McNair Scholars Journal

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Message from Dr. Nancy M. Giardina
Vice Provost for Student Success
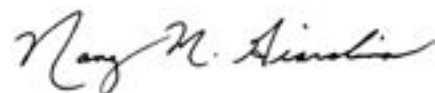*Academic and Student Affairs Division*

We are proud to present the 15th volume of the Grand Valley State University McNair Scholars Journal. It is the culmination of intensive research conducted by our student scholars and their faculty mentors through our Ronald E. McNair Scholars Program.

The Ronald E. McNair Scholars Program, now in its 17th year here at Grand Valley State University, provides an opportunity for students and faculty to apply much of what is learned within the classroom by engaging, outside the classroom, in research activities in a particular area of scholarly interest. These research activities provide a journey through the challenges and affirmations of scholarly work and better prepare students for graduate study and the pursuit of a doctoral degree. In addition, GVSU supports the AAC&U position that student engagement in research activities is one of the "high impact" experiences that better prepares students for academic success, transition into careers and the challenges of the 21st century.

Thank you to the faculty mentors who have worked so closely with our McNair Scholars to propel their research skills towards the next level of educational challenges.

Congratulations to the ten McNair Scholars whose research is presented here. Your journey and the challenges you have met during this scholarly activity speak to your talents and persistence in pursuing both your educational and life goals. Thank you for sharing your talents with the university community and continuing the spirit of this program.

Finally, thank you to all the people behind the scenes that work to sustain this program, guide students to success and produce this journal. Your work is valued.

Nancy M. Giardina, Ed.D.
Vice Provost for Student Success
Academic and Student Affairs Division

GRAND VALLEY STATE UNIVERSITY

"Before you can make a dream come true, you must first have one." - *Ronald E. McNair, Ph.D.*

Ronald Erwin McNair was born October 21, 1950, in Lake City, South Carolina, to Carl and Pearl McNair. He attended North Carolina A&T State University where he graduated Magna Cum Laude with a B.S. degree in physics in 1971. McNair then enrolled in the prestigious Massachusetts Institute of Technology. In 1976, at the age of 26, he earned his Ph.D. in physics.

McNair soon became a recognized expert in laser physics while working as a staff physicist with Hughes Research Laboratory. He was selected by NASA for the space shuttle program in 1978 and was a mission specialist aboard the 1984 flight of the USS Challenger space shuttle.

After his death in the USS Challenger space shuttle accident in January 1986, members of Congress provided funding for the Ronald E. McNair Post-baccalaureate Achievement Program. The goal is to encourage low-income, first generation students, as well as students who are traditionally underrepresented in graduate schools, to expand their opportunities by pursuing graduate studies.

Ronald E. McNair Post-Baccalaureate Achievement Program

The Purpose
The McNair Scholars Program is designed to prepare highly talented undergraduates to pursue doctoral degrees and to increase the number of individuals (from the target groups) on college and university faculties.

Who are McNair Scholars?
The McNair Scholars are highly talented undergraduate students who are from families with no previous college graduate, low-income background or groups underrepresented at the graduate level for doctoral studies. The program accepts students from all disciplines.

Program Services
The McNair Scholars are matched with faculty research mentors. They receive academic counseling, mentoring, advising, and GRE preparation. In addition to the above services, the McNair Scholars have opportunities to attend research seminars, conduct research, and present their finding orally or written via poster presentations. In the first semester of their senior year, the scholars receive assistance with the graduate school application process.

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Conversation Elaboration and Emotional Well-Being In Perceived Social Support

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McNair Scholar

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Introduction

Social support is an extremely diverse topic. It is the subject of approximately forty thousand scholarly articles when entered into the Grand Valley State University library database under the keyword, "social support." For example, social support has been linked to positive psychological health and low rates of disorders (Barrera, 1986; Finch, Okun, Pool & Ruehlman 1999; Sarason, Sarason & Gurung, 2001), major depression (Lakey & Cronin, 2008), and posttraumatic stress disorder (Brewin, Andrews, & Valentine, 2000). Also, people who do not have a strong social support system are subject to general psychological distress (Barrera, 1986; Cohen & Wills, 1985; Sarason et al., 2001).

There are three different constructs of social support (Barrera, 1986): social integration, perceived support, and enacted support. Perceived support is the only subconstruct that is consistently associated with psychological health regardless of the presence of stress (Finch et al., 1999). Perceived support does not just influence psychological health during periods of high stress (Burton, Stice, & Seely, 2004).

Perceived support consists of three influences: provider influences, recipient influences, and relational influences. Provider influences reflect agreement that some providers are more supportive than others; this is an indication of objective supportiveness. Recipient influences are the degree to which perceived social support reflects a recipient's personality. Relational influences are the extent to which a recipient perceives a provider as more supportive than the recipient perceives other providers and as more supportive than the provider is perceived by other recipients. Perceived support mainly consists of relational influences.

Social support is currently explained through the stress buffering theory (Lazarus, 1966; Cohen & Willis, 1985). Stress buffering is a theory of stress that occurs when individuals are better insulated or equipped by social support to deal with hazardous effects from stress. Support for stress buffering has been shown to help people that have poor mental health and a low social support network as opposed to people that have high social support networks (Lakey & Oreheck, 2010).

Social support research has often sought new intervention mechanisms; currently being tested is the relational regulation theory (RRT) (Lakey & Oreheck, 2010). RRT explains the association between perceived support and mental health. RRT accounts for the main effects that happen when people interact through conversations and shared activities rather than conversations about stress coping. Conversations that are unique to an individual and have an emphasis on conversation elaboration rather than on guidance and intervention would support relational influences.

Background and Significance

Individuals who do not have a strong social support system are subject to general psychological distress (Barrera, 1986; Cohen & Wills, 1985; Sarason et al., 2001) and disorders that include major depression (Lakey & Cronin, 2008), substance abuse (Wills & Cleary, 1996), and posttraumatic stress disorder (PTSD) (Brewin, Andrews, & Valentine, 2000). Also, it has been shown that positive psychological health and low rates of psychological disorder have been associated with high perceived support (Barrera, 1986; Finch et al., 1999).

