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Corrections: The drawing “See you soon, grasshoppers” is reprinted with the correct spelling of the artist’s name.

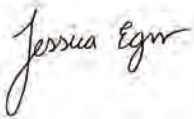
A letter from the editor:

It hasn't even been three years since I founded the Journal of Undergraduate Research and Scholarly Excellence, but so many amazing things have happened since then. Beginning as a dream to create a one-of-a-kind undergraduate publication, JUR has flourished and will continue to grow in the years to come.

It is eye-opening and encouraging to see the exceptional work that undergraduates are producing in universities around the world. In the preceding issues, we have seen articles covering new research on breast cancer, the conscientious "guinea pigs" in World War II, and the protests for higher education in Chile. Undergraduate students around the world are producing work that is worth showcasing, and that is exactly why JUR was created.

I have had the pleasure of serving as the Editor in Chief over these years and it saddens me to be leaving the publication when I graduate in May. Throughout my time with JUR I have seen my staff grow from a few students excited to be a part of this new publication to a staff knowledgeable about the inner workings of a professional journal. This journal is not only about publishing articles, but it is also about getting undergraduates involved in the publication process. From reviewing articles and creating the layout, to marketing and advertising, this publication is an invaluable learning experience both for the author and the staff. Being a part of this publication has been a priceless experience for both myself and the other graduating seniors leaving JUR this semester.

With this issue I am passing along the Editor in Chief title to Pasha Lookian who I know will take this publication and make it the premier undergraduate journal in the world. I cannot wait to see where JUR goes in the following years and the remarkable work that undergraduates everywhere are producing. I wish my staff the best of luck and encourage them to strive to take JUR to the next level.



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TABLE OF CONTENTS

TITLE	AUTHOR AND INSTITUTION	PAGE
Immune modulation as a tool in promoting recovery from traumatic brain injury and stroke	Ian McCullough, Petr Kucheryavyy, and Cassandra L. Quave, PhD. <i>Emory University, Georgia</i>	6
An overview of cancer virotherapeutics	Siddhi Lama <i>Colorado State University, Colorado</i>	11
An exploration of the gastrointestinal hormone ghrelin: From discovery to implementation	Katlin Hornig <i>Colorado State University, Colorado</i>	15
How does seasonality affect the fitness of cane toads (<i>Bufo marinus</i>) in the Wet Tropics of Northeast Australia?	Adam Miller <i>Colorado State University, Colorado</i>	20
The effects of fire regimes on distribution and diurnal activity of African ungulates in Kruger National Park, South Africa	Laura Bernhardt <i>Colorado State University, Colorado</i>	23
Recycling plastic: The untold story	Emily Bolles <i>Staff Editorial, Colorado State University, Colorado</i>	28
Labrynth The Art of Losing	Danielle Cole <i>Colorado State University, Colorado</i>	32
See you soon, grasshoppers	Veneron Yazzen <i>Institute of American Indian Arts, New Mexico</i>	35
A Pour of Moderation Longing to Dream Mesmerize Lost in Question	Kevin Barrett <i>Colorado State University, Colorado</i>	36
El pequeño Simón camina al frente de la marcha por la avenida Pedro Montt	Alvaro Benvenuto <i>University of Chile, Chile</i>	38
Stone Giants	Rose Corbett <i>Colorado State University, Colorado</i>	39
American Dream or American Divide?: The American Dream as symbolic boundary	George Ellerbach <i>Cornell College, Iowa</i>	40
Movilizaciones 2011: Reflexiones para el caso de Chile y Estados Unidos	Francisco Alvarez ¹ , Rodrigo Avilés ¹ , and Tyanna Slobe ² ¹ <i>Pontificia Universidad Católica de Chile, Chile</i> ² <i>Colorado State University, Colorado</i>	47
What is radical art?: A comparison of Brecht's Epic Theatre with Soviet Socialist Realism	Rory Fairweather <i>University of Glasgow, Scotland</i>	54
Does The Garden of Eden overturn Hemingway's canon?	Jack Nicholls <i>University of Exeter, United Kingdom</i>	59
Edziban naa! Dzi dzi (It is food, eat it!)	Julia Mallon <i>Colorado State University, Colorado</i>	64

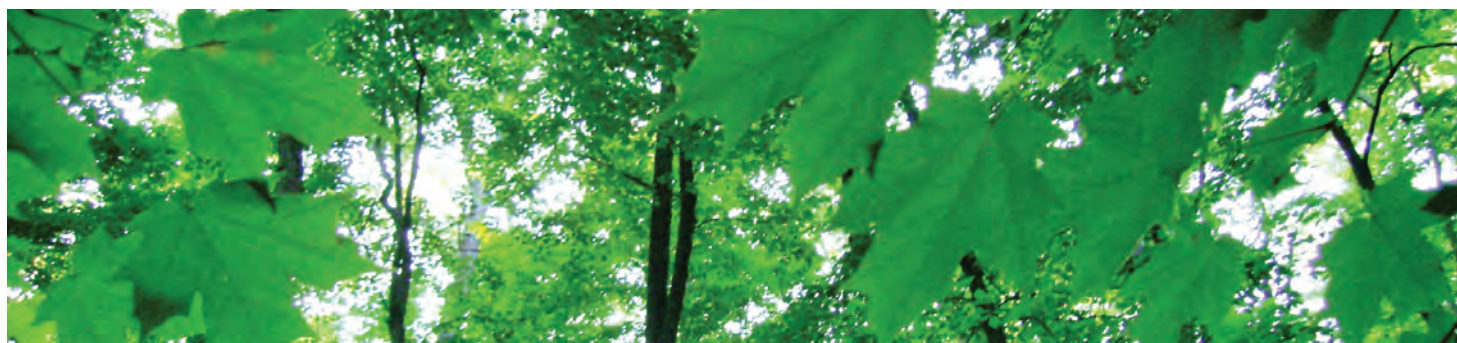


Photo by: Jessica Egner—Taken in Grand Haven, Michigan

Immune modulation as a tool in promoting recovery from traumatic brain injury and stroke

BY IAN McCULLOUGH, PETR KUCHERYAVYY, AND CASSANDRA L. QUAVE, PHD.

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Abstract

Traumatic brain injury and ischemic stroke are two heterogeneous pathologies. However, at the cellular and tissue levels, their etiologies bear striking similarities. Both result from an initial insult that is rapidly exacerbated by a neuroinflammatory as well as a subsequent systemic inflammatory response. Moreover, both traumatic brain injury and stroke appear to up-regulate neurogenesis as well as draw neural progenitors to the damaged cerebral parenchyma via chemotaxis. This paper explores the concept of immune system modulation as a means of regulating the inflammatory pathways involved in the immediate aftermath and weeks following an injury event. Recent research supports the idea that inhibition of the systemic inflammatory response in the days following injury, as well as potentiation of inflammation in subsequent weeks may promote neuronal progenitor differentiation and migration and could improve functional outcome among patients suffering from stroke or traumatic brain injury.

Introduction

Ischemic stroke is currently a leading cause of worldwide mortality as well as the leading cause of permanent disability among adults.^{1,2} Likewise, traumatic brain injury is another leading cause of mortality as well as a major cause of functional disability in the United States.³ The proximal causes of ischemic stroke and traumatic brain injury are clearly different. However, the underlying pathology is remarkably similar at the molecular, cellular, and tissue levels. Both conditions result in an initially destructive inflammatory pathology. However, both stroke and traumatic brain injury result in upregulation of endogenous neurogenesis as well as chemotaxis-driven neuronal progenitor migration to the injured site. While thrombolytic therapy with tissue plasminogen activator (tPA) is the current standard of care for qualifying stroke patients, very few patients are eligible to receive it, and there is currently no clinically accepted treatment for traumatic brain injury other than the management of

symptoms and supportive care.⁴

The neuroinflammatory cascade associated with these two pathologies appears initially destructive and promotes a systemic inflammatory response in the acute phase of injury.⁵ However, it also appears subsequently beneficial in the chronic phase of injury by facilitating neural progenitor migration as well as localization to the area of injury.⁶ Studies have shown that blocking neuroinflammation in the acute phase of injury greatly reduces functional impairment as well as neural damage, and that blocking this same pathway in the chronic period tends to detract from functional recovery.⁷ Therefore, it can be posited that the management of both stroke and traumatic brain injury would potentially benefit from the inhibition of inflammation in the hours and days following injury as well as from promotion of the localized inflammatory process in subsequent weeks.

Injury to the cerebral parenchyma begins within minutes whether the initial insult is traumatic or ischemic in nature.⁸ Cellular death may continue for hours, days, and weeks following the primary injury.⁹ Cytokines released from the damaged parenchyma as well as damaged vasculature initially promote a local neuroinflammatory response, followed by a systemic inflammatory response in the hours and days following vascular occlusion or traumatic brain injury, and amplifies damage caused by the initial lesion.^{10,11} Despite the initially detrimental immune response to injury, proinflammatory factors released from damaged tissue as well as by the general inflammatory response ultimately promote neurogenesis and enhance neural progenitor migration to the area of injury.^{12,13} Upregulated neurogenesis and neuronal progenitor migration has been repeatedly observed in the rodent, non-human primate, and human subventricular zone following focal ischemia as well as traumatic brain injury.^{14,15} Unfortunately, this endogenous repair system is not sufficient to reverse the highly destructive effects of traumatic brain injury or stroke as evidenced by the substantial long term deficit experienced by survivors of these pathologies.

Discussion

Hyperacute & acute ischemic stroke pathogenesis

The brain has a significantly greater vulnerability to decreased perfusion than other organs due to its intrinsically high rate of metabolism required to maintain homeostasis within the cerebral parenchyma.¹⁶ Cell death resulting from ischemic stroke tends to be heterogeneous due to differential tissue vascularization and occurs in hyperacute, acute, and chronic phases.^{17,18}

Neurons located in tissue receiving less than 20% of normal perfusion undergo anoxic depolarization and energy failure in the seconds to minutes following occlusion, and subsequently undergo unprogrammed cell death, or necrosis, during the hyperacute phase of stroke.¹⁹ This area of dead parenchyma is referred to as the infarct core.⁸ The core of the stroke is highly cytotoxic due to cellular bursting and necrosis, ionic dysregulation, and extensive Ca²⁺/glutamate-mediated excitotoxicity.²⁰

The acute phase of ischemic injury begins within minutes of vascular occlusion and lasts from hours to days after the ischemic event.¹⁹ Parenchyma adjacent to the unsalvageable core is termed the peri-infarct zone or ischemic penumbra, and tissue within the penumbra receives sufficient collateral perfusion to temporarily maintain cellular viability.^{8,21} Within minutes of vascular occlusion the decreased perfusion, as well as glutamate-mediated excitotoxicity leading to uncontrolled Ca²⁺ influx, increasing acidosis, ion gradient disruption, a potentiated free radical cascade, and tissue edema following blood brain barrier degradation increase metabolic demand placed on this tissue.²²⁻²⁷ This results in markedly increased cellular mortality and expansion of the area of infarction into the previously viable penumbra.²⁸

Acute traumatic brain injury pathogenesis

Traumatic brain injury initiates a similar pathology to that of ischemic stroke within the cerebral parenchyma in the minutes to hours following cranial insult.^{7,29} As described above, glutamate-mediated excitotoxicity in response to localized dam-

age increased Ca^{2+} influx via *N*-methyl-D-aspartate (NMDA) receptor activation increases the local metabolic demand and thus increases the area of injury.³⁰

Common acute injury pathways

In the minutes following insult, damaged cells release high concentrations of glutamate into the surrounding tissue.⁸ Even though glutamate is the major excitatory neurotransmitter in the brain, the release of this neurotransmitter in either stroke or traumatic brain injury is highly pathological as is it released in quantities much greater than normal.²⁰ Elevated glutamate levels result in prolonged and repetitive depolarization of neurons placing an increased metabolic demand on this tissue.²⁴ Postsynaptic depolarization is mediated in large part by excessive α -amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) and NMDA receptor activation in response to the elevated extracellular levels of glutamate.³¹ Prolonged NMDA receptor activation as well as the subsequent opening of other voltage gated ion channels results in pathologically high intracellular Ca^{2+} levels.³² Moreover, excitotoxic depolarization increases the energy requirement placed on surrounding parenchyma.³³

Among many deregulated ionic concentrations, Ca^{2+} serves as an important mediator of glutamate release from the cell.³³ The primary pathologic mechanism of post-traumatic brain injury/stroke excitotoxicity is Ca^{2+} influx, and the intracellular Ca^{2+} overload upregulates numerous catabolic processes mediated by proteases, lipases and nucleases as well as other Ca^{2+} dependent pro-apoptotic enzymes.^{24,34,35} ATP depletion is compensated for by anaerobic glycolysis which decreases pH within the surrounding tissue.²⁴ As the pH decreases, acid-sensing ion channels open and further potentiates Ca^{2+} influx, promoting the release of stored Ca^{2+} from the mitochondria and endoplasmic reticuli.^{28,36} As cellular ATP levels are further depleted, the membrane bound $\text{Na}^+/\text{Ca}^{2+}$ exchanger activity decreases and reduces the cell's ability to expel Ca^{2+} .^{12,37,38} Thus, the cyclical potentiation of glutamate release and Ca^{2+} are major contributors to acute parenchymal insult.

Excitotoxicity-mediated Ca^{2+} overload in conjunction with anaerobic glycolysis and decreasing pH, damage the mitochondria of surrounding cells and enhance the production of free radicals. Free radicals are highly reactive molecules containing an unpaired electron, and are often referred to as reactive oxygen species (ROS).³⁹ Uncoupled oxidative phosphorylation via

mitochondrial damage has been considered the primary source of reactive oxygen species, however recent studies indicate that superoxide, a highly potent reactive oxygen species, is generated predominantly by NADPH oxidase during excitotoxic NMDA receptor activation.^{40,41} Additionally, systemically produced nitric oxide readily diffuses across the blood brain barrier, and reacts with superoxide and other reactive oxygen species yielding various types of highly reactive nitrogen.⁴² Regardless of the proximal source, the free radical cascade within the local parenchyma greatly enhances cellular injury and promotes apoptosis in the minutes and hours following traumatic brain injury or stroke.^{25,43}

Inflammatory pathogenesis and chronic injury

Cell death is greatly enhanced by inflammation, which contributes to the secondary injury, or the chronic phase of injury.⁴⁴ Edema resulting from neurovascular endothelial cell injury increases intracranial pressure, which then directly decreases cerebral perfusion and leukocyte-mediated inflammation function to exacerbate the initial injury as well as expand the lesion into the surrounding parenchyma.^{19,44}

Neuroinflammation in response to acute injury is mediated by activated astrocytes as well as microglia, and is the prominent mediator of cell death and tissue injury in the days following a stroke or traumatic brain injury.⁴⁵ Microglia and astrocytes in and near the damaged parenchyma are activated, and subsequently release proinflammatory cytokines as well as chemokines in response to the initial injury.^{12,13} In addition to recruiting astrocytes and microglia from surrounding tissue, activated astroglia degrade the blood brain barrier, increase tissue edema, and localize a highly destructive systemic inflammatory response to the site of injury in the hours and days following the initial insult.^{26,46,47}

The cytokine and chemokine signals released by activated astrocytes facilitate systemic immune involvement by attracting circulating macrophages and leukocytes, as well as by promoting cell adhesion molecule upregulation in neurovascular endothelial cells.⁴⁸ Endothelial cells within the injured tissue also produce proinflammatory factors in response to injury, and enhance the adhesion of circulating immune constituents to the neurovasculature.⁴⁸ Matrix metalloproteinases are a category of protease upregulated by activated astrocytes which further degrade the blood-brain barrier and facilitate the influx of

circulating immune constituents.^{12,46} After extravasation and penetration of the *blood brain* barrier, these immune constituents release still more proinflammatory factors, greatly enhancing neuronal mortality, and markedly expanding the ischemic or traumatic lesion.^{49,50}

Neuronal progenitors

Smart first demonstrated that the adult brain has the intrinsic ability to regenerate following injury.⁵¹ Adult brains have endogenous stem cells in the subventricular zone that migrate to the olfactory bulb under normal physiological conditions, but can also aid in repair of damaged brain tissue.⁵¹ Numerous studies have observed neurogenesis in adult mammals, and recent studies have demonstrated that there is a continuous production of neurons in adult non-human primates as well as in humans.⁵²⁻⁵⁷ Of particular interest is the mammalian subventricular zone where a population of undifferentiated radial glial cells produce neural progenitors throughout adulthood.^{58,59} Under physiological conditions, these neural progenitor cells migrate in a network of chains along the rostral migratory stream to the olfactory bulb where they differentiate into interneurons and functionally incorporate into existing neural circuitry.⁶⁰⁻⁶³ These progenitors migrate from the subependymal zone of the lateral ventricle into the olfactory bulb in rats.⁶⁴

The role of inflammation in progenitor differentiation & chemotactic recruitment

Even though inflammation is the primary cause of neuronal damage in the hours to days following traumatic brain injury or stroke, inflammation can paradoxically play a role in neurogenesis, migration and regeneration in the weeks and months following injury.^{29,30,65} Accordingly, numerous chemotactic agents upregulated by tissue damage and inflammation can be classified as both pathologic and therapeutic depending on the time course and the extent of their expression.⁶⁶ Matrix metalloproteinase upregulation, for example, is highly detrimental in the acute phase of injury, however matrix metalloproteinases are upregulated by cells migrating from the subventricular zone to the damaged parenchyma.⁶⁷ Matrix metalloproteinases in the chronic phase of injury are involved in regeneration and repair of tissue damage.⁶⁸ Blocking matrix metalloproteinases in the weeks following injury significantly decreases neural progenitor migration and is highly detrimental to functional recovery.²⁶

Numerous factors are capable of influ-

encing neural progenitor proliferation. In the days following focal ischemic injury, many of these factors are significantly upregulated during neural progenitor proliferation.⁶⁹⁻⁷¹ Proinflammatory factors, such as tumor necrosis factor- α (TNF- α) released by dying cells, upregulate progenitor migration to locations of neuroinflammation.⁷² These factors enhance progenitor survival, and induce the migration of neuroblasts towards the site of ischemic or traumatic injury.^{73,74}

In addition to promoting neurogenesis, chemotactic factors released by damaged tissue appear to guide neural progenitors to the damaged parenchyma.^{72,75,76} Moreover, chemotactic factors released from the damaged tissue promote neurogenesis as well as angiogenesis, and neural progenitor migratory pathways to the damaged parenchyma tend to be closely associated cerebral vasculature.^{77,78} Erythropoietin (EPO) and vascular endothelial growth factor (VEGF), for example, are commonly known to enhance angiogenesis, but also upregulate neurogenesis as well as direct neural progenitor migration.^{15,28,78} Another highly versatile chemotactic factor in this category is stromal cell-derived factor-1 α (SDF-1 α), which is upregulated by activated astrocytes and vascular endothelial cells following injury.⁷⁹⁻⁸¹

Migrating neural progenitors require a physical scaffold to be able to physically move to the damaged parenchyma.⁶⁵ Under pathological conditions, cells migrate in association with reactive astrocytes as well as along cerebral vessels which they use as scaffolding.⁸² Following stroke or traumatic brain injury, neuroblasts migrate in chains or individually to the damaged tissue.⁸³ The chains extended towards the striatum in close association with cerebral vessels.⁷⁷ Bovetti and colleagues observed that about half of the cells migrating to the adult olfactory bulb use blood vessels as a scaffold for migration.⁸⁴

Post-injury progenitor migration: Time course and fate

In the days and weeks following ischemic stroke or traumatic brain injury, subventricular zone neural progenitor proliferation is greatly enhanced.⁸⁵ Migrating progenitor cells are diverted from the rostral migratory stream to the damaged parenchyma.⁸⁶ Moreover, the extent of injury has been demonstrated to determine the extent of subsequent neurogenesis and neural progenitor migration.^{79,87}

Migration of newly differentiated neuroblasts begins within 24 hours of ischemic

stroke or traumatic brain injury and these neuroblasts can be observed at the site of injury within one to two weeks.⁸⁸ Neural progenitor migration continues for several months following the initial traumatic/ischemic event.^{86,89,90} The peak of number of cells migrating from the subventricular zone is observed approximately three weeks post injury and drops off in the weeks that follow.⁹¹ However, the regenerative capacity of these stem cells is not intrinsically sufficient to repair the damage resulting from stroke or traumatic brain injury as most migrating neuroblasts die via apoptosis in the days and weeks following migration.⁶⁵

Progenitor migration without a systemic immune response

Experimental data supports that initial suppression of the inflammatory response following stroke as well as traumatic brain injury is highly beneficial to functional outcome.⁵ However, prolonged immunosuppression following traumatic or ischemic injury appears to be detrimental.⁹² Tumor necrosis factor (TNF), for example, is a proinflammatory cytokine released by microglia as well as circulating immune constituents.⁹³ In the hours and days following injury, TNF promotes apoptosis, breakdown of the blood brain barrier, and inflammation.⁹⁴ Brain-injured TNF-deficient mice demonstrate improved outcome for the first week following brain injury.⁹² However, TNF-deficient mice show diminished functional recovery in subsequent weeks, suggesting the effects of TNF may depend on the time course of its release.⁹² Although the exact mechanism of TNF's temporal effects is not entirely understood, TNF has been demonstrated to upregulate production of neurotrophic factor within reactive astrocytes as well as modulate neural progenitor differentiation.⁴⁴ Additionally, factors secreted by astrocytes and microglia such as monocyte chemoattractant protein-1 (MCP-1) not only serve as chemoattractants for lymphocytes, basophiles and macrophages, but also neural progenitors. Knocking out MCP-1 expression significantly decreases neural progenitor migration *in vivo*.⁹⁵

Although the initially destructive actions of the immune system in response to traumatic brain injury and stroke have been well characterized, the mechanism by which the immune response facilitates regeneration in the weeks following injury is not as well understood.⁴⁴ Recent studies have demonstrated that by suppressing the inflammatory response with progesterone for three to seven days following brain in-

jury followed by tapered withdrawal of the immunosuppressant results in marked improvement in comparison to prolonged immunosuppression.⁴ Improvements following short term immunosuppression were noted not only in functional outcome, but also neurogenesis in the subsequent weeks. These findings are consistent with negative outcomes following long-term administration of immunosuppressive corticosteroids to stroke patients.⁹⁶ Finally, progesterone-mediated immunosuppression does not appear as beneficial when abruptly halted rather than gradually discontinued.⁴ Taken together, these results indicate that not only is the time course of inflammation important to functional outcome, but also the speed at which the inflammatory response commences. By gradually withdrawing immunosuppressants in the days following stroke, it is highly plausible that intrinsic pathways of immunomodulation are upregulated to mitigate the destructive effects, whereas such pathways cannot be upregulated rapidly enough to prevent substantial parenchymal injury and neuronal death in response to a rapid and robust immune response.

Conclusions

The neuroinflammatory response as well as the subsequent recruitment of a systemic immune response is highly similar following ischemic stroke or traumatic brain injury. Endogenous neuronal progenitor upregulation and migration occurs in the adult mammalian CNS and is also comparable in response to either pathology. A conceptual model of neuroinflammation as a continuum which is initially destructive but subsequently beneficial is supported by studies demonstrating that blocking neuroinflammation in the acute phase of injury greatly reduces functional deficit as well as neural damage, but inhibiting neuroinflammation in the chronic period tends to worsen functional outcome.⁷ Therefore, management of both stroke and traumatic brain injury would likely benefit from the inhibition of inflammation in the hours and days following injury as well as from the tapered disinhibition of the inflammatory response in subsequent weeks.

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An overview of cancer virotherapeutics

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History of the use of virotherapeutics in cancer

Cancer, a group of more than 200 diseases characterized by uncontrolled cell division, is a worldwide health issue responsible for the death of millions of people each year. In America, it has been estimated that cancer accounts for one in four human deaths; nearly 570,000 deaths of Americans in 2010 alone.¹ Although the existence of cancer has been known for centuries, most types of cancer still have a poor prognosis and result in mortality. However, the five-year cancer survival rate has increased to 68% as of 2005 from only 50% in 1997.¹ Currently, the main treatments for cancer involve chemotherapy, radiation therapy, surgery, or transplants.^{2,3} However, mortality rates of this disease are still extremely high and many therapeutics are ineffective. Therefore, these various issues have led to research into the development of atypical therapeutics, such as virotherapies, which utilize genetically modified viruses to seek out and destroy diseased cells without harming healthy cells. Virotherapies are mainly developed to selectively kill cancerous cells, but can also be used for non-cancerous tumor lysis. Viral vectors used for delivery of genetic material are additionally used to treat a wide range of other diseases, such as immunodeficiencies.

Although use of virotherapeutics is still a fairly recent method of cancer treatment, the idea of using virotherapies as a way to eradicate tumors has been in existence for more than a century. Throughout the late nineteenth and early twentieth centuries, scientists worldwide reported remissions of cancer caused by infections with viruses or even by vaccinations.³⁻⁵ In 1912, a physician reported an 8-year regression of cervical carcinoma in a woman who had been given a live attenuated rabies vaccine after being bitten by a rabid dog.⁵

Beginning in the 1920s, a variety of viruses have been tested for their oncolytic properties.^{6,7} In the early 1950s, vaccinia virus became the first virus proven to have definite oncolytic activity against tumors.⁶ By the 1960s, several other viruses had proved to be exceptionally promising as cancer reducing agents.⁸ However, this treatment was not without its flaws. The effects of early cancer virotherapeu-

tics showed a lack of clinical efficacy by its mostly unimpressive results. Additionally, serious toxicity of these therapies could be seen in some patients. For these reasons - as well as the enthusiasm for the new development of chemotherapy - the majority of research into cancer virotherapeutics lagged until the 1990s.⁹

The end of the 20th century brought with it the advent of genetic engineering and molecular virology: two areas of research that allowed for the resurgence of interest in the field. Research discoveries allowed for the modification of the viruses themselves in order to enhance their cancer selectivity and anti-tumor potency while minimizing toxicity.¹⁰ In 1991, the first genetically engineered virus, a thymidine kinase negative mutant of herpes simplex virus-1, *dlsptk*, was reported to successfully inhibit cancerous tumor growth and to prolong host survival.¹¹ By 1996, an adenovirus mutant, ONYX-015, was shown to be more tumor-specific than was the wild-type adenovirus.¹² Soon after, it became the first genetically engineered cancer virotherapeutic to be enrolled in clinical trials.¹³ Six years later, nearly 10 cancer virotherapeutics had neared or been entered in clinical trials. In 2005, China approved Adenovirus type 5 mutant H101, a mutant nearly identical to ONYX-015, for the treatment of head and neck squamous cell carcinoma.¹⁴ China thus became the first country to approve a virotherapeutic for cancer treatment.

Development of 21st century cancer virotherapeutics

Virotherapeutics development is generally based upon both the molecular mechanisms of viral infection and cellular actions. However, manipulated viruses have now been shown to have a much higher efficacy than their wild-type counterparts. In this fashion, virotherapies can now be designed to be virocentric or immunocentric, depending on the type of cancer and the desired mechanism of the therapy. Virocentric therapeutics investigators view direct tumor cell lysis as the most important aspect of efficacy when treating cancer, whereas immunocentric therapeutics view activation of the immune system response to the cancer cells as most important. These two mechanisms allow for improved design

of virotherapies, generally based on the immunogenicity and peculiarities of the cancers being treated.¹⁵

Currently there are several types of cancer virotherapeutics in development. These can be separated into five groups: direct cell lysis due to viral replication, direct cytotoxicity of viral protein, induction of anti-tumor immunity, sensitization to chemotherapy and radiation therapy, and transgene expression as listed in Table 1.¹⁵ Adenoviruses and herpes simplex viruses are some of the most commonly manipulated potential virotherapeutic agents, with viral strains serving as vectors able to fit into all five categories. However, viruses of other families are being assessed for potential roles as cancer therapeutics. Table 2 shows some of the most common viruses currently being investigated as potential virotherapeutics.¹⁶ This list is by no means complete as there are dozens of viruses being assessed for use as therapeutics. However, the majority of these viruses, although showing promise in preliminary studies, using animal models, have not been developed for further use.

