

SLU Fellowship Proposal – Sample 1

THE EFFECTS OF WHITE NOSE SYNDROME (*Geomyces destructans*) ON THE
RELATIVE ABUNDANCE OF NINE SPECIES OF BATS FOUND IN DIFFERENT
HABITATS OF ST. LAWRENCE COUNTY

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Abstract

Since the discovery of White Nose Syndrome in 2006, bat populations throughout the northeastern United States have been decimated. White Nose Syndrome is fungal pathogen *Geomyces destructans* and it is linked to thousands of bat deaths in the past four years. In order to comprehend the gravity of the destruction caused by White Nosed Syndrome it is important to collect data on the relative abundance of the different bat species throughout the country. Unfortunately prior to the discovery of White Nose Syndrome very little effort was made to monitor certain populations of bats. This is especially true in St. Lawrence County and the Adirondack foothills. There are nine species of bats found in St. Lawrence County and the Adirondack foothills. Of these nine species one species, the Indiana bat (*Myotis sodalis*) is of tremendous concern as this bat species is endangered in New York State as well as the entire United States. The small footed bat (*Myotis leibii*) is also a species of special concern in New York. All of the nine species of bats found in New York State play important ecological roles as pest control agents, consuming large quantities of insects each evening. Loss of any one of these bat species would be a major ecological tragedy. The purpose of this study is to use an ultrasonic bat detector to gain insight into the relative abundance of each of the nine species of bats found

in St. Lawrence County and the Adirondack foothills. Ultrasonic detection provides an economic way to determine bat abundance over a wide range of habitats in a short amount of time. The data collected in this study will be important in future studies determining how the bat populations of St. Lawrence County and the Adirondack foothills have been affected by disease.

Introduction

Currently there are nine species of evening bats residing in New York State. These species include the Big Brown Bat (*Eptesicus fuscus*), Little Brown Bat (*Myotis lucifugus*), Keen's Bat (*Myotis kenii*), Indiana Bat (*Myotis sodalis*), Small-footed Bat (*Myotis leibii*), Silver Haired Bat (*Lasionycteris noctivagans*), Eastern Pipistrelle (*Pipistrellus subflavus*), Red Bat (*Lasiurus borealis*), and the Hoary Bat (*Lasiurus cinereus*) (Kays and Wilson 2002). The Indiana Bat is currently endangered in both New York State and the United States and the Small Footed Bat is a species of special concern. All of the species of bats in New York State are microchiropterans and members of the family Vespertilionidae. Vespertilionids play an important ecological role because the majority of their diet is composed of insects. In fact bats are the only predators of night flying insects. Many of the insects evening bats consume are considered nuisance species by humans, for example mosquitoes. In fact one bat can consume up to 1,000 mosquitoes in an hour (Harvey et. al 1999). Therefore stable bat populations are important to the ecosystems of not only New York State, but the entire Northeastern United States where most of the aforementioned species play similar ecological roles.

Unfortunately today the bats of New York State and the Northeastern United States are threatened by the fungal pathogen *Geomyces destructans*, commonly known as White Nose Syndrome, or WNS. White Nose Syndrome was first documented on February 16, 2006 at

Howes Cave 52km west of Albany, NY when a caver photographed several bats with a suspicious white substance on their muzzles (Blehert et. al 2008). The caver also noticed several dead bats on the cave floor. In 2007 the NYSDEC became aware of several hundred dead bats in various caves, bats behaving erratically, and bats with white noses. Today the death toll of northeastern Vespertilionids is unprecedented. Hundreds of thousands of bats have died since the initial discovery of white nose syndrome in 2006. The US Fish and Wildlife service has collectively found sick, dying, and dead bats in hibernacula in ten states (Figure 1). In some of these hibernacula 90 to 100 percent of the bats are dying (USFWS 2010).

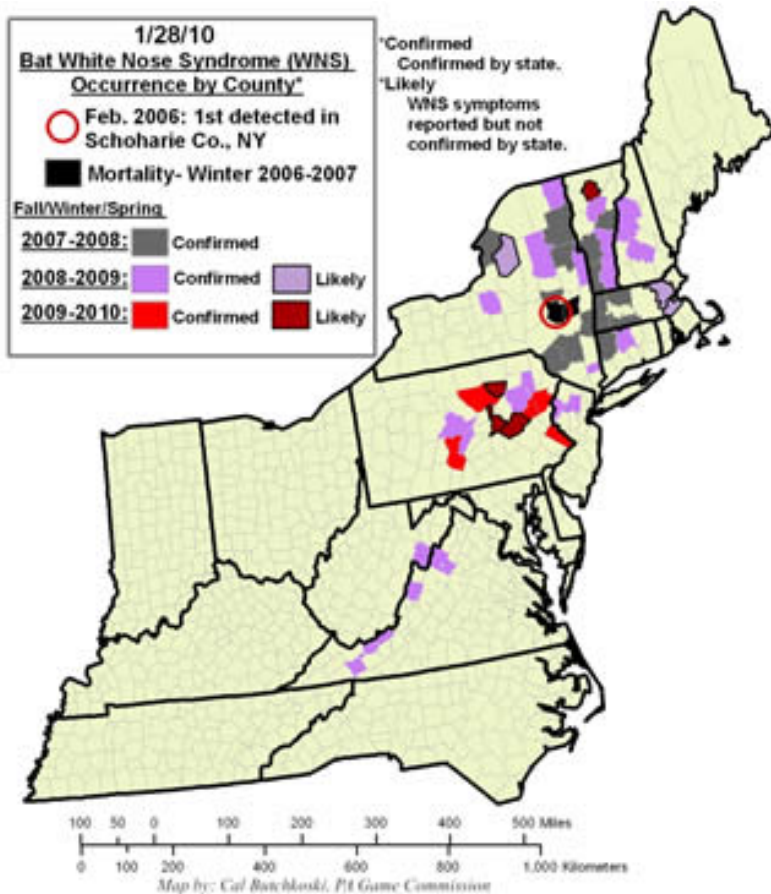


Figure 1. Occurrences of WNS in the northeastern US since 2006 (USFWS 2010).

WNS is characterized as an ailment of hibernating bats. WNS was named for the appearance of white fungal growth around the muzzles, ears, and wing membranes of afflicted bats (Blehert et. al 2008). Bats exhibiting WNS may also have low body fat, fly during the day, and reside in cold parts of hibernacula (USFWS 2010). Bats are especially vulnerable to fungal infection because hibernation takes place in large groups in hibernacula. Inside the hibernacula it is easy for fungal spores to spread from one animal to the next. Biologists at both state and federal levels have been working since the discovery of WNS to determine the specific cause of death in affected bats, however the definite cause is not yet known. One hypothesis is that over the winter bats lose their fat reserves due to the fungal infection, causing the bats to rouse from hibernation too early and die (USFWS 2009). However there may be multiple undetermined causes of bat mortality related to WNS.

The purpose of my study is to determine the abundance of individual bats left in the populations of the nine species of bats found in St. Lawrence County and the Adirondack foothills. This study is important because to date there has been little study of the bat populations of northern New York. The status of the summer bat populations in northern New York is therefore unknown. Baseline information about these bat population numbers is crucial to determining the affect of WNS on the summer bat populations of northern New York. WNS has shown to be a fast acting killer; therefore it is of utmost importance to maintain records of bat population numbers. In a survey of 23 caves in 2009, 18 of which were in New York State, researchers found an alarming 91 percent decline in the number of hibernating bats (NYSDEC 2009). It is estimated that the Little Brown bat has declined by an average of 93 percent, an alarming decline as Little Brown bats make up about 85 percent of all of the bats in the Northeast (NYSDEC 2009). It is also estimated that the endangered Indiana bat has declined by 53 percent

in numbers (NYSDEC 2009). These numbers reflect only some of the devastation caused by WNS. My study will be an important first step in determining the status of bat populations in the St. Lawrence County and the Adirondack foothills. By gaining information on the condition of Adirondack bat populations, more information will be available to the scientific community so that measures may be taken to preserve these bats.

