the Greek bas-relief – and the mimetic first stanza of the poem – both testify to the power of

repetition as *ekphrasis*, showing how much a picture (in text, stone, or cloth) can “silently say.”<sup>33</sup> Indeed, the first stanza is nearly all image; though the reader hears persistent, harsh, plosive *g*’s, *b*’s and *β*’s, as well as hissing *s*’s, these sounds are restricted to the text. The reader must independently imagine the sounds that *Leda* hears, since Yeats does not explicitly state these here. Gone are the victim’s echoing cries present in Arnold’s poem (see line 25–26). Reading the first two stanzas of the poem is like watching a silent film which pans between metonymic clips of Zeus’s wings, the staggering girl, the swan’s dark webs, the thighs and nape, the animal and human breasts.

Whereas “Philomela” approaches trauma from the frame of interlocution, “Leda and the Swan” witnesses trauma from the vantage point of a spectator. However, just as Arnold’s poem occasions an aporetic circularity of interrogation, Yeats’s poem engenders a fraught problematic of spectatorship, or a “collapse of witnessing.” As Caruth states, “The trauma is a repeated suffering of the event, but it is also a continual leaving of its site. The traumatic reexperiencing of the event thus carries with it what Dori Laub calls the ‘collapse of witnessing,’ the impossibility of knowing that first constituted it. And by carrying the impossibility of knowing out of the empirical event itself, trauma opens up and challenges us to a new kind of listening, the witnessing, precisely, of *impossibility*.”<sup>34</sup> In some ways, the poem actually thwarts visualization: I know that what I am “witnessing” in “Leda and the Swan” is both a physical impossibility, and a *myth*, inherently fictive. As Cullingford notes, swans have tiny penises, and “the disparity in height between a standing woman and an attacking bird evokes an absurdly athletic image of an airborne rapist, beating his wings furiously just to stay in place.” The most powerful *ekphrasis* communicates an “impossibility of knowing,” and allows one to “see” something one cannot see. How, then, is Yeats’s poem “too-clear”? How can one *see* an anti-visual image that one knows to be “false”?

Again I return to Bell’s premise that “[Myth] means a supremely significant foundational story and a falsehood.”<sup>36</sup> As I “watch” Leda’s story unravel, I must simultaneously hold in mind two antipodes of reality: 1) this story of a swan raping a girl in the mythological past is fabricated (“myth means . . . a falsehood”); and 2) the narratives of rape surround me, in the contemporary present (“myth means a supremely significant foundational story”). As I write this paper, thousands (or millions) of Ledas and Philomelas, both male and female, crumple under their violators. This sonnet collects “power” precisely because it holds on to so many opposite forms of “knowledge,” eliciting a hotbed of conflicting emotions.

I argue that Yeats’s rendering of trauma in this poem rests upon its groundedness in opposites, ruptures, rifts, and ambivalence. Yeats sustains a profoundly aporetic narrative of trauma by invoking tensions of vocabulary, form, and content, suggesting the “inability to know” which is so crucial to “knowing” anything about trauma. The poem explicitly raises the issues of sexual violence and powerful domination but refuses to cover these wounds with an easy moralism or a narrative bandage: instead relying on its own artistic autonomy to constitute a sufficient response.

The poem’s rivetingly ambivalent vocabulary forces the reader to register the multiple difficult and contradictory faces of the

myth. For instance, the image of the swan rapist *caressing* Leda's thighs in line two does not fit, in the context of rape, nor does the description of Leda's fingers in line five: "How can those terrified vague fingers push/ The feathered glory from her loosening thighs?" the narrator asks incredulously (5-6). It seems impossible that her self-defense could be *terrified* and *vague* at once; shouldn't it be *terrified* and *frenzied*? Or *alarmed*, or at least *hurried*? There is a mismatch between Leda's terrified emotional state and the wandering, *vague*, dreamlike motions of her fingers as she tries to protect herself.

The heartbeats in line eight are similarly problematic: why does the poet invoke the *heart*, a cultural sign for intimacy and romance, in this context? Listening to the swan's *heartbeats* during this act seems totally incongruous: "And how can body, laid in that white rush,/ But feel the strange heart beating where it lies?" (7-8). Even more disturbing is the way that the narrator frames the question, implying that Leda (referred to only as an opaque, article-less *body*) hears these heartbeats not just incidentally, but *inevitably*; she *can't avoid* feeling the pulse of this *strange*, animal, divine *heart* against her own. Though both Arnold's and Yeats's renderings of trauma invoke uncertainty by using the interrogative format, at least Arnold's narrator is openly and uniformly sympathetic. By contrast, I feel that it is impossible to track the narrator's stance in "Leda and the Swan." My conception of the event is skewed because the spectator who narrates does not deliver a tonally-unified perspective. Like crushed glass, such tonal multiplicity recalls the *aporetic* shattering of trauma, which may only gain coherence when a survivor imposes this structure upon it during therapy. Luckhurst states that "Narrative ideas . . . direct some forms of Cognitive-Behavioral Therapy. Traumatic memory persists because it is poorly integrated into autobiographical memory, but 'as therapy progresses . . . the narrative tends to become more coherent.'"37

The tension between form and content in this sonnet has long been noted by readers. I argue that this division derives from the difficulty of assigning a specific form to traumatic content. How does one appropriate language to speak the unspeakable? As I asked at the outset, how does one put words on a wound? While therapeutic narratives are infinitely valuable for their ability bring coherence to trauma's fragments, literature can provide a space in which narratives do not have to move along a linear trajectory of progress. As Luckhurst states, "Discourses requiring logical causation (such as legal proofs of causes and post-traumatic effects) cannot recognize this strange temporality. Literature can, registering it in the disarticulation of linear narration . . ."38

Yeats navigates the dissonance of trauma by disarticulating (rather than harmonizing) conventions of form and content. Wild, uncontrolled subject matter now fuses with the ornate structure of a sonnet. In *Our Secret Discipline: Yeats and Lyric Form*, Helen Vendler cogently epitomizes Yeats's relationship with sonnet form:

What the sonnet meant to Yeats, historically speaking, was verse consciously aware of itself as written, not oral; verse from a European court tradition . . . verse (although of Italian origin) associated with the essential English lyric tradition, from Wyatt and Surrey through Shakespeare, Milton, Wordsworth, and Keats. Precisely because of its centrality to English literature,

the sonnet compelled from Yeats both his literary allegiance and his nationalist disobedience. When we wonder why Yeats wrote so few "proper" sonnets, we can find the answer, I think, in a distinctive mixture of that allegiance and that disobedience.<sup>39</sup>

This allegiance/disobedience paradigm allows Vendler to discuss Yeats's "Irish ization" of the typically English sonnet form. In "Leda and the Swan," Yeats engages and promulgates the colonial language, English, as well as a Greco-Roman mythology passed down to him through the British colonial school system. However, at the same time, the poet creates a clever irony between these "English" materials and his own nationalist agenda by intelligently deviating from conventions of form and content.

As a genre sonnets often consecrate romance, dwelling on the lover's feelings toward the beloved. "Leda and the Swan" seems to directly reply to this convention in particular, twisting the theme of romance into a bestial act of erotic violence. "Leda"'s hybridization of sonnet techniques also recalls the hybridity of the intra-species sexual act: stanzas one and two follow the Shakespearean pattern of alternately rhymed quatrains (*abab cdcd*), but stanzas three and four comprise a Petrarchan sestet, rhymed *efgg*.

A shudder in the loins engenders there  
The broken wall, the burning roof and tower  
And Agamemnon dead.

Being so caught up,  
So mastered by the brute blood of the air,  
Did she put on his knowledge with his power  
Before the indifferent beak could let her drop? (9-14)

Yeats effectively perverts a standard literary practice in the poem's *volte*, or turn, in line nine. The first two octaves of a Petrarchan sonnet typically present a problem, and the *volte* near the beginning of the sestet provides a resolution to this problem. The *volte* here presents a wry, acerbic resolution - *of sorts*: it brazenly depicts violent ejaculation, swiftly resolving the massive tension of the preceding octave in a collapsing climax, notated grotesquely as "A shudder in the loins" (9-11).

Lines ten and eleven travel even further from the courtly romance, conflating Zeus and Leda's union with the Trojan War and the murder of King Agamemnon. Read together, these lines yield the sense that these events are happening *simultaneously*, thus linking dissemination and generation with destruction and violence. A reader familiar with classics might even undergo a kind of cognitive overload in the blank space of line eleven, unconsciously supplementing the poem with additional images of Helen and Clytemnestra's birth, as well as pieces of the *Iliad* and *Odyssey*. The sestet also disarticulates narrative time, jumping from one temporal realm into another. Whereas the first stanza fixates on the minutiae of the sexual act, here the entirety of Homeric epic unfolds in two clauses, and Aeschylus' greatest tragedy in one.

The break in line eleven fractures the mythic narrative, forcing the reader to pause, and allowing the last phrase ("Agamemnon dead") to echo in the mind's ear. (The breaking technique is also used in the first line, via a colon.) An eerie stillness fills the void until the poem closes not with the traditionally snappy



Shakespearean couplet, but instead with a haunting question. No mention is made of Leda's *Passion* or her *Pain*; unlike the speaker in Arnold's "Philomela," this narrator refuses to let the reader access Leda's interior life. By ending the poem with a question rather than a statement, the narrator leaves the reader hovering in a state of anxiety and doubt, answer-less and groundless, unfastened from temporality.

The question of power and knowledge has been raised, but refuses an answer: does the reader gain a kind of "knowledge," in her complicity with the poem's violent power? Can she use this knowledge to resist the poem's representation of rape – or, if she uses that knowledge to write or speak, will she, too, proliferate further images of rapacious "power," and continue the cycle of violence? Yeats reflects the extraordinary potential of language to simultaneously resist and comply with violent and traumatic events, whether sexual, cultural, colonial, or otherwise. As an Irish subject, he was doubtless familiar with this phenomenon. Beginning in 1831, the native Irish language was systematically supplanted by English, with the advent of an Anglican-controlled national school system.<sup>40</sup> Writing a century after the "fall" of the Irish language, as it were, Yeats spoke and wrote in the colonial language (English) to advance nationalist politics and cultural revolution in the magazine *To-Morrow*. As Edward Said states in *Culture and Imperialism*, "[Yeats] expresses the predicament of sharing a language with the colonial overlord . . . For Yeats the overlapping he knew existed of his Irish nationalism with the English cultural heritage, which both dominated and empowered him, was bound to cause tension . . ." (227). Leda's ambivalent reactions to Zeus thus confront this same repulsive, aporetic, and inevitable intimacy between oppressor and oppressed, whether in acts of sexual or colonial possession.