Virotherapeutic mechanisms of tumor selectivity

Tumor selectivity is important when creating a cancer therapeutic. Mechanisms of virotherapeutics can be categorized into four main groups: inherent tumor selectivity,¹⁸ viral gene inactivation,^{19,20} transcriptional targeting,²¹ and transductional targeting.²²

Tumor selectivity

Virotherapeutics with inherent tumor selectivity are wild-type viruses that preferentially infect and replicate in cancer cells. Preferential infection by these viruses is due to physiological alterations of these cells, which cause an increased rate of division of the cells and an evasion of the host immune response. Although for use as virotherapeutics most viruses are genetically engineered to be tumor selective, various viruses, such as the Sindbis virus, Newcastle disease virus, and measles virus have been used as virotherapeutics without any genetic alterations. Most genetically non-engineered virotherapeutics are either paramyxoviruses or togaviruses.²³

An example of a virotherapeutic with inherent tumor selectivity is the Type 3 reovirus; a non-enveloped double stranded RNA virus belonging to the *Reoviridae* family. Reoviruses infect humans (and other vertebrate hosts and even some invertebrate hosts), but infections tend to be asymptomatic or restricted to mild respiratory and gastrointestinal illnesses.²⁴ In the late 1970s, *in vitro* testing of the Dearing strain from Type 3 reovirus showed that it preferentially killed cells transformed by simian virus 40.²⁵ Later research showed reovirus oncolysis to be associated with Ras signaling pathway activation in transformed cells. RAS (a family of proteins originally found in rat sarcoma cells) promotes cell proliferation, transformation, and metastasis.^{26,27} Additional studies showed that activation of RAS could potentially enhance reovirus action by increasing viral uncoating, apoptosis-dependent release, and infectivity.²⁸ Clinical trials have shown that an altered form of Dearing strain Type 3 reovirus known as REOLYSIN is a functional anti-tumor agent that is well tolerated and not overly harmful to humans.²⁹

Viral gene inactivation

Viruses that have had certain genes inactivated are one of the most common types of virotherapeutics. Viruses such as these have genes that promote cell growth and evasion of antiviral responses. However, these genes are unnecessary for infection and growth in cancer cells since these cells already have mechanisms of increased proliferation and tend to be defective in generating antiviral responses.²³ In this fashion, viral genes are unnecessary for virotherapeutic use, and can consequently be used to improve tumor selectivity. Several viruses, such as the vaccinia virus, herpes simplex viruses, and adenovirus have been used as gene inactivated virotherapeutics.²³ All of these viruses have gone to clinical trials. A strain of herpes simplex virus with a gene for GM-CSF, a cytokine, known as Oncovex (OncoVEXGM-CSF; Amgen Inc.) is currently completing phase III trials for melanomas and squamous cell carcinomas of the head and neck.³⁰

An example of a virotherapeutic with gene inactivation is the human group C adenovirus, a double stranded DNA virus of the family *Adenoviridae*. Adenoviruses rarely cause serious diseases in humans and are most typically known as a cause of the common cold.³⁰ More than 50% of the human population has been infected with or exposed to adenovirus serotype 5: one of the two main serotypes of adenovirus used

as vectors in virotherapeutics.³¹ Cancer-specific adenoviruses have been generated in several ways. The first adenovirus deletion mutant used as a virotherapeutic, ONYX-015, lacked the gene encoding E1B-55kD, which binds to and inactivates a tumor suppressor gene known as p53.^{12,23} This deletion was made in order to promote selective replication of p53 defective tumor cells. Adenovirus deletion mutants can also have multiple deletions, such as mutant CB1, which has a deletion of E1B-55kD, as well as of CR-2, a gene that encodes complement receptors.³³ Although certain adenoviruses have been shown to be extremely safe, other adenoviruses have caused serious issues, such as toxic shock.^{4,6}

Transcriptional targeting

Virotherapeutics are sometimes transcriptionally targeted in order to enhance cancer cell specific viral replication.²³ This method involves specific promoters to control viral genes necessary for viral replication. Over the last few decades, more than 30 promoters have been discovered as methods for transcriptional targeting in virotherapies. Tissue and tumor specific promoters can be divided into two main types: tissue/tumor type-specific promoters, which are active in specific types of tissues or tumors, and pan-cancer specific promoters, which are active in various tumor types but are inactive in normal cell types.^{10,34} Transcriptional targeting has most commonly been applied to adenoviruses, parvoviruses, and herpes simplex virus type 1.^{35,36} In each case, different combinations of viral genes have been targeted, and transcriptional targeting is often combined with other methods to enhance tumor selectivity.³⁷

Transductional targeting

Certain virotherapeutics are altered prior to virus entry through transductional targeting. By this method, virus entry can be modified to only recognize cancer cells so that replication is restricted to them. Transductional targeting can be accomplished in various ways, such as through pseudotyping, use of adaptors, and genetic incorporation of targeting ligands. Transductional targeting is most often used to increase cancer cell specificity in herpes simplex virus type 1, measles virus, vaccinia virus, and adenoviruses.^{10,38}

Tumor specificity and virotherapeutic potency

All cancer virotherapeutics strive for increased tumor specificity, which is medi-

ated through one of the four main mechanisms of tumor selectivity. Once obtained, anti-tumor potency is analyzed to determine the clinical efficacy of the therapeutic. In this, virotherapeutics mediate tumor destruction through intrinsic anti-tumor activity, immune responses, expression of therapeutic genes, and sensitization to chemotherapy or radiation therapy.¹⁰ Intrinsic anti-tumor activity replicates and destroys cancer cells through apoptosis or necrosis. Virotherapy-triggered immune responses involve induction of cytokines, release of tumor-associated antigens, or activation of tumor-infiltrating dendritic cells within tumors.³⁹ Expression of therapeutic genes occurs through use of virotherapeutics enabled with genes that allow for increased tumor specificity and viral replication.⁴⁰ Sensitization of conventional cancer therapies, such as chemotherapy or radiotherapy, is often necessary since - due to their lack of sensitivity - these therapies often become ineffective in treating advanced stage patients.⁴⁰ However, virotherapeutics can enhance the response to these therapies, as has been shown with viruses such as measles virus. Additionally, virotherapeutics tend to be enhanced when combined with typical therapeutics such as the above mentioned and show high increases in efficacy.⁴¹

Difficulties and challenges of cancer virotherapies

Like most cancer therapeutics, virotherapeutics have drawbacks. In respect to virotherapies, vector-related issues can be narrowed into three main categories: (1) low infectivity, (2) vector agglutination to antibody, and (3) negative immune responses; two further subdivisions of this can be made as cytotoxic T lymphocyte (CTL) toxicity from the vector and cytokine production resulting in viral inhibition. CTL toxicity can eliminate cell populations in ways that are detrimental to virotherapy treatment, preventing the full effect of viral replication on the host. Additionally, production of cytokines, immunomodulating proteins, resulting in viral inhibition is the result of viral infections that cause inflammatory effects. Both CTL toxicity and cytokine production resulting in viral inhibition can be prevented by use of immunosuppressants and specific vector design in order to minimize immune responses that are detrimental to treatment. Cytokine production can also be prevented through anti-inflammatory treatments.^{42,43}

Low infectivity is often caused by poor viral transduction. Vector agglutination is caused by antibody inactivation of circu-

lating viruses. Although entirely different issues, low infectivity and vector agglutination to antibody have similar corrective methods. Both can be addressed through use of specific vector design or use of liposomes, which are vesicles used for administration of nutrients as well as therapeutics. Vector agglutination by antibody can also be corrected through use of collagen matrices and immune suppressants, while low infectivity can be fixed through protein coat alterations and bidirectional antibodies.⁴²

Lastly, for virotherapies to be successful, viral infection of cancer cells must exceed growth rates of uninfected cancer cells. Therefore, the efficacy of each virotherapy must be assessed as they may need to be incorporated with a preliminary treatment, such as chemotherapy or surgery.⁴³ Efficient delivery of the vector also plays a major role in the functionality of virotherapy; systemic injections require 1000x the viral load needed to obtain a desired result in comparison to intra-tumor injections.⁴⁴ All these issues must be addressed in order to create a fully functional virotherapeutic.

Safety issues regarding use of cancer virotherapies

Although cancer virotherapeutics have

great promise, the field is hardly risk-free. During the first wave of interest in virotherapeutics that led to clinical trials in the late 1940s and early 1950s, adverse effects were common. These included, encephalitis, fever, bleeding, and other more mild signs. One death, in the case of a 1949 clinical trial for Hodgkin's disease, even resulted in a death after injection of the hepatitis B virus.⁹

Since the second wave of interest in virotherapeutics however, data accumulated has shown that virotherapies are mostly safe. The most common adverse effects usually being flu-like symptoms and fever.^{3,10} However, several clinical virotherapy trials have resulted in serious adverse effects and death. For example, in May 2002, a 55-year-old male with renal carcinoma metastatic to the lungs died of respiratory failure five days after an intravenous dose of PV701, a replication competent strain of Newcastle disease virus: His death was possibly due to rapid tumor lysis.⁴⁵ Additionally, clinical trials which use virus vectors tend to influence the fate of virotherapeutics. In September 1999, a teenager died of toxic shock after receiving an adenovirus vector to treat ornithine transcarbamylase deficiency.⁴⁶ In October and

December 2002, two young boys who enrolled in a program for the treatment of X-linked severe combined immunodeficiency using a retroviral vector developed a form of leukemia, which resulted in one death. A third child in that program developed leukemia in January 2005.⁴⁶ These adverse effects highlight the most serious obstacles of tumor virotherapeutics – immune reactions against vectors and transgenes, and inappropriate insertions of vectors and transgenes that can potentially lead to further cancer-causing mutations.^{43,46}

Conclusion

The field of virotherapeutics is being developed into a fairly new area of treatment, one which holds great promise. Viruses of dozens of families have potential and many are innately capable of acting as viral therapeutic agents. Regulation of tumor selectivity and consequent anti-tumor potency have been shown to be of key importance, and have proven that virotherapeutics can be used to target and destroy cancer cells effectively while leaving normal cells unharmed. Since genetic engineering and biotechnology were demonstrated to be applicable to virotherapeutics, viruses have also been manipulated in order to increase their

Mechanism	Mode of Action
Direct cell lysis due to viral replication	The virus destroys cancer cells by replicating until inhibited by the immune response or by a lack of susceptible cells.
Direct cytotoxicity of viral protein	The virus destroys cancer cells by synthesizing proteins during replication that are cytotoxic.
Induction of anti-tumor immunity	The virus takes advantage of the weak immunogenicity of cancer cells and initiates anti-tumor immune responses.
Sensitization to chemotherapy and radiation therapy	The virus functions to prevent or stop chemoresistance or resistance to other similar therapies. The virus also functions in one of the ways listed above and tends to be minimally effective on its own, but is highly effective when combined with other therapeutics.
Transgene expression	The virus is genomically altered in order to improve its efficacy and specificity in cancer cell destruction.

Table 1: Mechanisms of Anti-Tumor Efficacy in Virotherapeutics

**Adapted from reference 16.

Family	Genus	Strain/Vector Used
<i>Adenoviridae</i>	<i>Mastadenovirus</i>	Conditionally replicating vectors based on canine adenovirus.
<i>Herpesviridae</i>	<i>Simplexvirus</i>	Replication-competent vectors based different types of strains of HSV-1 and HSV- 2.
<i>Polyomaviridae</i>	<i>Orthopoxvirus</i>	Replication-competent vectors based on vaccinia strains WR and Wyeth.
<i>Reoviridae</i>	<i>Orthoreovirus</i>	Live reovirus type 3 strain Dearing (T3D).
<i>Orthomyxoviridae</i>	<i>Influenzavirus A</i>	Replication-competent NS1 deleted influenza A.
<i>Picornaviridae</i>	<i>Enterovirus</i>	Live echovirus type 1 and coxsackievirus A21. Replication-competent vectors of poliovirus type 1. Live attenuated poliovirus and bovine enterovirus.
<i>Togaviridae</i>	<i>Alphavirus</i>	Live attenuated Sindbis virus and replicons.
<i>Coronaviridae</i>	<i>Coronavirus</i>	Replication-competent vectors based on feline coronavirus and murine hepatitis.

Table 2: Viruses Used in Cancer Virotherapies**

** Adapted from Reference 17.

efficacy in treating tumors.

Many virotherapies are currently in clinical trials, which have, for the most part, shown to be well-tolerated by humans. Therapies in which virotherapeutics are used in combination with more typical therapies—such as chemotherapy, radiotherapy, and antibody therapy—have been shown to provide much more effective results. Most of the issues that prevented the field of cancer virotherapeutics from expanding now are actively being overcome. Advances in research must now focus on the most serious obstacles of the field—vector and transgene caused immunological reactions, as well as inappropriate insertions of vectors and transgenes that can lead to further cancer-causing mutations. However, with viruses such as Oncovex reaching completion of phase III trials and adenovirus H101 approved for cancer treatment in China, virotherapeutics will continue to be in trial and, perhaps, become available as cancer therapies worldwide.

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An exploration of the gastrointestinal hormone ghrelin: from discovery to implementation

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Abstract

Ghrelin is a naturally occurring 28-amino acid brain-gut peptide with growth hormone-releasing and appetite-inducing capabilities. It is primarily secreted in the stomach mucosa but also has been expressed widely in different tissues, including the hypothalamus. This has led to the idea that it may have both endocrine and paracrine effects. It is an endogenous ligand of the G protein-coupled growth hormone secretagogue receptor. Ghrelin levels increase when subjects are fasting or hypoglycemic. Levels decrease in chronic obesity and positive energy balance. Ghrelin stimulates growth hormone release and regulates energy homeostasis by binding to ghrelin receptors in the anterior pituitary and possibly the mediobasal and mediolateral hypothalamus. This review progresses through a general analysis of the information pertinent to ghrelin's history, functional roles, structure, analytical aspects, clinical significance, and application. Eating disorders, gastrointestinal diseases, growth hormone deficiency, and growth hormone deficiency diagnosis will be analyzed. Special analysis of ghrelin in ovines will be briefly discussed.

Introduction

Ghrelin, a gastric-derived peptide, is an endogenous ligand for growth hormone secretagogue (GHS) receptor that may play an important role in energy homeostasis and the control of feeding behavior.¹ Ghrelin production is primarily in the endocrine cells in the gastrointestinal tract.² This orexigenic hormone's levels fluctuate over the course of the day in relation to food intake. Pharmacological administration of ghrelin has demonstrated increased feeding in multiple species.² Due to the hypophagia and hyperphagia that result from the removal of the lateral hypothalamus and ventromedial hypothalamus, respectively, it is demonstrated that feeding is regulated by a balance of the stimulatory and inhibitory regions of the hypothalamus.³ Close interaction between the brain and gastrointestinal gland in the regulation of feeding is probable due to the gastrointestinal gland being the main site of food digestion and nutrient absorption.⁴ Ghrelin is the first food-intake-stimulating signal originating from the stomach.⁵ The following

review will work to elucidate the most current knowledge foundation we have about ghrelin.

History

Kojima initially discovered Ghrelin in 1999 through investigation of rat stomach tissue.^{6,7} Since then, it has also been discovered in mammals including humans, cattle, and sheep. The term ghrelin descends from the Proto-Indo-European root *ghre* – meaning “grow”.⁶ Bowers' study identified that synthetic peptide analogues of the opiate met-enkephalin specifically released growth hormone *in vitro*.⁸ Human data later suggested that several peptide and non-peptide compounds have potent growth hormone (GH) releasing activity when administered parenterally or orally.⁹ Peptides include the following: growth hormone-releasing peptide (GHRP)-6, GHRP-2, hexarelin, and ipamorelin. Non-peptide compounds include the following: L-692, L-429, MK-0677, and NN-703.⁹ Demonstrated by computer-assisted overlays, non-peptide and peptide growth hormone secretagogues (GHSs) show three-dimensional similarities and many synthetic GHS have been synthesized by numerous companies since the initial appearance of that similarity.¹⁰ Good oral bioavailability and negligible effects on other pituitary hormones are two of the effects of potent GH-release.¹¹ A specific G-protein coupled receptor was identified in 1996. This receptor was the growth hormone secretagogue receptor (GHS-R) which is expressed primarily in the hypothalamus and pituitary gland.¹² An endogenous ligand for this receptor was swiftly revealed and called ghrelin.⁷ This so-called ‘reverse pharmacology’ is similar to the characterization and recognition of endogenous opiates and endocannabinoids.^{13,14} Ghrelin's originally identified source of the stomach in combination with its presence in the hypothalamus makes it a newer member of the brain-gut peptide family.⁹ Ghrelin's importance in body weight regulation was heightened with the observation that circulating ghrelin levels show both rapid and long-lasting effects on weight management.⁹

Structure

Ghrelin is synthesized as a preprohormone that is proteolytically processed to

a 28-amino acid peptide.⁵ Necessary for biological activity, a post synthetic modification takes place in which an n-octanoic acid residue is bound to one of the amino acids.¹⁴ The primary source of circulating ghrelin is the gastrointestinal tract, primarily the stomach. Slighter amounts also originate from the intestine, hypothalamus, placenta, kidney, and pituitary gland.¹⁶ Ghrelin is an example of a bioactive peptide with acyl (general formula: -C(O)R) modification.³

Chemical/biological structure and synthesis

In succession with the discovery of ghrelin was the identification of a stomach-derived mRNA sequence that codes for a protein with similarities in sequence to motilin and named motilin-related peptide m46.¹⁷ Though the fatty acid modification was not recognized, the aforementioned peptide was found to be identical to ghrelin.⁹

Mass spectrometry was accompanied by high-pressure liquid chromatography (HPLC) to identify the amino-acid sequence of ghrelin and a discrepancy between the observed and calculated molecular weight.⁹ This pointed to the presence of a post-translational modification; there is no other naturally occurring peptide that has been previously shown to have this acyl group as a post-translational modification.¹⁵ The hydroxyl group of Ser3 is octanoylated, meaning the hydrogen atom of the hydroxyl group of the third N-terminal amino-acid serine residue is replaced by a hydrophobic moiety, C7H15CO. Another discovery was a splice variant of ghrelin with 27 amino acids all missing the fourteenth amino acid, glutamine. Biologically active analogues of ghrelin were later described in much smaller amounts with acyl chains of 10 or 11 C atoms or with a peptide chain that contains a missing twenty-eighth position amino acid, arginine.¹⁸ At the Ser3 of the ghrelin molecule, the n-octanoyl group seems to be essential for a quantity of the hormone's bioactivity, which includes growth hormone release and appetite. Non-acylated desoctanoyl or non-acylated desacyl ghrelin circulates in much larger amounts than does the acylated form, and it does not displace ghrelin from its hypothalamic and pituitary binding sites.¹⁹ The non-acylated forms are unable to stimu-

late GH release *in vivo* in such animals as rats and humans.²⁰ Numerous common features are shared among ghrelin and the gastrointestinal peptide motilin.⁹ Both are synthesized within the upper gastrointestinal tract, exhibit prokinetic activity on gut motility, and both demonstrate the ability to stimulate GH release from the pituitary.²¹ The structures of these genes are similar. The motilin receptor is the closest relative of the ghrelin receptor.²²

Ghrelin was originally synthesized *in vitro*.²³ It has been shown to be mainly produced by X/A-like cells of the oxyntic stomach mucosa.²³ In humans, the ghrelin gene is located on chromosome 3 (3p25-26). Originally described were four exons and three introns that are at positions 141 (2000 bp intron), 258 (3000 bp intron), and 367 (800 bp intron) of the 511 bp long cDNA.²⁴ Prepro-ghrelin contains a 23 amino-acid signal peptide and pro-ghrelin contains a 94 amino-acid peptide; this includes the 28 amino-acid mature ghrelin and a tail that is 66 amino acids. Gly-Ser-Ser-(n=octanoyl)-Phe-Leu, the first 4 or 5 residues of ghrelin, are satisfactory for calcium mobilization *in vitro*.²⁵ Ghrelin activity is not affected by the short, hydrophobic acylation of the hydroxyl group of Ser3 with longer aliphatic chains or with unsaturated or branched octanoyl groups. However, ghrelin activity is dramatically decreased as a result of the acetyl groups replacing the natural 8-carbon group. Recent studies show that shortened ghrelin molecules may show GH-releasing activity *in vitro*, but not *in vivo*.²⁶

The 5' flanking region of ghrelin has been an elevated area of study. The 2000 bp region that is upstream in relation to the start codon contains some binding sites for transcription factors including the following: AP2, basic helix-loop-helix (bHLH), PEA-3, Myb, NF-IL6, NF-kB, hepatocyte nuclear factor-5, and half sites for estrogen and glucocorticoid response elements.²⁶ Ghrelin has been shown to co-purify with a high-density lipoprotein (HDL) that is associated with the plasma paraoxonase.^{9,27} A calcium-dependent esterase, paraoxonase, breaks down oxidized lipids in low-density lipoproteins (LDL). Low paraoxonase activity is linked with coronary disease. The octanoyl group of ghrelin binding to the peptide with an ester bond suggests a possible role of the enzyme in ghrelin, desoctanoyl ghrelin conversion.

Origin

Ghrelin is expressed and identified in a number of different types of tissues. It has been shown that ghrelin is expressed in the pituitary, immune cells, lungs, placenta, cyclical expression in the ovaries, testes, and kidneys.⁹ It can be identified at the mRNA

level, protein level, or both. Ghrelin is most prominent in the stomach, small intestine, and hypothalamus.⁹

Originally, ghrelin was isolated from the stomach. Out of the numerous different types of endocrine cells in the stomach, about 20% of the chromogranin A-immunoreactive endocrine cells contain ghrelin mRNA.²⁸ Ghrelin cells are identified by being round or ovoid in shape and are not in contact with the lumen of the stomach but are positioned closer to the capillaries. Ghrelin is found in the fundus of the stomach in the oxyntic gland, which is the acid secreting part of the stomach.⁹ The majority of circulating ghrelin is found to originate from the stomach, and a minor amount in comparison is found in the small intestine.²⁹ There are two types of ghrelin cells observed in the gastrointestinal tract: those that are closed and have no contact with the lumen and those that are open or elongated and have contact with the lumen.³⁰ When the acid-producing part of the stomach of rats was surgically removed, the amount of circulating ghrelin within the animals decreased by 80%, suggesting that the oxyntic mucosa is a major source of ghrelin.³¹

Ghrelin peptide is expressed in the hypothalamus and is released *in vitro* from the hypothalamic blocks spontaneously after stimulation of a depolarizing concentration of potassium chloride.³² Hypothalamus immunostaining studies exhibited ghrelin expression in the internuclear space amid the lateral hypothalamus, arcuate nucleus (ARC), ventromedial nucleus (VMN), dorsomedial nucleus (DMN), paraventricular nucleus (PVN), and the ependymal layer of the third ventricle.⁹

Functional roles

Ghrelin holds a considerable role in the regulation of GH secretion.⁵ GH release is stimulated when ghrelin activates Ghrelin Receptor (GHS-Rs) located on the pituitary and GH-releasing hormone-containing neurons in the hypothalamic arcuate nucleus. Studies have proven that ghrelin stimulates food intake and is very involved with energy homeostasis regulation.⁵

Secretion and release mechanism

Ghrelin signals are integrated with growth hormone releasing hormone and somatostatin to control the timing and magnitude of growth hormone secretion.¹⁶ Cells in the anterior pituitary have a receptor (named after GHS-R) that when activated by the binding of ghrelin to GH stimulates the secretion of GH.⁵ Acyl modification of ghrelin is pertinent for its activity; thus, enzymes that catalyze acyl modification are important in regulating the

activity of ghrelin.³ Amino acid sequences of ghrelin are well conserved; the ten amino acids at the N terminus of the sequence are identical. The structural conservation and the requirement for acyl modification indicate that the N-terminal section might be of central importance in regulating ghrelin's activities.⁷

Ghrelin secretion is controlled by the act of feeding.³ Plasma ghrelin concentration increases throughout periods of fasting and decreases after food is ingested. This correlation has been noted in numerous animals including rats, humans, sheep, dairy cows, and beef steers.⁶ The factors that are responsible for mediating the regulation of ghrelin secretion are unclear, but blood glucose levels may be critical.³³ If glucose is administered intravenously or orally it does decrease plasma ghrelin concentration. Gastric distension caused by increased water intake does not change ghrelin concentration. Thus, mechanical distension of the stomach cannot be the cause of ghrelin release.³³ High lipid concentrated diets decrease plasma ghrelin concentration; low protein diets increase plasma ghrelin concentration. Plasma ghrelin concentration also varies depending on body structure; lean people have high plasma ghrelin concentration and obese individuals have low plasma ghrelin concentration.³

Patients that undergo a gastric bypass surgery lose nearly 36% of their weight along with a concurrent decrease in their plasma ghrelin concentration.³⁴ Ghrelin concentration alterations with food intake diminish in these patients, thus suggesting that the main site of production of ghrelin is the stomach.³ Plasma ghrelin concentration decreases for patients with short bowel syndrome.³⁵ The loss of ghrelin-producing tissues in these patients is a cause for lowered ghrelin concentration levels. Ghrelin secretion and concentration is influenced by such things as; feed intake, body condition, nutritional status, and physical framework.

Ghrelin regulation

Ghrelin regulation and effects occur at numerous points including: transcription and translation of the ghrelin gene; addition of post-translational modification; secretion rate of ghrelin from cells in the stomach, hypothalamus, and other sites; binding proteins in the circulation; transport across the blood-brain barrier; clearance of ghrelin by liver/kidney; influence of the other ligands of the ghrelin receptors; expression of ghrelin receptors; and intracellular signaling of ghrelin receptors.³⁶ Ghrelin changes throughout the day depending on amount and time of food intake. Factors that influence the upregula-

tion of ghrelin secretion include: fasting, low body mass index (BMI) or body score, leptin, growth hormone releasing hormone (GHRH), thyroid hormones, testosterone, and parasympathetic activity. Ghrelin secretion downregulation is influenced by: food intake, high BMI or body score, glucose, insulin, somatostatin, GH, GHS, ghrelin, PYY3-36, and urocortin-1.⁹

Appetite and feeding stimulant

Feeding intake is stimulated by the activation of GHS-Rs by ghrelin on NPY/agoutirelated peptide (AGRP)-producing neurons that are located in the arcuate nucleus.³⁷ Ghrelin has the capability to increase total fat tissue by decreasing fat oxidation. Motility stimulation and stimulation of gastric emptying that is induced by ghrelin can involve a local effect as well as some central mechanisms.³⁸ Adult *Homo sapiens* exhibit a two-fold increase in plasma ghrelin concentrations before a meal and decrease to trough concentrations within a single hour after eating.⁵

Ghrelin has been shown to be appetite-stimulating when it is administered both centrally and peripherally.³ The main site of ghrelin is the arcuate nucleus. Due to the fact that peptide hormones in the blood do not generally pass through the blood-brain barrier, there has to be a mechanism through which peripherally administered ghrelin can trigger the central nervous system (CNS), which could possibly be the vagus nerve.³⁹ The appetite-stimulating effect of ghrelin is blocked by a neuropeptide Y (NPY) receptor (Y1) antagonist. Ghrelin stimulates NPY and agouti-related protein (AgRP) secretion, indirectly enhancing feed intake activity.⁶

Growth hormone releasing

Ghrelin can cause growth hormone (GH) release both *in vitro* and *in vivo*.⁵ Ghrelin acts directly on the pituitary gland, as indicated by ghrelin specifically stimulating GH release from primary pituitary cells in a dose-dependent manner. In both rats and humans, an intravenous injection of ghrelin induces potent GH release.⁷ Intravenous injection of ghrelin and intracerebroventricular (ICV) administration of ghrelin demonstrated an increase in rat plasma GH concentrations in a dose-dependent style. As little as 10 pmol of ICV ghrelin was shown to be enough to release GH.⁴⁰ This is a lesser amount than what is needed if ghrelin is administered intravenously, proving that ICV injection is much more potent. *In vivo* results, *in vitro* results, and ghrelin detected in blood samples implies that ghrelin is secreted from the stomach into the bloodstream and then acts directly on the pituitary gland to release GH.³

In cases where negative energy balance is generally prominent, such as low-calorie diets, chronic exercise, cancer anorexia, anorexia nervosa, and Prader-Willi syndrome, ghrelin concentrations were reported to have increased.⁴¹

Other functions

More than a mere natural GH secretagogue, ghrelin also acts on other central and peripheral receptors and exhibits an abundance of other actions.⁵ Some of those actions include the following: stimulation of lactotroph secretion, stimulation of corticotroph secretion, influences gastroenteropancreatic functions, and has orexigenic, metabolic, cardiovascular, and antiproliferative effects.