There are three different constructs of social support (Barrera, 1986): social integration, perceived support, and enacted support. The first of these subconstructs, social integration, can be explained as the many types of different relationships or roles that an individual has. For example, a woman could be a wife, mother, sister, daughter, friend, and so on. The second, perceived support, is the most important of the subconstructs in relation to psychological health and disorder (Lakey, 2010). Perceived support is an individual's

personal belief that he/she is cared for and belongs to a social network of friends and family during periods of high stress (Cobb, 1976; Lakey 2010). The last subconstruct, enacted support, relates to the helping actions provided in a stressful situation (Lakey, 2010). Perceived support is the only subconstruct that is consistently associated with psychological health regardless of the presence of stress (Finch et al., 1999). Thus, perceived support does not just influence psychological health during periods of high stress (Burton et al., 2004).

Perceived support consists of three influences: provider influences, recipient influences, and relational influences. Provider influences are the mean difference among providers, averaged across recipients. Provider influences reflect agreement that some providers are more supportive than others and this is an indication of objective supportiveness. Recipient influences are the mean difference among recipients on how they perceive providers, averaged across providers. Recipient influences are the degree to which perceived social support reflects a recipient's personality. Relational influences are the extent to which a recipient perceives a provider as more supportive than the recipient perceives other providers and as more supportive than the provider is perceived by other recipients. Essentially, relational influences are a given person's unique profile for perceived supportiveness (Lakey, 2010). An example of this would be recipient A perceiving provider A as more supportive than provider B, while recipient B perceives provider B as more supportive than provider A.

The most dominant mechanism of social support is the stress and coping theory (Lazarus, 1966; Cohen & Willis, 1985). According to the stress and coping theory, stress occurs when people are better insulated or equipped by social support to deal with the hazardous effects from stress, which specifically supports stress buffering. Support for stress buffering has been found in individuals that have poor mental health and a low social support network as opposed to people that have high social support networks (Lakey & Oreheck, 2010). Essentially, when stress is absent, there is no link between social support and mental health (Cohen & Willis, 1985).

The stress buffering theory is highly developed and has been at the forefront of social support, but there are observable boundaries. Stress buffering utilizes enacted support. Lakey and Cronin (2008) have shown that there is much evidence for linking the main effects of social support with major depressive disorder, as opposed to little evidence for stress buffering (Brown & Harris, 1978). Another limitation is that there is a significant amount of research that has failed to find a link between enacted support and mental health (Barrera, 1986; Finch et al. 1999). Lastly, stress buffering cannot explain the association between mental health and perceived support (Lakey & Oreheck, 2010).

Perceived support mainly consists of relational influences. A mechanism that might be able to explain this is RRT (Lakey & Oreheck, 2010). RRT explains the association between perceived support and mental health. Lakey, Orehek, Hain, & VanVleet (2010) showed that relational influences were the strongest determinants of perceived support at 62% of the variance. Recipient traits influences showed 27% of the variance and influence of providers accounted for 7% variance. RRT accounts for the main effects that happen when people interact through conversations and shared activities rather than conversations about stress coping. Conversations that are unique to an individual and have an emphasis on conversation elaboration rather than on guidance and intervention would support relational influences.

The present study expands on previous research about perceived support and mental health by focusing on the importance of conversation elaboration for perceived support. This was accomplished by utilizing RRT, which describes a mechanism by which perceived social support is linked to better mental health regardless of presence of stress.

Method

Participants

The participants were one hundred male recruits from a company of Infantry Marine Corps Reservists at a Midwestern United States Marine Corps Home Training Center (HTC). The mean age of participants was approximately 23 years old; the majority were of European descent, but eight were of Hispanic descent, two of African descent, two of Asian descent, and one of Native American descent.

Measures

Participants were asked to complete questionnaires pertaining to perceived social support. Measures included demographics that asked about age, ethnicity, and gender. For Perceived Social Support, participants completed the 7 perceived support items from the Quality of Relationships Inventory (Pierce, Sarason, & Sarason, 1991), which is widely used in social support research.

Conversation Elaboration was measured by completing 10 items from the Conversation Elaboration Questionnaire, developed at Grand Valley State University (Sain & Lakey, 2011). The final measure was positive and negative affect, and participants completed 10 items from the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988).

Procedure

Initially, all of the Marines were briefed and asked to sign consent forms. Afterwards, all the Marines in each separate platoon were randomly subdivided into groups of four; this was done to reflect a fire team mindset. Confidentiality was maintained by assigning each Marine a participant number. Thus, when rating each other, Marines sat at a table and each Marine had a number displayed on a lanyard hanging around his neck. Each Marine was given a questionnaire that rated every other Marine within the group of four on four different measures. Participants indicated which target was being rated by writing the subject number on the appropriate questionnaire; thus, the Marines answered questions with regard to Marine 1, Marine 2, etc.

The first measure involved positive emotion experienced (e.g., proud, enthusiastic) when with, or talking to, the specific Marine in question. The second measure was negative emotion experienced (e.g., nervous, jittery) when with, or talking to the specific Marine in question. The third measure was the perceived supportiveness of the specific Marine (e.g., "Can you depend on this person to help you if you really need it?"). Lastly, the fourth measure

was the perceived quality of conversations with the specific Marine (e.g., "When we have a conversation, we can go back and forth for as long as we want"). When each Marine finished the set of questionnaires, they placed them in order according to their group number.

within active duty but was reflective of the demographics of the Midwest. Future studies should track participants over a deployment having them fill out questionnaires pre-deployment, in theatre, and post deployment.