Both "Philomela" and "Leda and the Swan" participate in a wider discourse on trauma, seeking to understand "the other's" story through poetic questioning, fragmentation, and ambivalence. When representing traumatic events, one feels even more sharply the ever-present limits of language and the particular paradoxes of representation; and yet, these enclosures must also *motivate* the discourse itself. Perhaps we simply cannot put words on a wound, like so many medical dressings. But the words that come *out* of this wound – often shrill, always strange – function as a kind of therapy in and of themselves, acting as safeguards against "the erosion of opportunities" to tell stories that do not follow a narrative of temporality, progress, or development.<sup>41</sup> The literature of trauma is a place for exploration and contradiction, functioning not in spite of, but because of *aporia*.

#### REFERENCES AND NOTES

1. Traverso and Broderick, "Interrogating Trauma: Towards a Critical Trauma Studies," *Continuum: Journal of Media & Cultural Studies* 24, no. 1 (February 2010): 3-15. *Continuum: Journal of Media & Cultural Studies*, EBSCOhost (accessed April 14, 2013).
2. Cathy Caruth, *Unclaimed Experience: Trauma, Narrative, and History* (Baltimore: Johns Hopkins University Press, 1996), 92.
3. *Ibid.*, 4.
4. Marvin Modlinger and Philip Sonntag, eds., *Other People's Pain: Narratives of Trauma and the Question of Itself* (Bern, Switzerland: Peter Lang AG, 2011), 4.
5. Charles Martin, trans., introduction to *The Metamorphoses of Ovid: A New Translation, Contexts, Criticism* (New York: Norton, 2010), xxviii-xxix.
6. James W. Heffernan, *Museum of Words: The Poetics of Ekphrasis from Homer to Ashbery* (Chicago, London: University of Chicago Press, 1993), 48.
7. Charles Martin, trans., *The Metamorphoses of Ovid*, lines 655-657.
8. *Ibid.*, lines 803-811.
9. Heffernan, *Museum of Words*, 48.
10. Qtd. in Luckhurst, *The Trauma Question* (New York, Oxford: Routledge, 2008), 82.
11. Charles Martin, trans., *The Metamorphoses of Ovid*, pp. 157-166.
12. Warren Anderson, *Matthew Arnold and the Classical Tradition* (Ann Arbor: University of Michigan Press, 1965), 213.
13. Arnold's close friend and school-mate, Hugh Arthur Clough, states that by the time of his graduation from Rugby in 1837, he had read: ". . . all Thucydides, except the sixth and seventh books; the first six books of Herodotus . . . I had read five plays, I think, of Sophocles, four of Aeschylus . . . Four, perhaps or five, of Euripides, considerable portions of Aristophanes; nearly all the "Odyssey"; only about a third of the "Iliad," but that several times over; one or two dialogues of Plato . . . Not quite all Virgil, all Horace, a good deal of Livy and Tacitus: a considerable portion of Aristotle's "Rhetoric," and two or three books of his "Ethics" . . ." (qtd. in Anderson, 9-10). Because Arnold attended Rugby from 1837 to 1841, it is likely that he would have studied a similar set of authors. Anderson goes on to elaborate the curriculum Arnold would have studied at Oxford, which includes all of these authors, plus Plato and a host of other minor Greco-Roman authors (11).
14. George Whyte Melville, trans., *Horace: Odes, Epodes, and Carmen Saeculare* (London: Simpkin, Marshall, and Co., 1850), 89. University of Alberta Open Content Alliance eBook Collection. <http://chooks.library.ualberta.ca/local/horacodes/podes00horauoft>. 15 March 2013.
15. David West, trans., *Horace: Complete Odes and Epodes*. Trans. Oxford, New York: Oxford University Press, 2008. P. 127. Print.
16. Elizabeth Robertson and Christine M. Rose, ed., *Representing Rape in Medieval and Early Modern Literature* (New York: Palgrave, 2001), 2.
17. Robert Donovan, "Philomela: A Major Theme in Arnold's Poetry," *The Victorian Newsletter*, 12 (1957): 4.
18. Robertson and Rose, *Representing Rape*, 2.
19. Matthew Arnold, *Stanzas from the Grand Chanson*, line 85.
20. Cathy Caruth, Introduction to "Psychoanalysis, Culture and Trauma," *American Imago: Studies in Psychoanalysis and Culture*, 48.1 (1991): 3.
21. Michael Bell, *Literature, Modernism, and Myth: Belief and Responsibility in the Twenty-First Century* (Cambridge: Cambridge University Press, 1997), 1.
22. Caruth, *Unclaimed Experience*, 91-92.
23. Caruth, Introduction to "Psychoanalysis, Culture and Trauma," 3-4.
24. This is a definition from the APA's *Diagnostic and Statistical Manual*, 4th rev. edn, published in 2000, which Roger Luckhurst cites in *The Trauma Question* (New York, Oxford: Routledge, 2008), 1.
25. Arthur Dwight Culler, *Imaginative Reason* (New Haven: Yale University Press, 1976), 33.
26. *Ibid.*, 35.
27. Elizabeth Butler Cullingford, "Pornography and Canonicity: The Case of Yeats's 'Leda and the Swan,'" in *Representing Women: Law, Literature, and Feminism*, ed. Susan Sage Heinzelman and Zipporah Barshaw Wiseman (Durham, NC: Duke UP, 1994). This statement is a summary of pp. 168-169.
28. Such others include Apollodorus, Lactantius, and the First Vatican Mythographer.
29. Robert Graves, *The Greek Myths* (New York: G. Braziller, 1957), 206-207.
30. This visual source is *Die Paure's History of Art*. In "Pornography and Canonicity," on p. 175, Cullingford asserts that Yeats had access to this book. See Brian Arkins' *Builders of My Soul: Greek and Roman Themes in Yeats* (1991) for details on Yeats's classical education.
31. In his article "Leda and the Swan," author Charles Madge notes that the bas-relief "was made about the first century B.C., but that the motive goes back to the late fourth century B.C." *The Times Literary Supplement*, 20 July 1962, 532.
32. W.B. Yeats, "Leda and the Swan," *W.B. Yeats: The Poems*, ed. Daniel Albright. London: J.M. Dent and Sons, 1990. 260, lines 1-4.
33. Heffernan, *Museum of Words*, 51.
34. Caruth, Introduction to "Psychoanalysis, Culture and Trauma," 10.
35. Cullingford, "Pornography and Canonicity," 175.
36. Michael Bell, *Literature, Modernism, and Myth: Belief and Responsibility in the Twenty-First Century* (Cambridge: Cambridge University Press, 1997), 1.
37. A. Ehlers and D. Clark, "A Cognitive Model of Posttraumatic Stress Disorder," *Behavior Research and Therapy* 38: 319-45. Qtd. in Luckhurst, *The Trauma Question*, 82.
38. Luckhurst, *The Trauma Question*, 81.
39. Helen Vendler, *Our Secret Discipline: Yeats and Lyric Form* (Cambridge, MA: The Belknap Press of Harvard University Press, 2007), 147.
40. John Laukatis, "The Politics of Language and National School Reform," *American Educational History Journal*, 37.1 (2010): 222.
41. Luckhurst, *The Trauma Question*, 82.

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# DISTRIBUTIONAL LEARNING IN RAPID SYNTACTIC ADAPTATION

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One of the fundamental aspects of language is variability. Far from being consistent across or even within individuals, each user of language is shaped by previous experience and expectations. This variance is found on all levels of linguistic representation. On the phonetic level, speakers must be able to resolve the “lack of invariance” problem, in which a given phoneme (sound category) is actually produced differently by speakers that share the same language (Liberman, Cooper, Shankweiler, & Studdert Kennedy, 1967). This problem is very evident within the context of grammar, as the age, gender, and social status of a speaker influences whether he uses the active voice (“The boy hit the ball”) or the passive voice (“The ball was hit by the boy”) (Weiner and Labov, 1983).

Given that communication occurs in spite of the variability of grammar, there exist mechanisms to compensate for the issues that this variability can pose. One account of such mechanisms is the constraint satisfaction approach (MacDonald, Pearlmuter, & Seidenberg, 1994; McRae, Spivey, Knowlton, & Tanenhaus, 1998), which makes use of individuals’ sensitivity to the various probabilities of their linguistic environment. Constraint satisfaction theories hold that initial language processing activates in parallel all potential interpretations of a sentence. Statistical information is used to track the relative frequencies of syntactic structures (Jurafsky, 1996). More probable interpretations receive more activation and temporarily inhibit less probable interpretations. Likelihood is determined by the probabilistic expectations of a structure, given an individual’s past experiences. Another account of such compensating mechanisms, proposed by Kaschak & Glenberg (2004), is an episodic-processing approach. This approach suggests that in encoding a stimulus, the processing methods applied to the stimulus are incorporated into the encoding. For example, if one were asked to perform two different tasks to a word, those different processes would lead to two different memories of the word. Crucial episodic-processing theories pose a model where individuals are sensitive to both the probabilistic likelihood of a structure and how processing occurred on the structure. This is crucial to how such mechanisms influence sentence processing. Many such mechanisms for episodic-processing approaches are consistent with constraint satisfaction approaches, but the differences between them lead

to different testable predictions about behaviors in linguistic environments.

This paper focuses on syntactic adaptation. Adaptation is described in Fine, Qian, Jaeger, & Jacobs (2010) as “how language users maintain or update their representations of the probability distributions relevant to language use, given new evidence” – essentially, how language users utilize their expectations of how language will be used, and how they refine those expectations in the face of new or conflicting evidence. Syntactic adaptation examines how language users employ expectations of the various syntactic structures to comprehend any given sentence. For example, in (1) the first verb encountered can either be the matrix verb in the sentence (MV), or a descriptor in a condensed relative clause (RC).

(1) The flowers bloomed ten days ago...

MV: ...in the spring garden.

RC: ...were cut by the florist.

The sentence in (1) is ambiguous until the phrase “were cut” is encountered, which rules out the MV interpretation; “were cut” is thus the disambiguation point. If readers expect the MV interpretation more than they expect the RC interpretation, reading times at the disambiguation point will be longer. This is known as the garden path effect. Expectations are formed based on a priori experience with language. In this particular example, MV sentences are more frequent than RC sentences. Syntactic adaptation is the ability of language users to adjust to the statistics of the current linguistic environment and eliminate the garden path effect.

In a constraint satisfaction approach, the a priori expectations form the initial basis for a linguistic environment. These would be the accumulation of an individual’s entire previous experience with language. For the structures studied in this paper, a priori expectations are those MV structures that are more common than RC structures. When encountering an example of an ambiguous RC, individuals will expect an MV until reaching the disambiguation point, where the garden path effect occurs. However, as the individual encounters more RC structures, the probability of an RC increases and the individual begins to select the RC interpretation more often. As this theory relies on probabilistic weighting, if the infrequent structure is weighted higher, then the

frequent structure (or more frequent structures, as oftentimes there are more than two potential structures a sentence can take) must be correspondingly weighted lower. This leads to difficulty in processing the more frequent structure, which was previously processed with no issue. This would manifest as ambiguous MV reading times increasing as RC reading times decrease.