Ghrelin concentration is low in human obesity, which could be correlated with high caloric intake. A reduction of body weight in obese individuals causes ghrelin concentrations to increase. Despite the conclusion that ghrelin levels are elevated in individuals engaging in dieting, those who undergo stomach-bypass surgery demonstrate decreased ghrelin concentrations. This leads to the idea that the size of the stomach may correlate directly with ghrelin concentrations.⁴² A number of experimental observations have shown that ghrelin could possibly be a strong gastrokinetic agent.⁵

Analytical aspects

There are several assays available for ghrelin measurement. Linco Research, Inc., developed an analysis system typically applied when measuring human ghrelin levels.⁵ With this analysis antibody was raised against a human ghrelin epitope that was carrying an octanoyl group on the serine-3 position. This position determines the biological function of the hormone via enabling binding to the receptor. Precautions must be taken with this test due to the acidification of the sample to stabilize the labile side chain.⁴³ The specifications for this analysis from Linco Research are the following: the lower limit of detection is 10 ng/L, linear range is 10-2000 ng/L, intraassay CV is 7.4%, and interassay CV is 13.5%.⁴³ A less preferred method of analysis was developed by Phoenix, Inc. It provides a lyophilized preparation that must first be dissolved in assay buffer and then diluted repeatedly.⁴³ There is also a calcium influx assay which has been used in rodents to detect ghrelin levels.⁴⁰ The Linco Research, Inc., ghrelin assay is also applicable to numerous other animals, including bovines.⁶

In ovines, ghrelin concentration has been measured by a competitive solid-phase immunoassay that makes use of Europium (Eu)-labeled synthetic rat ghrelin and polystyrene microtiter strips coated

with anti-rabbit gamma-globulin.¹ Another method for ovine GH measurement is the GH; TR-FIA system that was developed using the RIA kit for ovine GH radioimmunoassay supplied by National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK).¹ In ovines there is another assay that can be used for ghrelin known as the time-resolved fluoro-immunoassay (TR-FIA). It, too, uses reagents supplied by NIDDK.⁴⁴

Ghrelin and other hormones

The arcuate nucleus is the target site of leptin, ghrelin, neuropeptide Y (NPY), and agouti-related protein (AgRP). Leptin is an appetite-suppressing hormone from adipose tissues.⁴⁵ NPY and AgRP are appetite-stimulating peptides that are inhibited directly by leptin. An ICV injection of ghrelin caused the expression of Fos protein in NPY-containing neural cells and increased the amount of NPY mRNA in the arcuate nucleus.³ An NPY receptor (Y1) antagonist blocks the appetite-stimulating effect of ghrelin. Appetite-stimulating effects were also inhibited by ICV injections of an AgRP inhibitor, anti-NPY IgG, or anti-AgRP-IgG. An intravenous injection of ghrelin was found to stimulate neurons that contained NPY and/or AgRP in the hypothalamus. Neuron fibers directly protrude onto these neurons as shown by immunohistochemical analysis.³ From this information we can conclude that ghrelin increases feeding activity by stimulating NPY- and AgRP-containing neurons in the hypothalamus. This promotes the production and secretion of NPY and AgRP peptides. It can be deduced that the hormone ghrelin is a natural antagonist to the appetite-repressing, protein hormone, leptin.³

Clinical significance and application

Ghrelin has distinct orexigenic, adipogenic, and somatotropic properties.⁵ The wide and various tissue distribution of ghrelin suggests that it may have multiple functionalities. Via vagal afferent-mediating ghrelin signaling, the brain-gut axis is the effector of anabolism by regulating growth, metabolism, and feeding. Ghrelin also has the ability to enhance immune responses and potentially down-regulate anti-inflammatory molecules.⁵ Ghrelin's role as a brain-gut peptide highlights the significance of afferent vagal fibers as a major pathway to the brain, thus maintaining physiologic homeostasis. Ghrelin and growth hormone secretagogues (GHSs) will be particularly important due to the number of effects they have including: increased growth hormone release, increased ACTH and cortisol release, increased prolactin release, increased appetite, regulation

of carbohydrate metabolism, increased gastric motility, immune function regulation, increased sleep, increased bone density, increased heart rate, increased vasodilation, proliferative regulation, autonomous nervous system regulation, and decreased thermoregulation.⁹

The characterization of ghrelin will be important due to the knowledge that it is involved with feeding regulation, nutritional homeostasis, and metabolic processes. Inevitably, the future will show the generation of new approaches to the diagnosis and treatment of different disease categories, particularly those related to over nutrition and the catabolic response to surgical trauma.⁴⁶ Some of the various implementations for ghrelin associated clinical response include matters of: cardioprotective effects, diagnostic or therapeutic tool in GH deficiency, marker for neuroendocrine tumors, treatment of catabolic states, enhancing immune function in cachexia or AIDS, obesity, and anorexia nervosa.⁵

Catabolic states

A prevalent and potential application of ghrelin is in relation to osteoporosis, aging, and catabolic states. Upregulation of ghrelin has shown benefits for many degradative metabolic conditions. This includes those seen in postoperative patients and in AIDS-associated and cancer-associated wasting syndromes.⁴⁷ Though ghrelin levels in GH-deficient subjects are not vastly different from controls, it still is in question whether some subjects can lack ghrelin and have growth-retarded phenotype and whether ectopic production of ghrelin can lead to acromegaly.⁴⁸

Eating disorders

Ghrelin has the ability to serve as an orexigenic agent for the treatment of such eating disorders as anorexia nervosa.⁴⁹ A mere administration of ghrelin orally or intravenously could stimulate appetite and improve the nutritional state of patients in this situation. Sensitivity to ghrelin is severely disturbed in individuals with anorexia nervosa due to very high plasma ghrelin levels.⁵⁰

Gastrointestinal disease

Ghrelin could be a candidate for the treatment of postoperative gastric ileus due to its stimulation of gastric motility.⁵⁰ Ghrelin counteracts gastric ileus as has been shown by its strong prokinetic effect, accelerating gastric emptying, the small intestinal transit of liquid meals, and reversing delayed gastric evacuation.⁵¹

Growth hormone deficiency

Circulating GH in humans can be increased by intravenous injection of ghrelin dose-dependently. The co-administration of ghrelin and GHRH has a synergistic effect on GH secretion. The combined administration of the two is the most potent inducer of GH release yet identified. Ghrelin supplementation may have the ability to give beneficial effects to GH deficient adults and children.⁵⁰

Growth hormone deficiency diagnosis

Ghrelin could be applied to the diagnosis and treatment of GH deficiency because of its potent GH-releasing activity and specificity. GH deficiency diagnosis is done through insulin-induced hypoglycemia. During this practice blood glucose level is decreased to less than 40 mg/dl. Side effects may result from the hypoglycemic action of insulin. Intravenously injected ghrelin in humans does not show any side effects, suggesting that ghrelin could be useful as a diagnosing tool for GH deficiency.⁵⁰

Exploration of significance in ovines

Ghrelin in reproductive organs

There has been significance evidence of ghrelin presence and its receptor's presence in the various reproductive tissues of adult and fetal sheep. It has been indicated that testicular expression of ghrelin, along with its receptors, is physiologically regulated in adult sheep and developmentally regulated in a fetus. This has shown that the ghrelin ligand and receptor system could have an endocrine or paracrine role in the cellular proliferation, development, and function of ovine reproductive axis.⁵²

In the tissue of adult sheep, ghrelin and growth hormone secretagogue receptors (GHSR-1a) immunostaining was distinguished in the stomach (abomasum in ruminants), anterior pituitary gland, testis, ovaries, and the hypothalamic and hind-brain regions of the brain. The adult testis experiences a significant effect on its level of immunostaining for ghrelin and GHSR-1a due to the season or photoperiod. For fetal sheep testis, there was a pertinent effect of gestational age on the level of immunostaining for ghrelin, SCF, PCNA, and GHSR-1a.⁵²

Transient ghrelin surges

It has been demonstrated that ovines experience a transient surge of plasma ghrelin in the pre-feeding period. Just before a scheduled-meal feeding, drastic increases in plasma ghrelin occur. In sheep fed twice daily, a transient surge of ghrelin secretion occurred before each feeding, leading to the suggestion that a diurnal

rhythm of plasma ghrelin would be dependent on feeding regimen.¹

Another experiment has been conducted using pseudo-feeding with ovines. It found that transient ghrelin surges still occurred when pseudo-feeding. This has led to the idea that psychological factors stimulate ghrelin secretion prior to feeding as a result of their conditioned emotional response (CER).¹

Conclusion

The peptide hormone ghrelin is found in numerous tissues throughout the body. It is extremely noticeable in the stomach and hypothalamus. Ghrelin is the endogenous ligand of the G protein-coupled growth hormone secretagogue receptor. Two of ghrelin's primary functions are the stimulation of growth hormone (GH) secretion and appetite inducing activities. Ghrelin will prove to be a very applicable hormone in the future as it is already demonstrating a number of possible clinical applications. Ghrelin is a very promising hormone that holds a positive and potential impact for the future of animals.

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How does seasonality affect the fitness of cane toads (*Bufo marinus*) in the Wet Tropics of Northeast Australia?

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Abstract

Understanding the viability and overall success of cane toad (*Bufo marinus*) populations is critical to exploring their impact on ecosystems and to develop management strategies. Our study looks to investigate how seasonality affects cane toad fitness. While past studies have mainly focused on the effect of lung worms (*Rhabdias pseudophaerocephala*) on toad fitness, we identified several factors that may indicate cane toad viability and tested their variability throughout the year. We collected toads at three sites across the dry, winter, and wet season in Northeast Queensland, Australia. Our results supported our hypothesis that cane toad fitness is at its lowest during the dry season due to unfavorable abiotic factors and poor foraging opportunities. During the wet season, when conditions are most favorable, percent body fat and average stomach content weight were at their highest. We found no significant difference between nematode infections across seasons. Future work should investigate demographic processes and how seasonality affects population dynamics throughout the year.

Introduction

Recognizing the importance of invasive species as an integral part of ecosystems helps guide critical decisions in the future conservation of our natural world. However, invaders often change their overall ecology and life history patterns when occupying a new habitat, which makes understanding their impact difficult.

Cane toads (*Bufo marinus*) were first introduced into the Wet Tropics of Australia in 1935 as a pest control.¹ Since their introduction, they have spread across the Wet Tropics and negatively affected ecosystem processes.¹ Past research has fallen under two main categories: investigating the behavioral ecology of cane toads and investigating the role of the lung worm (*Rhabdias pseudophaerocephala*) in cane toad viability. Seebacher and Alford revealed that the wet season and moist soils are extremely important for cane toad movement and therefore an integral part of their life history strategy.^{2,3} Other studies have shown

that toad behaviors are altered across age strata due to cannibalistic habits.⁴ The lung worm has shown to be the main negative force on the population and acts as the primary bio-control of the cane toad in the Wet Tropics.^{1,3,5} Initial research worked mainly to identify the toad's role as host and identify which parasites inhabited its body.⁶ However, more current research has explored how lung worms negatively affect their fitness.^{1,3,5}

Little work has looked into the role of seasonality on their overall fitness. Exploring the variability in cane toad fitness across multiple seasons is essential to understanding the overall impact of the toad in the Wet Tropics of Australia. We predict to find cane toad fitness lowest in the dry season due to food resource availability and abiotic conditions. The dry season poses unfavorably low temperatures and a dry climate that we predict will lower the overall success of cane toads.

Methods

We surveyed three field sites between 1730 to 2100 hours on September 19, 2011, and September 20, 2011. Groups were designated and sent out to collect cane toads at Crawford Plantation (-17.268, +145.64), Bonodios Plantation (-17.250, +145.534), and Centre for Rainforest Studies (-17.2045, +145.678), located near Yungaburra, Queensland. A total of 98 individuals were collected during the season. Toads were caught roaming individually and in groups found in holes. GPS data was collected on a Garmin 12. At each hole, readings of diameter, depth, temperature, and humidity were recorded using a Kestrel and metric measuring tape. Cane toads were then brought back to the Centre for Rainforest Studies Warrawee Field Station and euthanized using 3% chloral hydrate solution within two hours of capture.⁷ Toads were analyzed in the lab at the Centre, where each toad was weighed using a Pesola spring scale before and after removal of all organs. Additionally, using a caliper each toad was measured from snout to vent in order to make future inferences about the age structure of the toads. After each toad was dissected, measurements fo-

cused on three main internal aspects. First, the total fat bodies were removed from each toad and weighed. Fat bodies are found inside cane toads and have the characteristic resemblance of white oval-like sacs located near the digestive system. Second, the stomachs were weighed before and after the internal contents were removed in order to assess the mass of the contents. Finally, the lungs were weighed and then analyzed under a Prism Optical dissecting scope for presence of lung worms. The scale used in all instances was an Ohaus Adventurer.

Additional data was collected in the winter and wet seasons by previous School for Field Studies students.⁸⁻¹⁰ Data were used from these years to investigate seasonality in ecological patterns of cane toads. A total of 199 toads had been collected during the wet season and a total of 99 toads had been collected during the winter season.

Data were split into three main seasons of study. First, the dry season was designated as data collected between the beginning of September and the end of December, as past studies have done.² Second, we designated a winter transition season, which was data collected during the months of June and July. Finally, the wet season was designated between the beginning of January and the end of April.² We used an ANOVA to test variables in the dry, winter, and wet seasons. Our study focused on four indicator variables of fitness: average percent body fat, average number of nematodes per gram of lung, average total mass, and average stomach content mass. In cases where an overall significant difference was found, additional Tukey's Pairwise tests were run to identify specific variation between seasons.

Results

ANOVA tests and Tukey's Pairwise tests were run to investigate the effects of seasonality on cane toad fitness.

When comparing the average percent body fat between seasons, an overall significance was found (ANOVA, $F_{2,383} = 18.13$, $p < 0.001$) (Figure 1). Using Tukey's Pairwise test we found that the dry season was significantly different from both the winter and wet seasons (Tukey's, $p < 0.001$,

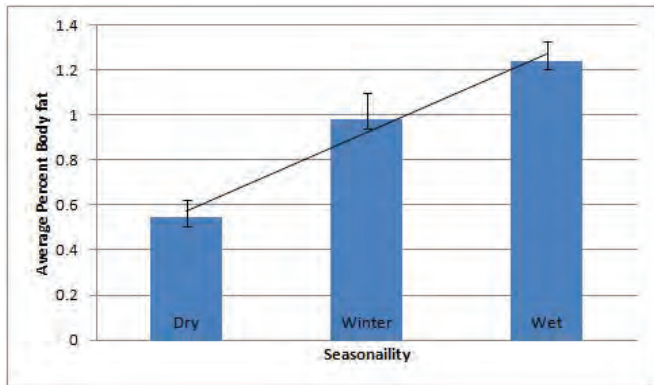


Figure 1: Average percent body fat between the three seasons.(ANOVA, $F_{2,383}=18.13$, $p<0.001$). Significance between dry and winter (Tukeys, $p<0.001$). Significance between dry and wet (Tukeys, $p<0.008194$). No significance between wet and winter seasons (Tukeys, $p=0.175$).

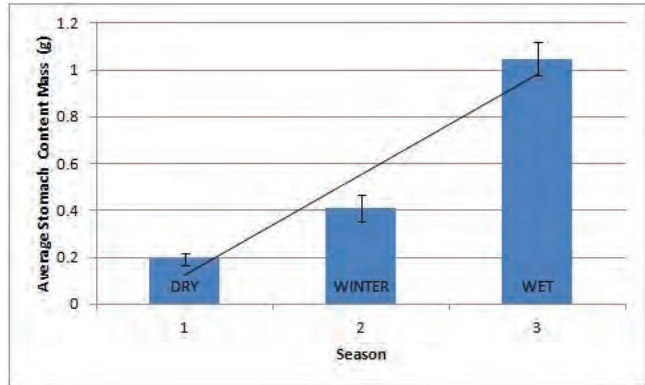


Figure 3: Average stomach content mass between the three seasons. (ANOVA, $F_{2,347}=64.15$, $p<0.001$). Significance between wet and both dry and winter (Tukeys, $p<0.001$). No significance between dry and winter (Tukeys, $p=0.1677$).

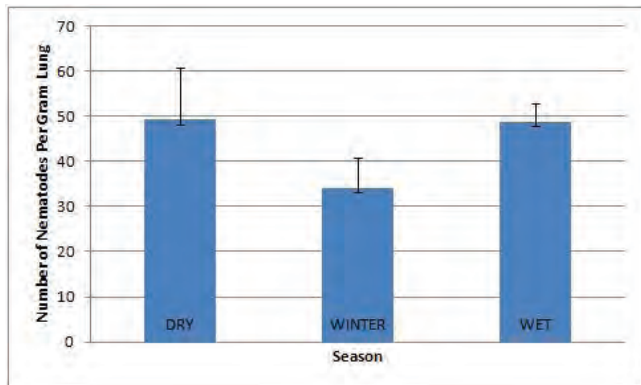


Figure 2: Average number of nematodes per gram of lung mass between the three seasons.(ANOVA, $F_{2,385}=1.794$, $p=0.1693$). No significance between the seasons.

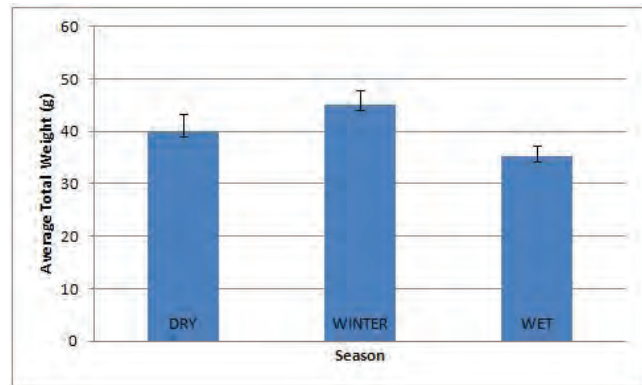


Figure 4: Average total body weight between the three seasons. (ANOVA, $F_{2,383}=4.166$, $p=0.01$). Wet and winter significance (Tukey's, $p=0.0295$). No significance between dry and both winter and wet (Tukey's, $p=0.3801$; $p=0.443$)

$p<0.008194$). There was no significant difference between the wet and winter seasons ($p=0.175$).

No significant difference was found when comparing the average number of nematodes per gram of lung mass between the three seasons (ANOVA, $F_{2,385}=1.794$, $p=0.1693$)(Figure 2).

Analysis showed an overall significant difference when comparing average stomach content mass between the three seasons. (ANOVA, $F_{2,347}=64.15$, $p<0.001$)(Figure 3). Further analysis showed the greatest variation between the wet season, and both the dry and winter seasons (Tukey's, $p<0.001$; $p<0.001$). However, analysis between the dry and winter seasons revealed no significance (Tukey's, $p=0.1677$).

Analysis showed a significant difference when comparing average total body weight across all three seasons (ANOVA, $F_{2,383}=4.166$, $p=0.01$)(Figure 4). However, further tests only showed one significant

difference between the wet and winter seasons (Tukey's, $p=0.0295$). Additional analysis between the dry and winter seasons (Tukey's, $p=0.3801$) and the dry and wet seasons (Tukey's, $p=0.443$) showed no significance.

Discussion

Our study investigated the role of seasonality on overall cane toad fitness. Due to lack of food resources and overall colder temperatures and drier climate, we predicted to find cane toad viability at its lowest in the dry season. Additionally, because past studies have mainly based cane toad fitness on the presence of nematode lung worms, we also wanted to investigate seasonality affects on lung worm concentrations.

First, our results revealed that percent body fat was at its lowest in the dry season (Figure 1). Moreover, analysis of variance showed that the greatest difference in percent body fat was between the wet and

dry seasons ($p<0.008194$). We contribute this finding to the likelihood of higher frequency of foraging opportunities in the wet season than in the dry. This supports our belief that toad fitness may be at its lowest in the dry season as low percent body fat is an indicator for poor viability.

Second, our results found no significant difference between the concentrations of lung worms across all three seasons (Figure 2). This result is interesting as past studies have attributed cane toad viability mainly to nematode concentrations.^{1,5}

Thirdly, analysis of stomach content found significance between the wet season with both the dry and winter seasons (p -value <0.001). We found stomach contents to be significantly higher in the wet season (Figure 3). Because cane toads are general opportunistic feeders, often stomach content could not be identified. But in some of the cases when it could be identified, it generally consisted of ants, beetles, and on oc-

casation other frogs and toads. We attribute this finding to the availability of food in the wet season compared to other seasons. This supports our hypothesis that cane toad fitness is lowest in the dry and highest in the wet season under ideal abiotic conditions and foraging opportunities.

Finally, our investigation of total weight revealed that the most variance was between the wet season and the winter (p -value=0.0295). We found the average total weight to be highest in the winter and lowest in the wet season (Figure 4). This result is somewhat surprising as we predicted lowest cane toad fitness in the dry season and believed that total cane toad weight is a predictor variable of overall fitness. One possible explanation could be that overall metabolic processes are somewhat slow and that high foraging rates in the wet season (Figure 1 and 2) are not transformed into total body weight until the dry and winter. This claim is also supported by our findings of lowest total body weight in the wet season (Figure 4). Low total body weight in the wet could be attributed to the use of stored resources throughout the winter and dry seasons.

Our study results coincide with previous finding in a study conducted on desert toads (*Scaphiopus couchii*) in Arizona, USA.¹¹ These results revealed that fat bodies and reproductive organs were at their peak in the most profitable foraging season.¹¹ Furthermore, the study showed that toads were most susceptible to parasite infection when fat bodies were at their lowest, and therefore, overall toad fitness was at its lowest in the winter. Although our study

found no particular increase in nematode presence, we believe that seasonality has an overall effect on toad fitness. Additionally, previous studies found that night activity increases with rising temperatures.¹² Assuming that more activity is related to more foraging opportunities and an overall increase in fitness, this coincides with our hypothesis that overall fitness may be affected by abiotic factors. The data supported the hypothesis that cane toad fitness is at its lowest when foraging opportunities are low and abiotic factors are non-favorable. However, our study was limited by variability in sample sizes across seasons as certain seasons have been better studied than others. Ongoing collections, especially in the dry season, are essential to fully understanding the role of seasonality. Future work should investigate demographics in cane toads across seasons to investigate predation, survival, and mortality rates in cane toad populations. This research will be an integral part of fully understanding the effect of seasonality on cane toads.

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The effects of fire regimes on distribution and diurnal activity of African ungulates in Kruger National Park, South Africa

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Abstract

The effects of fire on herbivore distribution and behavior have important management implications when assessing habitat and nutritional qualities of herbivores. Many factors including top-down and bottom-up processes as well as biotic and abiotic factors influence ungulate selection of forage and habitat across a landscape. Although there has been much research on herbivore distribution in relation to fire and physical attributes of herbivores, only a small amount of research has been conducted assessing herbivore behavior across differing burn treatments. In this paper I aim to identify if: 1) grazers are found most often on annually burned plots or plots burned at longer frequencies, 2) the behavior of grazers differ across burn treatments, and 3) grazer diurnal activity is differentiated across burn treatments. Herbivore counts and behavioral surveys were collected on three different experimentally burned plot treatments in Kruger National Park, South Africa. As expected, herbivores were found most often on annually burned plots. However, grazing was observed most often on 3-year burn sites. Additionally, vigilance behavior was not statistically different in annually burned sites vs. 3-year burn sites. Further research needs to be conducted with larger sample sizes to assess the difference among smaller and larger bodied species, seasonality effects, and a broader range of fire frequencies.

Introduction

The roles top-down and bottom-up trophic forces play in natural communities have long been a source of heated debate among ecologists.¹ Selective foraging by herbivores, in response to plant nutrient quality or predation, can alter how an ecological community will be organized.¹ A bottom-up hypothesis to explain herbivore habitat preferences suggests forage is the deciding factor for habitat selection. Whereas a top-down hypothesis states predators, or other higher factors, are the deciding factors for habitat selection. Therefore it is highly important to understand top-down

and bottom-up interactions to explain and comprehend the many complicated interactions that occur in the natural environment.²

A variety of factors, biotic and abiotic, contribute to foraging selection of ungulates across the landscape. Biotic factors include resource availability³ and competition,⁴ food preferences⁵ and the risk of predation while foraging;³ whereas external abiotic factors such as fire and rainfall are also important in shaping distribution of ungulates across a landscape.^{6,7} In addition, physical aspects of an ungulate are also highly important in shaping distribution of herbivores. Attributes such as stomach type and body size are both highly important when assessing distribution of ungulates. External factors such as rainfall and predation, as well as physical variation such as body size and stomach type, do play a crucial role in the ecology of habitat and habitat selection in most African savannas. Therefore, Kruger National Park in South Africa provides an ideal system for studying ungulate behavior in relation to fire regimes.

Among grazers in the African ecosystem, it is believed the distribution and behavior of smaller-bodied species are limited by predation risk, whereas populations of larger-bodied species are limited by forage availability.^{8,9} Furthermore, larger-bodied species generally prefer areas of low tree density (such as annually burned areas) possibly because of greater nutrient quality.⁸ For example, an African elephant may choose an annually burned plot to gain the best nutrient quality available in a given set of time. The elephant, therefore, is choosing a plot that holds the highest daily intake and thus can eat less food in a given amount of time but obtain a higher energy value than it could in another plot with plants exhibiting lower nutrient quality (such as a plot burned every three years). Smaller-bodied species are more susceptible to predation and exhibit higher amount of predator vigilance which is why smaller-bodied species are thought to choose annually burned plots. A Steenbok, a small-bodied ungulate,

for example, has a variety of predators due to its small size. Because of this the Steenbok should choose annually burned plots to forage in most often because it has a better chance of detecting a predator in a habitat with a low amount of trees and shrubs (as is exemplified in annually burned plots). Therefore, small-bodied individuals will choose annual burns for vigilance reasons and large-bodied ungulates will prefer annually burned areas for nutritious reasons.

Savanna ungulates are a big factor in driving habitat selection and facilitating species coexistence.¹⁰ In general, animals are attracted to burned areas due to the new growth and rich nutrients found in burned plots.^{6,7,11,12} High grass cover (and therefore greater biomass) and greater abundance of trees and shrubs are typical of tri-annually burned and unburned plots, whereas low grass cover is typical of annually burned areas.^{13,14} In a top-down trophic cascade hypothesis a tri-annually burned and unburned plot would be riskier for ungulates because of higher vegetation obstruction due to increased amounts of shrubs and trees present thus creating a lower visibility of predators.

Another important factor known to influence ungulate distribution on a landscape is the idea that grazers should select patches for the highest daily nutrient intake and highest daily digestible intake. This may differ among ruminating herbivores and non-ruminating herbivores.^{10,12,15} Ruminants (foregut fermentors) tend to forage in both burned and unburned areas as they are able to better digest low nutrient forage due to fermenting cells in their digestive tract.^{10,15} Non-ruminants (hindgut fermentors) on the other hand are restricted to high-quality forage, such as those found on annually burned plots, as they are constrained by the rate that forage passes through their digestive tract.¹² Therefore, non-ruminants should be observed most often on annually burned plots whereas ruminants should be found equally on all plots. Thus, ruminants are more widely and evenly distributed across the landscape than non-ruminants due to their better-

adapted digestive tracts.¹⁰

The African savannah has a large array of species. Therefore, it is also important to consider how body size affects nutrient and digestible intake. Generally speaking, smaller bodied herbivore species require higher quality food than larger species due to their higher metabolic demands, while larger bodied species require greater quantities and are more tolerant of lower quality food.⁷ Thus, smaller bodied herbivores tend to be non-ruminants whereas larger bodied herbivores tend to be ruminants. Within ruminant types, smaller bodied herbivores should prefer burned areas more than larger bodied herbivores because there is higher nutrient quality in these areas.^{7,16} This also exemplifies the fact that smaller bodied animals require less total energy, but more energy per unit of body mass or area of the landscape.⁷

Lastly, it is important to consider the diurnal effects on herbivores. Ecology of fear research has found that rock hyraxes (*Procavia capensis*) have higher giving up densities (GUD) during the early morning and late afternoon periods of the day.¹⁷ This may suggest a marginal value of energy driving foraging or higher predation risks from ariel predators. In conjunction with the previous study, research in klipspringers (*Oreotragus oreotragus*) exemplified the lowest GUD levels during the middle of the day, and thus high GUD levels in the morning and evening.¹⁸ This again could be due to perceived predation risk as predators spend the hottest parts of the day (the middle of the day) sleeping and saving energy, and hunt/move most often during the coolest parts of the day: generally between dusk and dawn. Thus, both smaller and larger-bodied species have higher GUD levels during the morning and evening.

Although there has been much research done looking at herbivore distribution in relation to fire as well as herbivore distribution across a landscape in relation to physical attributes of herbivores, little research has assessed herbivore behavior across different burn treatments. In this paper I aim to identify if: 1) grazers prefer annually burned plots over plots burned at longer frequencies, 2) if behavior of grazers differs across burn treatments, and 3) grazer diurnal activity is different between burn treatments.

Hypotheses

1. *Grazers will be found most often on annually burned plots rather than those burned at longer frequencies.* Grazers should choose a plot according to the highest nutrient in-

take available. Thus, grazers should choose an annually burned plot over those burned at longer frequencies due to the higher nutrient quality of plants exhibited in annually burned areas.

2. *Grazer diurnal activity will differentiate according to time of day.* Grazer diurnal activity should differentiate according to time of day due to the fact that grazers should be more vigilant in the early morning and evening when predators are present. Additionally, herbivores should be observed grazing more often during the early morning and evening due to the high temperatures and energy expenditure in the hottest part of the day.

3. *Grazer behavior and diurnal activity will differentiate across burn treatments.* Grazers should choose annually burned plots due to the high nutritional quality of forage found in these plots. Therefore, grazing behavior should be depicted most often on annually burned plots. Additionally, herbivores should exemplify lower amounts of vigilance in annually burned plots in comparison to plots burned at longer frequencies due to higher visibility in annually burned plots.

Materials and methods

Study site

With nearly two million hectares of land (covering approximately 7,332 square miles), Kruger National Park is the largest park in South Africa. Kruger National Park makes up part of the Great Limpopo Transfrontier Park in the north eastern portion of the country. This "peace park" links with Gonarezhou National Park in Zimbabwe and Limpopo National Park in Mozambique allowing animals to roam freely throughout their habitat.

Kruger National Park is in a subtropical climate with hot humid temperatures in the summer reaching at or above 38 °C (100 °F). There are two distinct seasons in South Africa: the rainy season, extending from September until May, and the dry season, extending from June through August. This study was conducted during the rainy season from January to March.

The park encompasses many different vegetative habitats including Baobab sandveld, Mopane scrub, Lembombo knobthorn-marula bushveld, mixed acacia thicket, Combretum-silver clusterleaf woodland on granite, and riverine forest.

My study sites were located in Satara Rest Camp in the east central portion of the park. Savannah grazing land is dominant in this region of the park. Grass species such as *Themeda triandra*, *Panicum sp.*, and

Bothriocloa sp. dominate much of the grasslands. *Acacia sp.*, *Sclerocarya caffra* (marula trees), and *Colophospermum mopane* were the dominant tree species in the area. These central grasslands contain the highest lion population in Kruger National Park. This nutritious grassland also supports some of the largest herds of grazers including plains zebra (*Equus quagga*), cape buffalo (*Syncerus caffer caffer*), common impala (*Aepyceros melampus melampus*), giraffe (*Giraffa camelopardalis*), blue wildebeest (*Connochaetes taurinus*), and African elephant (*Loxodonta africana*). Multiple predators including lion (*Panthera leo*), leopard (*Panthera pardus*), cheetah (*Acinonyx jubatus*), African wild dog (*Lycaon pictus*), and spotted hyena (*Crocuta crocuta*) also dominate the landscape.

Three differing sites were analyzed in the surrounding vicinity of Satara Rest Camp: Satara, N'wanetsi, and Marheya. Additionally, three experimental burned plot treatments at each site were surveyed: an annual controlled burn, a tri-annual controlled burn, and a 20-year controlled burn serving as a control. Each of the nine experimentally burned plot treatments were subjected to free ranging grazers.

Field procedures

Herbivore counts

Herbivore counts were done a minimum of two days a week on each burn site. Counts were done from a vehicle; the vehicle was driven in one direction around the burn plot, each of which varied in length. However, the mean plot was approximately 1 km². Counts were done at four time intervals: 6 am to 9 am, 9 am to 12 pm, 12 pm to 3 pm, and 3 pm to 6 pm. Each burn plot was counted for herbivores at each time interval at least once a week.

Herbivores were only counted when inside or foraging on the boundaries of the burn plot. Herbivores were not counted when passing through the plot or when entering the plot when a count was in progress. Counts were variable in length but lasted anywhere from 10 minutes to 1 hour depending on how many behavioral surveys needed to be conducted. Herbivores species were identified and counts were recorded for each species. Weather was observed and recorded to identify outlying days or occurrences in these data. Otherwise, weather was considered a non-factor variable for the purposes of this study.