Results

Data was then collected, coded and analyzed using SPSS. Findings were consistent with RRT for relational influences (Table 1). Analysis shows that perceived social support was linked to high positive affect at (r = .517) and low negative affect at (r =.353), and that positive affect and negative affect were weakly correlated (r =.082). Perceived social supports' link to negative affect was lower than the perceived social support link to positive affect. Also, perceived social support and conversation elaboration were highly correlated at about (r =.769). Thus, we can infer that there is significant recipient trait variance for each of these constructs. Of interest is that perceived support is linked to higher negative affect for provider influences. This is consistent with Bolger's effects for visible support (Bolger & Amarel, 2007).

Discussion

The current study demonstrates a useful tool for studying social influences on relational influence and affect that could easily be adopted for use in studying information processing within clinical disorder. These results may help to build the basic science needed to support interventions by providers that match a recipient's unique personality. Some strengths of this study are the large sample size (n=100) and that many of the Marines knew each other for more than three years. The fact that many of the Marines knew each other previously also correlates with a possible weakness. For example, all recipients could have rated the same individual as the best provider. Another weakness is that a few of the senior Marines in this sample had just transferred units and this was their first drill; thus, they had not yet established a social network within the platoon. The last weakness is that this group was not a direct reflection of the diverse demographic

Table 1 : Correlation Matrix Predicting Perceived Social Support Among Marines Who Received Conversation Elaboration.

	Conversation Elaboration	Positive Affect	Negative Affect
Perceived Social Support	.769**	.424**	-.352**
Conversation Elaboration		.517**	-.259**
Positive Affect			.082

Note. **Correlation is significant at the 0.01 level (2-tailed).

<div align="center">Appendix</div>

Measures
Demographic Form
How old are you? _____
What is your gender?
        Male   Female
What is your ethnicity? (i.e.: Polish, African-American, Greek, Hispanic, Irish)

_____

The following are statements about your conversations with participant #_____.

01.   How often do you have contact with him?

        A.   Nearly every day
        B.   Several times per week
        C.   Several times per month
        D.   Less than once per month

02.   How long have you known this person?

        A.   Less than 2 months
        B.   2 – 6 months
        C.   6 – 12 months
        D.   1 – 2 years
        E.   3 – 5 years
        F.   6 + years

Please read each statement carefully and decide how much you agree or disagree with each.
        A – Strongly disagree
        B – Mildly disagree
        C – Neutral
        D – Mildly agree
        E – Strongly agree

Conversation Elaboration (Sain & Lakey, 2011)
03. I enjoy talking with him because we have interesting conversations that last a long time.
04. It is difficult to find something he and I both want to talk about.
05. It is hard to have a conversation with him because he repeatedly says things that have no relevance to what I am talking about.
06. When we have a conversation, we can go back and forth for as long as we want.
07. My conversations with him usually end quickly.
08. I hardly ever change the subject when talking to him because he always has something interesting to talk about.
09. It is hard to talk with him because he never has anything new to say.
10. I think about how good our conversations are long after they end.
11. I normally forget our conversations soon after they are done.
12. When we have a conversation I often lose track of time and I don't realize how long we have been talking.

Perceived Social Support (Pierce et al., 1991)
13. To what extent can you count on him to listen to you when you are very angry at someone else?
14. To what extent can you turn to him for advice about problems?
15. To what extent can you really count on him to distract you from your worries when you feel under stress?
16. To what extent can you count on him for help with a problem?
17. If you wanted to go out and do something this evening, how confident are you that he would be willing to do something with you?
18. To what extent can you count on him to help you if a family member very close to you died?
19. To what extent can you count on him to give you honest feedback, even if you might not want to hear it?

Positive and Negative Affect (Watson, Clark, & Tellegen, 1988).

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to the word. Indicate to what extent you feel this emotion **when you are with or thinking about participant #_____**

> A – Very slightly or not at all
> B – A little
> C – Moderately
> D – Quite a Bit
> E – Extremely

When I am with this participant I feel…

20.   Excited.
21.   Ashamed.
22.   Upset.
23.   Inspired.
24.   Strong.
25.   Nervous.
26.   Guilty.
27.   Determined.
28.   Scared.
29.   Hostile.
30.   Enthusiastic.
31.   Active.
32.   Proud.
33.   Afraid.

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Phenomenology and the Rehabilitation of Philosophy

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Introduction

The question of the nature and scope of philosophical discourse is one of a contentious nature. The very direction of the field itself is often shifted away from its platonic roots in one of two general directions.[1] First, some postmodernist thinkers have gone so far as to claim the death of what people would generally describe as academic philosophy and, often times, of the notion of objective truth in general. Similar to this, other thinkers have likewise rejected past methods of philosophy but have instead conducted inquiries using the tools of the various physical or psychological sciences, which they claim have reaped more sure and tangible progress in their particular fields. Sciences such as psychology and semiotics have often times been used to completely replace the fields of epistemology and ontology. Much of the current trend is to declare the classical practice of philosophy dead and obsolete because it is thought to be intrinsically impossible, or to simply absorb it into one of the various other "sciences."[2] Even though the individuals that hold these ideas arrive at the conclusion they do, there is one general qualm that seems to run through the thought of both of the aforementioned groups. This concern is the seeming inability of philosophers throughout the ages to come to sure conclusions regarding given problems.[3]

While this objection is not entirely without ground, it will be argued in this paper that this is not truly an accurate appraisal of the situation. Indeed, as many modern thinkers have suggested, it is a case of philosophy needing to be reformulated into a fuller and corrected manifestation of its original intention. I argue that the contemporary theory of philosophy known as phenomenology has the tools to deal with the difficult questions of (and challenges to) philosophy. However, this method of philosophy is not an entirely new way of conducting an inquiry, but rather presents a refined and clarified view of the way in which philosophy was originally formulated. As will be shown, the methods of phenomenology are simply ways of clarifying and augmenting the classical contributions to philosophy while, in addition, offering new perspectives and insights into the age-old questions surrounding philosophy and why these questions are often clouded in confusion and ambiguity. Special attention shall be paid to the phenomenological reduction and some of the initial findings of the movement, as well as their implications. Furthermore, the significance of these findings in relation to their status as reactions against prior movements in philosophy will also be examined. However, before this can be undertaken, attention must be paid to the situation in modern philosophy that precipitated the need for phenomenology. In addition, the classical conception of philosophical realism must be briefly examined as well to gain a full grasp of the situation.