Many factors remain the same between the constraint satisfaction approach and the episodic processing approach. Initial processing difficulty is incurred by the infrequent structure; individuals favor the more frequent structures and are forced to revise. Over time, the infrequent structure becomes more expected, and the processing difficulty vanishes. However, in the episodic model, when encountering the more frequent structure, the individual has the structure already partially activated from when it was incorrectly selected as the interpretation of the sentences involving the infrequent structure. Rather than incurring a processing cost due to exposure to the infrequent structure, the more frequent structure is facilitated and comprehended more easily. Put more concretely, as readers encounter an ambiguous MV structure after many exposures to RC structures, the memory trace of the garden path leaves the MV interpretation partially active, which results in no processing difficulties.

Fine, Jaeger, Farmer, & Qian (2012) has shown some difficulty when encountering the MV structures later in the experiment. This paper is focused on examining how sensitive language users are to the environmental statistics by varying them. What percentage of the less common structure must be present to overcome the a priori expectations and have adaptation occur? Also, by strongly biasing participants towards one interpretation or another, can evidence of either facilitation or difficulty for the more frequent structure be shown?

### EXPERIMENT 1

In Experiment 1, subjects were presented with 4 different conditions of an experimental item in a 2x2 within-participant design: each item was either a matrix verb (MV) or relative clause (RC), and was either temporarily ambiguous (A) or was unambiguous (UA). An example of the same item in the four different conditions is shown below in (2). The different verbs are italicized and the disambiguating region is underlined.

(2) The experienced soldiers / ...

UAMV—wrote about the dangers / before the midnight / raid on the enemy.

AMV—cautioned about the dangers / before the midnight / raid on the enemy.

ARC—cautioned about the dangers / conducted the midnight / raid on the enemy.

UARC— who were cautioned about the dangers / conducted the midnight / raid on the enemy.

So far, this is essentially a replication of previous syntactic adaptation work, such as MacDonald et al. (1992) and Fine et al. (2010). However, we added an additional between-participant manipulation to the basic within-participant design. Experiment 1 was split into a training session and a test session, with no visible break between the two sessions. The training session contained 72 stimuli; of those, 28 were items and 44 were fillers. The test session contained 22 stimuli; of those, 8 were items and 14 were fillers. Participants saw one of 3 types of training sessions:

- 50% RC Condition: a uniform distribution of the four conditions (7 items in each condition) during the training session.
- 100% RC Condition: a 50/50 distribution of the two RC conditions (14 ambiguous, 14 unambiguous) during the training session.
- 0% RC Condition: a 50/50 distribution of the two MV conditions (14 ambiguous, 14 unambiguous) during the training session.

After exposure to the training session, participants saw the test session, which was consistent across all conditions and contained 2 instances of each of the four conditions (for the 8 items total).

A constraint satisfaction approach has multiple hypotheses. Firstly, it is predicted that previous research on garden paths in sentence processing should replicate experiment 1: the ambiguous stimuli should elicit longer reading times in the disambiguating region than the unambiguous stimuli, the effect of ambiguity should be larger for the less frequent structure (in this case, the ARC condition should have the largest reading time), and the less frequent structure might take longer to read. Secondly, the effects seen in Fine et al. (2012) should replicate this. The more exposure to the less frequent structure during the training session, the smaller the ambiguity effect should be for that structure in the test

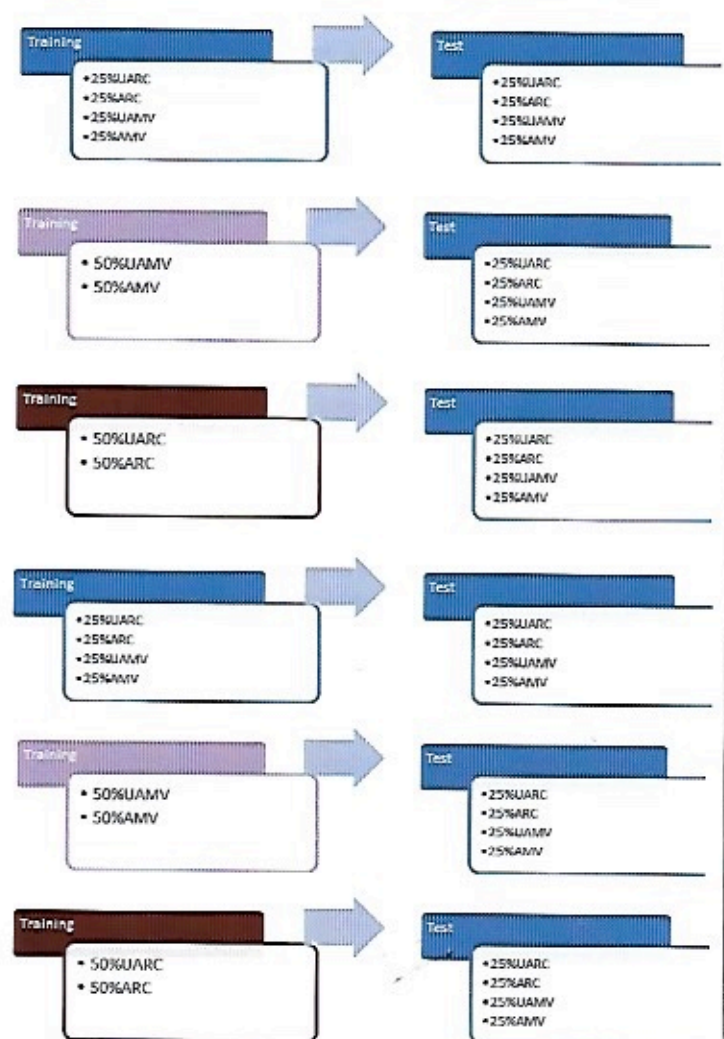


Figure 1: Design for Experiment 1

phase; conversely, the less exposure to the more frequent structure during the training session, the larger the ambiguity effect should be during the test session. In other words, the reading times for RC structures should be fastest, and the reading times for ambiguous MV structures slowest, in the 100% RC condition, where the most exposures of the infrequent structure and the least of the frequent structure occur. The 0% RC condition should have the fastest reading times for the MV structures and the slowest for the ambiguous RC structures, with the 50% RC conditions falling between the two extremes.

An episodic processing approach would hold most of the same hypotheses: ambiguous stimuli take longer to read than unambiguous stimuli, the less frequent structures initially take longer to read than the more frequent structures, and adaptation to the infrequent structures will occur. However, there are some hypotheses specific to this approach, among them that exposure to the less frequent structure will facilitate the reading of the more frequent structure. The 0% RC group should have the fastest reading times for the MV structures and the slowest for the RC structures, because the MV structure is the initial assumption. The 50% RC and 100% RC groups should have faster reading times for both RC and MV structures as the experiment progresses, with the 50% RC group showing the fastest reading times for the ambiguous MV structure. This is due to its presence in the probabilistic environment as well as the partial activation from the RC structures. The 100% RC group should have the fastest reading time for RC structures, because that group had the highest exposure to the RC structures.

## METHOD

*Subjects.* 144 monolingual native American English speakers participated in this study as part of a subject pool recruited through Amazon's crowd sourcing platform, Mechanical Turk (Mason & Suri, 2011). All subjects gave informed consent and were compensated monetarily.

*Materials.* The materials in Experiment 1 were a modified version of those used in MacDonald, Just, and Carpenter (1992), Fine et al. (2012) and Farmer et al. (2011). In the MacDonald et al. (1992) materials, 24 items were created from verb triplets, with 3 items per triplet. Of the three verbs, one would be used in both ambiguous conditions (ARC and AMV), one would be used in the UARC condition, and one would be used in the UAMV condition. Fine et al. (2012) and Farmer et al. (2011) created and added 12 additional items, following the same verb triplet format. This yielded the total of 36 items. The fillers were the same as in Fine et al. (2012).

However, the stimuli used in this experiment diverge from previous experiments in a few important ways. The sentences were lengthened, to allow the disambiguating region to occur earlier in the sentence. All experimental items had the same number of words per condition. The forms of the RC disambiguating region were standardized to a few different varieties: a verb/conjunction/verb phrase, an auxiliary verb followed by a main verb and noun phrase, or a verb followed by a noun phrase. This increased the variety of the items in a consistent manner, and helped eliminate any potential confounding variables associated with reusing the same structure. For each item, the same verb was used in three conditions: AMV, ARC, and UARC. This made

direct comparisons of the reading times and deviations easier by using the same verb in all applicable cases, instead of potentially skewing the results by having the UARC condition use a unique verb.

Most importantly, any and all lexical repetition was completely eliminated. Each item used a unique irregular past tense verb form for the UAMV condition (which is what makes the sentence unambiguous) and a unique regular past tense verb form for the other three conditions. On two occasions, two items shared UAMV condition verbs. However, the experimental lists were designed in such a way that no subjects saw both items in the UAMV condition, preventing any lexical overlap. This was done because some of the effects found in previous experiments may be due to the lexical repetition of the items.

Each of the three between participants groups had multiple lists, so each item appears in each condition across all participants. The fillers remained in the same position in all lists. Each training list was paired with the same test list. It is possible to further pair each training list with each test list, but this was logistically impractical. Four lists for each between participant group (one with each item presented in a different condition) and then the inverse item order for the training session makes for a total of 8 lists per between-participant condition.

*Procedure.* Subjects read sentences in a self paced moving window display (Just, Carpenter, & Woolley, 1982) in a flash applet hosted on Mechanical Turk. Each word in the stimulus is initially presented as a dash. Subjects were instructed to press the space bar to progress down the stimulus, one word at a time. Durations between space bar presses were recorded. Whenever the space bar was pressed, the previously displayed word reverted to a dash as the next word was displayed. Both the experimental and filler items were followed by a simple yes/no comprehension question, with half the answers as "yes". Subjects were presented with practice items before beginning the experiment proper.

*Results.* Data coding and exclusions. All raw reading times (RTs) that were abnormally low (below 100 ms) or abnormally high (above 2000 ms) were removed. Subjects who exhibited below 80% total accuracy on comprehension questions were excluded. 142 subjects were left for analysis. Some items were excluded from analysis due to experimental error from the ambiguous nature of their comprehension questions or errors in question design. Length-corrected RTs (cf. Ferreira & Clifton, 1986) were created by regressing the remaining raw RTs onto word length by means of linear mixed effects regression. This linear mixed model included a single main effect of word length, a random intercept for subject, and a by-subject random slope for length. This allows the model to discount mean differences in reading times across subjects as well as variable word length sensitivity across subjects. Length-corrected (residualized) RTs on the disambiguation region were analyzed using a mixed linear regression with the maximal random effect structure for which the model converged (random by-subject and by-item intercepts and the slopes for the full factorial of Ambiguity and Structure, but no random slopes for Group). The model analyzed the full 2 (Ambiguity) x 2 (Structure) x 3 (Group) factorial design.