Herbivore behavioral surveys

Behavioral surveys were done in conjunction with herbivore counts when herbi-

vores were available. Species were counted and separated into categories based on sex, age, and separated by species and group size. Group size was separated into four categories: lone forager (one herbivore), a pair of foragers (two herbivores), a small group of foragers (three to six herbivores), and large groups of foragers (more than six herbivores). Group size was estimated when 20+ animals were available. When a group contained juveniles, herbivore behavioral surveys were randomly assigned to capture the appropriate proportion of individuals with and without offspring. Female individuals closest to juveniles were considered to be the parent of the juvenile.

Individual behavioral surveys were taken on approximately 30% of the individuals available. Each individual was observed for five minutes and behaviors were recorded every five seconds throughout the period. Eleven behaviors were exhibited on plots including: browsing, foraging, grazing, grooming, laying, moving, ruminating, vigilance, socializing, standing, and time spent out of sight. Browsing was recorded when an herbivore was observed eating shrubs. Grazing was recorded when an herbivore was observed eating grass. Foraging was recorded when an herbivore was eating but whose view was obstructed by habitat structures. Grooming was recorded when an herbivore was grooming itself. Laying was categorized when an herbivore was resting but not ruminating. Moving was categorized when an herbivore moved two or more steps in a particular direction. Ruminating was categorized when an herbivore was seen regurgitating its food and re-chewing. Vigilance (scanning) was recorded when an animal raised its head and looked around before continuing to eat or when the animal or group of animals would rapidly exit the area from an effect unknown to the observer. Socializing was categorized when an herbivore was playing or grooming another individual. Standing was categorized when an individual was standing but not ruminating. Time spent out of sight was categorized when an herbivore was standing behind obstructing vegetation or if it moved outside of the plot while the survey was in progress.

Data analysis

All data was compiled in an Microsoft Excel spreadsheet and categorized based on species, plot, and the four time periods mentioned previously in the field procedures section. Elephants and giraffes were not included in the data set because of lack of observations permitted in the time pe-

riod. Therefore, only zebra, impala, and wildebeest counts and behavioral surveys were analyzed. The control plots were only included in the distribution data analysis, as only two animals were identified in these plots during my study. Therefore not enough data was present to exhibit differences in behavioral or diurnal patterns of grazers in control plots. Additionally, not enough data was collected to test the difference between body size or ruminating and non-ruminating herbivores; therefore all herbivores were grouped into one category.

The first hypothesis – grazers are equally distributed across burn plots – was tested by computing a chi-squared test ($\alpha=0.05$) in Microsoft Excel.

The second hypothesis – grazers behavior will be equally exhibited across burn treatments – was tested by computing a chi-squared test ($\alpha=0.05$) in Microsoft Excel. The top six behaviors exhibited were chosen for analysis: grazing, standing, moving, ruminating, vigilance, and browsing. Each behavior was re-quantified in order to get a total of all behaviors equal to 100%. Behaviors were then categorized based on time of day: early morning (6 am-9 am), mid-morning (9 am-12 pm), early afternoon (12 pm-3 pm), and evening (3 pm-6 pm). Furthermore, diurnal activity was then categorized based on distribution: early morning on annual burns, evening on annual burns, early morning on 3-year burns, and evening on 3-year burns. There was not a significant amount of data for the mid-morning or early afternoon periods for 3-year burns and, therefore, this data was excluded from the analysis of distribution in conjunction with diurnal activity.

Additionally, paired comparisons for the proportion of time spent in each of the top six behaviors for each individual in a five minute period were made for: early morning versus mid-morning, early morning versus early afternoon, and early morning versus evening foraging behavior using a two-sample, one-tailed t-test assuming equal variances in Microsoft Excel. A Bonferroni correction was then implemented to gain an alpha value equal to 0.017. The Bonferroni correction was used to counteract the multiple comparisons from the three t-tests mentioned above.

The third hypothesis – grazer diurnal activity will be equal across burn treatments – was analyzed using a chi squared test ($\alpha=0.05$) in Microsoft Excel. Additionally, foraging and vigilance behavior in relation to distribution was analyzed using a Two-Factor Weighted ANOVA with Unequal Sample Sizes in Program R ($\alpha=0.05$).

Results

Hypothesis 1

As expected, herbivores were more prevalent on annually burned plots than control plots ($p=0.00001$) (Figure 1). Twenty-seven grazers were observed in the annually burned plots, thirteen in the 3-year burned plots, and two in the control plots. No precision estimates were taken on these results, as data was not modified.

Hypothesis 2

As expected, diurnal activity was highly variable depending on time of day (Figure 2). Grazing and browsing behavior combined was higher in the evening ($p=0.02$) (Figure 3). Grazing was most pronounced in the early morning ($SE=29.35$), mid-morning ($SE=18.80$), and evening ($SE=33.3$). Differences in grazing activity during the early vs. mid-morning ($p=0.28$) and early morning vs. early afternoon ($p=0.27$) were not statistically significant. As shown in Figure 3, grazing behavior was observed more often in the evening than in the early morning ($p=0.046$). However, the behavior of grazing in the evening ($SE=33.3$) had a larger standard error than in the early morning ($SE=29.35$) meaning this behavior could have been less variable during both the early morning and evening times than what the data presents.

Standing was portrayed more often during the mid-morning ($SE=18.80$) and early-afternoon ($SE=12.91$) as expected due to the high temperatures during this time and the low amounts of energy needed to stand. Interestingly, ruminating was only seen during the early ($SE=24.97$) and mid-morning time intervals ($SE=22.62$). This may be due to the fact that animals are digesting their food after the previous evening and early morning intake. Browsing was not portrayed during the early morning period and is highest during the evening ($SE=26.93$). Additionally, vigilance spiked during the early morning ($SE=8.13$) and evening ($SE=5.40$).

Hypothesis 3

As hypothesized, herbivore distribution and diurnal activity vary according to burn treatment (Figure 3). Opposite from what was hypothesized, herbivores were shown more often to graze in 3-year burn plots than annually burned plots ($p=0.017$ and $p=0.033$ respectively). Standard error was much higher during the evening than in the early morning: signifying that behaviors in the evening are more variable compared to those in the early-morning (Table 1). However, time was not a significant factor in

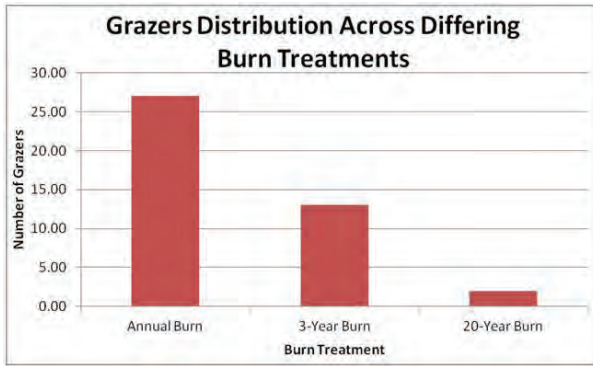


Figure 1: Grazer distribution across three burn treatments: annual burn, 3-year burn, and a 20-year burn serving as a control.

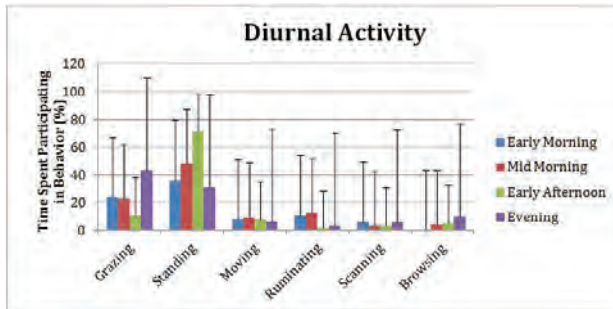


Figure 2: Diurnal Herbivore Activity with positive standard deviation bars.

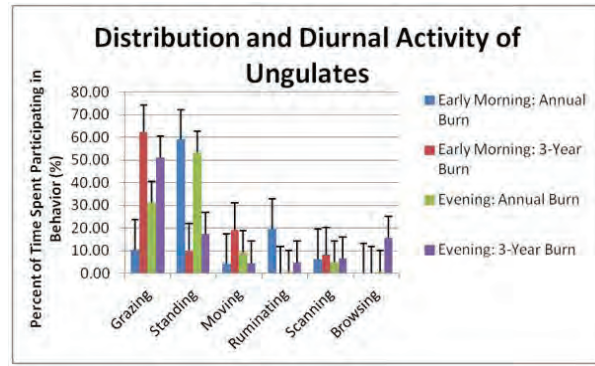


Figure 3: Distribution and diurnal activity during the early morning and the evening with positive standard deviation bars.

	Early Morning		Evening	
	Annual Burn	3 Year Burn	Annual Burn	3 Year Burn
Grazing	16.15	26.79	32.27	33.55
Vigilance	9.86	4.16	5.91	5.32

Table 1: Distribution and diurnal activity standard errors in percent for grazing and vigilance behaviors.

foraging behavior on annually burned plots versus 3-year burned plots ($p=0.46$ and $p=0.16$ respectively). Also opposite of what was expected, vigilance behavior was not statistically different in plots burned every three years versus plots burned annually ($p=0.55$) (Table 1).

Discussion

My results showed more herbivores on annually burned plots, which was in conjunction with additional studies stating that grazers are more often attracted to annually burned plots.^{11,12,19} However, herbivores were observed to graze most often on 3-year burn plots, which may indicate that annually burned plots may not have higher nutrient quality than 3-year burn plots, as previously thought.

Diurnal activity was highly variable depending on the time of day. Generally, grazing was exhibited most often during the evening which was different from my original hypothesis that grazing would be most prevalent in the early morning and the evening. This would be an accurate analysis as the middle portions of the day are generally much warmer than the early and late por-

tions of the day. Previous studies have also found higher giving up densities during the middle portions of the day for klipspringers and rock hyraxes.^{17,18} Because ungulates tended to forage in the early and late parts of the day, it would make sense that standing would be the key behavior exemplified during the middle of the day as it consumes less energy than grazing. Interestingly, ruminating was almost only seen during the early and mid-morning time intervals. This may be due to the fact that animals are digesting their food after the previous evening intake as well as the early morning intake.

Distribution and diurnal activity also varied across burn treatments. Herbivores grazed more often in 3-year burn plots than annually burned plots. This is different from previous research suggesting that ungulates may choose annually burned plots for nutritional quality.^{11,12,19} Therefore ungulates may choose 3-year burn plots during feeding times for higher nutrient quality. Herbivores may spend the majority of their time grazing in 3-year burn plots in the early morning and evening and then switch to annually burned plots during the

hottest parts of the day in order to assess predators' presence more readily. Additional research needs to be conducted to test this hypothesis. Opposite of what was hypothesized, vigilance was indifferent in annually burned plots versus plots burned every three years. This may show that there are additional variables attracting herbivores to annually burned plots over 3-year burned plots. Further research needs to be conducted assessing this statement.

Management implications and conclusion

It is extremely important to incorporate human induced disturbances into conservation plans and diversity patterns.¹⁹ The effects of fire on herbivore distribution and behavior are important for assessing habitat and nutritional qualities of herbivores. For example, the act of burning areas has been useful for managing habitats of two competing species. If there is a specific overgrazed habitat, a manager or farmer may be able to burn a nearby field allowing for re-growth in the overgrazed area. My study supports previous research that has observed that burning an area can increase ungulate use by up to twelve times.¹⁰

Additionally, competition between two species with overlapping habitats could be mediated through controlled burns. In the United States, black-tailed prairie dog colonies are often overgrazed by bison in areas where the two species overlap. A partial solution is to burn an area nearby for bison to graze which reduces the use of the bison colony by 30-60%.^{10,20} Thus, controlled burns have been an effective method for mitigating the impact on two conflicting species.²¹

In a large park such as Kruger National Park, there are many competing and overlapping species especially amongst the ungulates. In the Satara area alone there are six different species of ungulates. Therefore, controlled burns are a good mitigation technique to reduce competition between these ungulates. Additionally, by having different fire frequencies, a park manager allows for the highest variety of habitat in a given area, thus also allowing for high species diversity. In order to allow for the maximum amount of biodiversity in Kruger National Park, the best way is to allow multiple habitats exhibiting different fire intervals throughout the park. As this is already being done in Kruger National Park, my recommendation is that it is continued for the overall health and well being of biodiversity of the park.

With higher diversity one may infer a larger risk of competition in the area. However, with many varying burn plots each species will congregate towards plots that will yield the highest potential for the sustenance of its own life. In other words, having a variety of habitats allows for animals to expand across a landscape to decrease the amount of competition in an area.

Burning is also of importance during seasonality shifts when grasses die and ungulates are forced to feed on trees and

shrubs. It is then highly important for managers to have a good balance of annually burned plots and plots burned at longer fire frequencies. This allows for animals to graze on high quality plots (such as annually burned plots) in the summer months after the rainy season and plots burned at longer fire frequencies exhibiting higher amounts of shrubs and trees in the winter months.

Future studies should be conducted to further assess impacts of fire on herbivore behavior and distribution in relation to body size differences, seasonality effects, and fire frequencies to expand upon the highest potential for any given land.

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Recycling plastic: The untold story

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The consequences of plastics recycling are far more numerous than are often mentioned. The Colorado State University community focuses on the environmental benefits of recycling and often doesn't discuss its detriments. There are both environmental and human rights consequences stemming from the international recycling trade.

A brief overview of plastics and recycling

What is plastic? It seems almost silly to ask. Plastics have become such an integral part of 21st century life that it is easy to forget they were not always around. But "plastic" is a broader or more complex cate-

gory than other recyclables such as paper or metal. The Plastics Division of the American Chemistry Council identifies seven general characteristics of plastics: they are resistant to chemicals, can be thermal and electrical insulators, are lightweight and relatively strong, can be processed to make thin fibers and intricate parts, can appear in a wide range of characteristics, and are usually made from petroleum.¹ At a basic level, then, plastics can be understood as versatile materials with limitless possible uses from a non-renewable resource (petroleum). Table 1 lists some of the most common plastics, their individual characteristics, and general

uses for each.

In 2012, it is hard to imagine life without plastic. We, as citizens of developed countries, press the plastic snooze button on our alarm clock, brush our teeth with plastic brushes, eat off plastic plates, drive in cars that have many plastic parts, walk on carpets made of plastics, type on plastic computer keys, sleep in blankets filled with plastic fibers... the list goes on almost infinitely. Consumerism is not the sole driver of plastic goods; plastic is often very functional, even integral, to the way we live.

Plastic has improved lives. It has advanced medicine not only by providing sterile instruments such as IV bags, but also allowing synthetic heart valves, shunts, and other lifesaving devices. Kevlar protects the lives of police and military forces. Fleece, Gore-Tex, and synthetic fiberfill have allowed people to withstand the cold—be it on a walk around town or climbing Mt. Everest. No one can deny that plastic has many respectable applications.

It gets complicated when discussing *disposable* plastic items. There are some plastic products that need to be disposable, like hypodermic needles. But what about a plastic water bottle or product packaging? There are perks to using plastic in disposables: plastics are cheaper to manufacture, lighter-weight, and more resilient. Interestingly, "the energy requirement for the production and manufacture of plastics products is usually around 10-80% of the amount of energy that would be needed to produce comparable products made of glass, paper, or metal."² This huge decrease in necessary energy for production is environmentally beneficial. In addition, plastics actually create less waste than other materials:

Only 33 kg of plastics are needed to package 1 ton of yoghurt in 150 g units, while 573 kg of glass would serve the same purpose. Even at a recycling rate of 7%, 160 kg glass waste is created or, at an illusory reuse of 90%, 57 kg glass would still be created, compared to 33 kg of plastics. This assumes that the used plastics are not recycled at all.²

Plastic products can result in less waste than the same product made out of glass.

Name	Characteristics	Common Uses
Polyethylene terephthalate (PET)	Clear, good gas and moisture barrier, high use temperature	Carbonated beverage and food containers
High density polyethylene (HDPE)	Good moisture barrier properties, high chemical resistance, not a good gas barrier	Milk jugs, non-carbonated beverage bottles, margarine packages, detergent and bleach containers
Polyvinyl chloride (PVC)	Transparent, high chemical resistance, good weatherability, stable electrical properties	Pipes, flooring, cable sheathing, synthetic leather, medical tubing
Low density polyethylene (LDPE)	Tough, flexible, transparent, low melting point, stable electrical properties	Flexible films, lids, and bottles
Polypropylene (PP)	Chemical resistance, high melting point, resistance to water, salt, and acid	Packaging, fabrics, large molded parts for cars, yogurt containers, medicine bottles
Polystyrene (PS)	Versatile, clear, hard, brittle, good thermal insulation	Medical and food packaging, take-out containers

Table 1: Common Plastics¹



The tipping floor at the Franklin Street MRF. Photo courtesy of Katie Symons.

Plastic is often superior to other materials both in energy efficiency and reduction of resulting waste. Environmentally speaking, making disposable products out of glass, metal, and paper is often worse than making them out of plastic. But it also makes sense to recycle the plastic we do dispose of in order to keep it out of landfills, protect the environment, and keep production costs down. The significant downside to plastic disposables is that they will not break down in any useful time span. This is why it is important to recycle them; instead of living forever in a landfill, plastics can have secondary uses.

Recycling is a complicated process. First, recyclables need to be collected; this is often reliant on members of a community following through with curbside recycling, or even taking their recyclables to a community drop-off site. Next, the recyclables are driven to Materials Recovery Facilities, or MRFs, which “accept commingled curbside collected recyclables and separate them into their respective material categories.”³ I had the privilege to tour the Waste Management (WM) MRF in October of 2011. The director of communications for the facility prohibited me from taking photographs; she would send some stock photos that they used in promotional materials instead; those pictures are included here.

My tour began outside. My guide, Katie Symons, told me that the plant operates through wind, rain, snow, and blistering heat as we watched a WM truck back onto the tipping floor and dump recyclables onto

the huge pile that was already cumulated. As the truck left, a front-loader went back to work pushing more and more of the pile into the facility.

The MRF is a large warehouse. Huge machines churned, connected by belts, stairs, and designated walkways. Everything was covered in dust, and it hung thick in the air. There was movement everywhere—the workers, in bright yellow vests, hard-hats, and other protective gear, moved quickly and efficiently, hundreds of aluminum cans dropped into a holding cage in front of us, and paper rushed down a conveyer belt into a machine that squeezed and strapped it into bales. We made our way to the first

set of sorters, people who grabbed non-recyclables from fast-moving conveyer belts. This was the first line of defense to prevent contamination. As we watched, a worker pulled out half of a plastic kid’s swimming pool; another extracted a cracked toilet seat; another grabbed handfuls of plastic bags, which can’t be recycled at this facility. These items go in trash bins and will be landfilled.

Plastics are separated based on their resin. WM uses an optical sorting device that takes rapid pictures of the plastics on the belt to identify them and then uses bursts of air to push different resins into different compartments. It separates them into #1s and #2s, but lumps #3-#7 together. The separated plastics go into a baler to be pressed and strapped. A machine picks up each bale and takes it back outside, where bales are loaded into train cars. Then, the bales are transported by train to buyers.

After the tour, I was curious for more information. I e-mailed Katie some more specific questions in the hopes that she could ask the people that I wasn’t able to talk to during my tour. She sent them along to the director of communications, who instructed her to reply with answers that I found both generic and frustrating. Most importantly, I had asked what I thought was a simple question: “Where does it go?” The answer I received was: “This is proprietary information” and nothing further. These vague answers, although frustrating, provided a base for further research. I was determined to find out where those plastics went. During the tour, Katie said that she thought most of their plastics went to local buyers, since Colorado plastics have no easy access to ports. The bales of separated



Workers sort through paper at the WM MRF. Photo courtesy of Katie Symons.



Bales of HDPE ready for shipping. To the right are bales of PET. Photo courtesy of Katie Symons.

plastics might stay in the region, but they do need to be processed and reclaimed before they are ready to become new products. There is a good chance that at least some of the plastics processed by the Franklin Street WM MRF end up overseas, especially in China.

American and European plastics are shipped to China because their secondary plastics market is strong: “China currently takes up about 70 percent of the world’s used plastics.”⁴ Additionally, because of labor costs, it is “cheaper for the American manufacturers to bale up the discards and ship them to [China] than reprocess the material themselves.”⁵ Plastic waste from the manufacturing process and municipal plastic waste will, more likely than not, end up being cleaned, reprocessed, and manufactured into a new product in China.

Environmental consequences

Recycling is supposed to reduce pressure on the environment. It supplies materials for industry, thus preventing the overuse of virgin materials such as petroleum. It also reduces the waste put into ever-shrinking landfills. But it has some environmental costs that, although they may not cancel out the need for recycling on the whole, are problematic.

Energy and fuel

It takes an immense amount of energy to operate the heavy machinery, fast-moving belts, lights, ventilation systems, grind-

ers, balers, and other technologies involved in the recycling process. The WM MRF in Denver runs nearly 365 days a year, for 18 hours a day.⁶ That’s a lot of energy, and their operations are probably powered by coal and other fossil fuels. Thousands of collection and processing plants operate around the country, contributing to greenhouse gas emissions and polluting the regions they are located in.

Additionally, transporting recyclables by truck, train, and ship uses a huge amount of fossil fuels. However, there is one bonus to sending plastic recyclables to China for processing and manufacturing: “ships arrive here packed to the gills with cargo but return with mostly empty holds.”⁷ Recyclables get a “free ride” back to China, from an environmental standpoint. But once they dock, they still need to be transported across the country by train and truck.

Contamination and litter

Contamination presents another environmental issue. Throwing unacceptable items—such as food waste, plastic bags, or Styrofoam—into a recycling bin results in contamination. According to Sheela Backen, program manager for CSU’s Integrated Solid Waste program, the college has to maintain contamination lower than 10% in each outgoing shipment.⁸ If recyclables are contaminated, workers have to throw it out.

At the WM MRF, workers send contaminants, such as plastic bags (which clog the machines), down garbage chutes to be landfilled. As a result, the contaminated or non-recyclable materials are shipped to the MRF with the recyclables, taking up space in the truck. Then, they need to be taken to the landfill, necessitating more trucks to transport contaminants from the MRF to the landfill. These contaminants use up more energy than if they had been properly cleaned or thrown into the garbage bin in the first place.

In China, contamination could be dumped into the countryside.⁹ Plastic recycling pollutes the environment on both local and global scales. Although recycling may be a better option than landfilling, it is important to ensure that consumers know what can be put into a recycling bin and what can’t—and that they follow these rules. Table 2 lists acceptable and unac-

Acceptable Items	Unacceptable Items
<ul style="list-style-type: none"> • #1 & #2 narrow-necked containers, caps removed • Any container stamped #1 - #7 (except those listed under unacceptable items) • Wide-mouth containers stamped #1 - #7, snap-on lids okay • Yogurt containers stamped #1 - #7, snap-on lids okay • Clear clamshells stamped #1 - #7 • Rx bottles stamped #1 - #7 • Pails stamped #1 - #7, snap-on lids okay • Flower and garden pots stamped #1 - #7 • #7 Nalgene bottles 	<ul style="list-style-type: none"> • Containers larger than 2.5 gallons • Containers that are not free of food debris • Frozen entree microwave trays • Food trays or party platters, even if stamped with #1 - #7 • Film (e.g. shrink wrap, Saran wrap, etc.) • Plastic bags • Automotive chemical containers, including motor oil and anti-freeze • Pesticide containers • Styrofoam containers • #5, #6, #7 compostable bottles or cups

Table 2: Acceptable vs. Unacceptable Items in Single-Stream Recycling¹⁰

ceptable items to put in the single-stream recycling bins at Colorado State University.

Human rights consequences

In addition to environmental effects, recycling has negative consequences on human rights. In China, workers are exposed to unsafe conditions for low wages. In a more global sense, developed countries often take advantage of developing ones to get cheaper products.

Workers' safety, health, and rights

Safety standards in countries importing plastic waste are notoriously poor. In many developing countries, "the minimal regulatory framework that exists... for environmental protection and occupational health and safety is not enforced."¹¹ Consequently, "solid waste workers... are directly exposed to health risk factors."¹¹ One of the many health risks plastic recyclers abroad face is exposure to carcinogens. Melting PVC releases known carcinogenic fumes. If workers are not wearing protective gear such as masks and gloves, as sometimes happens in developing countries like China, those fumes are directly inhaled, likely causing health problems.⁹ In a *60 Minutes* exposé, journalists followed electronic waste from Denver to China, where "women were heating circuit boards over a coal fire, pulling out chips and pouring off the lead solder. Men were using what is literally a medieval acid recipe to extract gold."¹² Although this example pertains to recycling cathode-ray tubes in computer monitors, similarly unsafe working conditions occur in plastic recycling centers.

Furthermore, Chinese plastic workers make only about 200 USD per month, or \$6.66 a day. For the same work, American laborers would make \$200 a day.⁷ According to Toland Lam (owner of a recycling plant in China), "It's not worth that kind of labor to separate [materials]. But in China we can do that."⁷ Chinese workers are con-

siderably underpaid compared to their American counterparts.

Another human rights concern surrounding the plastics recycling industry is the weakness (or lack) of child labor laws in developing countries. In China, "small children [go] through bags of shredded plastic for hours, sorting the tiny pieces by color."⁹ Overworked children are deprived of their childhoods. The low price of plastic goods made in China result from the poor conditions, underpaid workers, and use of child labor in the country.

The bigger picture

On a larger scale, the international waste trade facilitates exploitation of developing countries by developed ones. Recycling in developed countries is expensive, so they look to export their plastic wastes elsewhere. Developed countries are taking advantage of the loose restrictions of developing countries where it is cheaper to manufacture plastic products because wages are not as high and safety measures are almost non-existent. The few regulations developing countries have in place to protect workers can be bent and broken to suit developed countries' monetary goals. This is an exploitive cycle: developed countries, restricted by domestic safety and workers' rights policies, send their waste plastic overseas where it can be manufactured cheaply. Then, citizens of developed countries buy these manufactured goods back from developing countries at a very low price—a price that is possible because of lax safety standards. Developed countries have been manipulating developing ones for hundreds of years, but in modern times these tendencies are swept under the rug. In the interest of human rights and dignity, the problems inherent in the international recycling trade should be public knowledge—in order to do something about it, people must first know that the problem exists.

Conclusion: What is to be done?

In school, our children are taught the three R's: reduce, reuse, and recycle. My own teachers in years past have stressed the importance of reducing waste first, reusing it if that fails, and recycling as a last resort. But as we grow, citizens of developed countries rely more and more on recycling to stymie their fears about the consequences of their consumption patterns on the environment. Recycling, however, is more complicated and has more negative effects than expected by many consumers. Research on this subject is woefully incomplete. In the future, I hope that more details emerge about the Chinese recycling industry, as well as a more complete picture of the transportation and processing costs of recycling. Perhaps with greater understanding, the problems inherent in recycling processes today can be solved in the future in order to protect both the environment and human rights.

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D. Cole, *Labrynth*, 2012
Paint on canvas; 12x3'



My work is a series of experiments. As my professor once told me, “Learning is knowing the logic of process.” While I’m constantly interested and affected by different artists, most of my influence comes from writers. Words have always been my trigger for my art. They run through my mind and then turn into pictures or colors or general forms. However, with my work, I often come across artworks that I will be inspired in terms of meaning or process.

My process for my most recent work, “The Art of Losing,” was an exploration in the materials I wanted to use. With painting, I tend always to decide early on what colors I will incorporate and then just start painting. With this installation, all I knew was that I wanted to use words; telling a story of the way that I think. I think in quotes and pages, and somehow they stick in my head more than anything else. This project is about my memory and the daily struggle I have trying to remember past events from years

D. Cole, *The Art of Losing*, 2012
Paper, ash, thread, ink; 12x5'



detail, D. Cole, *The Art of Losing*

ago to that morning. I decided first to soak pages of books that I didn't think I would read again in a container full of tea. As I was laying the pages to dry, I realized that one of the books I had chosen was perfect in illustrating my concept: *The Seven Sins of Memory*. I chose pages of the book that particularly interested me and began to annotate: poems, quotes, striking words, anything that told how I felt about my condition. From there, I wanted to play with the idea of "unraveling," so I sewed each page together carelessly, creating a long column of each thought and symptom I have. Wanting to further explore the process of memory loss, I then became fascinated with the idea of burned pages. I began to burn the unused tea soaked pages, phonebook pages, maps, and encyclopedias. Each represented a lost memory: a person, a place, an event, a lesson, and a journey. These built the base, creating my past. They were already lost. Each memory was now ash and severed from the thread loosely connecting my present and my future. It was all unraveling and everything not yet lost was in danger of catching fire which illustrates my constant fear of every part of me being taken over by the flames.