Theory and Hypotheses

The summer months provide an optimal opportunity to survey the populations of bats in St. Lawrence County. At dusk the 9 species of bats in St. Lawrence County depart their daytime roosts to forage throughout the night. Insectivorous bats use echolocation to detect, locate, and discriminate prey. The majority of these bats use a frequency modulated (FM) signal that sweeps from high to low frequency. These frequency modulated calls provide the bat with information regarding prey location, size, and shape (Barclay et. al 1994). Other bats also use constant frequency (CF) calls to detect fluttering prey set against a stationary background (Barclay et. al 1994). Different species of bats may be identified by their echolocation calls. Each species exhibits differences in echolocation calls such as changes in frequency composition, changes in frequency per unit time, duration of pulse, and repetition rate (Kunz et. al 1996) (Figure 2). Ultrasonic bat detectors make it possible to record bat echolocation calls at night. Ultrasonic bat detectors also allow researchers to identify different microchiropterans as well as determining relative abundance at foraging sites (Kunz et. al 1996). Currently ultrasonic bat detectors are one of the most effective ways to determine relative abundance of bats in the largest study areas in

most timely fashion (Roche et. al 2006). I propose to use an ultrasonic bat detector to determine the relative abundance of the 9 species of bats found in St. Lawrence County.

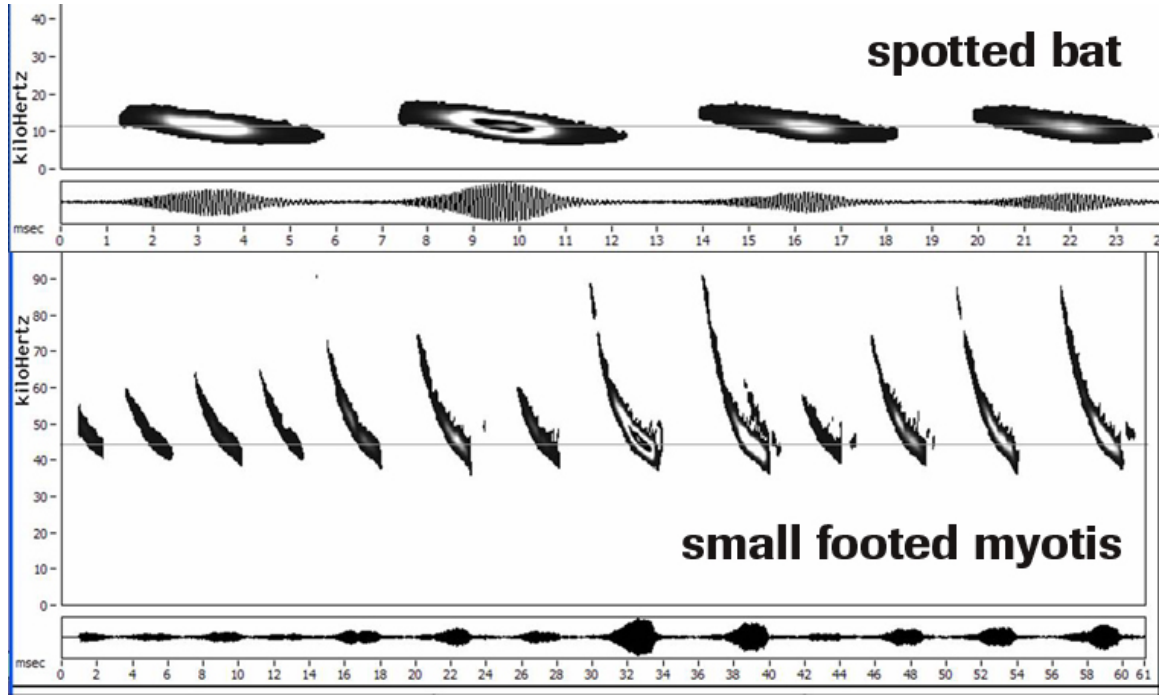


Figure 2. Example sonograms from two different species of bat (Nature Conservancy, 2007).

My goal is to determine the relative abundance of the 9 species of bat found in St. Lawrence County amongst several different habitat types: heavily forested habitat, rural habitat including open fields, open woodlands near water, and human developed habitat. This survey will determine whether each species of bat is present in each habitat as well as determining relative abundance of each species per habitat. Secondly I am concerned with determining the relative abundance of bats in St. Lawrence County in order to compare the vigor of bat populations in St. Lawrence County with previous studies completed by the NYSDEC and USFWS on populations of bats affected by WNS.

I hypothesize that big brown bats, little brown bats, small footed bats, and keen's bat will be found in highest relative abundance in wooded habitat because these species hunt prey by night in more heavily wooded deciduous and coniferous habitat. I also hypothesize that silver haired bats and eastern pipistrelles will be found in highest relative abundance along the edges of open woodlands near water because these species typically forage at night over open water. Finally I hypothesize that the red bat and hoary bat will be found in highest relative abundance in rural habitat comprised of open fields because these species typically forage at night over open fields. I expect to generate figures similar to figure 3 depicting bat abundance relative to each habitat (Figure 3). Ultimately I hypothesize that the relative abundance of bats in St. Lawrence County will reflect the overall decline in the number of bats populating the northeast due to WNS as many of the bats found in St. Lawrence County overwinter in afflicted hibernacula in the southern New York State.

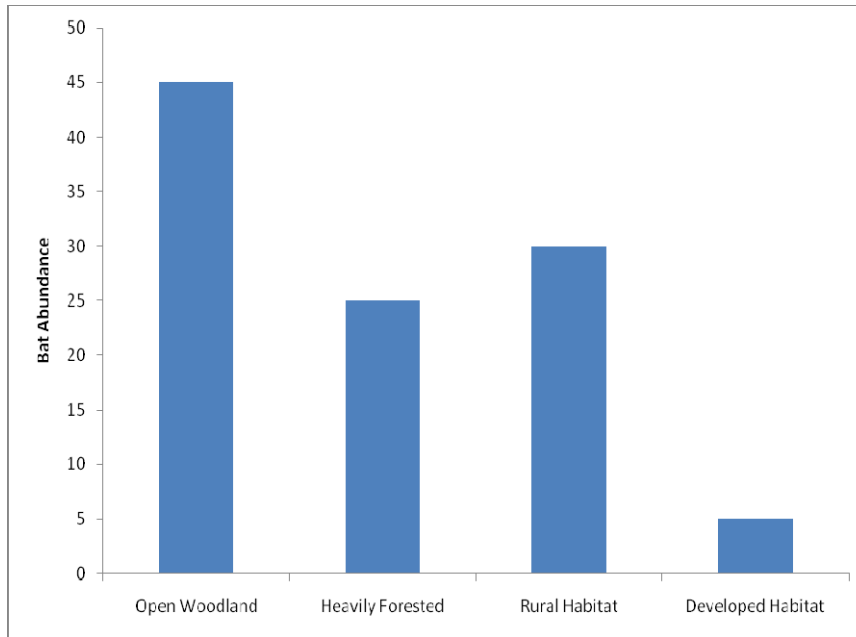


Figure 3. Sample graph illustrating expected abundance of the silver haired bat (*Lasionycteris noctavagans*) in different habitat types of St. Lawrence County and the Adirondack foothills.

Methodology

This study will employ a car based bat monitoring system. Car based bat monitoring was first developed in Ireland and involves driving a designated survey route at 15mph using a time expansion bat detector attached to the vehicle (Roche et. al 2006). We used this method during the summer of 2009 while volunteering as a part of a NYSDEC survey of bats on a designated route in St. Lawrence County. The bat detector used in this study will be an AR125 Ultrasonic Receiver from Binary Acoustic Technology. The bat detector is mounted in a housing of 10.16 cm schedule PVC pipe and a Quik Cap top (Fernco inc.) with a 2.5 cm hole in the middle. The housing then fits into a standard PVC reducer and is mounted onto a powerful magnet from an antennae mount, model MFJ-336S from MFJ Enterprises (Figure 4). The bat

detector uses software called SPECT'R Mobile[®] to record bat vocalizations onto a laptop. The bat detection system will be mounted onto a St. Lawrence University van and will detect bat vocalizations along designated routes using the car based bat monitoring system. Routes throughout St. Lawrence County will be determined to accommodate each habitat in question: heavily forested habitats, rural habitat including open fields, open woodlands near water, and human developed habitat. Because it is impossible to assume encounter rates directly reflect numbers of bats, encounter rates per unit time and per unit distance will be used to determine bat activity levels for each habitat (Roche et. al 2006). In most cases sonogram analysis software will facilitate the identification of bat calls down to the individual species. ANOVA statistical tests will be used to analyze raw data from the field study. The ANOVA statistical test will determine whether there is a significant difference between the relative abundances each species of bat for each different habitat. The only limitations of this study are that fieldwork depends on the weather. Under poor weather conditions such as excess wind and rain, bats will not forage. Cold temperatures also do not promote bat foraging, as insect prey availability drops (Roche et. al 2006).