*Analysis.* Initially, the sentence was divided into regions, and the average residual reading time in each region was found. Residual reading times track deviations from what would be an expected

reading time, given the word length and the subject's natural reading speed. Regions were consistent across all conditions. The mean reading times for each region in each condition were graphed to track how the times changed throughout the sentence. If the garden path effect was observed, reading times should be higher for the Ambiguous RC condition (ARC) in the disambiguating region than the other conditions. As seen in Figure 2, this effect was found. Reading times for the verb in the Unambiguous RC condition are significantly lower due to the subjects' previous exposure to the disambiguating phrase "who was/were", which allows them to know that the item is a RC.

In analyzing the model, we found a significant main effect of Structure, so that RCs were read more slowly than MVs ( $\beta = 21.5, t = 2.3, p < .05$ ). Since sum-coding was used, the coefficient estimate  $\beta$  is equivalent to the estimated mean difference in milliseconds of reading time on the disambiguating region between RCs and MVs. There was a marginally significant effect of Structure on Group: relative clauses were read marginally slower in the 100% RC group compared to the other groups ( $\beta = 7.7, t = 1.8, p < .06$ ). There also was a significant main effect of Ambiguity on Group: while the interaction between Ambiguity and the 50% and 0% RC groups did not reach significance ( $|t| < .6$ ), the interaction between Ambiguity and the 100% RC group compared to the other groups was significant ( $\beta = -12.1, t = -2.6, p < .05$ ). There was a marginally significant effect of Structure on Group: RCs were read marginally slower in the 100% RC group compared to the other groups ( $\beta = 7.7, t = 1.8, p < .06$ ). The three-way interaction between Structure, Ambiguity, and Experience Group was marginally significant in the expected direction ( $\beta = -18.3, t = -2.0, p < .06$ ): the ambiguity effect for RCs was reduced in the 100% RC group compared to the two other groups. None of the other main effects or interactions reached significance ( $|t| < 1.5$ ). Figure 3 is a representation of the mean residual reading times in the disambiguating region for items in the test phase, across both condition and group. Overlapping error bars indicates a lack of significance. In the 0% RC and 50% RC group, there is still an ambiguity effect for ambiguous RCs, which is numerically reduced in the 50% RC group, although it did not reach significance. However, in the 100% RC group, ambiguous RCs are read faster than they are in any other condition. The reading times for the MV structures do not differ significantly, however, there is a clear trend: such MV structures are read fastest in the 100% RC group,

followed by the 50% RC group, then followed by the 0% RC group.

### DISCUSSION

The expected garden path effect was replicated, as subjects reading ambiguous RC items slower in the disambiguating region than items in other conditions. MVs were numerically read faster, and ambiguous structures were read numerically slower, but these did not reach significance. Also, the ambiguous RC items were read fastest in the 100% RC group, which was predicted by both theories. However, the data was inconclusive with respect to most of the specific predictions for both constraint satisfaction and episodic processing theories. The reading times for MVs across groups did not differ significantly. There was a numerical ambiguity effect for the MV structure in the 0% RC and 50% RC group, but this did not reach significance. This does not allow us to draw any conclusions from most of the data. However, it was confirmed that the larger the amount of RCs the subjects were exposed to, the more easily ambiguous RC structures were read, to the point of eliminating the ambiguity effect by the testing region. It is possible that any effects that are present are masked by general task adaption, the tendency for subjects to get faster through the course of the experiment as they become more familiar with the task.

### EXPERIMENT 2

In Experiment 1, general adaptation to the task confounded the results, making it hard to disentangle what was true syntactic adaptation, and what was merely adapting to the experimental paradigm. As the testing session was at the end, the most relevant data was collected when the participants had the most experience with the procedure. This could have lead to some of the more sensitive effects being masked by the general task adaptation. Our solution to this was to test the participants in multiple phases to get a more accurate read of how the reading times of the different conditions changed throughout the course of the experiment and to use those to infer how the participants' expectations changed. This also provides more of an opportunity to see if the MV structures become impeded or facilitated as the number of exposures to RC structures increases.

In the constraint satisfaction approach, all of the hypotheses presented in Experiment 1 are still expected, with a few additional

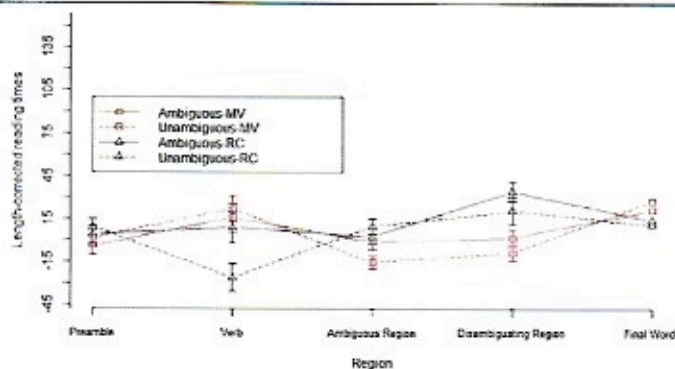


Figure 2: Mean residual reading times across regions for items in Experiment 1. The reading times in the disambiguating region of ambiguous RC items is the highest, indicative of the subjects experiencing the garden path effect.

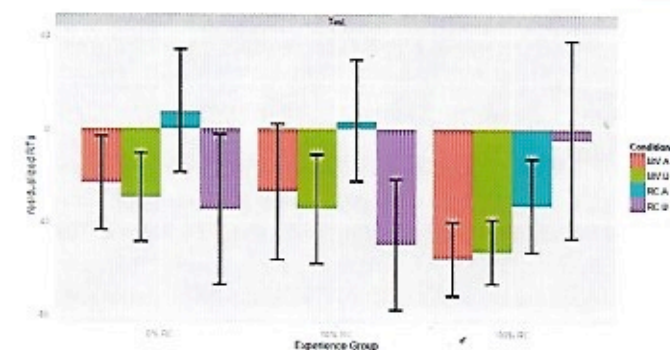


Figure 3: Mean residual reading times in the disambiguating region for test items in Experiment 1. The reading times in the disambiguating region of ambiguous RC items is the fastest in the 100% RC group.

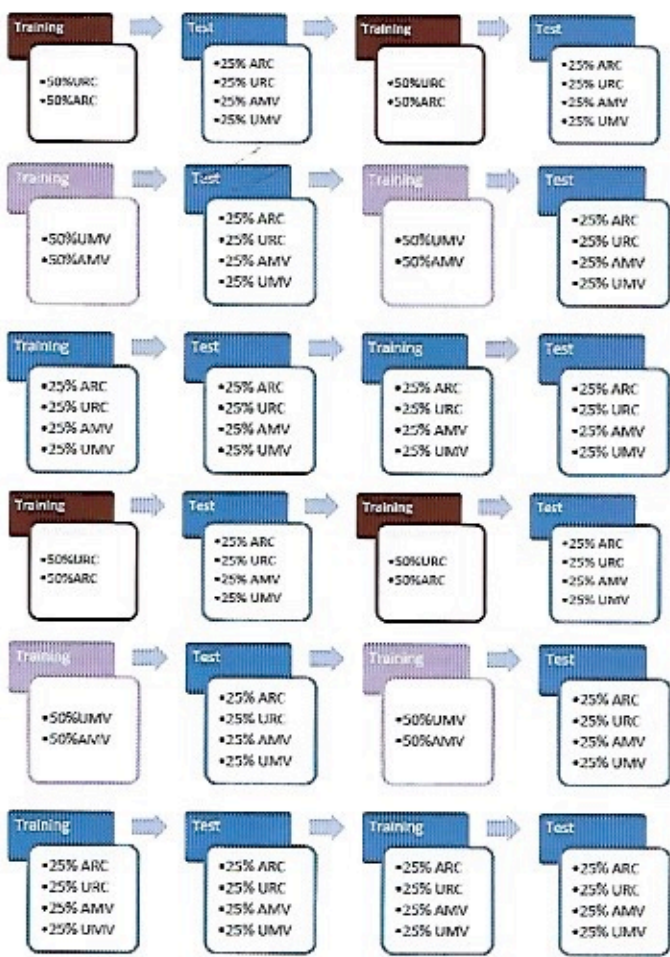


Figure 4: The design for Experiment 2, highlighting the three groups.

hypotheses: that reading times for RC structures will be faster in the second test phase than the first, and that the reading times for MV structures will be slower in the second test phase than the first. This difference should be greatest in the 100% RC group, followed by the 50% RC group, and the 0% RC group should see the least decrease in reading times for the RC structure and potentially no increase in reading times for the MV structure.

In the episodic-processing approach, the same is true—the hypotheses presented in Experiment 1 are still expected, and the new design invites additional hypotheses: reading times for both types of structures will be faster in the second phase than the first, with the difference being greatest in the 50% RC group, followed by the 100% RC group, followed lastly by the 0% RC group.

**METHOD**

*Subjects.* 292 monolingual native American English speakers participated in this study as part of a subject pool recruited through Amazon’s crowd sourcing platform, Mechanical Turk (Mason & Suri, 2011). All subjects gave informed consent and were compensated monetarily. No subjects who participated in Experiment 1 were able to participate in Experiment 2.

*Materials.* The materials in Experiment 2 were composed of the same stimuli as described in Experiment 1, but arranged differently. Each list for each between participant group had two training sessions and two test sessions. The first training session

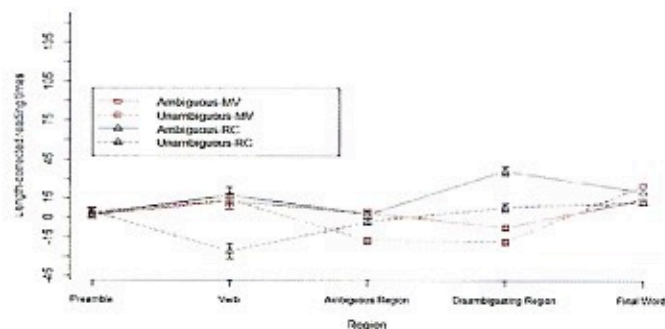


Figure 5: Mean residual reading times across regions for items in Experiment 2. The reading times in the disambiguating region of ambiguous RC items is the highest, indicative of the subjects experiencing the garden path effect.