Some of the effects of my project were unintentional, like the slow swaying of the column of my present and future. I enjoyed this because when approaching the hanging pages, it became difficult to read everything at first glance. The concept of making the decision to stay and understand or leaving because it isn't worth your time has become an underlying theme in much of my work. The placement's dramatic lighting was also accidental but definitely contributed deeply to my intent.



detail, D. Cole, *The Art of Losing*



detail, D. Cole, *The Art of Losing*

Veneron Yazzen INSTITUTE OF AMERICAN INDIAN ARTS

V. Yazzen, *See You Soon, Grasshoppers*
Color pencil, ink; 18x18"

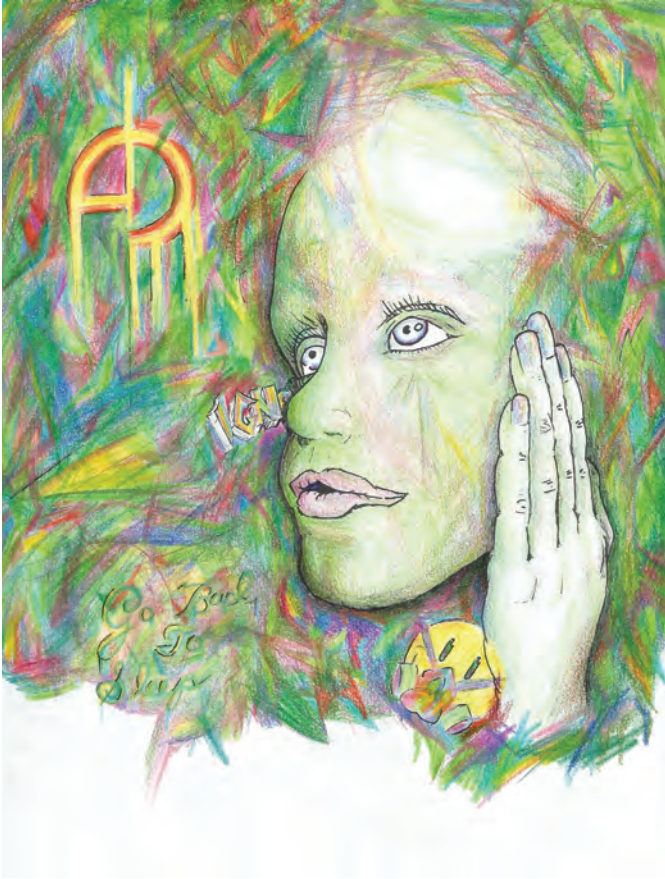


The falling leaves would show a countdown to another amazing winter. The cold mornings would capture frozen grasshoppers on the sidewalks as they tried to warm themselves. A compassion for grasshoppers and tress that soon undergo a harsh winter, which can sometimes be referred to as lifeless, enriches the human senses of how precious life forms can be. Sustaining itself with rotation by the sun, the earth repeats its cycle of life. It springs inspired artists such as mathematicians, scientists, writers or simply painters to learn from the white winter as a blank sheet of paper, evolving ideas that depict nature's process of beauty.

Kevin Barrett
COLORADO STATE UNIVERSITY



K. Barrett, *A Pour of Moderation*, 2012
Color pencil, ink; 8.5x11”



K. Barrett, *Longing to Dream*, 2012
Color pencil, ink; 8.5x11”

K. Barrett, *Mesmerize*, 2012
Color pencil, ink; 8.5x11”



K. Barrett, *Lost in Question*, 2012
Color pencil, ink;
8.5x11”

Alvaro Benvenuto
UNIVERSITY OF CHILE



A. Benvenuto, *El pequeño Simón camina al frente de la marcha por la avenida Pedro Montt*, 2011
Digital photograph
(Translation: Little Simon walks at the front of a march through Pedro Montt Avenue)

Rose Corbett
COLORADO STATE UNIVERSITY

R. Corbett, *Stone Giants*, 2011
Digital photograph



American Dream or American Divide?: The American Dream as symbolic boundary

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Abstract

The American Dream is an idea that pervades American politics, media, history and culture. To explore the meaning and use of the American Dream, I engaged in analysis of qualitative interviews with 20 middle class Iowans. These Iowans conceptualize the American Dream as a life in which one works hard, gets an education, values family and de-emphasizes conspicuous consumption. Using these values of the American Dream to build a symbolic boundary, interviewees separate themselves from others who they perceive as not sharing these values. These values include an emphasis on self-motivated hard work and a middle class lifestyle without excessive spending and luxury. Middle class individuals draw on these values of the American Dream to form symbolic boundaries which differentiate themselves as harder workers than the lower class and less greedy and materialistic than the wealthy. These boundaries provide the middle class economic stability in a time of increasing downward mobility and a growing gap between the poor/middle class and upper class. Ultimately, the middle class uses the American Dream as a cultural narrative to reinforce their status and to reify social inequality.

American Dream or American Divide?: The American Dream as symbolic boundary

The American Dream is not totally dead, but, it's dying pretty fast. You look at the numbers on social mobility, on the ability of people to move from modest or poor background up, the United States is way down the list. I mean, Horatio Alger would move to Europe these days.¹

During an appearance on "Real Time with Bill Maher" in September of 2009, economist Paul Krugman described social mobility as less of a reality in the United States than ever before, saying the American Dream is dying.¹ His emphasis on the death of the American Dream reflects current doubts about the American Dream, particularly in the economic climate of the second half of 2009 to October 2011 in which the unemployment rate stayed above or at 9 percent, not counting those who have dropped out of the job search.² There has been increased media scrutiny around this concept, often highlighting doubt in the American Dream. According to a 2009 ABC News poll, 43 percent of Americans described the American Dream as "once true," but currently not true.³

Yet, instead of foretelling a post-American Dream America, people and media outlets often react to this questioning of the Dream with disgust, anger, and continued support of the Dream. Fox Nation, of Fox News, for example, described Krugman's comments as part of his "perpetually pessimistic view of America."⁴ This outcry shows that while there has been doubt about the Dream, particularly in the past few years with the economic recession, it still holds tremendous power. In fact, 50 percent of Americans in the ABC News Poll still believe in the American Dream.³ The Dream serves an important function, and remains dominant even in periods of economic downturn. The American Dream

then, is still a powerful idea in American culture. It can be likened to what Michele Lamont and Virag Molnar call a "cultural narrative," a set of beliefs or values which legitimates the "truth" of some social circumstance.⁵

Given this lasting power of the American Dream, I explore the function it serves in the lives of middle class Americans. These individuals draw distinctions between themselves and those who do not have the American Dream. I argue these distinctions allow the middle class to justify itself as better than others who are struggling in the economy and thus to position themselves as immune to contemporary economic forces. The distinctions also allow them to justify themselves as superior to the elite Americans who are gaining wealth at an accelerating rate.

Literature Review

Values of the American Dream: Individualism in an American meritocracy

The cultural values implicit in traditional narratives of the American Dream include beliefs in meritocracy and individualism. The phrase American Dream is the crystallization of these American cultural values dating back to the colonial era.⁶ In colonial America, the Protestant ethic supported the claim that America was a meritocracy, invoking hard work, a "methodical performance of duty" before God, as the way to achieve success.^{6,7} Individuals often believed that hard work was a sure method of moving from poverty to wealth, more commonly known as the path of "rags to riches."⁷ The belief that hard work was justly rewarded reflects the perception that America is a meritocracy. The definition of meritocracy, according to sociologists of social inequality Stephen McNamee and Robert Miller, is that, "If you work hard enough and are talented enough, you can overcome any obstacle and achieve success. No matter where you start out in life, the sky is the limit. You can go as far as your talents and abilities can take you"⁸ Thus, individuals who subscribed to this ethic stressed meritocracy because they believed that hard work leads to success, no matter what obstacles appear, ignoring institutional biases and structural factors that foster success. This Protestant ethic fostered a belief in independence and self-sufficiency which would, along with meritocracy, later be secularized at the founding of the United States.

Secularization of the values of hard work and upward mobility led to an even more widespread culture of individualism and meritocracy. The secular emphasis on individual pursuit of success early in America's history is visible in the Declaration of Independence.⁶ This document reinforced the individual freedom of each person to work for one's own success, as each individual, according to the Declaration, had the right to "life, liberty and the pursuit of happiness."⁶ Other examples of these values in American culture include "success books" which promised upward mobility through individual hard work. For example, stories written by Horatio Alger depicted poor boys who used hard work, frugality and prudence to become rich and powerful.⁷ These stories illustrate the American Dream that "anyone can get ahead," thus reinforcing an idea of American meritocracy.^{6,7}

After Alger's books and the distribution of "success" literature, the term American Dream was popularized formally. In his 1931 book, *The Epic of America*, historian James Truslow Adams claims:

The American Dream is that dream of a land in which life should be better and richer and fuller for everyone, with opportunity for each according to ability or achievement. It is a difficult dream for the European upper classes to interpret adequately, and too many of us ourselves have grown weary and mistrustful of it. It is not a dream of motor cars and high wages merely, but a dream of social order in which each man and each woman shall be able to attain to the fullest stature of which they are innately capable, and be recognized by others for what they are, regardless of the fortuitous circumstances of birth or position.⁹

Thus, Adams's use of the term was a crystallization of the previous American values of individualism, and upward mobility, emphasizing an America where every person can obtain his or her dreams and move upward based on individual ability, hard work and effort. The emphasis on attainment "regardless of the fortuitous circumstances of birth or position" also reinforces the notion of equality of opportunity, which exists in a meritocracy. His use of the term recognized both the value of individualism, for its emphasis on individual capability (regardless of birth or position) and work for one's own, and also meritocracy, for its emphasis on a country where individual work would be rewarded regardless of family or social connection. These values of individualism and meritocracy would come to be the cornerstone of American culture in the years to come as the American Dream.

Values of individualism, hard work, and a belief in meritocracy form the foundation for contemporary cultural narratives of the American Dream. Foremost, there is still a focus on hard work as a quality that ensures that those who work hard and put forth the effort will be successful.^{8,10-14} The American Dream, founded on this ideology of meritocracy, portrays success and failure as deserved outcomes. In the American Dream, this ultimate goal is often a "middle class lifestyle" which is focused on a set of material goods and freedom from economic strife (i.e. having stable and secure resources).¹⁴ This lifestyle often includes the purchasing of a home and a college education.^{15,16} Through meritocracy and individualism, the current means of achieving this lifestyle and thus the American Dream includes both education and the value of hard work. In the American Dream, this individual hard work is the path to a "middle class" lifestyle which evolved from the belief in general upward mobility in the twentieth century.

The post-World War II economic boom, fueled in part by the GI Bill, created an idealized focus on moving upward to a particular middle-income status.^{6,15} Cassidy notes that the American Dream as a "middle class" status can be vague because the definition of the middle class is vague.¹⁵ The most agreed upon facets of middle class lifestyle include the money to purchase a college education, own a home, get health care, put "food on the table" and have some money left over for leisure spending.^{8,12,16} This idea of the American Dream as "middle class" also impacts family as an important institution for the performance of the Dream.

Individuals often use family to pass on the values of the American Dream, individualism and hard work, while also providing the middle class lifestyle that characterizes the American Dream.^{8,10,12,13,17,18} Newman describes the family as a place where the value of hard work and meritocracy must be proven; those parents who do not live a "normal," middle class lifestyle or who become downwardly mobile are an embarrassment to their

partners and children.^{12,13} Thus, family is important because the American Dream prescribes a certain appearance of family, based on a middle class lifestyle. Although people see the Dream as holding symbolic power in America today, the economic climate of the past two decades has been particularly threatening to an individual's economic stability, the chance of upward mobility, middle class lifestyles and hard work's connection to success.

While the ideology of the American Dream suggests anyone can succeed by relying solely on themselves and hard work, the reality of success often contradicts this belief. Newman argues that downward mobility, rather than upward mobility, has been an increasing reality for millions of middle and working class Americans.^{12,13} Downward mobility and rising costs have jeopardized individuals' middle class status and thus, their chance at achieving the American Dream.^{12,13} This economic stagnation for the middle class is compounded by the increasing wealth of the upper class which then elevates what is seen as the ideal middle class income and lifestyle.

While recent economic developments in America may make the American Dream less attainable than ever before, its power as a cultural narrative still remains. I argue that the Dream still remains powerful because middle class Americans are still able to use it to create status for themselves, while denying this status to others. Americans use components of the American Dream based in its values to distinguish themselves, masking the economic reality of downward mobility of many and the rapidly increasing wealth of few.

Symbolic boundaries

Symbolic boundaries are conceptual divisions which serve two purposes: to both create identity and to justify inequalities and social hierarchies.⁵ Cultural sociologist Michele Lamont's research finds that working class individuals have used boundaries to create and reinforce an identity as working class.¹⁹ Similarly, individuals may use the American Dream to reinforce identities about themselves as separate from others. This separation aids in the formation of identity, as individuals using the boundary to define themselves in a certain way, while labeling groups of people as outside from or different from their identity.⁵

Symbolic boundaries are also distinctions individuals make which morally separate themselves from others.⁵ A cultural narrative like the American Dream is part of a broad cultural context which provides ample material for the formation of symbolic boundaries.⁵ There are components of the Dream that individuals identify, based in the values of meritocracy and individualism, which are used as symbolic boundaries. These distinctions also justify social hierarchies as individuals who use boundaries to define their own identities as superior to other people who they perceive as being unlike themselves.⁵ These distinctions justify inequality and class hierarchy by distinguishing people's failures as their own responsibility.

My work is influenced by this research on symbolic boundaries and in particular Lamont's studies which explore class inequalities. By relying on this basis of research, I am narrowing my focus to class distinctions and their connection to the American Dream. This is not to say that other distinctions such as racial, ethnic, religious, and gender might not be of importance to the ideology of the American Dream. Rather, I am narrowing my focus to a manageable level for this research endeavor. I argue that middle class individuals use components of the American Dream as boundaries which aids in their identity formation as hard working, middle class citizens. This boundary work justifies a middle class superiority, as the middle class "us" in my research proclaims it has

achieved the American Dream, while also identifying the upper and lower-class “them” as lacking the Dream. The symbolic meaning of hard work creates an identity of the middle class as hard workers, and the lower class as lazy. These identifications then justify the lower class’s economic deprivation. The boundary of the “comfortable” middle class lifestyle identifies the upper class as greedy and superficial, allowing the middle class to avoid trying to catch up to the increasing consumption levels of the wealthiest Americans.

Methods

In order to determine how individuals both define and use the American Dream, I analyzed 16 interviews, each with an individual Iowan, and two interviews with Iowan married couples from across five different cities in Eastern and Central Iowa. Respondents were drawn from my own work associates and from social contacts of my academic advisor, Professor Tori Barnes-Brus. I also employed snowball sampling to find more Iowans to interview. This sample comprised white, middle class Iowans. The median household yearly income range is \$40,000-\$60,000. Since the U.S. Census Bureau reported national median yearly household income in 2010 to be \$49,445, this sample represents a very middle income group of people.²⁰

Most respondents have jobs that I would classify within the field of “professionals” such as doctors, teachers, nurses, professors and consultants. None of the respondents are currently working in manual labor. All of the respondents have at least some college education and most have completed at least an undergraduate level of education. The level of education reflects upward social mobility for many of the respondents, as nine respondents reported parents whose highest education was high school or lower. Jobs of the respondents’ parents are more diverse in their range than in respondents’ jobs, with more working class professions included such as farmers, factory workers, machinists and painters. Of the respondents, 15 were female and five were male. Six of the respondents were divorced, separated or widowed, one unmarried and 13 were married. Nineteen out of the 20 respondents had at least one child.

The interviews lasted an hour to two hours, with the average being approximately one hour and fifteen minutes long. Before each interview, respondents each read and signed an informed consent form. This form included details of the study, notice of audio-recording, and a notice that participants could refuse to answer any questions they did not want to answer and could withdraw from the interview at any time. Additionally, the form included an explanation that data could possibly be shared at conferences and in journals, but personal identities would remain strictly confidential. The interviews were semi-structured and opened with general questions about the American Dream, and then moved towards a respondent’s thoughts about “rags to riches”, “keeping up with the Joneses” and success, closing with questions about economic difference and social class. As the interviewer, I prompted respondents for more detailed answers or clarification and allowed them to deviate from the schedule in order to explain their ideas about the American Dream. After the interview, respondents completed a short written survey composed of demographic questions about their income, age, family, job and community involvement.

I transcribed each interview and analyzed the transcripts for common themes. I coded each complete interview with a code number that corresponded to interviewee’s actual names. To analyze the interviews, I used different colored highlighting and underlining in Microsoft Word to code different themes that repeat-

ed multiple times throughout the transcripts. I started with 28 concepts, which I narrowed to the most relevant and numerous categories. I found that every interview included mention of hard work, as well as mention of the proper income level, compared to greed. Additionally, 16 of the 18 interviews included references to education. Less cited concepts like “having a house,” and “having the right attitude” fit into the notions of “comfortable” (rather than greedy) and “hard work” that were dominant themes of the interviews. Another concept, where the components and boundaries of the dream seemed relevant to, the family, was cited in 16 out of 18 interviews. Later, I used a random name generator which drew on names from the U.S. Census to assign pseudonyms for each respondent.

Analysis

Values of the American Dream

Respondents described the American Dream by relying on cultural values of individualism and an ideology of meritocracy, similar to how previous researchers have described the American Dream.^{6-8,12,14} Respondents rely on these values in explaining important aspects of the American Dream, which include education, hard work, and emphasis on the achievement of a “comfortable” lifestyle and income level. Respondents also declare that family is an important display of these particular aspects of the Dream. My respondents describe family as important to these values and thus the American Dream as they use the appearance of family to measure themselves as individually responsible hard workers and as successful agents in America’s meritocracy.^{10,12,13} Family acts as the location where values of hard work, education, community and individualism come to be transmitted to future generations. One respondent, Joe Bowers, for example, describes how the value of education, part of the American Dream to him and many other respondents, was transmitted through his family. He explains:

I think actually my own life has been a pretty good example of the American Dream because I came out of a family in Texas, my dad was a doctor, my mom was a housewife. And the expectation, he was the first person that ever went to college and the expectation was that I would go to college...

Joe’s recollection of his family’s expectations for him reflects how American education, particularly higher education is an important path to “living the American Dream”, by gaining the skills necessary to find a job, be successful and to gain an income to raise a family.^{6,12-14} This aligns with a path towards self-reliance and individualism. Americans value education because of the perception that it provides the equality of opportunity necessary for all to succeed.¹⁸ I argue that family is an institution where this important pathway to the American Dream is emphasized. While he ignored his parents’ will on career choice, Joe notes the importance of family in that his parents transmitted the values of hard work and self-reliance that were necessary for him to succeed both in higher education and beyond.

The value of education as emphasized in the institution of the family is also explained by Helen Berry. When asked where her ideas of the American Dream came from, she responds”

I think that they [ideas about the American Dream] come out of your family, they come out of education a lot, you know, that’s why I’m sure a believer in education, they come out of how you can better yourself. Education will help you. I mean I worked for a lady one time, just helped her in her house,

it was a grandma that was raising her grandkids when their mother died and she used to, every Saturday, every Saturday for probably two years of my life she would say to me, ok no Helen, just get an education because they can't take that away from you. You can take everything else away from you but you cannot take an education away from you.

Helen's thoughts on education reflect how McNamee and Miller describe it as an important part of the American Dream because it represents a path to upward mobility, central to the notions of meritocracy in the United States.⁸ The American Dream is often shaped to fit a simple model of meritocracy and upward mobility, as respondents explain if a person gets an education, and then makes the most of that knowledge through hard work and perseverance, he or she cannot possibly fail. The American Dream, a set of values which does not take into account structural causes of poverty or downward mobility, is reflected in how interviewees discuss education as the path to the Dream. Family becomes an important background to this and other cultural values of the American Dream.

Emphasis on education as a process which ensures and creates a meritocracy is not the only value of the American Dream that is central in the institution of family. I argue, using these interviews, that values about individual responsibility, hard work and motivation, also central to notions of meritocracy, are also transmitted through family. Rosetta describes how family works to transmit these values, from parents to children. For her:

It's raising your children to be a good person, know right from wrong and do unto others as you would have others do unto you, that's, you know, always looking out for other people and, thinking about how they would feel if you, how you would feel in their situation, ...just being responsible, being accountable for your actions, being... caring and...available to the people that need you. And being motivated, you know, being, not to be a lazy person, to be somebody that is a doer...

The values Rosetta speaks about her family reinforcing correspond with values that are central to the American Dream: individual responsibility, accountability, motivation and hard work. By emphasizing these as some of the most important values of family, Rosetta describes the family as an institution which "teaches" the American Dream to the next generation of Americans. Just as McNamee and Miller argue, hard work is a value which reinforces the notion of meritocracy, and validates success as a product of one's own labor and failure as a product of one's own ineptitude or laziness.⁸

Arnez Parunski's recounting of her father's advice to her reinforces the cultural value of hard work as a part of the American Dream, and its connection to success. As her father emphasized to her:

Nobody's just going to give it to you for free kid, and nobody ever said it was going to be easy. Nobody's ever going to say it was easy, but if you keep your nose to the grindstone and you're honest and you're forthright, it can all come to you, so I think it is part of it.

Here Arnez is reinforcing the idea that one must be prepared for hard work and this must come from oneself, and not from others. This further strengthening of individualism and personal responsibility, as this hard work comes out of a place of individual motivation, rather than social regulation or force that might re-

quire hard work of an individual. This reinforcement of personal labor and individual responsibility casts individuals as responsible for their own failures or successes and justifies both successes and failures within the ideology of meritocracy that is part of the American Dream.

Respondents describe motivation and hard work as the path to the "comfortable," middle-class lifestyle that is part of the American Dream. The rise of the middle class in the years since World War II have led to the standard level of middle-class consumption which as defined by sociologist Fred Block includes a car, a house, health care and education.²¹ Bridgette Marcinko describes the American Dream in these terms of financial necessity and a comfortable lifestyle that includes necessities such as a safe house, food and medical care. She claims:

[T]he American Dream to me is owning, having a house, having *financial security*, feeling safe in your home, being happy in your home. That sort of thing.
...[Y]ou know, um, not necessarily millions of dollars, but being *comfortable* where you don't have to worry about, are you going to be able to feed your family. Are you going to be able to pay your bills and still get medical care? And not being afraid, not being afraid of leaving your windows open at night, you know, just feeling safe in your own home and being able to provide for your family.

The "comfortable" lifestyle Bridgette describes aligns with how these middle-class individuals see themselves. As the necessities of the "comfortable" lifestyle align with the research of what it means to be "middle class," "comfortable" equates to the status of a middle-class lifestyle. Respondents claim that this "comfortable" lifestyle includes the necessities, without extravagance or luxuries. This lifestyle then, based on the way it is described by respondents, is an essential part of the American Dream. The lifestyle is an end goal of the Dream, as a result of the hard work and effort that are emphasized as American cultural values. Thus, the "comfortable" and notably middle-class lifestyle is a marker of whether one has worked hard and to the best of one's ability and talents, consistent with the ideal of meritocracy.

Despite emphasis on family, the facets of hard work, motivation, education and a comfortable lifestyle are based in individualism.⁸ All of these components are demonstrated as individual actions or motivations. For example, hard work is described as individual effort and work completed in cooperation with a group or a community is rarely mentioned by the respondents. Education is also individually sought, as the interviewees talked about having a love of learning and doing well in school because they desired to go to college and do well there. Income for a comfortable lifestyle is awarded based on one's own work ethic and skill in a job. Parents have an individual responsibility to provide material goods for children and to instill ethics and values into their children. Thus, whether or not individuals reach the American Dream greatly depends on their own effort and performance. These thoughts confirm the existence of the belief in meritocracy where an individual is rewarded with success based on their own individual effort and skill.⁸

While respondents stressed that their understanding of the American Dream was their own individual definition, they ultimately shared the similar narrative of the Dream. The common description of the Dream, which explained importance of education, self motivation, a "comfortable lifestyle" and family, illustrates that there are shared cultural and social contexts that these individuals exist within. All live in the United States, which values

meritocracy and individualism.^{8,10,18} Additionally, respondents are middle-class individuals who have families. Their social context conditions them to respond similarly when asked the same questions. Further, I argue that respondents draw on this collective context, including the American Dream as cultural narrative, to build symbolic boundaries. Since most respondents described the same facets of the Dream and live with similar experiences in income and culture, they are able to build a common identity, defining others who transgress that identity as outside of the Dream. Creating these symbolic boundaries allows individuals to maintain status while under threat from both increasing extravagance of the elite and the increasing downward mobility of the middle class.^{13,22}

American Dream as symbolic boundary

The American Dream as a cultural narrative, with its emphasis on individual effort and America as a meritocracy, is drawn on to create symbolic boundaries. Since the Dream is so important to American culture, the emphasis on work ethic and a “comfortable” lifestyle are used by individuals as symbolic boundaries. My respondents articulated these boundaries in ways that aligned with general class divisions. While not everyone in my interviews claimed that all had the absolute ability to have the American Dream, many explained that most Americans could reach the Dream if they only had the correct goals and values (financial stability and hard work, for example). Therefore, in this Dream, most anyone can succeed, and failure is due to a failure to have the right goals, which is again, a reflection of the values of meritocracy and individualism in America.

Since this sample was mostly middle-income and identified as middle class, the significance of these boundaries is even more apparent. These respondents, as middle income Iowans, are lacking the privilege of the large incomes that members of the upper-middle class have. In a country that valorizes money, average Americans are attempting to gain status despite lack of a high income. By challenging the class hierarchies with their own symbolic boundaries which draw on the American Dream, Americans are able to define themselves as happy and fulfilled in a culture that often emphasizes consumerism and money. People use the American Dream to defend their position as desirable. They claim they will not become poor or downwardly mobile because they are insulated by their work ethic (which they claim the poor or downwardly mobile often lack) and do not wish to enter into the realm of the increasingly wealthy because such a status is “greedy” or “materialistic.” By drawing boundaries that define themselves as achieving the American Dream, they create moral boundaries that privilege a middle-income lifestyle over a poor or upper-income lifestyle, even amidst great economic turmoil and tension of the American reality versus the American Dream.

Iowans defend their status as middle class, financially secure and thus part of the American Dream by defining themselves against others who are struggling or poor. Stuart Rudolf uses the value of hard work to create a symbolic boundary between himself, a self-labeled “hard worker” and others of the “dependency class” who don’t work hard enough and thus are unworthy of and denied the American Dream. Stuart says:

Well, you know, a household in poverty with dysfunctional parents and drugs and alcohol and abuse and this is rife in your neighborhood and all your peers are the same. But it doesn’t have to be that gross. And moving up a step, people in the...dependency environment...it might be their American Dream to get welfare for the rest of their life, but I wouldn’t...

to me that’s not the American Dream. But there’s a certain welfare mentality.

By classifying a family that aims to achieve or gain welfare benefits for a lifetime as dependent, Stuart shows how many lower-income individuals do not fit into the values of individualism which underlie the American Dream’s components. Instead of working hard by oneself to provide for a family, instill values in children, and pay for education, these parents are perceived as lazy and dependent. Since Stuart and others rarely mention cases of the lower class as victims of structural factors, they allow their categorization of the lower class as dependent to become front and center of their personal narratives. By defining this group of people as lazy, dependent and lacking the value of hard work that underlies the American Dream, respondents are able to explain why they will keep their middle-class status in this economic unrest. They explain themselves as hard workers while explaining away why others, no matter how good economic conditions are, will always be stuck with low wages and living on government benefits.

Arnez Paranuski is another person who decries a group of individuals for choosing not to work. She argues:

And then you have the other set. That’s you know, the welfare to work moms and dads that are trying to do that job, but they just go for the welfare, you know and they really are sucking the system dry and then you have illegal immigration that are sucking entitlement programs dry. Sucking them dry!

Here, Arnez is describing certain people as dependent and lazy. Instead of depending on their own hard work, they depend on a “system” to take care of their needs and provide them with a sufficient lifestyle. As such, individuals who receive government benefits do not achieve the American Dream, as they do not sufficiently value hard work and thus do not rely on the value of individualism in a meritocracy. Respondents are using this distinction to create a hierarchy that provides them status as “Dream” realizers, denying that status to others, characterizing them as unwilling to make the strides necessary to reach the cultural values of the Dream.

Respondents use achievement of the “comfortable” and middle-class lifestyle as a boundary. This lifestyle becomes evidence of their achievement of the American Dream. Respondents construct this boundary to privilege themselves as having the American Dream and the upper class as not having the Dream. This boundary between the upper class and the middle class is focused on the consumerism of current American culture. Since the “comfortable,” middle-class lifestyle is valued in the American Dream, respondents define their own income and consumption level as desirable and morally superior, and that of those with more money as undesirable, both greedy and materialistic. Here Jimmy Lyons describes that there are negative outcomes to being rich and that he only wants things that fit into the level of “comfortable.” He explains:

I don’t need to be rich, you know, just comfortable. I’ve always thought that. I’d rather be comfortable than rich because it’s like to me, the more money you have, the more problems you have and the more people, more people want from you and the more people expect you to give this and that and the other. So, if I’m, if I have a job and I can support my family and I don’t have to worry about, um, you know being evicted or my lights going off or my heat or my water, any of that going off, then I mean that’s a comfortable living to me if I can afford to provide for my family plus provide clothing, food, the basics.

Jimmy's emphasis on necessities is echoed by others. Jimmy defines the rich as having their own set of problems based on the amount of money they have. This allows Jimmy and others like him to ignore the differences in lifestyle caused by increasing spending or increasing wealth of the upper class. This contrasts to what economist Robert Frank finds which is the middle class attempts to "catch up" to the increasing living standards of the rich.²² Instead, by defining anything above the "comfortable" lifestyle as greedy and materialistic, middle-class Iowans deny any positives of a higher income and more spending, cementing their status as better than those with more money. This separation of a middle-class lifestyle from the rich lifestyle reshapes the hierarchy so that the American middle class can consider themselves as better both than lower-class individuals and upper-class individuals.

The use of a symbolic boundary between the middle-class "us" and the upper-class "them" occurs in a period where most of the respondents see Americans as becoming increasingly materialistic and interested in consumption of luxuries. In order to maintain their status, even while not pursuing the latest luxuries, respondents use the boundary to define these others not just as wealthier, but rather as greedy and materialistic. Karina Davis cites an example of the "Joneses" that illustrates her contempt for those who use are buying the latest technologies for the sake of buying alone, and not to meet the needs of a "comfortable" lifestyle. She describes the Joneses as "greedy." She, on the other hand describes herself as only wanting things that are "really beneficial," rather than anything that is just a desire. Here again, the middle-class lifestyle is cast as better than upper-class, based on the way in which the upper class spends money. People who are wealthier are cast as lacking focus on the "simple" things that are necessary to the "comfortable lifestyle," including food, housing, and health care. Instead, members of the upper class are transgressing middle-class values and lifestyle by being "greedy" and focusing on luxuries. By focusing on the wealthy as greedy and materialistic, the rich are cast as outside of the American Dream, as they seek more than what is the "comfortable" middle-class lifestyle.