Figure 4. Photograph of the bat detector used in the summer 2009 NYSDEC bat survey.

Conclusion

I will gain more field experience in field techniques for characterizing populations of bats. I have previous experience with this type of study as Dr. Barthelmess and I have already conducted two volunteer bat surveys for the NYSDEC with an ultrasonic detector. Therefore I

already have some previous experience working with the software associated with the detector. This project will help me to hone my skills with ultrasonic bat detectors and it will also allow me to learn how to use sonograms to identify different species of bat. I will be able to complete my own analysis of the data generated by the ultrasonic detector, something I have never been able to do before (our volunteer methods merely introduced me to the methodology). The general tactics used in this study I will be able to apply in the future when working with other species of mammals. I intend to apply to graduate school in the future and this field work is very valuable to me as a future applicant. In preparation for future work with bats I have already completed a series of rabies immunizations. My main interests lie in the field of mammalogy. I completed a mammalogy course at St. Lawrence and since then have completely dived into the field. I am eager to learn new and exciting field methods. I have conducted independent research with Dr. Barthelmeß over the past year and I think that this research experience could better prepare me for future studies.

In addition this study is very relevant in the scientific community. Bats play a very important ecological role. As WNS becomes a serious threat to most species of bats in the northeastern United States it is up to all individuals with available resources to work to ensure the survival of these remarkable creatures. The data generated by this study will be valuable in understanding the population dynamics of not only bats in St. Lawrence County, but bats elsewhere affected by WNS. It is the small steps taken by individual scientists that contribute the most to the effort to understand and combat WNS.

Upon completion of this research project I plan on producing both a written paper describing my study and my findings. I also plan on producing a comprehensive poster presentation which will demonstrate my findings as well.

Appendix A

Works Cited

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Appendix B

Activity	# Hours to be Spent	Week #	Expected Outcome
Conduct road survey using ultrasonic bat detector along different routes throughout St. Lawrence County and the Adirondack Foothills.	100	1-8	Ultrasonic bat detector will be successful in generating data about the relative abundance of the bats on the survey routes.
Determine species of bat present on sonograms derived from the Ultrasonic detector.	80	1-8	Sonograms will give an accurate description of the species of bats detected ultrasonically.
Analyze data from the ultrasonic detector and compare using statistical tests.	40	4-8	Sufficient data will be present to determine abundance of the 9 species of bat along the routes as well as abundance relative to habitat.
Write paper and prepare presentation describing study conclusions.	30	6-8	Scientific conclusions may be made and clearly delineated regarding the relative abundance of the 9 species of bat in the study.

Appendix C

Skills/Technique/Knowledge to do Research	Relevant Classes	Grade Received
Knowledge of general lab techniques and familiarity with lab equipment. Knowledge of the scientific method and how to conduct effective research.	General Biology	4.0
Knowledge of the mammals of New York State as well as field methods for studying mammals such as small mammal trapping, the Jolly-Seber method, as well as knowledge of population dynamics.	Mammalogy	3.5
Knowledge of how to interpret general statistical tests such as ANOVA.	Statistics 113	3.5
Knowledge of the phylum Ascomycota, the phylum of <i>Geomyces destructans</i> .	Mycology	3.75
Knowledge of IACUC practices and the proper handling of animals.	Lab Animals	3.75
Independent research with Dr. Barthelmess from 2009-2010 involving a survey of field methods for studying mammals. Knowledge of field techniques and equipment		
NYSDEC volunteer work on a study using ultrasonic bat detection in the summer of 2009. Familiarity with ultrasonic bat detection equipment and how road surveys are conducted.		

SLU Fellowship Proposal – Sample 2

Faulkner's Neology

SLU Fellowship Proposal

Abstract:

William Faulkner once said: "I find it impossible to communicate with the outside world. Maybe I will end up in some kind of self-communication—a silence—faced with the certainty that I can no longer be understood. The artist must create his own language. This is not only his right, but his duty. Sometimes I think of doing what Rimbaud did—yet, I will certainly keep on writing as long as I live" (Meriweather and Millgate). Faulkner's work is an undeniable experiment of diction and syntax. Faulkner's South is "jonquilcolored" (*Light in August* 332) and "Augusttremulous" (116), populated by the "countrybred" (100) and "downlooking" (229). Yet Faulkner's artistry with words is not a "self-communication" (Meriweather and Millgate) as he himself believed, but rather a precise, if innovative, conversation with the reader, whose perception of Faulkner's South and its inhabitants is colored by his own "aweinspiring" knack for neology (*Light in August* 457). Neology, the practice of coining new words, or giving a new sense to a previously existing word, is a natural feature of language (McArthur and McArthur 685). This natural potential for an endless lexicon at the author's disposal generates the possibility for an endless variety of meaning and emotion that the reader can draw from the text the author produces. Faulkner's texts: *The Sound and the Fury* (1929), *Light in August* (1932), and *Go Down, Moses* (1942), clearly demonstrate Faulkner's unique affinity for coining new words in order to generate deeper meaning and succinctly portray the Southern essence that is essential to his novels.

1. Introduction:

a. The purpose of this project is to examine the function that neology, the practice of inventing new words, serves within William Faulkner's writing, by examining texts from three important periods in his development as an author. *The Sound and the Fury* (1929), *Light in August* (1932), and *Go Down, Moses* (1942) are representative of the scope of Faulkner's focus upon the South and its ideals of the early twentieth century. Each text remains constant in its use of neology to

depict the complexities of this time period, locality, and the racial tensions its inhabitants faced. *The Sound and the Fury*, *Light in August*, and *Go Down, Moses* each employ hundreds of different neologisms that serve to “defamiliarize” the reader with their preconceptions of the world through a unique aesthetic experience (MacArthur and MacArthur 617). These neologisms serve three uniquely different functions within the text that can be examined separately to determine how each one contributes to the general climate of Faulkner’s three texts, which is that of the racially charged and sexist deep-south of the early twentieth century.

b. Faulkner is a Southern Modernist. His writings bring to life the tense and racially explosive past of the South, while simultaneously depicting the slow methodical pace of Southern life. His work is dense and meaningful, drawing lots of critical attention and study towards his intricate web of characters, and expansive histories of his invented Yoknapatawpha County. A lot of critical analysis has been focused upon studies of racial tension and gender issues within his characters and plot lines. In regards to formal analysis, his use of stream-of-consciousness narration has been studied in depth, however, little critical attention has been focused upon Faulkner’s use of neology and the very distinct functions it plays within his texts to impact readers and generate a multitude of meanings. This project is interesting because it focuses on a lesser-studied aspect of a well-known and well-studied author in American Fiction.

2. Theoretical Underpinnings of the Project

a. The forms of literary criticism most relevant to this project are Russian Formalism, Semiotics, and Reader Response Theory. In the study of literature, Russian Formalism emphasizes the study of form and structure over content. The primary goal of a truly “literary” piece of work is to displace language out of its usual everyday meaning, in order to produce fresh meaning (Con Davis, 51). Semiotics studies words as signs and their roles as part of social life; it investigates the denotation and connotation of words, what the sign represents, other signs associated with it, and the possible meanings the sign can convey (Eagleton 101). Also relevant is the

examination of the transition of language. A word begins as an “abstract,” developing into a “concept,” and finally transitions into a “precept”, meaning that through use, a word gains strength (Vickery).

b. Faulkner is an extensively studied author. There is a wide and varied range of critical study concerning his texts. There are many critics who have discussed the depth of Faulkner’s characters or the racial and gender conflicts within his work. This project follows within the tradition of established Faulkner studies in that it applies a semiotic reading of race and gender within Faulkner’s writing, as well as a study into Faulkner’s characters, and Southern setting. However, this project is an addition to the preceding work done on Faulkner’s texts, because it is focused upon race, character, and setting specifically in the unique way that they are shaped by the application of Faulkner’s neologisms.