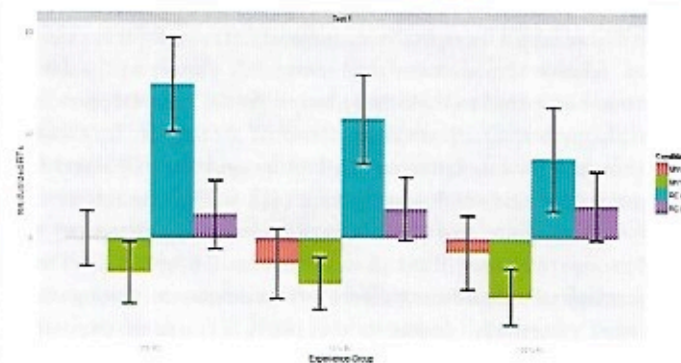


Figure 6: Mean residual reading times in the disambiguating region for test items in Test 1 of Experiment 2. The reading times in the disambiguating region of ambiguous RC items is the fastest in the 100% RC group, indicating already a diminished ambiguity effect.

was composed of 20 stimuli, with 8 experimental items and 12 fillers. The first test session was composed of 29 stimuli, with 12 experimental items and 17 fillers. The second training session was composed of 23 stimuli, with 8 experimental items and 15 fillers. The second test session was composed of 24 items, with 8 experimental items and 16 fillers. As in Experiment 1, each between-participant group had four lists (one with each item in a different condition) and then the inverse of those lists, but in addition the test phases were also presented in inverse order as well, creating 16 lists instead of the 8 found in experiment 1.

**RESULTS**

*Data coding and exclusions.* Exclusions were identical to that of Experiment 1: all raw reading times (RTs) that were abnormally low (below 100 ms) or abnormally high (above 2000 ms) were removed. Subjects who exhibited below 80% total accuracy on comprehension questions were excluded. This left 287 subjects to be analyzed. Due to experimental error, some items were excluded from analysis due to either the ambiguous nature of their comprehension questions or errors in question design. As in Experiment 1, Length-corrected RTs (cf. Ferreira & Clifton, 1986) were created by regressing the remaining raw RTs onto word length by means of linear mixed effects regression. This linear mixed model included a single main effect of word length, a random intercept for subject, and a by-subject random slope

for length. This allowed the model to discount mean differences in reading times across subjects as well as variable word length sensitivity across subjects. The model used was identical to that of Experiment 1. Length-corrected (residualized) RTs in the disambiguation region were analyzed using a mixed linear regression with the maximal random effect structure for which the model converged (random by subject and by item intercepts and the slopes for the full factorial of Ambiguity and Structure, but no random slopes for Group). The model analyzed the full 2 (Ambiguity) x 2 (Structure) x 3 (Group) factorial design.

**Analysis.** As in Experiment 1, the sentence was divided into regions, and the average residual reading time in each region was found. The mean residual reading times were then graphed. As seen in figure 2, the garden path effect was observed because reading times for the Ambiguous RC condition ( $\Delta$ RC) was higher than other regions. In reading times for the verb in the Unambiguous RC condition are significantly lower due to subjects having already been exposed to the disambiguating phrase “who was/were”, which allows them to know that the item is a RC.

**Test 1.** A significant main effect of Structure was found, so that RCs were read more slowly than MVs ( $\beta = 41.9, t = 6.0, p < .03$ ). The coefficient estimate  $\beta$  is equivalent to the estimated mean difference in milliseconds of reading time on the disambiguating region between RCs and MVs. Ambiguity also had a main effect: Ambiguous items were read more slowly than unambiguous items ( $\beta = 25.6, t = 5.9, p < .03$ ). The interaction between Ambiguity and Structure trended towards significance in the expected direction: ambiguous items were read more slowly than unambiguous items ( $\beta = 26.5, t = 1.6, p < .06$ ). None of the remaining main effects or interactions reached significance ( $|t| < 1.5$ ).

The mean residual reading times for the disambiguating region for items in the test phase, across both condition and group, is shown in Figure 6. Reading times were significantly higher for ambiguous RCs compared to unambiguous RCs in the 0% RC and 50% RC groups, but were not significantly higher in the 100% RC group. Between MV structures, reading times did not significantly differ but trended towards the slower end for ambiguous MVs; nor did the reading times between groups for MVs significantly differ.

**Test 2.** A significant main effect of Structure was found, so that RCs were read more slowly than MVs ( $\beta = 36.4, t = 5.3, p < .03$ ). Since sum coding was used, the coefficient estimate  $\beta$  is equivalent to the estimated mean difference in milliseconds of reading time on the disambiguating region between RCs and MVs. A significant main effect of Ambiguity was also found: ambiguous items were read more slowly than unambiguous items ( $\beta = 15.2, t = 3.1, p < .03$ ). The interaction between Structure, Ambiguity, and Experience Group approaches marginal significance in the expected direction ( $t = -1.64$ ): the ambiguity effect for RCs was marginally reduced in the 100% RC group compared to the two other groups. None of the remaining main effects or interactions reached significance ( $|t| < 1.5$ ).

Figure 7 is a representation of the mean residual reading times in the disambiguating region for items in the Test 2 phase, across both condition and group. In all three groups, there is no longer a significant difference between ambiguous RCs and unambiguous RCs. The fastest reading times for RC structures is numerically found in the 100% RC group. Ambiguous RCs are read numerically

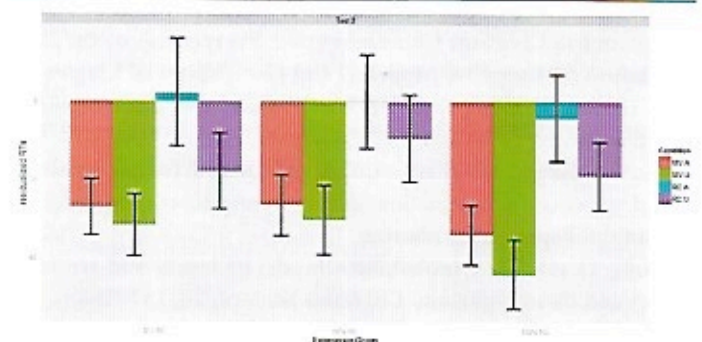
slowest in the 0% RC condition. There is no significant difference between the ambiguous MVs and unambiguous MVs in any condition, but the difference is numerically largest in the 100% RC condition, suggesting a trend to an ambiguity effect. MVs are not read significantly faster in any condition, but the 100% RC condition shows the numerically fastest reading times for MVs in both conditions.

**DISCUSSION**

Experiment 2 showed a replication of the garden path effect: ambiguous RC items had the highest reading times of the conditions. Test 1, occurring after only 8 items, is already showing an effect of group: the ambiguity effect for RCs is gone for the 100% RC group. This supports the conclusion of Experiment 1, where the 100% RC group had the faster reading times for ambiguous RCs. In Test 2, the ambiguity effect is no longer significant in any condition, where the fastest numerical reading times were again in the 100% RC group, but the difference between groups did not reach full significance. In the 100% RC and 50% RC groups, the MVs were read significantly faster than the RCs, and in the 0% RC group this was marginal. Unfortunately, as in Experiment 1, the MVs in all groups in both test phases did not differ significantly. However, some interesting trends did occur. In Test 2 for the 100% RC group, reading times were faster for MV structures despite having been exposed to only 4 MV structures (from Test 1, the 4 total in Test 2 create 8 exposures overall). Furthermore, the numerically largest increase in reading times for MVs happened in the 100% RC group. This is suggestive of what the episodic processing models would expect. However, the ambiguity effect for MVs is also numerically largest in the 100% RC group. This is suggestive of what the constraint satisfaction approach would expect.

One potential source of result confounding is the fact that Test 1 alters significantly the statistical environment for two of the three groups. This rapidly shifting difference in statistics could impact the expectations of the subjects, making it harder to adapt to the desired extent. The labels of “0% RC” and “100% RC” are technically misnomers, because each group saw both MVs and RCs during the test phases.

The fact that some predictions for both theories were apparent but not quite statistically significant suggests a need for further experimentation, perhaps with an altered paradigm in an attempt



**Figure 7:** Mean residual reading times in the disambiguating region for test items in Test 2 of Experiment 2. The reading times in the disambiguating region of ambiguous RC items is the fastest in the 100% RC group, and all groups show an increase for MVs.



to discriminate more finely between the theories. What can be conclusively stated is that exposure to a higher percentage of RC structures shifts the expectations of the subjects most rapidly. It shifts it so much that after just 8 exposures the ambiguity effect is not statistically significant. Interestingly, while the ambiguity effect is not statistically significant in Test 1 for the 100% RC group, it is also not statistically significant in Test 2 for the 0% RC group. The 100% RC group by Test 1 and the 0% RC group by the end of Test 2 have both seen 8 examples of RC structures. It is possible there is a potential threshold of exposures that causes adaptation to occur. This would be influenced by the a priori probability of a structure. Perhaps a very uncommon structure such as the reduced relative clause does not need many exposures to have the expectations be adjusted, regardless of the mechanism for adjustment. Adaptation may not just be rapid but also sensitive.

#### CONCLUSION

Language users are capable of adapting their expectations of the syntactic linguistic environment. Experiment 1 showed that the ambiguous RC items were read fastest in the 100% RC group. Test 1 of Experiment 2 showed that a small number of exposures to the RC structures with no exposures to MVs (i.e., the 100% RC group) could reduce the ambiguity effect to where it was no longer statistically significant. Test 2 in Experiment 2 showed that the ambiguity effect is no longer significant in any condition; this suggests a threshold of exposures beyond which adaptation occurs. The data did not provide any significant insight into the mechanisms by which adaptation was occurring; however, the data did show some trends. To support the constraint satisfaction theories, ambiguity effects trended higher in ambiguous MVs the more RCs a subject was exposed to in Test 2 of Experiment 2. To support the episodic processing theories, MVs were read faster in groups with high RC frequency in Test 2 of Experiment 2. This research is ongoing and hopefully further inquiry will tease out some of these effects.

#### REFERENCES

- Farmer, T. A., Monaghan, P., Misyak, J. B., & Christiansen, M. H. (2011). Phonological typicality influences sentence processing in predictive contexts: A reply to Staub et al. (2009). *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 37, 1318–1325.
- Fine, A. B., Qian, T., Jaeger, T. F., & Jacobs, R. A. (2010). Syntactic Adaptation in Language Comprehension. *Proceedings of the 2010 Workshop on Cognitive Modeling and Computational Linguistics* (pp. 18–26). Uppsala, Sweden: Association for Computational Linguistics.
- Fine, A. B., Jaeger, T. F., Farmer, T. A., and Qian, T. (under revision). Rapid expectation adaptation during syntactic comprehension. *Cognition*. Paper under revision.
- Jurafsky, D. (1996). A probabilistic model of lexical and syntactic access and disambiguation. *Cognitive Science*, 20, 137–194.
- Just, M. A., Carpenter, P. A., & Woolley, J. D. (1982). Paradigms and processes in reading comprehension. *Journal of experimental psychology: General*, 111(2), 228–38. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/6213735>.
- Kaschak, M. P., & Glenberg, A. M. (2004). This construction needs learned. *Journal of experimental psychology: General*,

133(3), 450–67. doi:10.1037/0096-3445.133.3.450

- Lieberman, A. M., Cooper, F. S., Shankweiler, D. P., & Studdert-Kennedy, M. (1967). Perception of the speech code. *Psychological Review*, 74(6), 431–461.
- MacDonald, M. C., Just, M. A., & Carpenter, P. A. (1992). Memory Constraints on the Processing Syntactic Ambiguity. *Cognitive Psychology*, 98, 56–98.
- MacDonald, M. C., Pearlmutter, N. J., & Seidenberg, M. S. (1994). Lexical nature of syntactic ambiguity resolution. *Psychological Review*, 101, 676–703.
- McRae, K., Spivey-Knowlton, M. J., & Tanenhaus, M. K. (1998). Modeling the influence of thematic fit (and other constraints) in on line sentence comprehension. *Journal of Memory and Language*, 38, 283–312.
- Weiner, F. J., & Labov, W. (1983). Constraints on the agentless passive. *Journal of Linguistics*, 19, 29–58.