In another interview, Cornelius and Pearl Quinn also decry people who spend extravagantly, holding those people as separate from their own saving and spending methods:

Cornelius: It bugs me when I see...people...um...living...

Pearl: Beyond their means?

C: Living better than me...superficially anyway. Living better than me and me surmising that...um...they can't afford it. You know. And how is it then that...For example, when our children were really little, we had a nanny so we could get some work done. We knew how much we were paying the nanny and...how she was living seemed beyond that. And uh, she wasn't living it, she was living...was she living with her parents at the time?

P: Yeah.

C: And she, that family... you know, their Christmas gifts were way out of line with what we had expectations for, for spending for Christmas. Stuff like that. And...I don't know, I think. What bugs me is people...going bankrupt after spending uncontrollably.

By talking about people going bankrupt or spending beyond their means, Cornelius and Pearl form an identity for themselves as those who spend just enough to be "comfortable" and to save the rest, and for others, who they perceive to spend lots of money on luxuries. This focuses not only on those who are wealthy but those middle-class peers who spend "uncontrollably" on unneces-

sary and unaffordable luxuries. In this way, these individuals are cast as crossing a boundary of the respectable meaning of money and wealth, attempting to pretend they have immense wealth, when in fact they do not have the wealth and income to support their lifestyle. This outrage shows regulation of those who achieve the Dream (the middle class, focused on living at simply a level of "comfort"), and those who do not (those whose use of money transcends "comfort" to spend on luxuries, both wealthy and wealthy-pretenders). This symbolic boundary is used to reorder the social hierarchy and create status for oneself as a middle-class individual who achieves the American Dream.

This focus on both wealth and middle-class peers who spend "too much" reinforces the stability of identity and status between the boundary of the "comfortable" and the "middle class." Respondents' use of this boundary to distinguish themselves from middle-class peers shows that they emphasize rejection of keeping up with the Joneses. Using this boundary, they not only create stability given the downward mobility of some but given the increasing wealth of others. By maintaining a certain level of status and income, they defend themselves against the need to "catch up" to the increasing wealth of upper-class Americans. By doing so, they cast their middle-class peers who are big spenders as outside the American Dream, identifying a group of middle-class individuals who are somehow more true to the "comfortable" level of the American Dream than consumerist and greedy peers.

Respondents use the cultural narrative of the American Dream, which includes their belief in individual effort and hard work, and the resulting achievement of the "comfortable" middle-class lifestyle, to build symbolic boundaries which divide the middle class from both people in the lower-class and those in the upper-class. These boundaries function to maintain class status for middle-class Iowans, even while others around them lose income and wealth due to the economic downturn and as the wealthy maintain their income levels. With changing economic conditions and less income and job security than before, middle-class Iowans use the American Dream to prove their immunity from these forces while also explaining why these forces exist. They explain the economic failures as mostly a result of laziness or a dependence mentality, and explain the increasing wealth of the rich as unimportant to the American Dream and to morality.

Discussion/Conclusion

My research builds on past discussion of the American Dream by confirming its central tenets through qualitative interviews with Iowans. I argue that these respondents show how the American Dream today is still composed of the core cultural values of individualism and a belief in meritocracy. These values, crystallized in the American Dream, are used to discuss the importance of education, hard work, obtaining the middle-class "comfortable" lifestyle and the use of family to transmit these American cultural values. These values and their repetition across most interviews show the common cultural fabric of the American Dream that each individual draws from.

Relying on Lamont's exploration of "symbolic boundaries," I argue that the American Dream operates, then, as this common cultural narrative for the purposes of creating "symbolic boundaries" which are used to form an identity and maintain status. Drawing on the American Dream, middle-class Iowans describe themselves as harder working, independent and motivated than the lower class below them. By using this boundary, they are reconciling the values of the American Dream, namely its emphasis on America as a meritocracy, with the modern reality of downward mobility. Thus, these middle-class respondents are able to

claim that those who are in poverty, lacking economic resources, or those who have moved downward in income and class status are merely feeling the results of their own actions. The poor are cast as lazy and dependent; it is this laziness and dependence which justifies their lack of income and low status. The perceptions of laziness of the poor justifies their inequality relative to the middle class, while also providing comfort to the middle class that they are immune to economic forces that may render them poor or downwardly mobile.

Additionally, my research shows that Iowans create a symbolic boundary between themselves and upper-class individuals, which focuses on the “comfortable” income level and lifestyle. They define the wealthy as outside of the American Dream because they are “greedy” and want more than is necessary to have the American Dream, more than the necessities of food, housing, and health care. By using a boundary to separate themselves from the wealthy, middle-class Iowans secure their place as “comfortable” and thus achieving the American Dream, labeling the wealthy as outside of the Dream. This also means that members of the American middle class deny the significance of income inequality between themselves and the rich, as those who are wealthier lack the emphasis on “comfort” and morality and are instead construed as greedy. This allows the middle class to construct themselves as superior to the rich, even as the rich’s assets and income grow at a rate faster than the American middle class, as Frank and Perrucci and Wysong explain.^{14,22}

The use of symbolic boundaries based on the cultural narrative of the American Dream as I’ve described has the potential to impact public policy. Their use justifies inequality of the lower class relative to the middle class, as they are constructed as working less hard and thus being less deserving of the comfortable income and lifestyle of the American Dream. Thus, it is possible that such attitudes may be used to justify the elimination or decrease of social welfare programs which aim to provide a better standard of living to the poor. On the other hand, the boundary which separates the middle from the upper class seems to downplay the impact or importance of that inequality. This boundary leads the American middle class to believe that they do not want to be in a position of greater wealth, as such a position does not merit achievement of the American Dream. Therefore, with that boundary, inequality is downplayed or reinterpreted in a way that does not merit policy changes. It seems then, that by emphasizing the inequality between the middle class and the poor as justified, and the inequality between the middle class and the rich as insignificant or without impact, Americans can justify a “do-nothing” government, which, while cutting off aid to the poor, also does nothing to lessen the gap between the wealthy and the middle class.

This research of the American Dream is very specifically focused on middle-class individuals with families and who are mostly white. Further inquiry should examine how the lower class, especially given their own economic deprivation, rejects or accepts the American Dream, and if accepted, how that is justified with their own lived experience of downward mobility or static mobility and low income. Another focus may be on how race might alter the cultural narrative of the American Dream, both in its definition and its use. Additionally, gender is another component that could be explored, particularly how changing gender roles and sex discrimination in the workplace interacts with the American Dream.

In conclusion, these middle-class Iowans rely on the cultural values of individualism, and meritocracy to define the American Dream. In doing so, they describe their family as a necessary background for the achievement of the American Dream, as it becomes an institution where the values of education, self-motivation and hard work necessary to meritocracy are transmitted. Additionally, family becomes a location for the performance of the “comfortable” lifestyle that is the result of individual hard work in the American Dream. The American Dream, defined by these values, is used to create symbolic boundaries which separate these middle-class Iowans from both the lower and upper class. The American Dream is a tool for these respondents to acquire status and make meaning of other people, defining themselves as superior as and better than both the lower and upper class. This tool is not used without consequences, as it can affect policy making and thus, distribution of resources. By understanding the meaning Iowans make of the American Dream and the divisions between those who have this Dream and those who do not, researchers can understand the potential consequences in American culture and politics, particularly in public policy affecting the distribution of wealth.

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Movilizaciones 2011: Reflexiones para el caso de Chile y Estados Unidos

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English translation follows

Sin duda que el año recién pasado remeció las conciencias de muchos de nosotros. Varios pudimos ser protagonistas de las movilizaciones en nuestros países, pero también, acompañados de las ventajas de difusión e inmediatez que nos brindan las redes sociales virtuales, pudimos ser además testigos de innumerables movimientos sociales, en diversos países, que se manifestaban por distintas razones, y siempre adquiriendo un gran protagonismo social y político.

Fue tanta la masividad y protagonismo de estos movimientos sociales, que incluso la revista “The Times” escogió al “Manifestante” como el personaje del año. Y por ello también hoy, estudiantes de Chile y Estados Unidos, reflexionamos sobre las características de nuestros movimientos y sobre los alcances sociales y políticos que tuvieron o pueden adquirir poniendo atención tanto a las similitudes como a las diferencias. Pero entendiendo sobre todo que más allá de las particularidades de cada movimiento social y de los problemas específicos de cada país, el 2011 puso en evidencia que el modelo de desarrollo que llegó a implementarse de manera hegemónica en el mundo después de la guerra fría, comienza a presentar fisuras y es susceptible de recibir fuertes y masivas críticas.

En el caso de Chile, por ejemplo, la emergencia de los movimientos sociales se ha suscitado con una enorme rapidez, generando movimientos (todos diferentes entre sí) que no dejan de impresionar y que son reflejo de la apertura de un nuevo ciclo político y social. Desde la “guerra del gas” – levantamiento ciudadano hace aproximadamente un año en Punta Arenas, ciudad ubicada en la Patagonia chilena – los diversos movimientos sociales se han multiplicado, expresados en distintas formas, y con un contenido de fondo que ha sido cada vez más profundo en su crítica al modelo de desarrollo. Movimientos ambientalistas, por la vivienda, salud, de trabajadores del puerto (portuarios), estudiantiles, regionalistas, etc., todos marcaron la pauta del año recién pasado y comienzan a marcar la del que comienza.

Junto a la rapidez con que han emergido, se ha constituido un camino de maduración que resulta evidente en la profundidad y la amplitud de las demandas en torno a las que se organiza movimiento social. Se ha llegado a lograr en algunos casos la com-

prensión de que la demanda social no puede ser solo por temas específicos, puesto que el problema que nos aqueja es fruto del conjunto del modelo socioeconómico y político.

En relación con lo anterior, el ejemplo más claro es el del movimiento estudiantil del 2011, cuyas demandas implicaban cambios estructurales en el sistema educacional chileno. Nuestro reclamo no era – en términos directos – porque las becas fueran insuficientes o nuestros aranceles universitarios demasiado altos. Efectivamente son problemas que nos aquejan, pero en la práctica los comprendimos como reflejo de algo más, como la “punta del iceberg” de un problema mucho más profundo, que en realidad

corresponde al cómo está diseñado el sistema educacional chileno. Por eso fue que se promovieron transformaciones – como la Gratuidad en la educación pública – que en definitiva apuntaban a expulsar las lógicas del “sistema de mercado” del lugar central que ocupan hoy en nuestro sistema educacional. Es decir, nos movilizamos comprendiendo que la privatización de la educación y el rol subsidiario que asume el Estado – fenómenos que son parte de lo mismo – no han generado el desarrollo que se había prometido, sino que

por el contrario, han contribuido a forjar aún más diferencias en nuestra sociedad, generando una brecha gigantesca entre el tipo y calidad de educación que se recibe, según el origen social del estudiante.

La crítica que los estudiantes chilenos hacíamos al modelo de educación, significaba también una crítica al conjunto del modelo socioeconómico, ya que éste, actualmente, se caracteriza por la concesión de proyectos públicos a empresas privadas, el subsidio a la demanda, y la privatización de los servicios públicos, elementos que – sobre todo los últimos dos – encontramos muy presentes en nuestro actual sistema educacional. Lo que significa que cuando el año pasado nos movilizamos a favor de la educación pública, gratuita y de calidad, lo que hacíamos era también romper con algunas de las premisas básicas del actual modelo socioeconómico, ya que si éste se concentra en la entrega de subsidios a la demanda en educación y en la inversión privada dentro de la educación superior – universidades –, cuando nosotros nos movilizamos porque la educación pública sea gratuita y porque



“I would rather die than live in an unconscious society”

Photo by: Tomás Vasconcelo, La Universidad de Valparaíso—Taken in Valparaíso, Chile



Photo by: Brenna Reagan, University of Connecticut – Taken in New York, New York

se controle, desde el Estado, los proyectos privados en educación superior, estábamos –en el fondo– poniendo un freno a que el modelo educacional se siga desarrollando en concordancia con lo que plantea –en su conjunto– el actual modelo socioeconómico.

Asumiendo también, que no es sólo que ese supuesto de la mejoría en la calidad por la competencia privada no se corrobore en la realidad de nuestro sistema educacional, sino que además nos escandaliza que las personas que promueven dicho modelo, no sean capaces de reconocer que ni la educación, ni la salud, ni ningún servicio público concebido como derecho, puede acomodarse de manera mecánica a las leyes del mercado: Querer estudiar en una Universidad de calidad, no puede compararse con querer beber una “Coca-Cola” o comer un chocolate suizo. Y si así se entendiese, entonces no deberíamos sorprendernos porque el día de mañana siga existiendo una “educación para ricos” y otra “educación para pobres”. Tal cual como para el caso de un chocolate, quién tiene más dinero podrá tener la opción de comprar un chocolate más caro y de mejor calidad, y quién tiene menos dinero verá más limitada su opción de compra, teniendo que optar por un chocolate más barato que probablemente será de más baja calidad.

Junto a esa crítica latente que podemos develar en el movimiento estudiantil, identificamos también otra crítica de relevancia que se hace extensiva al resto de los movimientos surgidos en el último tiempo, y que tiene que ver tanto con el modelo político chileno como con la clase política que administra y detenta el poder.

Respecto a esta última, se observa una carencia de proyecto histórico relacionada –entre otras cosas– con dos fenómenos, por una parte la poca novedad económica que han introducido, dado que más bien se han enfocado en la instalación y perfeccionamiento del modelo económico que se inauguró en Chile durante la dictadura de Pinochet; y, por otra, el agotamiento del proyecto político de la “Transición”, es decir del ajuste político y social necesario tras el fin de la dictadura y la paulatina transformación hacia formas más democráticas de gobierno y Estado. Sin ambas cosas, sin “proyectos de país” que impulsan, la clase política comienza fácilmente a verse como un conjunto de personas más o menos ineficientes para resolver nuestros problemas; posiciones anquilosadas en el poder sin otro proyecto que su posicionamiento individual y el de sus partidos.

Lo anterior termina por reflejarse en consideraciones específicas respecto de la clase política y las instituciones que hegemonizan llegándose a observar – por ejemplo – en las encuestas de opinión pública que el Parlamento es una de las instituciones con menos respaldo por parte del pueblo chileno, al mismo tiempo que los partidos políticos presentan una muy baja aprobación por parte de la población.

Junto a la crítica sobre la clase política, se realiza también otra respecto al modelo político que se ha constituido en Chile, el cual se ha comenzado a mostrar estéril e incapaz de dar soluciones a las problemáticas que mueven hoy al pueblo chileno. Esto tiene que ver con que las bases del entramado institucional del Estado chileno se construyeron – en su mayor parte – hace casi 30 años durante la dictadura militar, por lo que se hace evidente que fueron pensadas para tal

periodo o en su defecto para el de “transición a la democracia”, y no para el Chile del presente.

Efectivamente desde la Dictadura se han establecido instituciones estables y duraderas, pero a lo que apuntamos acá es que la estabilidad institucional no dice nada respecto a la fertilidad política y pública que las instituciones tienen. Pueden haber estados e instituciones estables pero completamente estériles en términos sociopolíticos, como sucede actualmente en nuestro país donde se pueden observar instituciones que han permanecido constantes durante años, pero que no han sido capaces de asumir los cambios necesarios para estar de acorde a los nuevos tiempos, demostrando – cada vez mas – una creciente infertilidad.

Bajo esta lógica, el imaginario reivindicativo que sustenta la lucha social empieza a expandirse. Hoy el movimiento de Aysén, pueblo al sur de Chile de escasos treinta y cinco mil habitantes, ha generado un petitorio social que considera demandas que no son propias de un sólo gremio o de un sólo tema en específico, sino que abarcan una amplitud de temáticas y problemáticas sociales que develan que el conflicto no es algo puntual, sino algo sustancial, de fondo: de cómo hoy se construye Chile como país. Estamos frente a las puertas de un cambio de paradigma que nos presenta una sociedad que comienza a transitar hacia un camino que le permite entender que el problema es ulterior, sistémico, de modelo, pero que, a pesar de ello, aún no da el paso definitivo para comprender que por tanto la solución es transformadora, ya que pasa justamente por cambiar aquello que se sabe está mal construido: el modelo sociopolítico y económico de nuestro país.

La incipiente maduración del movimiento social, como se mencionó, se debe a la comprensión efectiva de una realidad desde una forma mucho más compleja, develando el fracaso de las diversas aristas de un sistema sociopolítico y económico que exhibía a Chile como la panacea sudamericana. Aquella ilusión se comienza a desmoronar por los diversos movimientos sociales que, cansados de la negligencia de la clase política, el abandono, el centralismo geopolítico (o sea de Santiago respecto al resto de las regiones del país), el “robo” de nuestras riquezas naturales por parte de las compañías extranjeras, los míseros sueldos, las promesas incumplidas, etc., realizan hoy una crítica profunda a las estructuras políticas, económicas y sociales.

Por otra parte, a diferencia de los movimientos que se originaron en España, Grecia o Estados Unidos, el movimiento social chileno no surge a partir de un contexto de crisis económica o de algún fenómeno similar asociado a un empeoramiento en las condiciones materiales de vida – incluso, como se dijo con anterioridad, lo hace en instancias de que a Chile se le miraba como el ejemplo a seguir en el resto de América Latina.

Es cierto que las condiciones de vida en nuestro país dejan mucho que desear, pero aun así, no nos comenzamos a movilizar porque nos faltara de manera generalizada la comida, el techo o el trabajo – por dar algunos ejemplos más característicos –, sino porque pareciera comenzar a sembrarse la idea de que tanto el modelo político como el modelo económico que la Alianza y la Concertación (los conglomerados de partidos políticos más grandes e influyentes del país) acordaron construir en nuestro país, no están diseñados para dar soluciones a las demandas y problemas del Chile de hoy.

Es en parte por eso que, lo que está latente en el movimiento social de Chile, no es un reclamo en contra de los excesos del capitalismo, sino más bien contra el modelo que se ha ido implementando en nuestro país desde hace 30 años aproximadamente. O sea, no es sólo que nos molesten las consecuencias excesivamente negativas del modelo neoliberal – o, como algunos dicen, las externalidades negativas que genera –, sino que, más importante aún, nos comienza a molestar un modelo de país que está mal diseñado. Modelo que siempre se nos ha querido presentar como exitoso, pero que en realidad – comenzamos a percatarnos – nunca ha permitido efectivamente el desarrollo social y económico de las mayorías, sino sólo el enriquecimiento de unas pocas familias.

Si Chile es considerado como el ejemplo del “éxito económico” para Sudamérica, Estados Unidos lo es para el mundo; o por lo menos, así lo concebimos nosotros. A pesar de la crisis económica, al caminar por las calles de cualquier ciudad estadounidense, sea ésta Nueva York, Los Ángeles, es probable que uno de tres transeúntes tengan en su mano su nuevo y reluciente iPhone, mientras sostienen un Frappuccino de Starbucks con la otra.

Cada año más de un millón de estudiantes se gradúan de excelentes universidades estadounidenses, quienes comienzan a trabajar o a levantar exitosas compañías, incluso de carácter filantrópico. Parece difícil pensar en una sociedad más justa e igualitaria, que ofrezca más oportunidades para el desarrollo de sus ciudadanos. Sin embargo, como consecuencia de la consciencia social generada por movimientos como Occupy Wall Street, la gente está empezando a enfrentar las grandes desigualdades que aquejan al “99%” de la población. De igual forma que los estudiantes chilenos se han hecho conscientes de la estrecha relación entre los problemas que enfrenta la educación pública y el modelo de desarrollo implemen-

tado en el país, en Estados Unidos hemos comenzado a observar las severas consecuencias negativas que son intrínsecas a una sociedad formada en el capitalismo.

El arancel de las universidades sube de forma exponencial, sean éstas privadas o públicas, provocando que el acceso a universidad sea cada vez más para una pequeña élite. Gran parte de la ciudadanía vive sin seguro de salud, sin embargo, cualquier intento por administrar la salud pública es asociado con un retroceso político cercano al “Susto Rojo”, como también a respuestas de índole sexistas. La educación pública y las tasas de graduación en muchos colegios urbanos, rurales y colegios en reservas indígenas, da vergüenza, teniendo en cuenta la calidad de la educación disponible de la que se privilegian muchas personas en EEUU.

En lo que toca a otros movimientos que emergen actualmente en Estados Unidos, es notoria la problemática que se genera en torno a la inmigración: en una nación que no solo se ha construido sobre ella, sino que prospera *a causa* de ella, discriminamos a quienes contribuyen y buscan a su vez el “sueño americano”, incluso a aquellos individuos a quienes se dirigen los “Dream Acts”, individuos que fueron llevados a Estados Unidos sin haberlo deseado necesariamente, siendo todavía niños. La deuda estudiantil ha llegado a USD\$ 1,000,000,000,000 y, mientras el gobierno subsidia la deuda de la banca, la administración política no hace nada para contribuir a subsanar los altos costos de la educación superior. Se siguen enviando a nuestras mujeres y hombres a luchar, a morir por una guerra absurda. Continúan las torturas a personas inocentes en Guantánamo. Los cuerpos y derechos reproductivos de mujeres son determinados por hombres viejos, las grandes corporaciones toman ventaja de los pobres, y frecuentemente estamos sujetos a discursos y medidas racistas, sexistas, y homofóbicas. Todos estos temas, junto con una plétora de otros, están haciendo que sea cada vez más difícil aceptar la sociedad de consumo, capitalista, y pasiva que ha definido a los Estados Unidos.



“I do not want chocolate or flowers... I want the power to choose my life!”
Photo by: Alvaro Benvenuto, La Universidad de Chile – Taken in Santiago, Chile

en los últimos años.

Los estudiantes y los recién graduados de las universidades estadounidenses, crecimos con adultos que constantemente nos recordaban que el mundo estaba lleno de oportunidades, que no había nada inalcanzable. Padres y profesores nos anunciaban una vida feliz y exitosa. Sin embargo estas mismas personas que nos prometían sueños, ahora nos los niegan, burlándose de nuestras deudas, nos llaman prostitutas por demandar anticonceptivos, considerándonos flojos por no encontrar trabajo. Dijeron que no podríamos vivir sin asistir a la universidad, la realidad señala que hoy la universidad no está al alcance de todos ni de todas. Aquellos que nos impulsaron a seguir nuestros sueños, como es para nosotros luchar por la justicia, son los mismos que hoy, cuando queremos empoderarnos y forjar con nuestras vidas un futuro propio, libre e independiente, olvidan todos los consejos y promesas que nos hicieron. Pareciera que lo que querían decir cuando nos decían que siguiésemos nuestros sueños no era más que consumir un discurso, aceptar un sistema, para luego consumir nuestra vida y nuestras almas trabajando en McDonalds. No sospecharon que podríamos desear algo más, que desearíamos luchar contra el capitalismo en vez de contribuir a su desarrollo; no sospecharon que nuestros sueños serían más grandes que una lata de Coca-Cola.

Las demandas del movimiento estudiantil, de la “Guerra del Gas”, y de los habitantes de Aysén difieren de las demandas de los movimientos de Occupy, las protestas en las universidades de California, o la lucha por la igualdad en matrimonio en Estados Unidos. Sin embargo, todos estos movimientos sociales son simi-

ares porque tratan de redefinir la sociedad, buscando cambios que permitan justicia e igualdad para los tiempos y los problemas que hoy nos aquejan. Las metas tienen que ver con hacer cambios profundos y estructurales al modelo capitalista, y para redefinir estos “servicios”, devolviéndoles su lugar como *derechos*, de modo que no puedan ya ser tratados como objetos de consumo. Como mencionamos anteriormente, los movimientos chilenos no son resultado de una crisis financiera como muchos de los movimientos en Estados Unidos. Desafortunadamente, nosotros necesitábamos un gran golpe a la economía para percibir las problemáticas ¿Acaso era necesario aquello para comenzar a luchar contra las desigualdades que enfrenten al “99%”? Creo que no, por lo pronto esta lucha estadounidense está comenzando. Con suerte esta lucha continuará y se hará más fuerte durante las próximas elecciones presidenciales del 2012.

El capitalismo global ha demostrado ser un sistema incapaz de garantizar una producción e implementación adecuada de una educación de calidad, de igual forma que ha fallado en la tarea de distribuir justamente la riqueza de acuerdo a las necesidades y el esfuerzo de cada individuo. Estos fracasos piden una acción fuerte del Estado, una acción que está siendo demandada por agrupaciones sociales en Chile, Estados Unidos y el resto del mundo. Los movimientos sociales a nivel global se están construyendo en diálogo unos con otros, aprendiendo de sus respectivas experiencias. Es por ello que la ineficiencia del actual modelo de “desarrollo ideal” se hace cada vez más evidente a nivel internacional, y cada vez más difícil de ignorar.

Social movements of 2011: Reflections on Chile and the United States

Without doubt the past year has shaken the consciousness of many of us. We have been protagonists in the protests in our respective countries and, together with the availability and immediacy that social networks have provided, we witnessed countless movements in innumerable countries. We have been fighting for diverse reasons but always with great social motives and a strong desire to live in a better country and a better world.

The social movements have been so massive and prominent that *Time* magazine has chosen “The Protester” as the person of the year, and it is not surprising that today students from Chile and the United States are reflecting on the characteristics of our social movements and on the social and political perspectives that they offer, and looking at both the similarities and differences. Beyond the specifics of every social movement and the problems of different countries, 2011 taught us a great lesson – that the model of development that was hegemonically implemented in the world after the Cold War has begun to crack and is now susceptible to mass criticism.

In the case of Chile, for example, the social movements have arisen very quickly, generating protests, all different from one another, that do not cease to impress and that reflect the beginning of a new social and political cycle. Since the “War of the Gas” citizen protests from one year ago in Punta Arenas, a city located in the Chilean Patagonia, the diverse social movements have been multiplying and manifesting themselves in different ways, every time becoming more critical of the model of development. Movements for the environment, housing, health, ports, mines, and students have all defined the struggles of the past year and have marked the



“I pay to study, I study to pay. I do not have a car, I do not have a house, and I still don't even have my degree and I already owe thousands. Quality education and healthcare now!”

Photo by: Kelly Peuquet, University of North Carolina at Chapel Hill— Taken in Santiago, Chile



Photo by: Abigail McDonald-Crook, Colorado State University – Taken in Denver, Colorado

changes that are coming.

In turn, this rapid emergence has been accompanied by a pathway of maturation which is evident in the depth and extent of the demands that mobilize the protests. People are coming to the understanding that the social demands are not only about specific issues but that the problems that afflict us are a part of the larger socioeconomic and political models.

The clearest example of this is the student movements of 2011 whose demands implied structural changes to the Chilean education system. Our demands were not – in direct terms – because our scholarships are insufficient or because our tuition is too high. Indeed these are issues that we face, but in practice we understood the issues to be a reflection of something larger, the “tip of the iceberg” of a much more profound problem, which in reality corresponds to the design of the Chilean education system. That is why we promoted changes – like that of free public education – which ultimately aimed to expel the logic of the “market system” which our education system is based around today. It is to say, we mobilize understanding that the privatization of education and the subsidiary role that the State assumes – phenomena which are part of the same – have not generated the development that they had promised us, but instead the exact opposite. They have contributed to forging even greater differences in our society, generating a huge gap between the type and quality of education that a person receives based on the social status of the student.

It is because of this that we believe that the criticism that the students have in regard to the education model also signified a critique of the

entire socioeconomic model – which is currently characterized by the provision of public projects by private companies, the subsidy demand, and the privatization of public services. The last two points are especially evident in our education system. This means that last year when we mobilized in favor of free and quality public education, we were also working to destroy some of the basic premises of our current socioeconomic model; since as of now it focuses on the supply of demand subsidy in education and private investment in higher education. When we mobilized for free public education and against the investments of private interests in higher education through the State, we were fundamentally putting the brake on the further development of an educational model in accordance with the current socioeconomic model.

It is not only that this supposed improvement in the quality due to private competition does not substantiate in the reality of our system of education, but it also deeply shocks us that the people who promote this model, are not able to realize that neither education nor health, nor any public services that should be designated as basic human rights, can be accommodated in a mechanical way in market laws. Wanting to study in a quality university cannot be compared to wanting to drink a Coca-Cola or to eat Swiss chocolate. If understood this way, it should

not surprise us that tomorrow there will continue existing an “education for the rich” and another “education for the poor”, because exactly as in the case with the chocolate, where the person with more money will have the option to buy a more expensive and higher-quality chocolate, and the person with less money will see their purchasing options limited, thus having to opt for the cheap, low-quality chocolate.

Along with this latent criticism that we can uncover through the student movements, we also identify yet another relevant criticism that extends to the rest of the social movements that have



“My father makes \$370/month, my tuition is \$378/month”

Photo by: Tomás Vasconcelo, La Universidad de Valparaíso— Taken in Valparaíso, Chile



“Social Justice.”

Photo by: Alvaro Benvenuto, University of Chile— Taken in Valparaíso, Chile

recently arisen which has as much to do with the Chilean political model as with the political class who administers and wields power.

One can observe a lack of historical project related to, among other things, two phenomena. The first being the lack of economic development, given that there has been a focus on the installation and perfection of an economic model that was introduced in Chile during the dictatorship of Pinochet. The second being the exhaustion of the political project of the “Transition”; the political and social adjustment that was necessary after the end of the dictatorship and the gradual shift toward more democratic forms of government and State. Without both of these things, without a “national project” to implement, the political class easily begins to be seen as a group of people more or less inefficient to solve our problems and ossified in power without any other project other than their own individual stance and that of their parties.

The above allows us to reflect upon the political class and the institutions that hegemonize; observing, for example, that in public opinion polls Parliament is viewed as an institution with little support from the Chilean people, and at the same time that the political parties also have a very low public approval rating.

Together with the criticism of the political class, there is even more criticism developing in respect to the political model that has been established in Chile which has begun to prove incapable of providing solutions for the issues that face the Chilean people today. This has to do with the foundations of the institutional framework that the Chilean State constructed for the most part almost 30 years ago during the military dictatorship. It is evident that they were intended for such a period, or in the absence of the “transition to democracy”, and not for today’s Chile.