3. Detailed Explanation of topic, research question, and hypotheses

a. Faulkner’s texts are rich in neologisms that serve to “defamiliarize” the reader with their preconceptions of the world and provide a unique aesthetic experience (Vickery 617). This means that Faulkner’s neologisms cause the reader to question the concept he has coined in a new way, which would not be possible with a standard word; his neologisms convey a more precise meaning than otherwise possible with established vocabulary. I wish to study the role neology has played in Faulkner’s depiction of the South, its people, and its issues throughout his career. Through a literary analysis and close reading of three important novels from his development as an author: *The Sound and the Fury*, *Light in August*, and *Go Down, Moses* it will be possible to discern the precise manner in which neology brings a unique depth to Faulkner’s prose. This project is a continuation of one I began in my ENG 250 Methods of Critical Analysis course last spring, which focused solely upon one singular use of neology within Faulkner’s *Light in August*. Through a secondary close reading of the text, I was able to generate a list of over 300 neologisms used in *Light in August*, and the three specific functions they served within the

text. My preliminary project focused solely upon Faulkner's neologisms that elevated tension and emotion in emotionally charged moments, and were typically centered upon gender and race, such as "womanshenegro" (*Light in August* 156) or "womanfilth" (*Light in August* 132). However, this project is an expansion of that previous work and will examine all three functions of neology within Faulkner's work in *Light in August* as well as two other important texts by Faulkner that address similar themes as those seen in *Light in August*.

b. Faulkner's neologisms serve three major functions within his texts: firstly to escalate emotion in emotionally charged moments of the plot, secondly to convey personality of characters, and finally to invoke sentiments of reality and place in relation to the landscape of Mississippi. An examination of these three functions and their corresponding neologisms serves to push the reader to a greater understanding of the overarching social themes present in the text. Faulkner uses his neologisms to escalate tension in racially charged moments, as well as to define his characters, and depict the uniquely Southern climate of Yoknapatawpha County. These three distinct uses of neologisms can be traced through *The Sound and the Fury*, *Light in August*, and *Go Down, Moses* to bring a larger perspective to Faulkner's neology throughout his career. The final product would be an academic paper examining the three functions of Faulkner's neology across three important novels in his oeuvre.

4. Research Design and Methodology

a. The primary method of research will be a close reading of all three novels and a study of critical work already produced on Faulkner's neology, resulting in a literature review. The major methods of literary analysis that apply to the project are Russian Formalism, Semiotics, and Reader Response Theory. The literature review will be followed by an argument detailing the three primary uses of Faulkner's neologisms throughout his work, referencing established Faulkner critics and the primary texts as evidentiary support.

b. No special resources are required other than the three texts and other resources available at ODY library.

c. The first step of the project will be to have completed a preliminary reading of each of the novels before arriving in the summer to begin research. Once on campus, a closer reading of *Go Down, Moses* and *The Sound and the Fury* will be necessary in order to generate a list of the neologisms used throughout the text and observe patterns of use. (The list of neologisms found in *Light in August* was already completed during my Methods of Critical Analysis course and is attached as an appendix to this proposal). I will then begin research for my literature review focusing upon critics in Russian Formalism, Semiotics, and Reader Response Theory as well as previous studies in Faulkner's neology. I will then compile my research into an annotated bibliography. Using my annotated bibliography I will then move towards a working outline of the paper, laying out both the literature review and the argument portions of the paper. The next step will be to move from the working outline towards generating a draft of the literature review. Following the draft of the literature review the next step will be to move towards a complete rough draft. Following the first rough draft will be a second and third revision of the paper, resulting in a polished final copy.

d. The primary reason that this project could fail is that there may not be enough prior research on Faulkner's neologisms to support my argument. I noticed when I began studying Faulkner's neology in my Methods of Critical Analysis course last spring that neology is not a well studied aspect of Faulkner's writing as of yet, and that it was sometimes difficult to find sources. To address this problem I will utilize more primary sources than secondary sources. Using the texts directly, and the secondary sources that are available it will be possible to examine the three ways in which Faulkner employs his neologisms.

5. Conclusion

a. I began this project for a course last spring that focused solely on *Light in August* and Faulkner's use of neology to escalate racial tension. His unique writing style and experimentation with words became a topic I was very interested in, and something I wished to study further. When I heard about the SLU Fellowships it seemed to be the perfect outlet to continue studying this topic I had stumbled upon and found so fascinating. Completing this project would have great personal satisfaction for me. I am planning to apply to Grad School next fall and this project is a great opportunity to begin the type of work that I will be continuing to do there. This project could also work as a preparation for further study in the patterns and functions of Faulkner's neologisms throughout a larger time period of his career as an honors thesis in the fall.

b. This project contributes to the University and larger community, because it is perhaps surprisingly, a very relevant topic pertaining to a college community. With instant messaging, text messages, Facebook, and other forms of electronic communication, students are creating their own neologisms on a regular basis. A neologism is an invented word that gets accepted into the everyday lexicon. Students create multitudes of these terms on a daily basis, and it is both interesting and instructive to study an author who conscientiously noted this linguistic phenomenon and employed it in a very pointed way within his work. In 2010 alone, 43 new words were added to the *New Oxford American Dictionary*: "defriending," as an act on Facebook, "hater," a person who strongly dislikes someone, and "bromance," a friendship among men, only a few examples among them (My BFF). These words are in the running vocabulary of St. Lawrence students who are perhaps unaware of their own practice of neology and the fact that it is a nod towards an author like Faulkner who embraced the adaptability of language to better convey the depth of meaning within his texts.

c. The final product will be a critical paper on the three functions of neology within Faulkner's texts.

Appendices:

A. Selected Bibliography

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B. Timeline

	Activity	# Of hours to be spent	Week #	Expected Outcome
1	Preliminary reading of three texts: <i>Light in August</i> , <i>The Sound and the Fury</i> , <i>Go Down, Moses</i>	As many hours as necessary to complete texts	Before arrival in Summer	Gain familiarity with the text.
2	Reread <i>The Sound and the Fury</i> and <i>Go Down, Moses</i> specifically for neologisms. Generate list of neologisms (list for <i>Light in August</i> already complete).	5 hrs per day, until both texts are complete	1	Three lists of Faulkner's neologisms will be compiled in order to observe patterns and similarities across the texts. Further familiarity with the text will be established.
3	Begin research for literature review.	3 hrs for reading, 2 for finding resources per day	2	Secondary sources concerning Russian Formalism, Semiotics, and Reader Response Theory.
4	Research established Critics on Faulkner's neologisms and writing style.	3 hrs for reading, 2 for finding resources per day	3	A compilation of secondary sources concerning Faulkner and neology.
5	Continue necessary research and compile annotated bibliography.	2 hours for continuing research, 3 for reading sources and writing bibliography	3	Annotated bibliography of all resources found to date.
6	Structure working outline, continue research as necessary.	1 hr per day to continue looking for additional sources where needed, 3 hours compiling old sources and writing outline	4	Working outline of the literature review and argument.
7	Compose first draft of literature review.	1 hr per day, continuing reading sources and research, 3-4 hrs per day writing and editing	5	A preliminary draft of the literature review.
8	Begin drafting argument portion of paper, working towards a rough draft.	1 hr per day, continuing reading sources and research, 3-4	6	Preliminary rough draft will be complete.

		hrs per day writing and editing		
9	Work with advisor to refine argument and writing.	1 hr per day, continuing reading sources and research, 3-4 hrs per day writing and editing	7	A secondary rough draft will be complete.
10	Final revision of the rough draft.	1 hr per day, continuing reading sources and research, 3-4 hrs per day writing and editing	8	Final Draft will be completed

C. Level of Preparation/Experience for the research proposed

	Skills/technique knowledge needed during the research	Relevant classes	Grade received	Other experience
1	Library research skills	FYP, FYS, Methods of Critical Analysis	3.5, 3.75, 3.75	Student Research Assistant at ODY Help Desk
2	Methods of literary and Critical Analysis	Methods of Critical Analysis, English Lit to 1700, Intro to Dramatic Scripts, French Literature, Francophone African Literature, Le Roman Moderne (The Modern Novel)	3.75, 3.5, 3.75, 4.0, 4.0	
3	Familiarity with Faulkner and Neology	Methods of Critical Analysis	3.75	
4	Understanding of the processes of language	Language and Human Experience	3.0	
5	Writing Competency	Methods of Critical Analysis, English Lit to 1700, FYP, FYS,	3.75, 3.5, 3.25, 3.75	