The Classical View of Philosophy

Originally philosophy began not strictly as the clearly-stated study of the nature of truth, but rather as a form of scientific cosmology that attempted to figure out the ultimate causes that permeated reality. Thales, one of the progenitors of the movement toward philosophy, with his identification of the element of water as the basic unitary feature of matter, was the first in a series of Greek thinkers that sought to identify what this unity consisted of.[4] One basic feature of all of the Greek thinkers was the desire to come to an understanding of the broadest principles of reality. This quest was generally confused and convoluted as

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1. Robert Sokolowski, Introduction to Phenomenology (New York: Cambridge, 2000), 198-202.
2. In this paper, the term "science" shall be broadly used to describe any organized body of knowledge.
3. See also: Dietrich Von Hildebrand, What is Philosophy? (Chicago: Franciscan, 1991), 1-10.
4. A.H. Armstrong, An Introduction to Ancient Philosophy (Totowa: Rowman & Allenheld, 1983), 1-3.

one would expect in a new field of study that must, by practical necessity, grapple with ways to express brand new ideas. However, what united most of these earlier thinkers was the underlying belief that reality is indeed intelligible, organized, and accessible. It must be highlighted that the basic idea that underlies all of this thought about the structure of the world is the acceptance of the idea that we can indeed know reality as it is in itself. This idea, popularly called realism, was the underlying thread that permeated most philosophies up until the early modern era in philosophy, which began in the 16th century. It seems like a simple idea, but it is one that unites the search for all forms of knowledge besides that of the strictly philosophical variety. This concept of realism is implicitly found in all of the sciences, which seeks to discover the nature of existent entities in so far as they are considered biologically, physically, etc. Indeed one could justly regard the academic enterprise folly if our ability to attain truth was considered impaired.

Philosophy began to be understood as the study of truth first with Socrates, Plato and Aristotle as a clearly demarcated field of truth in its highest categories. A constant theme for Plato was the nature of truth, and in various dialogues the type of knowledge that he considered genuinely philosophical relates to non-contingent essences which give existent entities their intelligibility and being as concrete particulars. In this way, the many facets of life can all be considered philosophically insofar as the essence of existent entities is the primary focus and not their intelligibility insofar as it relates to just any one other science (i.e., physics or biology).

The idea of philosophical knowledge as the study of truth in its highest categories could also be expressed by Aristotle in his phrase of philosophy as the study of "being qua being" in which he outlines his concept of first philosophy or metaphysics.[5] By this, Aristotle was referring to a field of study that examines existent entities from the point of view of their existing as things in general. This would be opposed to an investigation into the nature of things insofar as they hold interest as a psychological, physical, or neurological phenomenon. This was indicative of the classical idea that our ability to achieve truth is also an ability to step back and consider the world in its totality and not merely in reference to limited facets of its existence. This idea will become more important later when considering the role of phenomenology in restoring philosophy to its original objects and methods of investigation.

This focusing of the object of philosophy on the study of being also resulted in the separating off of the other sciences into their own fields of specificity. As such, physics became separated from metaphysics while fields such as neurology became separated from the philosophy of mind. Considering various topics philosophically, the objects of speculation then became more removed, in a certain sense, from the everyday sort of scientific investigation that a study of physics or biology would entail. Because of this, philosophy came to be viewed as more of a contemplative enterprise by those in the disciplines because its methods were not physical methods aimed towards certain aspects of existence, but rather contemplative methods aimed at existence as a whole. As far as justification of such a philosophical knowledge was concerned, the Greeks saw that the self-evidencing of ultimate phenomenon was necessary, for what other tools (such as the tools involved in biological, physical, or economic research) could possibly exist beyond universal phenomenon of features to study those features which are, by definition, the limits or structures of knowledge and of knowable entities?[6] This concept will come back into the philosophical picture later with the general concern over the nature of the justification for philosophical knowledge.

One more fact that is worthy of note is the emergence of the formulation of the correspondence theory of truth, which holds that truth value is achieved when what is "in the mind" coordinates to what is "out there in the world." According to this theory, when there is agreement (or isomorphism) between the concept in the mind and the object of intellection there is truth.

Kant and the Question of Knowledge

This realist view was the general backdrop of the philosophical enterprise up until the early modern period when the paradigm began to shift. Starting with thinkers such as John Locke and Rene Descartes and culminating with Immanuel Kant, the ability to achieve truth and true knowledge was systematically challenged.

There are two general lines of concern that contribute to this shift. One reason for this, as Immanuel Kant mentions, is the general lack of surety or agreement between different philosophers.[7] For example, one can point to certain mathematical or scientific texts as definitive in their respective fields, but we cannot do the same with philosophy. Because of this, there was a greater push for philosophy to be performed using methods akin to the precise proofs found in mathematics and the other physical sciences. From this general direction of concern came the eventual limiting of philosophy by various methods depending on the thinker. Whether it was economics, politics, or physics, philosophy was being constantly limited by various other fields of study that either intentionally or unintentionally sought to supplant the traditional methods of philosophy. However, the main influence on modern concerns about the possibility of attaining knowledge comes from the philosophical critiques of Immanuel Kant.

One important feature of Kant's analysis that fueled his concerns about how knowledge exists was his synthetic-analytic/a priori-a posteriori distinction by which he characterized what is meant by different types of knowledge. According to Kant, there are statements that have a universal quality (i.e., the a priori) and statements that are empirical observations of singulars (i.e., the a posteriori). In the former (the a priori), a universal statement or determination is made that includes all possible entities referred to by the concept. One example of an a priori proposition

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5. Aristotle, The Metaphysics, trans. John McMahon (Amhurst: Prometheus, 1991), 66.
6. See also: Aristotle, The Metaphysics, 71-85.
7. Immanuel Kant, Prolegomena to any Future Metaphysics, trans. Gary Hatfield (New York: Cambridge), 5-6.

would be "all men are rational animals." In this proposition, a universal statement has been proclaimed about any currently or possible existing man.[8]

This is contrasted with the a posteriori statement in which a singular existing entity is referred to. An example of this style of proposition would be "this table is square." In this statement, the nature of tables in general is not referred to but rather a quality of this particular table.