Since the dictatorship there have been established and lasting institutions, but what we aim to point out is that the established institutions do not say anything in regard to the effectiveness of the politics and the public that the institutions have. States and institutions may be stable yet completely incompetent in sociopolitical terms which can be observed today in our country where you can see institutions that have remained constant for years but which have not been able to undergo the changes necessary for keeping up with the times, showing that they are increasingly incompetent.

Under this logic, the image of the assertiveness that sustains the social struggle has begun to expand; recently the mobilized

people of Aysén, a city in southern Chile of around 35,000 inhabitants, have presented a series of demands which are no longer specific to a single union or respond to a certain subject but instead encompass a wide range of themes and social problems which reveal that the conflict is not just ephemeral but more substantial. Essentially: the way in which Chile is constructed today as a country. We are at the gates of a paradigm shift that presents us with a society which begins to transit toward a road which allows the understanding that the problem is ulterior, systematic, endemic to the model, but that, nevertheless, still does not understand that the final step of the solution is the transformation of something which is poorly constructed: the socio-political and economic model of our country.

The incipient maturation of the social movements, as we have mentioned, has led to the effective comprehension of a reality of a much more complex form; revealing the failures of the various parts of a socio-political and economic system that has actually presented Chile as the epitome of South American development. This illusion is being destroyed by the various movements of the

people who are tired of neglect from the political class, the abandonment, the geopolitical centralization (Santiago in relation to the other regions of the country), the “robbery” of our riches by foreign companies, our meager salaries, the broken promises, etc. All of these issues result in today’s profound critique of the political structures, both economic and social.

On the other hand, different from the movements that originated in Spain, Greece, or the United States, the Chilean social movements are not a response to an economic crisis or some similar phenomenon associated with deteriorating living conditions. Additionally, as we mentioned before, they are surfacing at a time when Chile is looked to as an example to be followed by the rest of Latin America.

It is true that the conditions in our country leave much to be desired, but regardless, we have not begun to protest because we are lacking food, roofs, or work – to give a few examples – but instead because there is an idea growing that says that both the political model and the economic model used by *la Alianza* and *la Concertación* (the syndicates of the biggest and most influential political parties in the country) to construct our country are not designed to give solutions to the demands and problems of today’s Chile.

It is partially because of this that, what is embedded in the Chilean social movements, is not a complaint against the excesses of capitalism but instead against a model that has been implemented in our country for approximately the past 30 years. That is, we are not only bothered by the excessive negative consequences of the Neoliberal model – or as some say, the negative externalities that it generates – but even more importantly, we are beginning to realize that the entire model for our country is a poorly designed model. It is a model that they have always wanted to present to us as successful, but in reality – we are becoming aware – it has never allowed the majority to effectively develop socially and economically but only allowed the advancement of a few families.

If Chile is the “economic success story” of South America, the United States is the “economic success story of the world”; or at least we certainly think of ourselves that way. Despite the financial crisis, if you walk down the street in any city from New York to Los Angeles, probably one-third of the people that you pass will have their shiny new iPhone in one hand and a frappuccino from Starbucks in the other. With more than a million students gradu-

ating each year from excellent universities and going on to work for or start successful and – frequently even philanthropic – companies, it is actually difficult to imagine living in a more egalitarian society with even more opportunities for its citizens. However, thanks to the social consciousness brought about by movements such as Occupy Wall Street, the people are starting to realize the great inequalities that face “the 99%”. In the same way that the students of Chile are realizing that the problems facing their public education system are directly related to the country’s entire model of development, we are also realizing the negative and severe consequences of a capitalist-driven society.

University tuition is rising exponentially, and college, even at a public in-state university, is increasingly affordable only to the elite. Tens of millions of our citizens live without health insurance, yet any attempts to administer social medicine are met with extreme backlashes and even shockingly sexist responses such as Rush Limbaugh. The lack of support for public education and the resulting low graduation rates in many inner-city schools, rural schools, and schools on Native American reservations is tragic – especially considering the extremely high quality of education that is available and enjoyed by many in the United States.

To touch on a few more choice developing movements in the United States today: in a nation that was not only built on immigration but continues to prosper because of immigration, we discriminate against anyone wishing to contribute to and seek out the “American Dream” – even individuals such as those that “Dream Acts” are aimed at who were brought to the United States by no choice of their own as young children. Student debt has hit \$1,000,000,000,000, and while the government can afford to bail out banks, policy makers are doing nothing to help make the costs of higher education manageable. Our women and men are continuously sent to fight and die in endless wars, we torture innocent people in Guantanamo Bay, women’s bodies and reproductive rights are determined by men, big corporations exploit and take advantage of the poor, and we are frequently subject to racist/sexist/homophobic discourses and media. All of these issues combined with a plethora of others are making it increasingly difficult to accept the consumerist and capitalist society that has defined the United States in recent years.

Current students and recent graduates in the United States grew up being told that the world is full of opportunities for everyone and we could do anything; no dream was too big or unachievable. If we put our minds to it, we were told by parents and teachers, we could make a successful living just by going to college,

studying hard, and following our dreams. Yet the same society that promised that they would help us follow our dreams is now furiously denying them from us, mocking us for being in debt, calling us sluts for demanding birth control, deeming us lazy for not being able to find jobs. We were told that the only way we would succeed was by going to college, yet college is unaffordable. We were told that we should follow our dreams and fight for what is right – but when it comes down to it the same people who inspired us to dream big are not actually willing to support us in our quests. It seems that what they meant when they told us to follow our dreams was that we should not only buy into the system one Coca-Cola can after another but then aspire to work at the McDonald’s, selling sodas and our souls. They did not expect that what we would want was to fight capitalism, not continue it; that our dreams would be bigger than Coke cans.

The demands of the Chilean student movement, of the “War of the Gas”, and of the people of Aysén are different from the demands of the Occupy movements or the protests at the University of California in the United States. However, all of these social movements seek to construct a more egalitarian society. They seek to provide access to amenities that are available to only a percentage of citizens in our respective countries. Our goals have to do with making profound structural changes to an oppressive capitalist system – to provide more funding and support for public services like health and education and to redefine these services so they are no longer bought and sold like commodities.

As previously mentioned, the Chilean movements are not the result of a financial crisis as many the movements in the United States are. Unfortunately, it did take a huge blow to the US economy to see and start fighting against the inequalities that face the “99%”, and our fight is only starting. Hopefully this fight will continue and grow stronger during the upcoming 2012 presidential elections.

Global capitalism has failed to adequately and justly produce and distribute quality education, and, relatedly, has failed to adequately distribute income according to individuals’ needs and efforts. These failures necessitate strong government action – action that we see being demanded by social groups in Chile, the United States, and elsewhere around the globe. The social movements around the globe are undeniably building off of one another, and more importantly, we are learning from one another. Thus, the social ineffectiveness that the current model of “ideal development” presents is becoming increasingly clearer on a global scale and harder to ignore.



“Students on a hunger strike: 37 days without eating”
Photo by: Tyanna Slobe, Colorado State University – Taken in Santiago, Chile

What is radical art? A comparison of Brecht's Epic Theatre with Soviet Socialist Realism

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I posit that radical art is that which deliberately increases the likelihood of radical modes of analysis; increases questioning of current political, economic, and social conditions; and consequently increases the likelihood of radical actions to bring about change. In this article I will demonstrate that Socialist Realism is not radical art, but instead a form of conservative propaganda – especially in the context of Soviet Russia. In that context it is conservative as it attempts to neutralize resistance against the powers that be. On the contrary, Bertolt Brecht's concept of Epic Theatre, as depicted in his "A Short Organum for the Theatre", is radical as it seeks to create critical audiences who question aspects of society – specifically the presence of Capitalism. The conclusions that the audience reaches by themselves may lead to radical actions. Georg Lukács is an important figure in this discussion both for his critique of modernism and his separate defence of realism. Lukács highlights some problems with Epic Theatre but, as I will demonstrate, these can be overcome. Lukács' defence of realism is ultimately unsound and, I argue, Socialist Realism should be rejected as conservative propaganda. I conclude that Brecht's Epic Theatre is radical art.

Firstly, I must clarify what I mean by radical art. Radical art is that which encourages us to question the current dominant ideology, such as Capitalism or Leninism, and thus increases the likelihood of significant political and ethical change. Radical art increases the likelihood of radical thoughts or modes of analysis and, consequently, radical actions. Radical art provokes debate and alters how we discuss issues of politics, economics and ethical conduct. However, radical art only allows for significant and rapid change but does not necessarily guarantee it. My concept of "radical" is partly the negation of "conservative". For my purposes here, conservatism can be understood as an attitude or disposition against change and in favour of stability. At its most active it can allow for gradual reform, as exemplified by Edmund Burke (1729-1797), who advocated "not blind resistance to change, but rather a prudent willingness to 'change in order to conserve'".¹ Conservative art maintains our current modes of analysis in that we are not encouraged to question underlying or prevailing ideologies and social structures. Within this definition of radical art there is no necessity for it to be realist in form or content contrary to Lukács, as I will demonstrate.

To increase the likelihood of radical actions art must provoke the reader (i.e. the audience) into contemplation about some element of the real world. In doing so it allows or encourages the reader to conclude that said aspect of the world is contrary to their interests or moral codes and practices. Allowing the reader to reach their own conclusion, in turn, engrains that conclusion into their day to day thoughts and actions. A simple passive acceptance of an ideologically loaded piece of art will not result in comparable levels of engagement or commitment to the cause advocated by the artwork. Instead of this passivity the reader must be critically active and engaged with the piece and must be allowed to reach her own conclusions. Radical art is thus thought-provoking rather than thought-directing, and the conclusions are ambiguous rather than transparent.

I intend to make clear now that Socialist Realism creates a passive, unquestioning audience resulting in a conservative rather than radical response. Primarily, my argument focuses on Socialist Realism in post-1917 Soviet Russia. However, the criticisms are applicable in part to Socialist Realism in the wider context. The term is accredited, questionably, to Stalin by his hagiographers.² Socialist Realism became the only state approved artistic form in 1932 when the several artistic and literary organizations were disbanded following the Decree on the Reconstruction of Literary and Artistic Organizations from the Central Committee of the All-Union Communist Party.³ The term was first expanded theoretically by Stalin's cultural commissar Andrei Zhdanov in his "speech to the Congress of Soviet Writers".⁴

Socialist Realism aimed "to educate workers in the spirit of Communism".² Aleksandr Gerasimov, a key figure in Socialist Realism, defined it as "an art realist in form and socialist in content".² Socialist Realism "aims at a truthful reflection of reality" combined with advancing the cause of Socialism.⁵ Three main features are apparent in Socialist Realist art. Firstly, Capitalism was portrayed as exploitative. Secondly, the Bolshevik revolution, its leaders, and the subsequent Socialist political movement are shown as glorious. Thirdly, the working class is shown as noble, happy,



A. Gerasimov, *Lenin on the Tribune*, 1930⁸



V. Malagis, *Steel Workers*, 1950⁷

and well-off under Socialism. These features were all intended to educate the reader about the benefits of Socialism and the harshness of Capitalism. Indeed, Zhdanov set as a goal “the ideological remoulding and education of the toiling people in the spirit of socialism”.⁴ Thus Socialist Realism was an instrumental art form, with a clear purpose.

Lukács writes “the perspective of Socialist Realism is, of course, the struggle for Socialism” and that this perspective “enables the writer to see society and history for what they are”.⁵ Both the greatness of Socialist society and the advantages of such a viewpoint are unquestioned in Socialist Realism. Zhdanov writes that Soviet “literature is impregnated with enthusiasm and the spirit of heroic deeds. It is optimistic.”⁴ Along similar lines, Vladimir Kemenov, Deputy Minister of Culture of the USSR in the 1950s, describes Socialist Realism as “ideologically forward-looking”.⁶ Socialist Realism is portrayed as a useful way of bringing about socialism. It is an instrument that guides the people “along the true path indicated by the genius of Stalin”.⁶ Thus, it is a teleologically-orientated artistic style. By including a conclusion in the work the audience need not draw their own. They become passive recipients of the conclusions and thus cease to be active and critical.

This brings me to criticisms of Socialist Realism. I intend to show that it is deeply conservative rather than radical on the basis of my definition of radical art above. Chronology is a critical factor to my argument. Socialist Realism came 15 years after the Bolshevik revolution. Showing Capitalism as bad and Socialism as good cannot result in the population revolting against Capitalism for that has already been achieved. Instead, as I argue, Socialist Realism aims to keep things as they are. To this end I shall go through each of the three features of Socialist Realism, as expressed above, in turn.

Works showing the exploitation of the worker under capitalism include Malagis’ *Steel Workers*.⁷

Referring to the portrayal of Capitalism, Kemenov writes that Socialist Realism portrays “profound sympathy for that part of humanity living under the Capital-

ist system, a system which cripples and degrades men”.⁶ The aim of art “is to liberate the toilers” and to free the workers “from the yoke of Capitalist slavery”.⁴ But this portrayal of Capitalism comes after the revolution when the workers are no longer under that system of exploitation. Rather than inspiring radical action against Capitalism, Socialist Realism is attempting to entrench anti-Capitalist leanings to decrease the chances of a return to Capitalism.

The second feature of Socialist Realism is its glorification of the revolution and Party figures. A famous example is Gerasimov’s *Lenin on the Tribune*.⁸

Painted after Lenin’s death, Gerasimov literally gives Lenin an aura. It shows him as heroic - part of the revolutionary crowd but always above it. Similar hero worship encourages obedience of the hierarchies in place. This works to create a homogenous population in awe of its leaders who passively and unthinkingly accept the new dominant ideology of Socialism. Once again Socialist Realism is conservative rather than radical.

The portrayal of the working class in Socialist Realism is exemplified in the Ukrainian artist T. S. Naumova’s *Celebration*.⁹

The working class is shown as happy, well-fed, and well-off under Socialism. They are well clothed and possess material goods; for example, the bicycle in the foreground. It depicts a society that is working well; one which the subject should be happy to live in. Therefore, it attempts to discourage efforts to destabilise the status quo.

In all of these ways, Socialist Realist art aims to create homogeneity. This uniformity under the “fraudulent” iconography is unthinking and uncritical of society as it is.² The audience are not engaged or active and thus Socialist Realism is not radical art.

The “realism” of Socialist Realism can be doubted as well. Herbert Marcuse argues that Socialist Realism shows things which never take place and avoids showing things which are real but are inconvenient to its telos.¹⁰ He continues by saying “it is a realism that conceals, that hides what reality actually is” in the sense that



T. S. Naumova, *Celebration*, 1950s⁹

portrayal of “the dark, tragic side of human life” is to be avoided in Socialist Realism.^{10,11} Another criticism of the “realism” comes from Brecht in “Popularity and Realism.” He writes that “reality changes; in order to represent it, modes of representation must also change.”¹² If realist art stays the same, even if it was representative in the beginning, it would cease to be so after some time. What is real is continually changing and so realist art must do so also. Brecht writes: “If we wish to have a living and combative literature, which is fully engaged with reality and fully grasps reality... we must keep step with the rapid development of reality.”¹² At best, Socialist Realism shows an outdated and unrepresentative portion of reality. At worst it fails to show reality at all. The motivation behind this cynical manipulation of reality is arguably to strengthen the conservative effect of the works.

Socialist Realism, then, takes a number of opportunities to be conservative rather than radical. For example, Socialist Realism prescribes conclusions to the audience: thereby making them passive receivers of the dominant ideology instead of encouraging them to question it. Socialist Realism might fundamentally encourage criticism of Capitalism, but its predilection for prescribing conclusions means that it never creates an active audience which makes the ideas their own. Therefore, it never creates active and deeply committed critics of Capitalism. The impact of Socialist Realism in Soviet Russia was propagandistic and the impact outside of the Soviet context was weak. Socialist Realism is not radical art.

I move now to Brecht’s Epic Theatre. For Epic Theatre Brecht brought together a number of aesthetic practices already used in theatres by other writers and directors including Erwin Piscator and Vladimir Mayakovsky. Brecht gathered various techniques together and popularized them through his own works, including *The Good Person of Szechwan* (completed in 1943). Epic Theatre was in part a rejection of realism which had become popular towards the end of the 19th century. Realism had remained popular during the first half of the 20th century not least through the efforts of Constantin Stanislavski and Vladimir Nemirovich-Danchenko who together had created the Moscow Art Theatre which drove forward a new naturalist and realist aesthetic.¹³ Epic Theatre aims to create an audience which thinks critically and reaches its own conclusions. Whereas Socialist Realism tells you exactly what to think about something, Epic Theatre merely encourages you to think. In this regard, Epic Theatre is also making a more modest claim to knowledge than the Socialist Realists. Under Socialism the vanguard elite directs the people to “the truth”. Epic Theatre does not arrogantly profess to know “truth” but encourages the audience to create their own. With Epic Theatre, conclusions are reached through much more democratic and dialogical methods than in the hierarchical Socialist imposition of a fixed and spoon-fed conclusion. In agreement, Roland Barthes says that Epic Theatre encourages the spectator to ask “what is to be done in such a situation?”¹⁴ The way in which this was achieved was through “alienation effects.”¹⁵

Brecht writes, “A representation that alienates is one which allows us to recognize its subject, but at the same time makes it seem unfamiliar.”¹⁵ The unfamiliarity to which Brecht refers makes the play seem less smooth to the audience, which in turn gives opportunities for the audience to think. By breaking from familiar staging and acting techniques, Brecht highlights various social issues and conventions of bourgeois theatre. He writes, “Who mistrusts what he is used to?” in an attempt to make us question what we normally do not, such as the underlying ideology of a piece of art. He also encourages us to ask why it might be that we normally do not question that.¹⁵

Brecht’s above reference to alienation can cause confusion here and so it needs some exploration. It is useful to consider it as alienation from the comfortable conventions of theatre. We are stopped – alienated – from falling into the emotionality and drama of the play by various techniques, such as breaking the fourth wall. Alienation effects compel the subject to consider the social and political causes of situations. The difficulties the characters face are understood as “made” rather than as “fate” and this “encourages the spectators of Brecht’s plays to take the matter of political change directly into their own hands.”² This, therefore, is radical art.

The actor has an important role in creating alienation effects. “At no moment must he go so far as to be wholly transformed into the character played. The verdict: ‘he didn’t act Lear, he was Lear’ would be an annihilating blow to him.”¹⁵ The point Brecht is making is that the audience must be aware that the actor is at all times an actor. To this end he has the same actor play several roles.¹⁵ The audience must not empathise with the characters, as Walter Benjamin writes, “Instead of identifying with the characters, the audience should be... astonished at the circumstances under which they function.”¹⁶ This astonishment will lead the audience to question their own circumstances and how they function within them.

The entire production, not just the actor, is aimed at creating the alienation effect. Brecht does not use atmospheric music or highly believable set design so as to discourage the audience from being absorbed into the drama and away from their role as critical subjects.¹⁵ Also, “the episodes must not succeed one another indistinguishably but must give us a chance to interpose our judgement.”¹⁵ Brecht gives us opportunities to think, to reach our conclusions, and attempts to limit our chances of being passive.

Brechtian theatre is also radical in the way it portrays the role of human agency in rectifying a situation. Two clear examples of this can be found in *The Good Person of Szechwan*. The courtroom scene ends with Shen Teh crying to the gods “I need you terribly! ... Help!”¹⁷ In the prologue, the following dialogue takes place:

Wang: ... We all know that Kwan province has suffered from floods for years.

The Second God: Oh? And why is that?

Wang: Because they are not god-fearing people, I suppose.

The Second God: Rubbish. Because they didn’t look after the dam properly.¹⁷

Again, the point is being made that the answer to human problems is human action. Instead of pacifying the audience with prescribed conclusions, Epic Theatre not only tells us to think for ourselves it also tells us that it is our own action that can bring about change. Epic Theatre currently fits the criteria of radical art. I turn now to its critics to see if it holds up to inspection.

At times Brecht struggles between making his works enjoyable and maintaining alienation effects. He acknowledges that “from the first it has been the theatre’s business to entertain people.”¹⁵ It is hard, for example, not to engage with the character of Shen Teh at some point in her difficult struggles and the audience might slip into passivity. Thus some of its radical impact is lost. Alternately, we may find ourselves more actively engaged if we do feel sympathy for the characters. It might serve to create an emotional provocation which would in turn encourage radical consequences. Getting the balance between emotional connection and estrangement is difficult; some emotional connection may make for a more radical artwork but too much would leave us passive. As mentioned above with regards to atmospheric music and believable staging, Brecht does take important steps to reduce the likelihood of the

audience becoming passive recipients. This combined with a reasonable but minimal emotional connection with Shen Teh might create highly radical audiences.

Here I turn to Lukács and his selection of criticisms of modernism and its ability to bring about change. Given that “there is every reason to consider Brecht a theatrical modernist”, Lukács’ arguments are likely to be of relevance here and thus worth greater consideration.¹⁸ Firstly, I must demonstrate the basis of Lukács’ criticisms. Lukács was deeply critical of Capitalism and Capitalist ideology. This ideology, namely the bourgeois ideology, was fully accepted by the worker; The proletariat’s natural “values, beliefs and ideas were subdued by Capitalism”.¹⁹ Lukács did not claim it was a “false consciousness” in the traditional sense of Marx and Engels, but rather a “true consciousness for a false situation”.²⁰ This false situation is sustained by the dominant bourgeois ideology: composed of property rights and class-antagonism between employer and employee, which reifies people.²⁰ But, for Lukács, this can be changed. The significance of Lukács’ *History and Class Consciousness* is its (Hegelian) assurance that through knowing society we can change it. Subjects produce culture which in turn forms society, according to Lukács. Society and culture are thus man-made, so the subject – the human being – should be able to consciously manage it. This determinism of subject-to-culture-to-society allows for the revolutionary subject to alter society by first changing culture, including art in all its forms. Lukács was not so much aiming at the creation of a specific alternative (such as classless society), but was primarily concerned with showing the possibility of an alternative to the unsatisfactory Capitalist, class-based society.¹⁹ This aim, to reveal and dissolve the Capitalist ideology, brought Lukács into conflict with modernism. Lukács, drawing on the few texts by Marx and Engels on realism, saw realism, not modernism, as the only artistic practice capable of disrupting the system by which Capitalism spreads its bourgeois consciousness and ideology.

Modernism, with its focus on subjective experience over objective totality, causes a “retreat from social engagement”.²² Modernism, contends Lukács, is pessimistic. He cites the example of Gregor Samsa in Kafka’s *Metamorphosis*.²³ Sascha Bru writes that Samsa’s “irrational transformation from man to insect, expressed only a part (the particular) within the totality (the universal)”.¹⁹ Instead of looking at the cause of the angst of his period, Kafka mystifies it. Kafka gives no suggestion of how to overcome it. Lukács writes that “Kafka is the classic example of the modern writer at the mercy of a blind and panic-stricken angst”.²³ Lukács does, however, acknowledge that this modern angst-ridden vision of existence actually undercuts bourgeois ideology. However, it fails to “frame or visualise this vision in a larger social constellation”.¹⁹ The same cannot be said for Brecht, who applies the angst of modern existence to our place within capitalism and forces the audience to question that form of existence. Though Lukács may be correct about some modernism, his criticism cannot be applied to Epic Theatre which does attempt to question the pervasive bourgeois ideology by revealing and interrupting it.

Lukács makes further criticisms of modernism. For him, it “reflects social and historical realities – though in a distorted, and distorting, fashion”.⁵ Lukács’s adherence to realism makes him indiscriminately critical of all that is not realism. However, from the perspective of radical art, in Brecht the distortions of reality, through alienation effects, add to its radical power; including its power to reveal bourgeois ideology which Lukács himself supports as a goal of art. Lukács’s point certainly fails to do damage to the view of Epic Theatre as radical art. Brecht achieves far greater criticism of reality by disregarding realist and naturalist aesthetics

than he otherwise might. In effect, there is no need to accurately portray reality in order to condemn it or change it. Brecht correctly recognises this. For example, in *The Good Person of Szechwan*, the presence of gods and their search for a good person, though clearly not a realist device or realistic premise, stands to reveal the difficulties facing those living under capitalism of acting ethically towards others. If restricted to realism and naturalism, Brecht would have been unable to reveal such aspects of reality in his plays. When applied to Brecht’s theory and practice Lukács’s criticisms of modernism are misguided.

Lukács makes a further point; The characters are “mere spokesmen” through which Brecht imposes his ‘intellectual schemata’.⁵ Lukács, it seems, is criticising Brecht for imposing conclusions on the reader. However, as I have already discussed, the audience is given significant opportunity to draw their own conclusions and to think for themselves. And yet it is Brecht who frames the areas for discussion and decides which issues the audience should consider. The audience do reach their own conclusions, but it is Brecht himself who chooses which issues they think about. Lukács’s criticism is not entirely unfounded. However, Lukács’s criticism only applies to Brecht’s practice, not his theory. And even with this concession, using the above definition of radical art we can still consider Epic Theatre to be radical art despite this flaw as the audience are engaged and active as a result of Epic Theatre.

The final criticism made against Brecht is that his audiences are predominantly bourgeois. This is explicitly not his intention. He writes, “Our representations of human social life are designed for river-dwellers, fruit farmers, builders of vehicles and upturners of society, whom we invite into our theatre”.¹⁵ The problem is that the theatre is a traditionally bourgeois medium. It takes time and usually costs money. Furthermore in Brecht’s plays a lot is asked of the audience, regardless of Benjamin’s claim that the audience will be relaxed and able to follow “the action without strain”.¹⁶ Working class people may not be able to afford the time or money and might not have the energy to participate in Brecht’s plays. This criticism stands.

However, for art to be radical it need not necessarily engage the working class. Lukács claims that “the proletariat fought capitalism by forcing bourgeois society into a self-knowledge which would inevitably make that society appear problematic to itself”.²⁰ He acknowledges that self-awareness in the bourgeois society is a powerful, radical instrument of anti-capitalism. But is it necessary for the proletariat to bring about this self-knowledge? I contend that it is possible for the bourgeoisie to be radicalised against capitalism. In *The Good Person of Szechwan* it is not just the poor who are suffering under capitalism. The rich, also insecure in their wealth, so often choose not to do good deeds for fear of ending in penury. Indeed, the character of Shui Ta is created to protect Shen Teh’s wealth from slipping away through kind deeds to those in need and to aggressive creditors such as the carpenter.¹⁷ The point I am making, though conceding to the criticism above, is that the bourgeois audience of Brecht has something to gain from radical action against capitalism also. Thus they are a susceptible audience to radical art, i.e. they are also encouraged to draw radical conclusions about the state of society. Opposing this claim, one could argue that making the current dominant class the agents of radical change might end in a reassertion of current hierarchies. This reassertion of the status quo is not a radical change and I accept this criticism. However, this is only a possibility, not a guaranteed outcome of dominant classes responding to radical art.

To summarise: I have argued that radical art is that which creates active, critical, and socially aware audiences thereby resulting in an increased likelihood of radical action. Radical art is not

necessarily linked to an accurate portrayal of suffering under capitalism or the benefits of socialism. I have shown that Socialist Realism aims to create passive, unthinking audiences that accept the three main features of Socialist Realism: the horrors of capitalism, the wonders of socialism, and the heroic and glorious nature of Soviet leaders. On the contrary, Epic Theatre provides the audience with questions, not conclusions, and this creates critically active and socially aware members of society. Thus I conclude that Epic Theatre is radical art and Socialist Realism is conservative.

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Does *The Garden of Eden* overturn Hemingway's canon?

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The question of whether or not *The Garden of Eden* is a novel wherein Hemingway explores new topics and challenging concepts established in his other work is a critically controversial one. Certainly the 1986 text published by Scribner's seems to do so; Hemingway's characteristic realism is pushed to new levels, particularly in detailing the possibilities of both individual sexuality and eroticism. Robert E. Fleming, in an essay entitled "Hemingway's Late Fiction: Breaking New Ground", asserts that the book "adds... new dimensions to the Hemingway canon."¹ The plot of "the published version of *The Garden of Eden*"² (as critic Thomas Strychaz refers to the book, for clarity) centres on the relationship of a newly married couple, David and Catherine Bourne. Catherine begins to experiment sexually with David; in bed, she deems herself a boy and him a girl, "Don't call me girl... I'm Peter. You're my wonderful Catherine.... I'm going to make love to you forever."³ She continues in her experimentation by attempting to make them both appear exactly the same, notably in their hairstyles; they both have their hair bleached and cropped. Her character is the driving force behind this experimentation, as is evidenced in the dialogue where David gets his hair cut:

"Please make it the same as mine," Catherine said.
"But shorter," David said.
"No. Please just the same."
.... "Aren't you going to let him lighten it?"
"No... you really want it that much? ... Go ahead and do it."⁴

Catherine then introduces another woman into their relationship, Marita, beginning a *ménage à trois* that gradually destroys their marriage and ebbs away at Catherine's sanity. Throughout this, David, a writer, is attempting to concentrate on his short fiction. In *A Moveable Feast*, writing about his time spent with two women, (his first wife Hadley Richardson and second Pauline Pfeiffer) Hemingway notes that "to really love two women at the same time, truly love them, is the most destructive and terrible thing that can happen to a man when the unmarried one decides to marry."⁵ Whether it is Marita who decides to marry David is unclear, but *Garden* certainly seems to present an impossible situation in the *ménage à trois*. They cannot exist easily as a three, and the novel arguably becomes the story of Marita and David struggling to become a couple. Near the close of the novel, with this goal completed, they refer to themselves as being figuratively married, "Are we the Bournes?" asks Marita. "Sure, says David, 'we're the Bournes."⁶

This story, the plot of the published *Garden*, may certainly be described as what John Updike in his review, "The Sinister Sex," called "a fresh slant on the old magic," "add[ing] to the canon not merely another volume but a new reading of Hemingway's sensibility."⁷ The editor of the work, Tom Jenks, stated that he saw in the manuscript "Hemingway's desire to take on his own myth without, however, destroying or relinquishing it."⁸ This certainly seems to be what the text, standing alone, presents to the reader; a Hemingway conscious of his own canon, "risk[ing] writing about sexually taboo subjects...because this risk carries the possibility

of breaking into new aesthetic territory and reaching a deeper level of truth."⁹ This corresponds with a statement attributed to Hemingway in Carlos Baker's acclaimed biography, *The Writer as Artist*: "for a true writer each book should be a new beginning where he tries again for something that is beyond attainment. He should always try for something that has never been done or that others have tried or failed."¹⁰ A question seems to be raised, then, of the extent to which *Garden* calls us to revise our understanding of Hemingway's body of work. Exactly how much "new ground" is broken in *Garden*, that necessitates a "new reading of Hemingway's sensibility?" When the novel emerged in 1986, was fresh light shed on the canon, or was it overturned?