# DELAYED AGREEMENT AND BUY-OFF DECISIONS IN A THREE-PLAYER, TWO-PERIOD, TWO-PIE BARGAINING MODEL

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I develop a three player, two period, two pie bargaining model with complete agreement without time discounting. One pie is in play during both periods, while the other arrives in the second period with some positive probability. Agreement is reached if two of three players accept the proposer's division. Proposers are chosen in each period with equal probability. If no agreement is reached, a positive breakdown payoff  $0 < k < 1$  is awarded to all players. I extend the results from Acharya and Ortner (2010) and find conditions under which agreement is delayed until the second period. In addition, I examine the tradeoffs weighed by players when deciding whom to buy off in the three player model.

## 1. INTRODUCTION

Due to the nature of discounting, classic models of bargaining such as Baron and Ferejohn (1989) prescribe immediate agreement when dividing up a pie, which fails to explain phenomenon such as legislative deadlock. One possible explanation for this discrepancy is that players are actually bargaining over multiple pies, delaying agreement on one until the other arrives, with the expectation that dividing up both pies at the same stage will result in a higher payoff. In this vein, Acharya and Ortner (2010) construct a two-player infinite horizon model where in periods where only the first pie is available, equilibrium solutions without immediate agreement exist. Here I extend and modify their two player model to a three player, two period model which accounts for delayed agreement. Additionally, a three player model allows us to evaluate the tradeoffs proposers must consider when deciding whom to buy off in a majority-rule bargaining situation, providing insight to what may occur in an  $n$ -player situation.

## 2. THE MODEL

### 2.1 Structure

Three players  $i = 1, 2, 3$  divide up two pies  $X$  and  $Y$  in two periods of play. We consider two cases: one where pie  $X$  is available in both periods and pie  $Y$  arrives in period 2 with probability  $0 < p < 1$ , and one where  $Y$  is available in both periods and  $X$  arrives in period 2 with probability  $0 < p_x < 1$ .  $x_i$  and  $y_i$  denote the shares player  $i$  receives of each pie. If  $i = 1, 2$ , the player's payoff is

$$u_i(x_i, y_i) = x_i + ry_i,$$

and if  $i = 3$ , the player's payoff is

$$u_i(x_i, y_i) = rx_i + y_i,$$

where  $0 < r < 1$  is the players' marginal rate of substitution between pies. Players make complete offers over the pie(s) in play, and for the sake of simplicity, each pie is worth 1 in total; i.e.,

$$\sum_i x_i = \sum_i y_i = 1.$$

Here I outline the model where pie  $X$  arrives first and  $Y$  arrives in period 2 with some positive probability. The converse situation has an identical structure. In each period, one of the three players is recognized with probability  $1/3$  as the *proposer*. In the first period, the proposer makes an offer  $(x_1, x_2, x_3)$  over pie  $X$ . The other two players, the responders, vote to either accept or reject the proposer's offer. If two or more players (including the proposer) accept the offer, then  $X$  is consumed accordingly. If less than two players accept the offer, then  $X$  is not divided up, and it remains in play during period 2.

Pie  $Y$  arrives in period 2 with probability  $p$ , as previously stated. If  $X$  has been consumed during period 1 and  $Y$  does not arrive in period 2, then the game ends. If  $X$  has been consumed during period 1 and  $Y$  arrives in period 2, then the proposer makes an offer  $(y_1, y_2, y_3)$  over pie  $Y$ , which is voted on as above. If the proposal is accepted, pie  $Y$  is consumed accordingly, but if the proposal is rejected, then each player is awarded a breakdown payoff  $0 < k < 1$ . If  $X$  was not consumed in period 1 and  $Y$  arrives in period 2, then the proposer makes an offer  $((x_1, x_2, x_3), (y_1, y_2, y_3))$  over both pies. As above, if the offer is accepted, the pies are consumed as proposed, and if the offer is rejected, each player is awarded a breakdown payoff  $0 < k < 1$ .

### 2.2 Continuation Values

In order to find subgame perfect equilibria, we must evaluate players' expected second period payoffs given that the first period has occurred. Let us define a *continuation value*  $v_i$  as the expected payoff of player  $i$  in period 2 of the game given the outcome of period 1. I discuss two cases: one where pie  $X$  is the first pie to arrive, and one where  $Y$  is the first to arrive.

2.2.1 Case 1: Pie X Arrives First

Here, we examine the model given that  $X$  arrives in period 1 and  $Y$  arrives in period 2 with probability  $p_y$ . Note that since only two players' approval is needed to pass an offer, the proposer essentially needs to "buy off" only one of the other players; she can give the minimum acceptable offer to one player and give nothing to the other player. Recall that if the proposal is rejected in period 2, each player is awarded  $0 < k < 1$  in breakdown payoff. Thus, the player being bought off must receive at least  $k$  in payoff, in order to accept the proposal. First, let us assume that pie  $X$  has been consumed in period 1. Then, players in period 2 only bargain over  $Y$ . Since players 1 and 2 discount  $Y$  by a factor of  $0 < r < 1$ , they require a larger share of  $Y$  to accept a proposal  $(y_1, y_2, y_3)$ . So, if player 1 or 2 propose, they will choose to pay off player 3, while player 3 has no choice but to pay off player 1 or 2 with probability  $1/2$ . Thus, the continuation value where  $X$  has been consumed in period 1 for  $i = 1, 2$  is given by

$$v_i = p_y(\frac{1}{3}r(1-k) + \frac{1}{6}k), \tag{1}$$

and for  $i = 3$  it is given by

$$v_i = p_y(\frac{1}{3}(1 - \frac{k}{r}) + \frac{2}{3}k), \tag{2}$$

where  $p_y$  is the probability that pie  $Y$  arrives in the second period.

If pie  $X$  has not been consumed in the first period, then both pies are potentially in play during the second period. As above, if player 3 is the proposer and pie  $Y$  arrives, he will pay off player 1 or player 2 with equal probability, keeping all of pie  $Y$  and  $1 - k$  of pie  $X$  for himself. If player 1 is proposer, she will keep all of pie  $X$  for herself and buy off player 3, keeping  $1 - k$  of pie  $Y$  for herself. If pie  $Y$  does not arrive, then the players must pay each other off with pie  $X$ . Player 3 would pay  $k$  to either player 1 or player 2, and player 1 would pay  $k$  to player 2, since if only  $X$  is available, player 2 is cheaper to pay off than player 3. Player 2 has an identical strategy than that of player 1. Thus, the continuation value where pie  $X$  has not yet been consumed for  $i = 1, 2$  is given by

$$v_i = p_x(\frac{1}{3}(1+r(1-k)) + \frac{1}{6}k) + (1-p_x)(\frac{1}{3}(1-k) + \frac{1}{3}k + \frac{1}{6}k), \tag{3}$$

and for  $i = 3$  it is given by

$$v_i = p_x(\frac{1}{3}(1+r(1-k)) + \frac{2}{3}k) + (1-p_x)(\frac{1}{3}r(1-k)). \tag{4}$$

2.2.2 Case 2: Pie Y Arrives First

Here, pie  $Y$  arrives in period 1 and  $X$  arrives in period 2 with probability  $p_x$ . If pie  $Y$  has been consumed in period 1, then players bargain over  $X$ . Since player 3 discounts pie  $X$ , players 1 and 2 are cheaper to buy off. So players 1 and 2 buy off each other, and player 3, as always, buys off 1 or 2 with a probability of  $1/2$ . Thus, the continuation value where  $Y$  has been consumed in period 1 for  $i = 1, 2$  is given by

$$v_i = p_x(\frac{1}{3}(1-k) + \frac{1}{3}k + \frac{1}{6}k), \tag{5}$$

and for  $i = 3$  it is given by

$$v_i = p_x(\frac{1}{3}r(1-k)), \tag{6}$$

where  $p_x$  is the probability that pie  $X$  arrives in the second period.

If  $Y$  is not consumed in period 1, then players can potentially bargain over both pies in period 2.

If pie  $X$  arrives, then players buy off as in equations (3) and (4) where both pies have arrived. If pie  $X$  does not arrive, then players bargain over  $Y$  as in equations (1) and (2). Thus, the continuation value where  $Y$  has not been consumed in period 1 for  $i = 1, 2$  is given by

$$v_i = p_x(\frac{1}{3}(1+r(1-k)) + \frac{1}{6}k) + (1-p_x)(\frac{1}{3}r(1-k) + \frac{1}{6}k), \tag{7}$$

and for  $i = 3$  it is given by

$$v_i = p_x(\frac{1}{3}(1+r(1-k)) + \frac{2}{3}k) + (1-p_x)(\frac{1}{3}(1-\frac{k}{r}) + \frac{2}{3}k). \tag{8}$$

3. RESULTS

The following results focus on two features of the model: delay of agreement and buy off choice in period 1. As before, we first examine the case where  $X$  is available in both periods. Since players 1 and 2 have identical utility functions, it is sufficient to only examine the model where players 1 and 3 propose.

3.1 Case 1: Pie X Arrives First

3.1.1 Player 1 Proposes in Period 1

Recall that in period 1, player 1 makes an offer  $x_1$ , giving  $1 - x_1$  to the player being bought off.

**Lemma 1:** There exists an  $0 < x_1^* < 1$  such that any first period proposal  $x_1 \geq x_1^*$  is acceptable to player 1.

*Proof:* For  $x_1$  to be satisfactory to player 1, her continuation value from rejecting the proposal (equation (3)) must be less than or equal to  $x_1$  plus her continuation value from accepting the proposal (equation (1)):

$$p_y(\frac{1}{3}(1+r(1-k)) + \frac{1}{6}k) + (1-p_y)(\frac{1}{3}(1-k) + \frac{1}{3}k + \frac{1}{6}k) \leq x_1 + p_y(\frac{1}{3}r(1-k) + \frac{1}{6}k).$$

Simplifying, we have that for all

$$x_1 \geq \frac{1}{3} + \frac{k}{6}(1-p_y) = x_1^*, \tag{9}$$

player 1 accepts her proposed division. If (9) is not satisfied, pie  $X$  is not yet consumed, and agreement is delayed until period 2.