These categories could also be paired with the further categories of synthetic and analytic statements. An analytic statement is one in which the subject of the proposition has included within it the predicate with which it is adjoined. An example of an analytic statement would be "all bachelors are single" because within the concept of bachelor the quality of being single is already explicitly assumed. The other type of statement is the synthetic statement in which what is predicated of the subject is something that is not explicitly contained within the concept with which it is joined. An example of this type of statement would be "seven plus four equals eleven." In this statement, the concept of eleven is not contained within the concepts of four or seven; something new is being said about the subject.

These categories of a priori/a posteriori and synthetic-analytic yield four combinations: analytic-a priori, analytic-a posteriori, synthetic-a posteriori, and synthetic-a priori. For Kant, it was this last category that true philosophical knowledge consists of as the synthetic-a priori statement is universal in nature and does not tautologically repeat whatever concept/predicate is contained explicitly with the subject. This was the genesis of the main question for all philosophers following in the footsteps of Kant: how do we seemingly attain knowledge of universals when we, as Hume thought and Kant agreed, only have (in one sense) experience of singulars?

This is where Kant's famous "Copernican Revolution" in philosophy occurred. In this theory, Kant shifted the direction of the formation of thought from knowledge as passive receptivity to the necessity of the objects of knowledge as being created by the mind of the inquirer. Presupposed in this theory was the Lockean concept of mind as an "internal screen" of sorts that projected to the ego the input or data from the senses. While Locke assumed constancy between the "external world" and the sensations "inside" the mind, Kant saw no reason to do so. One important reason for this is the fact that there is no way of investigating whether or not the world is as it is outside of our perceptions if our "internal" perceptions are all we can truly know.[9]

Because of this, Kant shifted the structuring element of reality from things in themselves to the human mind. For Kant, it was the mind that contained within itself the structures that made perception possible. The various structuring categories that Aristotle listed (quantity, quality, relation, etc.) that once were considered properties of things themselves were now posited as structures in the mind. Space and time were completely reduced to basic intuitions of the mind. Instead of being structures that were the order of the world, they became mental acts/intuitions that constitute or construct the world. Metaphysics, as the study of being qua being was practically reduced to studying the so-called a priori structures of the mind (psychologism). An unbridgeable gulf, theoretically speaking, thus emerged between thought and world. Because of this perceived gulf, the very idea of the achievement of knowledge became threatened because of the lack of direct access to the world.

These reasons, taken together, can be viewed as the starting point for the disintegration of philosophical thought into post-modernity, whether it is the post-modernity of Nietzsche and his family of followers or the scientism of Ayer and the other positivists. While the former of these two groups generally related more to our inability to achieve genuine philosophical knowledge of reality at all, it was the latter type that sought philosophical truth with a scientific (the physical sciences) methodology. It was primarily these two groups that the phenomenological movement sought to respond to in its restoration of philosophy.

Edmund Husserl and the Origin of Phenomenology

Such problems formed the background for a young German mathematician-philosopher named Edmund Husserl when he sought to discover the basis of logic. Husserl wanted to find out where the inner necessity of logical concepts could come from and began to notice that the then-current Kantian-influenced strains of psychologistic philosophy could not ultimately or even adequately explain the necessity of such truth concepts. For example, if the mind is that which structures the world (and thus truth) then how could one explain the truth value of that statement (that the mind structures truth) in the first place?

To accomplish his goal, Husserl adapted the first-person introspective experiments of Gestalt psychology. He sought to eliminate philosophical confusion by returning to "the things themselves," which he refers to as any phenomenon insofar as it is given to experience. This is important because, ultimately, our knowledge of the world comes from our experience of it, even if the idea of experience is much broader than some would be willing to recognize. In this sense Husserl sought to come to a direct intuition (intellectual apprehension) of the source of and evidence for the concepts/problems he was investigating. Through his method, he wanted philosophy to receive a fresh start.

With much hope and promise, Husserl thought the phenomenological movement had started to unravel the supposed problems and pseudo-problems of philosophy. However, the movement quickly fractured off into various schools such as the existentialists (e.g., Sartre, Merleau-Ponty, and De Beauvoir), the realists (e.g., Von Hidebrand, Scheler, and Stein), and the hermeneutic school (e.g., Ricoeur, Gadamer, Heidegger). While all of these schools have made their own unique contributions to phenomenology,

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8. See also: Immanuel Kant, Critique of Pure Reason, trans. J. Meiklejohn (Amhurst: Prometheus, 1990), 1-18.
9. Robert Sokolowski, Introduction to Phenomenology, 8-11.

my reading and analysis is primarily influenced by the realist school as I believe it most clearly exemplifies, in one sense, a faithful continuation of Husserl's original vision for the phenomenological movement.

The Phenomenological Method

However, before proceeding with criticisms and responses to Kant and the positivists, it would be prudent to lay out the method that Husserl himself developed in order to proceed with his investigations. The method that Husserl developed was a series of steps that carefully sought to eliminate observer bias as much as possible and to increase the precision and objectivity of the reported experience. This set of methods is also known as the phenomenological reduction.