The problem critically presented to us, of course, is the extent to which *Garden* may be said to be included in the canon at all. The novel was published 25 years after Hemingway's death, and is edited very heavily by Jenks. The manuscript Jenks worked from is described by various critics as being either "1500"¹¹ to "over two thousand" pages long¹²; regardless, "approximately 130,000 words"¹³ have been cut from the text, as well as the manuscript itself being "patche[d] and rearrange[d]."¹⁴ The quotation of Fleming cited above stating that "new dimensions" are added to the Hemingway canon by *Garden* is, in its original context, qualified by a preceding clause noting that the published book is "incomplete...in relation to the entire manuscript."¹⁵ Three major characters, and their entire storyline, are excised from the novel, as is a roughly drafted "provisional ending." The original—fairly grand in scale—plot apparently "revolved around two sexual triangles composed of three artistic men, the wives of two of these men, and an unattached woman."¹⁶ The 1986 Scribner's *Garden* is, of course, seemingly much more modest in scope than this.

If the published *Garden* were Hemingway's final draft, and not Jenks', then to accept unquestioningly, as Updike does, that the book "add[s] to the canon" as well as challenging and advancing existing, classically Hemingwayan ideas within it, would arguably be the only option available to critics. As it exists, however, the novel is the source of much disagreement, specifically regarding if it fulfils (to use Jenks' term) Hemingway's "vision."¹⁷ Having analysed the original manuscript, Debra A. Modellmog states that "[she] can confirm...that there is a kind of truth behind Jenks' statement that the publisher's note is generally accurate."¹⁸ The publisher's note states, "in every significant respect the work is all the author's." Analysing the same manuscript as Modellmog, however, Robert E. Fleming flatly states, "in handling the ending of the novel, Jenks departed radically from Hemingway's express intentions."¹⁸ Fleming claims that "Jenks altered the novel so that it runs counter to the pattern of tragedy Hemingway had been preparing....Hemingway had very deliberately been constructing a tragic novel."¹⁹ Disregarding whether or not one agrees with Fleming's statement, the stark difference between the two critical opinions demonstrates that not only is there scholarly disagreement over the issue, but confronted with the large, unfinished manuscript contrasting with the novel published in 1986, consensus regarding the fulfilment of authorial intentions (which, when considering a text's place in the canon of the author, must be taken

into account) is arguably unobtainable. The biographer, Michael S. Reynolds, even argues that the manuscript was “nearing its final length” and “had the conclusion in sight,”²⁰ contradictory to the generally shared view that the work was victim to what Updike terms “the Papaesque logorrhoea:” “the fatal dependency upon free-form spillage and some eventual editor,”²⁷ and Fleming’s assertion that there are in fact many endings present in the manuscript.

It is important to assert that there is much of note within the published *Garden*—particularly because, in its extant form, much of the novel seems to demonstrate Hemingway exploring the validity of tropes and ideas that are arguably steadfast and perhaps assumed as certainties in his other works; the active, masculine hero, for example, or the significance of the male being defeated, or even the morality of big game hunting. Upon first consideration *Garden* appears to be an examination of his own canon on Hemingway’s part. The critical conflict regarding the extent that *Garden* may be said to be a Hemingway novel is significant as for the most part, agreement has been reached that it marks a departure for Hemingway—that he evaluates his canon and then goes somewhere new with it. This is significant if it is Hemingway’s doing; not so if it is Jenks’, who, in an interview with *New York* magazine, admitted to trying “to take on everything people had pinned on him, his work, and his image,” creating a “new, sensitive Hemingway.”²¹ Moddelmog argues, “Jenks’ *Garden* is a reading of Hemingway’s *Garden* based on the popular, commodified Hemingway and his work.”²² This, however, is not necessarily so. A close reading of the published *Garden* seems to suggest more than anything that Hemingway was writing from the same perspective that his other works come from, but that he was presenting it in a new and interesting way: “a fresh slant on the old magic.”²⁷

Also problematic in Moddelmog’s argument here is that the sensibilities of the ‘popular’ Hemingway persona are arguably entirely at odds with those of *Garden*. *The Inward Terrain* is a book-length Freudian biography of Hemingway, published in 1968. In the preface, its author offers a critical description of what the Hemingway persona signified in the late sixties (the purpose being to then try to “debunk... [this] publicized image”²³ where Hemingway has not, in the ensuing psychoanalysis of the book): “the bronzed god of the moderns, the big, strong, romping fighter, soldier, sportsman, lover, drinker”²⁴—it goes on. He also notes that the persona itself is seemingly of Hemingway’s creation, “[he] himself invited us to believe it... the relentless publicity, and those countless news photos he permitted ... suggests a straining to keep [the image] alive.”²³ A 1996 essay by Rena Sanderson, “Hemingway and Gender History,” contextualises this view of the author’s persona: “public displays’ of Hemingway’s led to ‘Papa Hemingway’ [being] synonymous with a stereotypical notion of masculinity.”²⁵ Since the rise of feminist criticism and Hemingway’s canon being attacked, and then, subsequently re-evaluated, “sensitivity to gender issues” and possible “unresolved androgynous inclinations”²⁶ have been found in Hemingway’s work. The ‘popular’ Hemingway persona Moddelmog argues for is irreconcilable with the androgyne themes in *Garden*. In fact, Sanderson argues that criticism has somewhat destroyed the “bronzed god” Hovey decries and replaced it with a “new Hemingway.” (However disparate the “new Hemingway” may be from the writer’s “fame as a man [that]...hangs over...his work”²⁵ still in the public eye.)

A line from the story-within-a-story that David writes in *Garden*, “fuck elephant hunting,”²⁷ arguably epitomises this “fresh slant on the old magic.”²⁷ Updike saw fit to comment in his review that “an uncharacteristic ambivalence is... expressed about hunting.”²⁸ It certainly seems that “ambivalence” is expressed toward

hunting in *Garden*, yet, arguably, this is not the case, as a consideration of the philosophies expressed regarding hunting in this text alongside others in Hemingway’s body of work prove.

The story details his experiences as a young boy on an elephant hunt with his father; his father’s African hunting guide, Juma; and his dog, Kibo. Throughout the work, David becomes disillusioned with his father and finds an affinity with the elephant, feeling incredibly guilty that he has aided his father and Juma in killing the elephant. “David thought... [that] Juma would not have found him if I had not seen him... why didn’t you help the elephant while you could?”²⁷ At this point David flatly says, “fuck elephant hunting” to his father; his father replies with “Be careful you don’t fuck it up,” and David reflects that “he will never trust [him] again.”²⁹

The fact that the African episodes are part of a text within a text is especially significant because it marked considerable progression in the use of metafictional devices in Hemingway’s work, giving further example of *Garden* being a text wherein Hemingway advances his canon.³⁰ Stories regarding Nick Adams’ later life show him to be a writer, and the protagonist of “The Snows of Kilimanjaro” is one, too. *Green Hills of Africa*, though a nonfiction work, discusses fiction theory at length; no work prior to *Garden*, however, makes use of metafictional conceits to so great an extent.

The particular significance comes from this narrative device placing further distance between the reader and the story; they perceive not only the events of the hunting expedition, but also the writer creating them, and are therefore being reminded that they are reading a text that is being written and constructed. The reader is therefore placed in a position where they are forced to be more critically aware. It is here that Hemingway makes a very bold and at first perplexing (as Updike found it) statement of theme, “fuck elephant hunting.”²⁷ Hunting may be argued to a defining trope of Hemingway’s: it is widely known that he enjoyed big game hunting himself, and it is treated with respect, perhaps reverence, in *Green Hills of Africa*, and short stories, “The Short Happy Life of Francis Macomber” and “The Snows of Kilimanjaro.” The young son’s loss of respect for his father is also seemingly at odds with the sentiments of the Nick Adams stories Hemingway was acclaimed for, such as “Indian Camp,” “Ten Indians,” or “Fathers and Sons.” In the latter, Nick realizes his father’s infallibility, but his respect for the man is still unquestionable. Within its meta-textual context, the act itself of writing “fuck elephant hunting” seems to be a bold move on Hemingway’s part. The reader is not only aware of David Bourne writing the statement, but is sufficiently distanced from the main narrative so that they are aware of Hemingway writing it too; and for Hemingway to write “fuck... hunting” appears on its surface to the reader as Hemingway seemingly refuting what he once celebrated. One could also argue that in writing this bold statement and then attributing it to one of his fictional characters, that Hemingway was able to simultaneously write things that were interesting and expectation-defying, and also be able to distance himself from it personally; his image therefore easily separated from his works.

A statement from Patrick Hemingway in a 1986 *New York* magazine interview (chiefly conducted with Jenks, regarding *Garden*’s publication) elucidates what Hemingway may in actuality be achieving in the passage. “It may come as a surprise, but Hemingway never shot an elephant... he thought it wrong—he felt that elephants are our equals.”²¹ The “ambivalence” expressed toward hunting in the novel, then, is in no way “uncharacteristic”—it in fact corresponds exactly with Hemingway’s own beliefs. However, it crucially *appears to be* uncharacteristic. The “fuck elephant hunting” passage arguably serves as a metaphor for what

Hemingway promulgates throughout the whole of *Garden*: ideas and themes that are present in much of his other works, that on their surface seem to be new and distinct from what critics identify as being typically Hemingwayan, when analysed, correspond with Hemingway's actual beliefs. Updike is fundamentally incorrect, then, when he says that "ambivalence towards hunting" is present in *Garden*; ambivalence toward elephant hunting is, something Hemingway considered entirely different. The philosophy being expressed here is arguably one present since Hemingway's early fiction: that of only taking life responsibly and intelligently, and doing things correctly (one may consider Nick Adams wetting his hands before handling the fish he lets go in "Big Two-Hearted River," for example.) While Jenks' statement, quoted above, that he saw in the *Garden* manuscript Hemingway's "desire to take on his own myth without... destroying... it," may seem to be relatively dubious coming from one who admits "not approach[ing] *Garden*..." as a scholar,¹⁷ who "hadn't read a Hemingway novel in years [and]... didn't review the Hemingway canon before he started."³¹ One is tempted to read Jenks' statement as him hedging his bets in case he had created a novel unrecognisable as Hemingway's. It seems that there is in fact truth in the fact that Hemingway was indeed challenging his own tropes and scrutinising his own philosophies in *Garden*, playing with the expectations of the reader.

Also, perhaps of note when regarding the published *Garden*'s status as a progressive Hemingway text, is the role the word "fuck" plays—in both the statement "fuck elephant hunting," and in its use throughout the novel. The swearwords that Hemingway included in his drafts were edited out of his final, published works, as words such as "fuck" were unpublishable at the time. Memorably, *For Whom the Bell Tolls*, is filled with such faintly absurd lines as "go and obscenity thyself."³² Due to the more relaxed publishing environment afforded by 1986, *Garden* is able to fulfill Hemingway's original drafts to a fuller extent, allowing a level of realism his works had not been able to achieve up until that point. While it cannot be argued that this new device has been added to the canon because of a stylistic choice of Hemingway's, its presence in the published novel perhaps demonstrates effort on the part of Jenks to advance Hemingway's body of work in a direction the author wished. The authorial intention of "trying again"¹⁰ is also fulfilled.

Notably, the novel utilizes a preconception of Hemingway's canon that he protested in his lifetime, but persists even in modern perceptions—that of equating Hemingway's heroes as being a thinly veiled version of Hemingway himself.

There is strong evidence for the persistence of this myth with particular relation to *Garden* in the aforementioned *New York* article; it suggests that "like all Hemingway heroes, David Bourne resembles his creator."³³ *Garden*'s 2008 film adaptation, *Hemingway's Garden of Eden*, goes to great effort to make the David character clearly resemble Hemingway—the hair and moustache are particularly alike. Also in the film, David writes standing, which sources claim Hemingway did, but which the published *Garden* makes no mention of.³⁴ A book of criticism published in 1969, Delbert E. Wylder's *Hemingway's Heroes*, shows that the criticism of his works that was being published while Hemingway was still alive followed very closely the "attitude expressed by Granville Hicks in 1935—that from Hemingway's [work]... 'there emerges... the Hemingway hero, whose story is... the story of Hemingway's life.'³⁵ "Linking Hemingway with his fictional heroes has been part of Hemingway criticism for many years,"³⁶ writes Wylder (he provides many examples apart from Hicks in his introduction), despite Hemingway's "objection to biographical criticism." Biog-

raphies by Carlos Baker and, more recently, Michael S. Reynolds, have well established the legitimacy of the distinction between Hemingway's life and his fiction.³⁷ *Hemingway's Heroes* exists as an early critical reaction in this vein, and therefore provides a useful tool in seeing what was perceived as needing to be overthrown in early Hemingway criticism—"unfortunate"³⁶ perceptions of his canon from near the time of its creation. What Wylder saw fit to challenge gives us an insight into what Hemingway may be challenging in *Garden*. One of the things Wylder reiterates having tried to achieve in the book is "[trying] to demonstrate... that the protagonists are distinctly different characters,"³⁸ an original critical standpoint at the time (but one that firmly embedded in the critical consciousness, a reaction against the equally persistent public perception of the Hemingway hero). In *Papa Hemingway*, Hotchner recounts Hemingway's reaction to his protagonists being not commonly perceived as being "distinctly different." The author supposedly rhetorically asked himself, "Mr. Hemingway, do you give credence to the theory of a recurring hero in all of your works? Answer: Does Yogi Berra have a grooved swing?"³⁹

The idea that the protagonist of a Hemingway novel must be both a Hemingway stand-in and the same as in all of his other works is *deliberately overturned* in *Garden*, in the character of David Bourne. There is no ambiguity regarding whether or not David is one of a long line of recurring heroes—he is noticeably different, something new entirely in outlook. Updike notes in his review that usually he finds Hemingway to be "hobbled by his need to have a hero in the obsolete sense, a central male figure who always acts right and looks good.... David Bourne, as initially presented, is an oddity, an inwardly vulnerable Hemingway hero."⁷ Updike's assertion that Hemingway's heroes always act right and look good is inaccurate, as a consideration of the latter's earlier fiction may prove: stories such as "Cat in the Rain," "Hills Like White Elephants," or in particular, "Soldier's Home" are notably lacking in the "obsolete" heroics of a Robert Jordan or Frederick Henry. In terms of being inwardly vulnerable, David Bourne is not an oddity; this is one aspect in which he shares some commonality with other Hemingway heroes. Jake Barnes' injuries are both physical and psychological, to give an example; it is also arguable that Robert Jordan's falling in love with Maria serves to make him vulnerable, possibly hindering him in performing his work correctly. In contrast with the protagonists of many of Hemingway's previous long-form works, however, David has not literally performed acts of heroism in war, which serves as the most obvious break from tradition in terms of protagonist choice. *Garden* uses this difference to explore another recurring element in Hemingwayan protagonists and further expand upon a theme already present in the canon: that of being undefeated.

Hotchner relates that at the heart of *The Old Man and the Sea*, Hemingway thought there to be "the oldest *double dicho*"⁴⁰ he knew. A *double dicho* is explained as a "saying that makes a statement forward or backward," however, it is clarified in the text that he only accepted one half of the statement, and not its inversion. Hemingway's *dicho* is, "man can be destroyed but not defeated." *The Old Man and the Sea* does in fact seem to be a fable of man struggling against defeat, and tragically meeting it at the end, "it is easy when you are beaten, he thought... 'They beat me, Manolin,' he said. 'They truly beat me.'⁴¹ Whether Santiago is in fact defeated or just destroyed as a man, is debatable. He perfectly followed the "codes," as Wylder terms them, of masculinity—his particular codes arguably being managing his skiff and fighting the marlin intelligently, but the equation of a tragic end being met when the tropes of manhood the character perceives as making up their

own identities as men is destroyed, is seemingly part of the philosophy of Hemingway's novels. This theme is present in *A Farewell to Arms* when Frederick Henry's masculinity is useless against the "dirty trick"⁴² of death, leaving him hopeless in the rain, and in *For Whom The Bell Tolls*, in which Robert Jordan meets death, but follows his instinct throughout the novel and fulfills what he set out to do (thereby making him undefeated). Perhaps the reason that Updike saw *Garden* as not being "hobbled" by an "obsolete" heroic protagonist is that David Bourne seems to be the continuation of this part of Hemingway's ideology—a natural, logical advance, in accordance with previous novels. David is both destroyed (sexually as a man, as Catherine demands he become a girl) and defeated at the end of the book's first chapter. The tropes that make up his masculinity are defeated, and so he destructs—to Catherine, he no longer exists as a man. This is not a subversion of a theme Hemingway thought valid to explore in his other canonical works; rather, it seems an extension of it.

"Don't call me girl,"⁴³ says David near the end of the first chapter, when Catherine first imposes her will on him. However, by the end of the chapter he has capitulated in forsaking his masculinity—at least as it has previously been understood in Hemingway's novels. Throughout the novel there are moments where David seems utterly dominated by Catherine, and not only in a sexual sense. "The hell with you too,"⁴³ David says in an argument with Catherine about Marita in the novel's 17th chapter—a classically stoic, masculine Hemingwayan outburst when considered as an individual statement. Catherine's reaction, however, throws the efficacy and validity of not only the outburst in itself, but also the mindset that could produce such an outburst into question: "That's good. Now you're reacting better. I like you when you are more careless. Kiss me goodbye."⁴³ Catherine appears to critically analyse his statement and then dismiss it. After three sentences, the mood shifts from declarative to imperative. Shortly afterwards in the conversation, she makes David admit that he likes her, and then cuts him with a line far more penetrating than "the hell with you too": "you aren't very hard to corrupt and you're an awful lot of fun to corrupt." In Fleming's "The Endings of Hemingway's *The Garden of Eden*," he compares "Jake Barnes's bitterly ironic reply... Frederic Henry's solitary walk... Robert Jordan's preparations for death"⁴⁴ and so on, to the "optimism" of *Garden*'s ending. Fleming does not take into account that what is recognisable as a particularly Hemingwayan tragic ending, especially to the perceptions of his canon at the time Hemingway was writing *Garden*, is present at the end of the first chapter: "At the end they were both dead and empty... 'Let's lie very still and quiet and hold each other and not think at all,' he said and his heart said goodbye Catherine goodbye my lovely girl goodbye and good luck and goodbye."⁴³ The similarity to Henry saying goodbye to Catherine Barkley as if she were a "statue,"⁴⁵ with Catherine being tragically unaware of the goodbye, does not seem insignificant. *Garden* addresses Hemingway's canonical themes, but pushes further ahead, trying for "something that is beyond attainment." A man is destroyed and defeated, but what happens to him then? This seems to be, to quote the tricky publisher's note, "in every significant respect... the author's."⁴⁶ That Hemingway makes David a writer, and uses this to explore the process of writing throughout the novel, seems to be a further level of the challenge Hemingway proffers to those reading the text with the protagonist as a consistent author-insert. In an almost hyperbolic fashion, Hemingway provides what may be lazily identified as the closest character to himself (in terms of profession) that he had yet written, while juxtaposing this with the novel that

its editor describes in an interview (and Sanderson describes separately in an essay⁴⁷) as displaying "a new... Hemingway."²¹ Updike's description might be the most accurate, "a fresh slant on the old magic,"⁷ or the use of new methods to make alien what readers may mistakenly identify as classically Hemingwayan statements; a coarse dismissal of elephant hunting being one of them.

Debra A. Modellmog interestingly notes that since *Garden*'s publication in 1986, an "extensive reevaluation, perhaps the most extensive ever undertaken in the world of literary scholarship"⁴⁸ has been undertaken regarding the construction of Hemingway's identity—*Garden* being generally seen as a "departure...in his writing...from traditional codes of masculinity and heterosexuality." However, the very fact that this is a "reevaluation" (her essay is titled "Reconstructing Hemingway") denotes that *Garden* is not an overturning of the Hemingway canon, but rather, the expression of themes already present in other works. She cites Susan F. Beegel's "Introduction" to *Hemingway's Neglected Short Fiction: New Perspectives*, reiterating Beegel's point that "the weight of a novel"⁴⁹ was necessary in order for attention to be drawn to otherwise neglected themes in Hemingway. The "themes of... perversion, and androgyny [are] present throughout Hemingway's career in short stories like 'Mr. and Mrs. Elliot'...[and] 'The Sea Change'...widely available for at least 50 years."⁵⁰ The *ménage à trois* was not new ground for Hemingway, neither was lesbianism.

In Modellmog's book, *Reading Desire: In Pursuit of Ernest Hemingway*, Modellmog argues that Jenks "organized his version of Hemingway's story in accord with the popular image of Hemingway, thus creating a book that the public could imagine Hemingway would write."⁵¹ There is evidence to the contrary, however. It seems that Jenks is in actuality the editor of a novel that makes Hemingway seem entirely different to his "popular image," regardless of all evidence discrediting this image that had existed for 50 years. In Jenks' *New York* interview, where he is not attempting to defend the scholarly validity of the work, as he is in other published interviews and is simply trying to sell the book to the public, Jenks makes bold claims regarding *Garden*. In editing it, he tried "to take on everything people had pinned on him, his work, and his image."²¹ It is explicitly stated that "he hadn't read a Hemingway novel in years. He didn't review the Hemingway canon before he started... 'I thought it'd gum me up,' said Jenks."⁵³ Jenks describes the fluid sexuality of the novel as being distinctly "modern," "not Michael Jackson, but almost."⁵³ The journalist who authors the piece gives some hint as to why this may be the case—Scribner's were apparently becoming increasingly reliant on their back catalogue of Hemingway classics, their new fiction being less popular. A "modern," "new, sensitive"²¹ Hemingway novel was, as the article emphasises, "highly saleable....a good read and an even better business proposition."⁵²

The published *Garden*, it seems, arguably had much to gain from overturning the Hemingway canon. And yet, this is not what is presented in the novel at all. Even when edited to accentuate features that one would not readily identify with a Hemingway text in accordance with common understanding, (the experimental androgyny, for example) the ideology behind the writing and themes explored firmly cement the work in the canon. What is in fact overturned in *Garden* is Hemingway's other great work: the "Papa Hemingway" persona, product of "performance and... public displays."²⁵ The published *Garden* arguably marks the first time that the "new Hemingway"⁴⁹ that many critics have accepted since his "extensive reevaluation,"⁵⁰ has been exposed to the public, and the old "bronzed god" of chauvinism and masculinity that makes

up Hemingway's public image has been fully challenged in a non-academic setting. The newness of this allows the reader to perceive deep, essential themes in an entirely new way. Updike's "old magic"⁷ is reconsidered. While what is original in the piece gives it the ability to surprise, the inclusion of Hemingway's recurrent ideologies and themes then remind the reader of *Garden's* place in Hemingway's body of works as a whole. The sentence may shock on the first read—but Hemingway never shot an elephant.

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Edziban naa! Dzi dzi (It is food, eat it!)

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The most invigorating part of experiencing a new culture comes when one adapts a perspective similar to that of a young child. Not in the sense of regression, but the pure wide-eyed wonderment accompanying new environmental sights, sounds, tastes, and smells. Through this, an enhanced perspective will unveil itself as our viewpoint is often dulled in the security of our own society. I was given the privilege of spending two months in Ghana, West Africa, living and learning the art of Ghanaian cuisine from a beautiful Adele woman whom I referred to as Mama Esther.

The Adele tribe populates the Northern Volta region of Ghana where I was located for the duration of my stay, more specifically in the District Capital of Nkwanta. A popular staple dish for the Adele consists of fufu and light soup, which is eaten daily. From the standpoint of a Westerner, the consumption of this seemingly uncooked dough ball and eating soup with one's fingers feels worlds away from the comfort of mom's homemade chicken noodle soup, eaten with a spoon and sourdough bread. An adventurous eater by nature, I found it was an exciting opportunity to put aside everything I knew to be true about soup. I learned as a child would through observations and questions, which expanded my world view



Nkwanta outdoor market. Photo by: Julia Mallon.



Nkwanta outdoor market. Photo by: Julia Mallon.

and taste palate to include one of my new favorite foods – fufu.

The main market day in Nkwanta is on Mondays. People from all over the town and surrounding villages come to sell, buy, bargain, eat, and most importantly, socialize. As I accompanied Mama Esther to the market, we stopped and greeted each friend we saw along the way. Ghanaians do not greet with a simple, “Hey, how are you?” in passing as Westerners often do. They take their time greeting through an extensive dialogue inquiring into all aspects of life. It was on these walks to the market where I met many of Mama Esther’s friends; and though they were from various tribes, they all welcomed me generously with familial titles such as Sister or Auntie. The time Ghanaians take to develop relationships, whether acquaintance, friend, or an outsider such as myself, is admirable and a reflection of their culturally innate hospitality. It is believed that their actions not only represent themselves but their family and tribe as well. This unspoken system of accountability held by tribal sentiments consequently results in a safe and highly moral culture.

When we first reached the outdoor market in the heart of town, I noticed it was segregated into different culinary sections for the purpose of organization



Gloria and Mama Esther pounding fufu with a mortar and pestle.
Photo by: Julia Mallon.

and ease of purchasing. To me, it seemed every stall overflowed with new exotic foods that were just flush with culinary possibilities; I could hardly contain my excitement. The produce section is a natural mosaic with an expansive spread displaying every color on the spectrum; the meat is so fresh it is cut right off the animal, a true custom cut for every customer. We stopped at several different vendors to compare prices and quality before purchasing yams, plantains, dried tilapia, tomato paste, onions, and various spices – while, of course, greeting friends and acquaintances along the way.

After visiting the market for about two hours, it was time to head home and start cooking dinner. We began by boiling the yams and plantains for about twenty minutes until they were soft. We then placed the boiled items into a large wooden mortar and pounded the starchy mass with a long pestle. During this process in the southern regions of Ghana, one person typically pounds the mixture while another is seated next to the mortar, turning the mixture in between strokes. In the northern region, however, it is commonplace for two people to pound the mixture in an alternating rhythmic motion. It will be pounded until a smooth and sticky, yet firm, consistency is reached. I quickly found that the soothing easy rhythm of pounding fufu was slightly deceiving; when it was my turn to pound I realized how much upper body strength was required. Since my endurance slowed after a mere few minutes, the children squealed with amusement as they were passed the

pestle to continue pounding which left me drained but thoroughly impressed with their strength.

Concurrent to preparing fufu, the light soup is also made. Water, tomato paste, dried tilapia, and spices such as salt, pepper, curry, and chili powder are slowly simmered together until the fufu is fully prepared. There are various types of soup that fufu can accompany besides fish such as goat meat, chicken, vegetables, and groundnut (peanut) soup. The “light” fish soup indicates a broth base where these other soups contain a higher viscosity. When the smell of our fish soup began to make my mouth water, I knew dinner was close to being served.

We ladled our soup over the ball of fufu and I immediately began to eat, not realizing that I was eating the dish all wrong. As my Ghanaian family stifled their laughter, Mama Esther explained that the first rule of eating fufu is there are no spoons allowed. She told me to eat the food with my right hand by pulling off a piece of fufu from the side to eat first since it had been marinating in the soup for the longest amount of time. I was surprised to find that much of the soup was absorbed in the fufu, yet it remained a firm consistency and was not soggy. Mama Esther continued to instruct that one does not chew as the fufu piece is put into the mouth, but swallowed whole since the flavor is in the absorbed soup and not in the yam/plantain mixture. The surprised (and probably slightly mortified) look on my face sent us both into hysterical laughter, followed with questions such as, “What if I choke?” and, “Is it safe to stick my fingers in this burning hot soup?”

I was assured that no one has ever died from choking on fufu and my fingers would get used to the hot temperature eventually.



Enjoying fufu and light fish soup. Photo by: Julia Mallon.

Even though I was still a little skeptical, I decided to do what every child does when learning something new – I jumped in without hesitation. The second I swallowed my first proper bite, my senses came alive. The warm feeling in my stomach from the still hot soup, the spice lingering in the back of my throat, the feeling of soft fufu in my fingers – I could not get enough! After discovering my new favorite dish, Mama Esther smiled from ear to ear like a proud mother. From that day on, I ate fufu regularly with the family. Each time I ate my plate clean, she would say, “Now I know you love me, you are a true Ghanaian now!” She would then pat my belly, relishing in the fact that I enjoyed her culture. After about a month of observing my host family preparing meals and then slowly assisting, I cooked a whole Ghanaian dish by myself with the oversight of my mentor. I was beaming with excitement as Mama Esther clapped in approval upon sampling my creation.

That small gesture of acceptance meant I had successfully set aside my own cultural preconceptions and used observation, questions, and my senses to learn and value the culture of my Ghanaian family. I used the comfort of something familiar, food, as a medium to adjust to my new and unfamiliar surroundings. Through the highly prevalent social aspect of Ghanaian cuisine, I was able to form a strong bond of love and understanding with Mama Esther, my new friends, and my host family that overcame any language barriers or cultural differences; for that lesson alone, I am eternally grateful.



Nkwanta outdoor market 7/11/2011. Photo by: Julia Mallon.



Children in Nkwanta loving the camera. Photo by: Julia Mallon.

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The Oval at Colorado State University
Photo by: Jeffrey Dale



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