We can establish similar bounds for acceptable proposals for players 2 and 3 when player 1 is the proposer:

**Lemma 2:** If player 1 buys off player 2, there exists an  $0 < x_1^{**} < 1$  such that any first-period proposal  $x_1 \leq x_1^{**}$  is acceptable to player 2.

*Proof:* For  $x_2 = 1 - x_1$  to be satisfactory to player 2, her continuation value from rejecting the proposal (equation (3)) must be less than or equal to  $x_2$  plus her continuation value from accepting the proposal (equation (1)):

$$p_x(\frac{1}{3}(1+r(1-k)) + \frac{1}{6}k) + (1-p_x)(\frac{1}{3}(1-k) + \frac{1}{3}k + \frac{1}{6}k) \leq 1 - x_1 + p_x(\frac{1}{3}r(1-k) + \frac{1}{6}k).$$

Simplifying, we have that for all

$$x_1 \leq \frac{2}{3} - \frac{k}{6}(1 - p_y) = x_1'' \tag{10}$$

player 2 accepts player 1's proposed division.

**Lemma 3:** If player 1 buys off player 3, there exists an offer  $0 < x_1''' < 1$  such that any first period proposal  $x_1 \leq x_1'''$  is acceptable to player 3.

*Proof:* For  $x_3 = 1 - x_1$  to be satisfactory to player 3, his continuation value from rejecting the proposal (equation (4)) must be less than or equal to  $rx_3$  plus his continuation value from accepting the proposal (equation (2)):

$$p_y(\frac{1}{3}(1+r(1-k)) + \frac{2}{3}k) + (1-p_y)(\frac{1}{3}r(1-k)) \leq r(1-x_1) + p_y(\frac{1}{3}(1-\frac{k}{r}) + \frac{2}{3}k)$$

Simplifying, we have that for all

$$x_1 \leq \frac{2}{3} + \frac{1}{3}k(1 - \frac{p_y}{r^2}) = x_1''' \tag{11}$$

player 3 accepts player 1's proposed division.

From Lemmas 1 and 2, we can derive the following result:

**Theorem 1:** If player 1 buys off player 2, the period 1 proposal  $x_1 = x_1''$  is the sole equilibrium proposal accepted by both players.

*Proof:* For  $x_1$  to be acceptable, from (9) and (10) we have that

$$x_1' - \frac{1}{3} + \frac{k}{6}(1 - p_y) \leq x_1 \leq \frac{2}{3} - \frac{k}{6}(1 - p_y) - x_1'' \tag{12}$$

must be satisfied. In order for  $x_1$  to exist,

$$\frac{1}{3} + \frac{k}{6}(1 - p_y) \leq \frac{2}{3} - \frac{k}{6}(1 - p_y) \tag{13}$$

must be satisfied. Simplifying, we have that

$$k - p_y k \leq 1, \tag{14}$$

and since  $k$  and  $p_y$  both range from 0 to 1, (14) is unconditionally satisfied. Thus, player 1 proposes

$$x_1 = \max\{x_1 | x_1' \leq x_1 \leq x_1''\} = x_1'' \tag{15}$$

with  $x_2 = 1 - x_1''$ , and we have immediate agreement over pie X.

This result complies with our intuition. Recall that the incentive for delayed agreement is the anticipation of using a pie currently in play as a bargaining chip to acquire more of a pie, which arrives later which the player values more. If the two players both value pie Y at a discount in comparison to X, then regardless of the value of  $r$ , delay does not occur.

From Lemmas 1 and 3, we can derive the following:

**Theorem 2:** If player 1 buys off player 3, there exists an  $0 < r_1' < 1$  such that the proposal  $x_1 = x_1'''$  is the equilibrium proposal accepted by both players for all  $r \geq r_1'$ .

*Proof:* For  $x_1$  to be acceptable, from (9) and (11) we have that

$$x_1' = \frac{1}{3} + \frac{k}{6}(1 - p_y) \leq x_1 \leq \frac{2}{3} + \frac{1}{3}k(1 - \frac{p_y}{r^2}) = x_1''' \tag{16}$$

must be satisfied. In order for  $x_1$  to exist,

$$\frac{1}{3} + \frac{k}{6}(1 - p_y) \leq \frac{2}{3} + \frac{1}{3}k(1 - \frac{p_y}{r^2}) \tag{17}$$

must be satisfied. Solving for  $r$ , we have

$$r \geq \sqrt{\frac{2p_y k}{2+k+p_y k}} = r_1' \tag{18}$$

So if  $r \geq r_1'$ , player 1 proposes

$$x_1 = \max\{x_1 | x_1' \leq x_1 \leq x_1'''\} = x_1''' \tag{19}$$

with  $x_3 = 1 - x_1'''$ , and we have immediate agreement. If  $r < r_1'$ , pie X is not consumed and the players delay agreement until period 2.

Clearly, player 1 needs a measure by which to determine whom to buy off. To that end, we have the following result.

**Theorem 3:** There exists an  $0 < r_1'' < 1$  such that for all  $r \leq r_1''$ , player 1 buys off player 2.

*Proof:* For player 1 to buy off player 2 over player 3, from (15) and (19), we have that

$$x_1'' = \frac{2}{3} - \frac{k}{6}(1 - p_y) \geq \frac{2}{3} + \frac{1}{3}k(1 - \frac{p_y}{r^2}) = x_1''' \tag{20}$$

must be satisfied. Solving for  $r$ , we have that if

$$r \leq \sqrt{\frac{2p_y}{3-p_y}} = r_1'' \tag{21}$$

player 1 buys off player 2. If  $r > r_1''$  and (18) is satisfied, then player 1 buys off player 3.

Theorem 3 reflects the tradeoff between player 3's advantage when Y is in play and the higher price required to pay off player 3 when only X is in play. When Y is in play in period 2, both player 1 and player 2 will choose to buy off player 3, which gives him a higher continuation value and thus makes him cheaper. However, player 3 discounts X, which requires player 1 to give more of pie X to player 3 in order to satisfy him in the first period. With a low enough  $r$  value, the disadvantage of having to pay more of pie X outweighs player 3's advantageous period 2 continuation value, and so player 2 becomes cheaper to buy off.

### 3.1.2 Player 3 Proposes in Period 1

Recall that if player 3 is the proposer in the first period, then he consumes  $x_3$  himself and buys off either player 1 or player 2 with probability  $\frac{1}{2}$  with an offer  $1 - x_3$ .

**Lemma 4:** There exists an  $0 < x_3' < 1$  such that any first-period proposal  $x_3 \geq x_3'$  is acceptable to player 3.

*Proof:* For  $x_3$  to be satisfactory to player 3, his continuation value from rejecting the proposal (equation (4)) must be less than or equal to  $rx_3$  plus his continuation value from accepting the proposal (equation (2)):

$$p_y(\frac{1}{3}(1+r(1-k)) + \frac{2}{3}k) + (1-p_y)(\frac{1}{3}r(1-k)) \leq rx_3 + p_y(\frac{1}{3}(1-\frac{k}{r}) + \frac{2}{3}k)$$

Simplifying, we have that for all

$$x_3 \geq \frac{1}{3}(1 - k(1 - \frac{p_y}{r^2})) = x_3' \tag{22}$$

player 3 accepts his proposed division. If (22) is not satisfied, consumption is delayed until period 2.

Since player 3 buys off players 1 and 2 with equal probability, we have the following:

**Lemma 5:** There exists an  $0 < x_3'' < 1$  such that any first period proposal  $x_3 \leq x_3''$  is acceptable to the player being bought off.

Proof: For  $x_i = 1 - x_i$  to be satisfactory to player  $i$ , her continuation value from rejecting the proposal (equation (3)) must be less than or equal to  $x_i$  plus her continuation value from accepting the proposal (equation (1)):

$$p_i(\frac{1}{3}(1+r(1-k)) + \frac{1}{6}k) + (1-p_i)(\frac{1}{3}(1-k) + \frac{1}{3}k + \frac{1}{6}k) \leq 1 - x_i + p_i(\frac{1}{3}r(1-k) + \frac{1}{6}k)$$

Simplifying, we have that for all

$$x_3 \leq \frac{2}{3} - \frac{k}{6}(1-p_y) = x_3'' \tag{23}$$

player  $i$  accepts player 3's proposed division.

Using Lemmas 4 and 5, we have the following result:

**Theorem 4:** There exists an  $0 < r_i' < 1$  such that the proposal  $x_i = x_i''$  is the equilibrium proposal accepted by both players for all  $r \geq r_i'$ .

Proof: For  $x_i$  to be acceptable, from (22) and (23), we have that

$$x_3' = \frac{1}{3}(1 - k(1 - \frac{p_y}{r^2})) \leq x_3 \leq \frac{2}{3} - \frac{k}{6}(1 - p_y) = x_3'' \tag{24}$$

must be satisfied. For  $x_i$  to exist,

$$\frac{1}{3}(1 - k(1 - \frac{p_y}{r^2})) \leq \frac{2}{3} - \frac{k}{6}(1 - p_y) \tag{25}$$

must be satisfied. Solving for  $r$ , we have

$$r \geq \sqrt{\frac{2p_y k}{2 + 2k + p_y k}} = r_3' \tag{26}$$

So if  $r \geq r_3'$ , player 3 proposes

$$x_3 = \max\{x_3 | x_3' \leq x_3 \leq x_3''\} = x_3'' \tag{27}$$

and we have immediate agreement. If  $r < r_3'$ ,  $X$  is not consumed and the players delay agreement until period 2.

Theorem 4 reflects the general result—where both pies are valued similarly, we see immediate agreement.

### 3.2 Case 2: Pie Y Arrives First

Now we consider the case where pie  $Y$  is available in both periods and pie  $X$  arrives in period 2 with probability  $p_x$ . Utility functions defined above for players  $i = 1, 2, 3$  remain the same. As before, we need only evaluate cases where players 1 and 3 propose, as players 1 and 2 have identical payoff functions.

#### 3.2.1 Player 1 Proposes in Period 1

Here, player 1 makes a period 1 offer  $y_1$ , giving  $1 - y_1$  to the player being bought off. The following lemma establishes the lower bound for player 1's proposal.

**Lemma 6:** There exists an offer  $0 < y_1' < 1$  such that any first-period proposal  $y_1 \geq y_1'$  is acceptable to player 1.

Proof: For  $y_1$  to be satisfactory to player 1, her continuation value from rejecting the proposal (equation (7)) must be less than or equal to  $y_1$  plus her continuation value from accepting the proposal (equation (5)):

$$p_x(\frac{1}{3}(1+r(1-k)) + \frac{1}{6}k) + (1-p_x)(\frac{1}{3}r(1-k) + \frac{1}{6}k) \leq y_1 + p_x(\frac{1}{3}(1-k) + \frac{1}{3}k + \frac{1}{6}k)$$

Simplifying, we have that for all

$$y_1 \geq \frac{k}{6r}(1-p_x) + \frac{1}{3}(1-r) = y_1' \tag{28}$$

player 1 accepts her proposed division. If (28) is not satisfied, pie  $Y$  is not yet consumed and agreement is delayed until period 2.