The first step of the method is called the "epoche." The epoche is a backing away from the standard way of mental participation in the world in which assumptions are (as best as is possible) left behind. This is the theoretical term that Husserl used to describe the theoretical openness held in contrast to the systemic constructions of certain contemporary analytic philosophers, as mentioned before. It refers to a sort of temporary suspension of belief in any feature of a phenomenon being any more essential that the other. In this sense, the observer equalizes all experienced phenomena as much as possible. Again, this is important because of the fact that it is easy for any observer to bring their prior assumptions about the essences of certain phenomena to bear on a situation or to unjustifiably limit the scope of essential possibility from the outset.[10]

An example of unintentionally bringing bias into an analysis would be if two individuals were analyzing a wire pyramid (one of the individuals being an ancient Egyptian who knew nothing of geometry, and the other being an ancient Greek geometrician who knew nothing of Egyptian pyramids) and a third individual asked them to describe the pyramid. The

observers would likely answer differently. While the former observer would undoubtedly bring religious beliefs about pyramids to bear on the analysis of the phenomenon, the geometrician would probably consider it as a teaching tool with his background as a mathematician. The problem is that both of these individuals have, in a way, already decided from the outset the essence of the wire pyramid because of the system of beliefs that they brought to bear in analyzing the phenomenon. The basic function behind the epoche could basically be described as performing the task of keeping the phenomenological observer's mind open so as not to exclude any phenomenon, possible data, or aspects of reality.

Related to this is the idea that phenomenological observers must, in light of this openness, describe what they are seeing to the best of their ability and not simply state what the phenomenon is right from the start: To state definitively what its essence is violates the principle of the epoche and the openness to evidence that it is supposed to engender. For example, if one were asked to give the essence of the color black, they would probably get a variety of responses from the observers. These answers would probably include black as either a color or the absence of color. However, if one were to point at a black object and describe it, they would probably respond simply, "black." In this way the difference between describing and defining can be seen as vital to the possible richness of things themselves.[11]

The next step of the phenomenological reduction is related to the first: the phenomenon must be apodictic in its appearance. In other words, the phenomenon must be certain in appearance, even though the observer might not be certain as to what is exactly appearing before him. For example, if one were to observe and describe a coat and hat on a rack at the end of a dim hallway, he must only describe the phenomenon as it certainly appears to him; namely, as a phenomenon that presents itself in the appearance of either a person cowering in

the hallway or as simply a hat and coat on a rack. This openness is important because, in a way, all of these features belong to the essence of the phenomenon. However, it is important to note that this reduction is simply a tool that will assist in maximizing the observed richness of the phenomenon and that assessing which aspects of the phenomenon are most essential will come much later in the process.

The feature of the process that follows the initial reduction is known as the phenomenological variation. In this method, as many different variations as are practical are performed on the phenomenon. Throughout this search for variations, invariants are looked for that governs the perceptions of the observer. It is through this analysis of invariants that a sense of finality is achieved although for some phenomenon it is only a relative finality. Through this method several regularities and formal structures were indeed discovered by Husserl. However, before going into some of the particular findings of phenomenology, an examination of the theoretical attitude implied by this method of openness should be laid out in order to clearly realize its implications for philosophy.[13]

The Phenomenological Attitude and the Domain of Evidence

As implied by its name, phenomenology is, tautologically, the study of phenomenon. In Husserl's view, this means literally any phenomenon insofar as it is given in perception. Any phenomenon such as religious experience, logic, or emotions may be evidence insofar as it is directly intuited (beheld or apprehended) by the one investigating. This feature is highly and purposely emphasized in order to keep a genuine openness so as not to exclude any possible data which could reveal something about reality. It is an openness akin to the ancient view of our ability to step back and look at the world in its totality.

In this way, phenomenology could be described as a radical empiricism, in

10. See also: Don Ihde, Experimental Phenomenology: An Introduction, (Albany: SUNY, 1986) 32.
11. Don Ihde, Experimental Phenomenology: An Introduction, 34.
12. Don Ihde, Experimental Phenomenology: An Introduction, 33.
13. See also: Robert Sokolowski, Introduction to Phenomenology, 179-180.

the sense that the definition of what is considered to be valid empirical evidence is not arbitrarily limited as it is in some systems of philosophical thought (such as that of the positivists). In logical positivism, as exemplified by A.J. Ayer, a statement can only be meaningful if it is either (1) empirically verifiable or (2) a logical tautology (analytic a priori statement); that is, a statement where the predicate is contained within the subject (i.e., All bachelors are unmarried: the concept of bachelor already references the state of not being married).[14]

The point made against this notion by phenomenologists is that the largely physical-centered criteria of empirical evidence that the positivist uses implicitly assumes that the only kind of verifiable existence is of the physical. The phenomenological criticism of this first point is important because it reveals the generally arbitrary and non-necessary character of the positivist notion of the empirical. By outlining what the domain of suitable or valid evidence is, the positivist assumes the very point that they are attempting to prove when they attack metaphysical notions.

One other example that would be helpful in illustrating the positivist assumption is an analysis of the foundational character of the logic that positivists assume in any analysis that they give (in particular the principle of non-contradiction: that something cannot be true and non-true in the same sense and at the same time). According to their own principles of "empirical observation" positivists would be wholly unable to ground the very logic they depend on for their system of thought because logical "entities" cannot be analyzed in the way that contingent physical features can be analyzed.

One further point that follows from this in regard to the second criteria of positivism is the fact that the principle of non-contradiction is not itself an analytical statement: it is synthetic. In the statement that "(A) cannot be (non-A)," the concept of any being does not explicitly

contain within itself reference to its own negation (to what it is not). This statement conditions all of our thinking about any possible conditions of reality. Because of this, the aforementioned proposition, while existing as a material element of existence, must also subsist as a formal element that reaches out to all real and possible beings.[15] This is important to note as this is a basic axiom to be accepted and intuited if the life of reason is to be entered at all. To enter into any rational discussion or discourse is to implicitly assume the universal validity of the principle of non-contradiction.