Neologisms from *Light in August* by William Faulkner:

bugswirled 4
stump-pocked 5
hookworm-ridden 5
back-rolling 7
creak-wheeled 7
allembracing 7
ditchbank 7
pinewiney 8
mile-consuming 10
pleasantfaced 11
manlooking 11
bleacheyed 11
brokenspringed 12
inwardlistening 15
sweatfaded 16
nightprowling 26
slowspitting 26
stiffbrim 31
worksoiled 32
sweatstained 32
middleaged 36
backwatching 36
backflung 40
overlingering 41
exminister 48
mansmelling 48
manstale 48
heavybodied 52
patinasmooth 54
bugmouthed 54
lowgrowing 57
littleused 59
daygranaried 60
quietlooking 62
wellmeant 73
unwinded 76
duskfilled 76
greenshaded 77
swolebellied 78
selfconvicted 86
countrybred 100
downlooking 101
swolebellied 101
longdrawn 102
niggerblooded 103
thightall 107

thighdeep 108
halfreclining 108
onehanded 109
sunshot 111
sandblanched 112
frictionsmooth 113
thickvoiced 113
redbarred 113
shadowbrooded 114
cabinshapes 114
kerosenelit 114
fecundmellow 115
manshaped 115
inbreath 115
stillwinged 115
Augusttremulous 116
womenvoices 117
sootbleakened 119
cinderstrewnpacked 119
childtrebling 119
parchmentcolored 120
womangarments 120
fullbodied 120
pinkcolored 120
womansmelling 121
automatonlike 121
pinkwomansmelling 122
pinkfoamed 122
parchmentcolored 123
sobereyed 124
sootgrimied 126
steelrimmed 126
coalgrimied 127
womansinning 128
icecold 129
womansuffering 129
womanfilth 129
halfdark 130
downlooking 131
womanroom 132
womanpinksmelling 132
womanfilth 132
backthrust 132
pitchdark 135
batebreathed 136
clashedto 136
inyawned 138
unsilvered 141

lightcolored 141
unsilvered 144
oftenbrushed 148
manshape 148
manvoice 148
rigidfaced 149
dryscented 150
spreadkneed 150
lowpitched 152
musclebound 152
cutdown 152
granitelike 153
cutdown 155
womanshenegro 156
womanshenegro 157
duskcolored 158
phantomlike 158
dewgray 158
rocklike 159
selfcruxification 160
fostermother 164
oftenwashed 171
stiffbacked 174
brasshaired 175
diamondsurfaced 175
thwartfacecurled 175
brasshaired 176
violentaired 176
inwardleaning 176
brassridged 178
bigknuckled 179
overlarge 179
greasecrusted 180
frictionsmooth 180
countryfaced 180
highboned 180
flatvoiced 183
downlooking 184
allseeing 184
drymouthed 185
backglaring 185
downlooking 187
downspeaking 187
downlooking 188
downlooking 189
branchshadowed 189
hardfeeling 189
hardsmelling 189

notseeing 189
hardknowing 189
deathcolored 189
flyspecked 191
bigknuckled 193
monklike 194
downlooking 194
downlooking 195
downlooking 199
odorreek 199
juggernautish 203
sluttishness 204
bluntheaded 205
offcolors 206
illcut 206
boardlike 206
calmfaced 206
farmbred 207
moonglow 209
backfallen 209
moondappled 210
shadowdappled 210
moonshadows 211
moonblanched 212
downlooking 216
diamondsurfaced 218
wireends 222
diamondsurfaced 222
wireends 222
catlike 226
townshaped 227
chocolatecolored 228
neversunned 228
allmother 230
nothungry 230
downfalling 232
softungirdled 232
scarceused 233
liplifted 234
untearful 234
unselfpitying 234
lightningflash 235
mantrained 235
stringstraight 239
frogeating 241
lowbuilt 247
onearmed 249
scarcebreathing 254

wordsymbols 258
coldfaced 258
halfdark 260
moongleamed 260
backlooking 263
upflare 266
halfdeath 266
lintpadded 267
selfpity 267
backmotion 274
midsnicker 274
steelrimmed 275
sweatstained 278
symbolwords 280
backhooked 282
softcolored 283
backshrunk 283
small-animallike 284
forwardlooking 284
handpower 288
longfamiliar 289
selfborn 290
wildhaired 290
airengendered 291
droopeared 296
fulltongued 297
backflung 297
backrolled 297
longdrawn 298
mankept 299
downlooking 299
downlooking 299
weatherhardened 300
laborpurged 300
downlooking 301
nogood 301
flabbyjowled 306
darkcaverneyed 306
backthrust 307
blackclad 308
spectacleblurred 308
blackrimmed 308
manodor 308
flyspecked 309
countrybred 312
paperwrapped 317
overplump 318
cavelike 322

semihysterical 322
whiterolling 322
hollerwhispering 324
headtall 329
inbreathed 331
yetdark 332
yellowly 332
manmovement 332
cattlesounds 332
jonquicolored 332
leatherhard 332
wormriddled 334
backswinging 334
ironhard 336
unswimming 338
unhaste 338
selfdedication 341
handpeeled 342
twofisted 342
stringlike 345
woreout 351
tiedup 359
selfdoubt 368
tobaccostained 369
glacierlike 369
prophetlike 371
woodenfaced 372
midrecord 373
womanflesh 374
womansign 374
womanflesh 374
stonefaced 375
laidby 377
stonefaced 379
lipmovement 379
moneypaper 380
comalike 382
womanevil 386
stonevisaged 386
mangrown 388
chairarms 389
oftwashed 391
puttycolred 391
clenchfisted 391
primrosecolor 396
woodenfaced 398
hardmusclcd 400
ilkept 404

manchild 411
queershaped 413
linoleumstripped 418
mansense 419
countrybred 421
wellnigh 421
erosiongutted 425
toyllike 425
horselike 427
allembracing 428
unwinking 429
mulelike 430
fellowaid 433
wolflike 436
loosejointed 444
queerlooking 444
vainglory 453
prophetlike 453
aweinspiring 457
forwardlooking 460
mansewn 469
leafbrown 469
rednosed 471
fanaticfaced 472
layingon 474
allembracing 475
garmentworried 478
sweatstained 484
outlooking 486
bandagedistorted 487
dreamrecovering 487
sandclutched 490
forwardlooking 492
housedin 494
pleasantfaced 495
leatherlooking 496
goodlooking 504

TOTAL: 323

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SLU Fellowship Proposal – Sample 3

A Novel Therapeutic Approach to Multiple Sclerosis: Astaxanthin-Mediated Suppression of Cytokine Production in Experimental Autoimmune Encephalomyelitis

SLU Fellows Proposal

Abstract

Multiple Sclerosis (MS) is an autoimmune disorder in which the immune system inappropriately targets the central nervous system (CNS), thereby destroying cells responsible for motor movement, and ultimately causing paralysis in its patients. A cure for MS has not been established. Treatments are available but the efficacy of current treatments is limited by adverse side effects. This project examines the effects of astaxanthin, a naturally occurring anti-inflammatory agent, on a mouse model of MS. The model we use, experimental autoimmune encephalomyelitis (EAE), is a well-established mouse model for MS. Preliminary studies in Dr. Heckman's laboratory have shown that astaxanthin ameliorates EAE, but the mechanism of action remains unknown. In preliminary studies, we expected astaxanthin to decrease immune cell populations in the CNS. Our data does not support this proposed mechanism of action however. Therefore, here we propose that astaxanthin mediates EAE protection by inhibiting the production of damaging chemical messengers generated by the immune cells that infiltrate the CNS. We will examine this hypothesis by evaluating the effects of astaxanthin on a specific pro-inflammatory chemical messenger called TNF- α .