The following lemmas establish upper bounds  $y_i$  for players 2 and 3 when player 1 is the proposer in period 1.

**Lemma 7:** If player 1 buys off player 2, there exists a  $0 < y_2'' < 1$  such that any first-period proposal  $y_2 \leq y_2''$  is acceptable to player 2.

Proof: For  $y_2 = 1 - y_2$  to be satisfactory to player 2, her continuation value from rejecting the proposal (equation (7)) must be less than or equal to  $y_2$  plus her continuation value from accepting the proposal (equation (5)):

$$p_x(\frac{1}{3}(1+r(1-k)) + \frac{1}{6}k) + (1-p_x)(\frac{1}{3}r(1-k) + \frac{1}{6}k) \leq r(1-y_2) + p_x(\frac{1}{3}(1-k) + \frac{1}{3}k + \frac{1}{6}k)$$

Simplifying, we have that for all

$$y_2 \leq -\frac{k}{6r}(1-p_x) + \frac{1}{3}(2+k) = y_2'' \tag{29}$$

player 2 accepts player 1's proposed division.

**Lemma 8:** If player 1 buys off player 3, there exists a  $0 < y_3''' < 1$  such that any first-period proposal  $y_3 \leq y_3'''$  is acceptable to player 3.

Proof: For  $y_3 = 1 - y_3$  to be satisfactory to player 3, his continuation value from rejecting the proposal (equation (8)) must be less than or equal to  $y_3$  plus his continuation value from accepting the proposal (equation (6)):

$$p_x(\frac{1}{3}(1+r(1-k)) + \frac{2}{3}k) + (1-p_x)(\frac{1}{3}(1-\frac{k}{r}) + \frac{2}{3}k) \leq 1 - y_3 + p_x(\frac{1}{3}r(1-k))$$

Simplifying, we have that for all

$$y_3 \leq \frac{k}{3r}(1-p_x) + \frac{2}{3}(1-k) = y_3''' \tag{30}$$

player 3 accepts player 1's proposed division.

From Lemmas 6 and 7, we have the following:

**Theorem 5:** If player 1 buys off player 2, there exists an  $0 < r_2 < 1$  such that the proposal  $y_1 = y_1''$  is the equilibrium proposal accepted by both players for all  $r \geq r_2'$ .

Proof: For  $y_1$  to be acceptable, from (28) and (29) we have that

$$y_1' = \frac{k}{6r}(1-p_x) + \frac{1}{3}(1-r) \leq y_1 \leq -\frac{k}{6r}(1-p_x) + \frac{1}{3}(2+k) = y_1'' \tag{31}$$

must be satisfied. In order for  $y_1$  to exist,

$$\frac{k}{6r}(1-p_x) + \frac{1}{3}(1-r) \leq -\frac{k}{6r}(1-p_x) + \frac{1}{3}(2+k) \tag{32}$$

must be satisfied. Solving for  $r$ , we have

$$r \geq \frac{k(1-p_x)}{1+2k} = r_2' \tag{33}$$

So if  $r \geq r_2'$ , player 1 proposes

$$y_1 = \max\{y_1 | y_1' \leq y_1 \leq y_1''\} = y_1'' \tag{34}$$

with  $y_2 = 1 - y_2''$ , and we have an immediate agreement. If  $r < r_2'$ , pie  $Y$  is not consumed and the players delay agreement until period 2.

Similarly, from Lemmas 6 and 8, we have the following:

**Theorem 6:** If player 1 buys off player 3, the proposal  $y_1 = y_1'''$  is the equilibrium proposal accepted by both players.

Proof: For  $y_1$  to be acceptable, from (28) and (30) we have that

$$y_1' = \frac{k}{6r}(1 - p_x) + \frac{1}{3}(1 - r) \leq y_1 \leq \frac{k}{3r}(1 - p_x) + \frac{2}{3}(1 - k) = y_1'' \quad (35)$$

must be satisfied. In order for  $y_1$  to exist,

$$\frac{k}{6r}(1 - p_x) + \frac{1}{3}(1 - r) \leq \frac{k}{3r}(1 - p_x) + \frac{2}{3}(1 - k) \quad (36)$$

must be satisfied. Solving for  $r$ , we have

$$r \geq \frac{k(1 - p_x)}{2(1 - k)}. \quad (37)$$

Note that since  $k$ ,  $p_x$ , and  $r$  all range from 0 to 1, (37) is unconditionally satisfied. Thus, player 1 proposes

$$y_1 = \max\{y_1 | y_1' \leq y_1 \leq y_1''\} = y_1'' \quad (38)$$

with  $y_1 = 1 - y_1''$ , and we have immediate agreement.

Once again, player 1 must decide whether to pay off player 2 or player 3:

**Theorem 7:** There exists an  $0 < r_2'' < 1$  such that for all  $r \leq r_2''$ , player 1 buys off player 3.

**Proof:** For player 1 to buy off player 3 over player 2, from (34) and (38) we have that

$$y_1'' = \frac{k}{3r}(1 - p_x) + \frac{2}{3}(1 - k) \geq -\frac{k}{6r}(1 - p_x) + \frac{1}{3}(2 + k) = y_1' \quad (39)$$

must be satisfied. Solving for  $r$ , we have that if

$$r \leq \frac{1 - p_x}{2} = r_2'', \quad (40)$$

player 1 buys off player 3. If  $r > r_2''$  and (33) is satisfied, then player 1 buys off player 2.

Note that switching the order of the pies' arrival reverses player 1's buy-off decision. In this case, player 2 is more expensive in period 1, and so a high enough  $r$  value is required to pay her off, outweighing player 3's high period 2 continuation value (with high  $p$ ).

### 3.2.2 Player 3 Proposes in Period 1

Recall that in the case where pie  $Y$  arrives first, if player 3 is the proposer in period 1, he consumes  $y_3$  himself and with probability  $\frac{1}{2}$  gives either player 1 or player 2  $1 - y_3$ .

**Lemma 9:** There exists a  $0 < y_3' < 1$  such that any period 1 proposal  $y_3 \geq y_3'$  is acceptable to player 3.

**Proof:** For  $y_3$  to be satisfactory to player 3, his continuation value from rejecting the proposal (equation (8)) must be less than or equal to  $y_3$  plus his continuation value from accepting the proposal (equation (6)):

$$p_x(\frac{1}{3}(1 + r(1 - k)) + \frac{2}{3}k) + (1 - p_x)(\frac{1}{3}(1 - \frac{k}{r}) + \frac{2}{3}k) \leq y_3 + p_x(\frac{1}{3}r(1 - k))$$

Simplifying, we have that for all

$$y_3 \geq -\frac{k}{3r}(1 - p_x) + \frac{1}{3}(1 + 2k) = y_3', \quad (41)$$

player 3 accepts his proposed division. If (41) is not satisfied, consumption is delayed until period 2.

**Lemma 10:** There exists a  $0 < y_3'' < 1$  such that any period 1 proposal  $y_3 \leq y_3''$  is acceptable to player 3.

**Proof:** For  $y_3 = 1 - y_3''$  to be satisfactory to player  $i$ , her continuation

value from rejecting the proposal (equation (7)) must be less than or equal to  $y_3$  plus her continuation value from accepting the proposal (equation (5)):

$$p_x(\frac{1}{3}(1 + r(1 - k)) + \frac{1}{3}k) + (1 - p_x)(\frac{1}{3}r(1 - k) + \frac{1}{3}k) \leq r(1 - y_3) + p_x(\frac{1}{3}(1 - k) + \frac{1}{3}k + \frac{1}{3}k)$$

Simplifying, we have that for all

$$y_3 \leq -\frac{k}{6r}(1 - p_x) + \frac{1}{3}(2 + k) = y_3'', \quad (42)$$

player  $i$  accepts player 3's proposed division.

Using Lemmas 9 and 10, we have the following:

**Theorem 8:** The proposal  $y_3 = y_3''$  is the equilibrium proposal accepted by both players.

**Proof:** For  $y_3$  to be acceptable, from (41) and (42), we have that

$$y_3' = -\frac{k}{3r}(1 - p_x) + \frac{1}{3}(1 + 2k) \leq y_3 \leq -\frac{k}{6r}(1 - p_x) + \frac{1}{3}(2 + k) = y_3'' \quad (43)$$

must be satisfied. For  $y_3$  to exist,

$$-\frac{k}{3r}(1 - p_x) + \frac{1}{3}(1 + 2k) \leq -\frac{k}{6r}(1 - p_x) + \frac{1}{3}(2 + k) \quad (44)$$

must be satisfied. Solving for  $r$ , we have

$$r \geq \frac{k(1 - p_x)}{2(1 - k)}. \quad (45)$$

Since  $k$ ,  $p_x$ , and  $r$  all range between 0 and 1, (45) is unconditionally satisfied. So, player 3 proposes

$$y_3 = \max\{y_3 | y_3' \leq y_3 \leq y_3''\} = y_3'', \quad (46)$$

and we have immediate agreement.

Since player 3 is the sole player who favors  $Y$ , he has no incentive to use it as a bargaining chip in period 2, and so we see an unconditional immediate agreement.

## 4 DISCUSSION

This model extends Acharya and Ortner's (2010) work and provides conditions under which delay occurs in a two-period, three-player bargaining model. Additionally, I provide an intuition concerning buy-off strategy of players which is not observed in a two player model. We see a trade off—if a player discounts the pie presently in play over a pie to be considered at some later date, then she will be cheaper later but more expensive at present. Thus, she requires a lower utility this period to agree on a proposal (in anticipation of a higher payoff later on), but this utility will only be cheaper to the proposer if she has a high enough  $r$  value. I will explore both the conditions for delay and the trade-off dynamics of the model in future work with  $n$  player models, the goal being to construct  $n$ -player, infinite horizon models which can be applied to legislative bargaining with greater ease.

## 5 REFERENCES

1. Acharya, Avidit, and Juan M. Ortner. 2010. "Delays and Partial Agreements in Multi-Issue Bargaining." Princeton Economic Theory Center Working Paper 004, August 31, 2010. Available at: <https://www.princeton.edu/econtheorycenter/wps/wp004.pdf>.
2. Baron, David P., and John A. Ferejohn. 1989. "Bargaining in Legislatures." *American Political Science Review* 83 (4):1181-1206.
3. McCarty, Nolan, and Adam Meirowitz. 2007. *Political Game Theory: An Introduction*. New York: Cambridge University Press.
4. Rubinstein, Ariel. 1982. "Perfect Equilibrium in a Bargaining Model."

Econometrica 50 (1):97- 109.

5. Volden, Craig, and Alan E. Wiseman. 2007. "Bargaining in Legislatures over Particularistic and Collective Goods" *American Political Science Review* 101(1):79-92.



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