The basic character of the phenomenological objections could be phrased as follows: why should topics such as metaphysics or ethics be considered any less real because they are not able to be verified in the way that a physical object can be by an "objective" party of observers? While it is, admittedly, difficult to verify logical and metaphysical phenomenon, it only can be prejudicial towards the search for truth if all possible evidence is not taken into consideration. This inquiry becomes truly philosophical when the categories of acceptable evidence are broadened to include anything that appears to the observer. This is the attitude that early thinkers had when they viewed philosophy as a stepping back from the world to be able to view it in its totality. As shown in the next section, the findings of this method and attitude have cleared away much of the ambiguity that surrounded much of the critical problem in modern philosophy.

Some Specific Findings: Objections, Responses, and Implications

The plan for this philosophical method was simple: with the phenomenological reduction in play, the phenomenologist was to seek out the invariant features in experience (i.e., essences) that characterized it or appeared in it. When this was done, one phenomenon quickly started to re-occur as basic: intentionality. By this term, Husserl referred to the idea that all of our thoughts or perceptions were about something. Husserl acquired

this idea of intentionality from his teacher Franz Brentano, who in turn acquired this notion from the tradition of Aristotle and his medieval followers. This idea states that all of our experiences (thinking, willing, etc.) are always about something.[16]

With this, Husserl noted that there is a basic shape to experience: the object perceived and the accompanying act of perception which invariably and necessarily accompanies the object. He termed the object of perception the "noema" or "noematic object," and he termed the mental act of disclosure the "noesis" or "noetic act." In this basic structure of intentional consciousness, the self or ego is only implicitly assumed as the bearer of experience and is not a direct object of "introspection."[17]

Superficially, this observation of intentionality perhaps seems rather dull and unnecessary until one begins to unpack all of what is implied by this statement. According to Locke and Kant, what we are directly aware of is an image in our consciousness. However, if one were to thoroughly analyze his or her experiences of phenomenon, an experience of pure consciousness would nowhere be encountered, but only the things themselves. Because of this, the theoretical doorway from our minds to the world is demolished; the bridge between mind and world is revealed as a pseudo-problem. Knowledge is once more theoretically viable because of the bridging of mind and world.

Another piece of evidence against Kant would be the phenomenological experience of the logically objective nature of Kant's claims. For example, if the limits for truth are the a priori structures of the mind, then there is no way Kant could objectively make that claim, for then the logic that he uses would be above and prior to his mind, ontologically speaking. Again, if all that can be (in terms of knowledge) is what the mind forms, then describing the nature of the mind would be impossible to objectively do. This phenomenon of experienced truth in that case does not at all match up with what Kant has said about

14. A.J. Ayer, Language, Truth, and Logic (New York: Dover, 1952) 5.
15. Dietrich Von Hildebrand, What is Philosophy? 84-85.
16. See also: Robert Sokolowski, Introduction to Phenomenology, 8-16.
17. See also: Don Ihde, Experimental Phenomenology: An Introduction, 43-50.

the nature of how the mind conditions truth. In this aspect, Kant's theory does not match up with what presents itself to the mind of the honest phenomenological observer. In this way, knowledge is observed to be a passive receptivity in which we receive knowledge in accordance with our attentiveness to the phenomenon.[18]

However, while the aforementioned evidential phenomenon supports the phenomenological position, there are some phenomenon that support other theories of the mind. One example that could imply a Kantian model of the mind would be hallucinations. The question could be posed as such: if we truly experience the world as it is, then how does one explain the nature of hallucinations (which are implicitly assumed as not truly of the world). However, there are equally suitable explanations for hallucinations that lend themselves just as much, logically speaking, to a direct realist model of consciousness (wherein we directly behold the world as it is) as postulated by ancient and medieval philosophers. As such, there is not truly as much reason to consider mind as separate from the world, especially if our conscious experiences of the world are inseparably and intentionally related to it.

The objection could still be made against phenomenology that one cannot see and verify the universals that we use in logic and as such must exclude them. However, this line of objection exemplifies the type of automatic exclusion that the openness of the epoche was designed to create. Because we experience universals or logical principles as somehow or another "in the world," then philosophical patience, attentiveness, and diligence become required to delve into their secrets, rather than an automatic exclusion of relevant information that could provide genuine insight into the true nature of things just because they do not fit into a pre-constructed paradigm. Truth is something that gains its meaning from the fact that it is not all revealable at the same time. There is often the implicit assumption that whatever is knowable must be something which is accessible to everybody at every time, which is not necessarily the case.

Another line of objection concerns the justification of beliefs about the nature of the mind and world. How can one justify the basic principles of experience, phenomenologically speaking, with something beyond the experience of reality if one is not to head into an infinite regress? There often seems to be theoretical grounds for doubting our perceptions (in the manner of Descartes even).

One answer would be that, as the ancients thought, there must be something self-justifying about our experience of things in the world. It would also be accurate to state that the kind of surety that such objectors require is not even possible, in principle, because of the fact that truth or its justification is not something that can be taken by force or possessed as a mere object in the world. In addition, the discovery of deception implies that a certain truth relating to the actual state of affairs has been intuited. The apprehension of entities comes prior to any other intellectual stance that one can take toward them. In this way it can be seen how any organized attempt to doubt apprehension is futile, as any attempt to doubt an object pre-supposes its prior existence.

Phenomenology as the Continuation of the Classical Notion of Philosophy

Throughout all of the phenomenological objections put forward against some modern philosophies, one general trend exists: namely, the idea that the ability to participate in the world is knowledge. To even begin rational discussion, our ability to achieve truth is implicitly assumed. Because of these ideas and findings of phenomenology, the debris caused by several centuries of philosophical rubble is cleared in order to let philosophy flourish as it was originally formulated. This is not to say that the movement has generated solutions to all of the philosophical problems out there; there is much yet to be solved. I believe that it is only the case that phenomenology has cleared a pathway for future contributions to the field. Again, the tools of phenomenology are not strictly

meant as a new way of doing philosophy but rather as a much clearer expression and development of what it was originally intended to be.

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18. Dietrich Von Hildebrand, What is Philosophy? 13-25.