Introduction

Multiple Sclerosis (MS) is a neurodegenerative disease that affects about 350,000 people in the United States (Lutton et al., 2003). MS is characterized by decreased motor function leading to eventual paralysis as the neurons responsible for motor movement slowly deteriorate. The disease is classified as autoimmune because, for unknown reasons, an immune response is activated against self-tissues, specifically the myelin sheath of the neuronal cells. The myelin sheath is important for proper message relay between neurons as well as neural control of muscle movement. Destruction of the myelin sheath results in decreased signal efficiency, subsequent neuronal dysfunction, and eventual paralysis as the neurons fail to relay messages to the muscles. Treatment options for this disorder are currently limited, and often consist of frequent injections, which may cause nausea, fatigue, depression, and pain (Tselis and Lisak, 1999). The purpose of this project is to explore a novel pharmaceutical approach to treatment using a mouse model of MS called experimental autoimmune encephalomyelitis (EAE). The potentially therapeutic compound of interest is a naturally occurring pigment called astaxanthin. Astaxanthin is typically found in fruits, vegetables, and marine life (i.e. red algae, shrimp) and has been shown to have anti-oxidant and anti-inflammatory properties (Guerin et al, 2003 and Lee et al., 2003). Dr. Heckman hypothesized that due to its anti-inflammatory properties, astaxanthin is ideal for dampening the damaging inflammatory response generated by the immune system against the myelin sheath of neurons. Treatment with astaxanthin is more ideal than current MS treatment due to its natural occurrence in foods and potential for fewer side effects (if any). Also, due to its anti-inflammatory properties, it could be applied to other neurodegenerative and autoimmune disorders with similar pathological features as those of MS (Guerin et al, 2003 and Lee et al., 2003).

EAE is a mouse model that exhibits similar clinical symptoms to MS. EAE is an ideal model because it can emulate the four different subtypes of MS: acute, chronic, relapsing-remitting, and acute progressive (Karlsson et al. 2003). EAE is induced by a series of potent injections, which activates the immune system to attack the myelin sheath, leading to myelin loss, decreased signal conductance, neuronal death, and motor movement dysfunction in test animals (Lutton et al., 2003). When the immune system is

activated in a characteristic EAE/MS response, specific immune cells called macrophages take up myelin protein and present it to T-cells. The macrophages and T-cells then initiate an inflammatory attack on the myelin sheath using specific chemical messengers called cytokines (Lafaille et al., 1997 and Ercolini and Miller, 2006).

Preliminary studies in Dr. Heckman's laboratory have confirmed the hypothesis that astaxanthin ameliorates EAE. Astaxanthin prevented EAE disease incidence in 86% of treated animals (Rebecca Klar '10, unpublished data). Although these results are promising, the exact mechanism of action of astaxanthin in mice with EAE is unknown. Preliminary flow cytometry data showed that more macrophages were present in the brain and cervical lymph node tissue of EAE mice treated with astaxanthin (Rebecca Klar '10, unpublished data). This finding opposes the mechanism we originally proposed for astaxanthin. We expected that the anti-inflammatory characteristic of astaxanthin would decrease the level of macrophages present in the inflammatory response. Hence, these results imply that astaxanthin may be modifying events at the cytokine level rather than on the cellular level. Astaxanthin may alter cytokine production from these cells, which explains the high proportion of brain macrophage levels even though astaxanthin decreased the incidence of EAE.

Previous studies have highlighted some of the mechanisms of cytokines during an MS/EAE immune attack. There are many different cytokines involved, some pro-inflammatory and some anti-inflammatory. In this study we are focusing on a pro-inflammatory cytokine called TNF- α because it is well documented in MS pathology and EAE research. Lafaille et al., (1997), showed that macrophages and T-cells stimulated with a specific myelin protein produced high levels of TNF- α . TNF- α activates a component of the apoptotic cascade, a pathway that causes cellular death, possibly affecting CNS neurons in MS (Lin et al., 2007). Lee et al., (2003) showed that our compound of interest, astaxanthin, inhibits production of the cytokine TNF- α in vitro by blocking a molecule required for its production. Based on these studies, we propose that astaxanthin may mediate EAE by blocking TNF- α cytokine production by macrophages.

Because TNF- α has been shown to play a significant role in the neuronal damage of EAE and MS (Lafaille et al., 1997) and is also directly inhibited by astaxanthin in a different disease model (Lee et al., 2003), we hypothesize that astaxanthin may decrease

disease incidence of EAE by inhibiting TNF- α production. We will investigate this hypothesis in vivo using EAE infected mice injected with exogenous TNF- α . We expect that if astaxanthin ameliorates EAE by blocking TNF- α production, then injecting exogenous TNF- α should render astaxanthin treatment less effective, thus elucidating astaxanthin's protective mechanism.

Methods

In this project we plan to test our hypothesis by performing scientific research using immunological and cell biology techniques. This study requires the use of a mouse model, which enables us to determine whether astaxanthin mediates its effects through the TNF- α pathway.

Animal handling and EAE scoring

We will induce EAE in genetically susceptible mice and subject half of them to TNF- α cytokine injections, while issuing astaxanthin to mice from each group. We will use 20 mice, 5 for each treatment group. The treatment groups are divided as follows:

Group:	Treatment:	Cytokine:
Control	Control vehicle	Control vehicle
Control + TNF- α	Control vehicle	TNF- α
Astaxanthin	Astaxanthin	Control vehicle
Astaxanthin + TNF- α	Astaxanthin	TNF- α

Dr. Heckman has used the EAE mouse model at St. Lawrence, and we will submit a protocol to IACUC at its upcoming meeting for permission for the studies proposed here. We have developed a reliable EAE induction technique in the lab, consisting of a series of specific injections given to genetically susceptible mice. Following the disease injections, we will score the mice twice daily to properly evaluate disease stage. The mice will be scored on a level of 1-5 based on disease severity. The data from scoring will be used to compare the disease onset and severity between different treatment groups.

Astaxanthin injections will be given to appropriate mice every 5 days starting day 5 post disease induction. TNF- α injections will be given to appropriate mice weekly throughout the experiment. All other mice will receive vehicle injections to maintain a controlled experiment. At day 45, the time point at which the disease has entered a consistent relapsing-remitting stage, all of the mice will be used for in vitro analysis.

In vitro studies from harvested tissue

Tissue harvested from EAE mice will be used for pathological analysis of astaxanthin's proposed mechanism. Flow cytometric analysis of TNF- α production by macrophages and T-cells will provide further insight into the function of astaxanthin. RT-PCR may be used to evaluate the amount of TNF- α RNA present in experimental tissue. Additional in vitro studies on tissue are dependent on disease course and will be decided during the experiment. In vitro studies that we will consider are isolating splenocytes (white blood cells from the spleen) to test for T-cell TNF- α production, using an ELISA test to determine blood plasma TNF- α levels, and/or using GREISS reagents to determine the production of a molecule associated with TNF- α production.

Complementary in vitro studies

As the disease develops in our mice, we will test astaxanthin's effects on macrophage cell lines in vitro to complement the in vivo studies. We will use cell culture techniques to determine the effect of astaxanthin on macrophage cell lines by administering astaxanthin treatment and measuring TNF- α cytokine levels in the cell culture media.

Potential problems

The most unpredictable component of the project is the variability of the EAE disease course. We have had consistent success with EAE disease induction over the past year in addition to success with the astaxanthin injections. We expect all injections and procedures to be successful and, due to the nature of the disease course, we have time to evaluate any problems, solve them, and still be able to complete the study.

Conclusion

Personal benefits

I have appropriately planned my undergraduate curriculum to support a career in research. I am extremely passionate about this goal, and want to use that passion to pursue a career in researching neurodegenerative disorders and neuroimmunology. I am particularly interested in diseases that affect the motor system, such as multiple sclerosis and amyotrophic lateral sclerosis (also known as Lou Gehrig's Disease). I entered St. Lawrence with this goal in mind, but did not know then how to realize it. As a sophomore, I was presented with an opportunity to work with Dr. Heckman on a multiple sclerosis project. I was concerned that I would not be able to focus on my true goal until graduate school, so when this opportunity arose, I pursued it with curiosity and excitement. Working in Dr. Heckman's lab introduced me to many new techniques and provided a highly stimulating focus to my passion for research. After returning from studying abroad in Denmark in the fall of my junior year, Dr. Heckman invited me to conduct junior year independent research in her laboratory. I intend to use my practical experience from sophomore year, my current independent research, and from the project in this proposal to support the creation of an honors thesis in neuroscience in Dr. Heckman's lab next year. Spending this amount of time on this project will enable me to produce a cohesive, high-quality, and well-researched honors thesis. This thesis will be immensely helpful in my desire to pursue graduate study in neuroimmunology and neurodegenerative diseases after graduating from St. Lawrence University. This amount of high-quality research experience is excellent preparation for my graduate studies and career and will provide a solid foundation for me as I pursue a similar project for my PhD.

Community Benefits

This project benefits St. Lawrence in that it will result in the generation of primary research that the university can be truly proud of. The goal of this project is to determine the effects of a naturally occurring substance on a disease that causes debilitating and eventually life-threatening paralysis in its patients. The data from this

project will be presented as a poster for the St. Lawrence community and will supplement data from previous research in Dr. Heckman's lab for the production of a publishable paper on astaxanthin's potential as a novel therapeutic for MS. We plan to present all of the data generated from this project at the Cytokines in Infectious Diseases, Autoimmune Disorders and Cancer Conference in Chicago in October. This opportunity not only benefits St. Lawrence, through representation, but also benefits the greater scientific community, as we share our work, and learn from the work of others. Lastly, this project benefits the entire community of MS patients and their family members, due to its exploration of a less harmful therapy for this debilitating disorder.

Appendix A: Literature Cited

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Appendix B: Timeline

Week	Activity	# hours to be spent	Expected outcome
1	EAE disease induction, start scoring mice 2X daily, TNF- α cytokine injections to appropriate mice, astaxanthin treatment to appropriate mice 5 days post-disease induction, first blood test for ELISA of cytokine levels Read and review appropriate papers.	40*	EAE development: Control mice and control TNF- α mice should show severe symptoms, Astaxanthin treated mice with and without TNF- α injections should show no symptoms or reduced symptoms
2-4	Continue scoring the mice/general mouse care, TNF- α cytokine injections to appropriate mice weekly, blood test for ELISA of cytokine levels, continue treatment injections of astaxanthin every 5 days Start cell culture experiments. Read and review appropriate papers.	40/week	EAE symptoms continue following a relapsing-remitting pattern until termination date
5	Harvest tissues for in vitro analysis: use FACS staining to characterize cellular populations using flow cytometry Complete cell culture experiments. Read and review appropriate papers.	40	Prepared tissue will be sent out to the Wistar Institute in PA for flow cytometry. Data will be analyzed when received.
6	In vitro analysis continues: RT-PCR of cytokine RNA's from harvested tissue Read and review appropriate papers.	40	Amplified cytokine RNA visualization on an agarose gel. Analysis and figure preparation.
7	In vitro analysis continues: culture cells to assess cytokine production and cellular proliferation	40	Results generated from an ELISA, analyze and generate a figure.

	Read and review appropriate papers.		
8	Analysis of all data-preparation of poster displaying results, written documentation of results Read and review appropriate papers.	40	Generation of cohesive figures for poster/paper
9	Analysis of all data-preparation of poster displaying results, written documentation of results Read and review appropriate papers.	40	Generation of cohesive figures for poster/paper
10	Wrap up entire project	40	

Appendix C. Level of preparation/experience

	Skills/technique/knowledge needed during research	Relevant classes	Grade received	Other experiences
1	Cell culture techniques	Cell Biology (Bio 250)	Currently enrolled	Independent study with Dr. Heckman (Bio 381)
2	Induction injections (includes solution preparation, loading syringes, etc.)	Lab component of Advanced Neuroscience (Bio 389) (worked w/ Dr. Heckman)	3.75	Internship in a circadian rhythms lab at Smith College (Summer 2009 & January 2010)
3	Animal Care: handling, EAE disease scoring, euthanization	Lab component of Adv. Neuro. (Bio 389)	3.75	Internship at Smith College
4	FACS staining for flow cytometry	Lab component of Adv. Neuro (Bio 389)	3.75	Independent study with Dr. Heckman (Bio 381)
5	ELISA	Independent study with Dr. Heckman (bio 381)	Currently enrolled	
6	RT-PCR	Lab component of Adv. Neuro (Bio 389), Genetics (Bio 245)	Adv. Neuro: 3.75 Genetics: currently enrolled	
7	Preparation of solutions and general lab knowledge (pipetting, aseptic technique, chemical reactions, hazards, lab safety)	General Chemistry 103, 104 General biology 101, 102	Gen. Chem. 103: 3.75 Gen. Chem. 104: 3.5 Gen. Bio. 101: 3.00 Gen. Bio. 102: 3.75	Internship at Smith College
8	Data Analysis	General Biology 101, 102 Advanced Neuroscience (Bio 389)	Gen. Bio 101: 3.00 Gen. Bio 102: 3.75 Adv. Neuro: 3.75	Internship at Smith College

SLU Fellowship Proposal – Sample 4

The Existential Zombie:
*Illuminating the Role Individual Consciousness and Independent Choice Play in
Defining Individual Human Existence*

Department of Philosophy, St. Lawrence University

Abstract

This research project aims to explore the thought experiment of the “philosophical zombie”, or “p-zombie”, as a method for defining individual consciousness in the sub-field of the philosophy of mind and augment it by applying it to Existential philosophy and the questions of human existence raised therein. Through identifying individual consciousness as the distinguishing feature between humans and p-zombies in the philosophy of mind, the p-zombie thought experiment provides a framework to discern how independent choice defines individual human existence in Existential philosophy. By establishing individual consciousness as the basis in which the realization of independent choice is rooted, my project will explore five characters in Existential thought to further flesh out the relationship between individual consciousness and independent choice and the role they play in defining human existence. I will firstly focus on Dostoevsky’s “underground man”, Nietzsche’s “Übermensch”, and Camus’ depiction of the mythological character Sisyphus to determine the importance of independent choice in crafting individual existence. Secondly, I will focus on Kierkegaard’s depiction of the biblical character Isaac and De Beauvoir’s “second sex” as figures that are akin to p-zombies rather than individual humans because of their lack of individual consciousness and/or independent choice. Through this analysis in which the p-zombie thought experiment serves as the foundation, my project will illuminate the role individual consciousness and independent choice play in defining individual human existence.

Introduction

The purpose of my project is to illuminate the role individual consciousness and independent choice play in defining individual human existence through the use of the thought experiment of the “philosophical zombie”, or “p-zombie”. This project explores how the p-

zombie has been used as a thought experiment in the sub-field of the philosophy of mind, and then applies it to Existential philosophy and the specific questions raised therein. This project is interesting because it augments a commonly used method in the philosophy of mind, the p-zombie thought experiment, through the application of it to Existential philosophy, and subsequently expands upon work done in both sub-fields. This project is worthwhile because it not only adds to established arguments in philosophy, but also grapples with questions of individual agency and how a person views his existence in society.

Theoretical Underpinnings

To begin this proposal, crucial definitions and clarifications are required. By ‘individual consciousness,’ I mean the subjective experiences and thoughts of a discrete person grounded in the immaterial. By ‘independent choice,’ I mean an uncoerced, unbiased decision made with all possible options available to the chooser. Both individual consciousness and independent choice are indispensable to the fundamental question of Existential philosophy: to define individual human existence. Here, the emphasis is not conceptual, i.e. what is ‘existence.’ Rather, Existential philosophy explores the *value* or *significance* of individual existence. Philosophy of mind, on the other hand, focuses much more on conceptual questions, i.e., what is consciousness?

It is in pursuit of the conceptual question, David Chalmers in *The Conscious Mind: In Search of a Fundamental Theory* poses the p-zombie thought experiment. The p-zombie thought experiment posits a modal argument against physicalism, which purports that anything which is physically indistinguishable from another is entirely indistinguishable. In other words, everything supervenes on the physical - the nature of the universe and everything in it depends upon the physical condition or state of things. Physicalists argue that individual consciousness is

dependent upon and relates back to a physical condition. In order to question the thesis of physicalism, Chalmers poses the p-zombie as a being that is physically indistinguishable from a human being, but lacks conscious experience. He argues that this distinguishing feature of the p-zombie necessitates the negation of physicalism, because it shows that something physically indistinguishable from another is not entirely indistinguishable. There are, in fact, immaterial, non-physical conditions upon which the natures of things in the universe depend.

Chalmers' argument presents conscious experience as the distinctive feature of human beings and what distinguishes them from p-zombies, and therefore serves as the primary condition in which to ground discussions of human existence. Providing a working definition of what is human consciousness is a needed step in discussing individual human existence and the conditions that give meaning to it. Without understanding human consciousness and how it separates a human being from the physically indistinguishable p-zombie, any existential philosophical arguments claiming that individual human existence is given meaning through independent choice do not have ground to stand upon because there is no concept of conscious experience in which the subjective can be rooted.

Once I establish the necessity of linking the conceptual work in the philosophy of mind with Existential philosophy through the p-zombie thought experiment in my project, I will turn to the works of the Existential philosophers Søren Kierkegaard, Fyodor Dostoevsky, Friedrich Nietzsche, Simone De Beauvoir, and Albert Camus. The common premise in these works is that independent choice defines (i.e., gives value) to individual human existence because it allows the individual to craft meaning for himself. And, as I argued above, conscious experience is a prerequisite for independent choice.

Firstly, I will focus on Dostoevsky, Nietzsche, and Camus' works primarily to flesh out the importance of individual choice. Dostoevsky's "underground man" from his *Notes from the Underground* demonstrates the dichotomy of men of thought and men of action, and how the former requires awareness of individual consciousness. The underground man is a man of thought inasmuch as his awareness of consciousness makes him attentive to the necessity to enact independent, unfettered choices to flout any systems that deny him of his free will, and therefore individual human existence. Nietzsche's "Übermensch," on the other hand, demonstrates the role individual consciousness serves in making an individual aware of his "will to power", or freedom to create truth and values as dynamic manifestations of meaning. Thirdly, I will examine Sisyphus in Camus' *The Myth of Sisyphus*. In this essay, Camus makes the argument that while Sisyphus' life can be perceived as being meaningless and futile because he is bound to continue the task of pushing a rock up a mountain for eternity, Sisyphus nonetheless does find meaning because he continually chooses to passionately apply himself to this task each time he performs it. From a superficial reading, Sisyphus would represent the p-zombie because he lacks independent choice derived from individual consciousness. Yet Camus' analysis shows that Sisyphus is not a p-zombie because he is conscious of his actions, which is demonstrated by him committing them each time with passion. That passion necessitates independent choice and individual consciousness because without those qualities, there would be nothing from which that passion could stem.

From Kierkegaard and De Beauvoir's works, I will draw features of human existence that are more akin to p-zombies, and thereby add more detail to the p-zombie thought experiment that Chalmers' poses. I will argue first that Kierkegaard's depiction of Isaac, the son of Abraham, in his treatise *Fear and Trembling*, further clarifies what a p-zombie is. Isaac is a p-zombie because

he is denied the freedom to exercise independent choice by Abraham's exercise of independent choice. Issac's lack of independent choice may be caused from a lack of individual consciousness, which presents him as a p-zombie in contrast to his father. Secondly, De Beauvoir's representation of the "second sex", or women, in her book *The Second Sex*, as aberrations of the normal sex, men, presents another dimension of p-zombies. The relation between women (aberrant) and men (normal) is hierarchical, and De Beauvoir shows that women's actions are too influenced by those of the normal sex. Hence, the second sex is denied independent choice. It is only through realization of this power imbalance that the second sex can challenge it and begin to independently craft meaning in their individual lives. This realization is founded in individual consciousness, which lends itself to my argument that an individual is a p-zombie so long as she is not exercising independent choice derived from individual consciousness. The second sex will exist not as p-zombies, but rather as existing individuals, when they overcome this obstacle.

Research Design and Methodology

My methodology for this project will be to complete a thorough literature review of the works I have mentioned in the Theoretical Underpinnings section. This literature review will not only consist of reading those works, but also explaining and developing major concepts, terms, and arguments crucial to my topic in the context of them. More specifically, I will clarify the p-zombie thought experiment and add to and strengthen my definitions of individual consciousness and independent choice. Having completed these two steps in the process of my literature review, I will augment them by applying them to the five characters in Existential thought I have identified as prime examples of individuals enacting independent choice and of individuals analogous to p-zombies. Through this application I will be able to discern the role individual

consciousness and independent choice play in defining human existence. The final step in my methodology will be to consider possible counter arguments while conducting this philosophical inquiry.

Given the complexity of my project, there will be a variety of counter-arguments that can weaken my stance. The most obvious places where a counter-argument could be directed would be in the practicality of the definitions I have postulated for individual consciousness and independent choice as well as my method of analysis. For example, it could be argued that existence produces, and therefore necessitates individual consciousness, which contrasts with my argument that individual consciousness necessitates independent choice, and independent choice is the key to realizing one's existence. Also, the characters in Existential thought I have briefly outlined in the Theoretical Underpinnings section could be read and analyzed differently. Sisyphus in Camus' *Myth of Sisyphus* may not have independent choice according to the definition I have established because it could be argued that all possible options are not available to him. The acknowledgement and analysis of these counter-arguments will strengthen, rather than weaken, the conclusions I draw from this project.

Conclusion

The product of my project will be to create a poster that outlines my method of using the p-zombie as a thought experiment to illuminate how individual consciousness and independent choice defines individual human existence. This poster will illustrate the various characters in Existential thought that I have discussed in this proposal, and show how they do or do not support the thesis of my project after conducting a thorough and detailed literature review. The work done with this project, and the resulting poster, will benefit me personally because it will serve as the foundation of my SYE Thesis in Philosophy. From the work completed with this

project, I plan to develop and write an essay arguing for my thesis of using the p-zombie as a thought experiment to show the role individual consciousness and independent choice play in defining individual human existence.

This project will benefit the St. Lawrence community because it deals with many themes that are commonly overlooked in an academic world where the intellectual growth and social maturity of students is dependent upon individual agency. Furthermore, this oversight of individual agency is one that affects students not solely in the academic realm, but also has profound implications in how they view their existence in the world. As a student comes of age, often in the context of college, he can be left overwhelmed by the amount of freedom given to him, and consequently is eager to sacrifice that freedom for direction. Realizing and analyzing the Existential themes my project explores will help justify grasping onto this freedom, and will subsequently allow a student to exercise his individual existence.

Appendix A: Bibliography

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Appendix B: Timeline

<u>Activity</u>	<u># of Hours Spent</u>	<u>Week #</u>	<u>Expected Outcome</u>
Exploring the p-zombie thought experiment.	20 hours	1-2	Clarifying what a p-zombie is and how consciousness is defined from this thought experiment.
Augmenting the p-zombie thought experiment by applying it to questions in Existential philosophy.	20 hours	2-3	Establishing the framework to ground the use of the p-zombie thought experiment as a way to define individual and independent existence.
Examining Dostoevsky's "underground man", Nietzsche's "Übermensch",	40 hours	3-6	Discerning the role independent choice as realized by individual consciousness plays

and Camus' Sisyphus as individuals realizing their independent existence.			in achieving individual existence.
Examining Kierkegaard's depiction of Isaac and De Beauvoir's "second sex" as p-zombies.	30 hours	6-8	Further discerning the role of independent choice in achieving individual existence by contrasting it with beings who lack individual consciousness and/or independent choice.
Synthesizing work done weeks prior. Considering counter arguments and refining thesis.	30 hours	8-10	Poster illustrating various characters in Existential thought studied and how they illuminate the role individual consciousness and independent choice play in defining human existence as grounded in the p-zombie thought experiment.

Appendix C: Level of Preparation/Experience for Research Proposed

Relevant Classes	Grade Received	Skill Acquired
Introduction to Philosophy	3.75	Basic introduction to various fields of philosophies and different methods of analysis
Modern Philosophy	4.0	Introduction to and analysis of themes prevalent in modern philosophy
Existential Philosophy	Currently Enrolled	Experience reading and analyzing Existential works
Reasoning	Currently Enrolled	Ability to construct concise and thorough arguments
Independent Fieldwork Project, India Fall 2010: Gender Transcendence in Kathak: <i>a case study in Jaipur Gharana</i>	Have not yet received fall grades	Ability to develop and conduct a detailed and complex research project independently over a period of 3 months while studying abroad in India