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War and Economy

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Introduction

War has historically been and continues to be one of the costliest endeavors for citizens, governments, and states. Countless lives are lost in war, and civilians make up the majority of war casualties (UNICEF, 1996). In 2011 over 26 million people were displaced from their homes due to war, many of them children (Internal Displacement Monitoring Center, 2012). Although current data is unavailable, from 1986-1996, at least 2 million children lost their lives in wars, and around 5 million more were maimed or permanently disabled (UNICEF, 1996).

There are direct and indirect impacts on the economies of states aside from the loss of life and the incidence of disability. Among these are military expenditures, the loss of physical capital, destruction of infrastructure, the decline of internal and external investment, and the opportunity costs associated with war spending that by necessity decreases government spending in other areas of the economy, unless the war in question is financed entirely through taxation and/or borrowing. The question of whether or not these costs are associated with a decline in economic growth is unresolved in the literature.

This paper addresses two questions: How does the cost of war as measured in increased military spending (Milex) affect the economies of nation-states? How does this cost affect short- and long-term economic growth? The theoretical prediction is that there will be an initial positive association between war and economic growth which will eventually plateau and shift to a negative relationship. When war occurs, there may initially be an increase in internal investment and production. However, war may also create uncertainty within markets and eventually discourage investment (Mintz & Huang, 1990). Additionally, there may be a retraction of other sectors of the economy in response to the expansion of the defense sector, and this might impact growth positively or negatively (Marwah & Klein, 2005).

War and Economy

Historically, war has been believed to be of benefit to states, economies, and the advancement of humanity. In 1891, S.B. Luce contended:

War is one of the great agencies by which human progress is effected. Scourge though it be, and much as its practice is to be deplored, we must still recognize war as the operation of the economic laws of nature for the government of the human family. It stimulates national growth, solves otherwise insoluble problems of domestic and political economy, and purges a nation of its humors. (Luce, 1891, 672)

Conventional wisdom holds that once all tokens are cast, military expenditures and war stimulate state economy. This idea in part hails from the World War II era, when America emerged from the Great Depression as a buttress of the European nations and Russia (Blattman & Miguel, 2009). As economists Stiglitz and Bilmes (2008) point out, "There was a problem of insufficient demand… World War II created a demand for tanks and armaments; the economy ran at full steam; everyone who wanted a job could get one-and the war even demanded that those who could work two shifts did so" (Blattman & Miguel, 2009, 115).

However, there is evidence that war has the potential to harm economies as well. Poast (2006) describes this apparent contradiction as "The Iron Law of War" (21). He theorizes that war is only economically beneficial to a country under certain conditions:

When that country has slow economic growth and low use of resources prior to the war; when there are large and sustained government expenditures during the war; when the war is not local, is of moderate duration, and is financed responsibly. (21)

This is in line with Stiglitz and Bilmes' claim that insufficient demand prior to WWII helped create the economic conditions that made the war effort fruitful for America. However, the effects on the European economy after the World

Wars were negative and differed from the American experience (Milward, 1970).

Economic Growth Theory explains that war can be expected to affect economies in such ways as depleting human capital and physical capital stock, increasing or slowing the development of technology, strengthening or weakening existing institutions, and affecting prices by raising the cost of capital. After a war, political and economic uncertainty has the potential to increase perceived risk and decrease expected returns, leading to shorter investment horizons. This in turn may reduce investment and raise the cost of capital (Blattman & Miguel, 2009).

There are also social and structural changes that are in part or fully a consequence of war. They are beyond the scope of this paper, but deserve mention. A primary example is the change in the productive capacity and the technological landscape of the United States after World Wars I and II. Productive capacity rose astonishingly, while there was a boom in technological advancement:

Many were completely new industries of great importance for the future.…The development of radio receivers, of nuclear fission, of radar, of better tractors, of the jet engine, of new alloys, of optical glass, of measuring tools, of synthetic materials, of electronic computing and control systems and of a wide range of therapeutic drugs were all due largely to research for military purposes. (Milward, 1970, 35)

There was also an increase in the cooperative efforts within Europe after WWII, most particularly between France and Germany. Cooperation was not only a by-product of the quest for unity, the devastation in Europe after the war was so great that the road to quickest recovery was through cooperation in industry and a free flow of trade, as well as American support (Marwick, 1974).

Additionally, the Second World War helped to create the conditions under which American and Russian interests increasingly clashed. A decimated Europe laid the groundwork for the Cold War and a focus of the United States on containment, having raised American concerns about Russian influence in the region. The effects of the cold war on the lives of Americans were various and pervasive; fallout shelters and the fear of a nuclear war with Russia was an immense part of American existence (Marwick, 1974).

Internal disturbances within a state that might approximate war effects are political instability and regime change. Alesino, Ozler, Roubini, and Swagel (1996), found that in countries and time periods with a high degree of political instability, growth is significantly lower than otherwise.

There are both direct and indirect costs of war, as described by Arunatilake, Jayasuriya, and Kelegama (2001) in their analysis of the cost of the civil war in Sri Lanka. Direct costs of war include the military costs borne by the government, costs of damage to physical and social infrastructure, damage to capital assets and land, and the costs of providing for the displaced and disabled. The total direct cost of the war in Sri Lanka from 1987 to 1996 was calculated at over US\$ 6 billion or 61.9% of Sri Lanka's GDP in 1996.

Indirect costs included lost income due to the loss of human capital, forgone investment and foreign investment, and lost income from reduced tourism. The research found that government military expenditure had a negative and significant effect on investment in the long run, suggesting that military spending decreased government investment. However, this reduction seemed to have no direct effect on economic growth in Sri Lanka (Arunatilake, et.al., 2001).

Marwah and Klein (2005) sought to uncover the "hidden costs" of military expenditures through their macroeconomic analysis of the impact of military expenditures on productivity for the Southern Cone of Latin America from 1971-1990. The results indicate that each country's productivity and growth is impacted negatively by its military spending, with the loss of growth varying from 4.8% to 17.3%.

The effects of military expenditures on economies have been examined and some findings suggest that although defense expenditures do not affect growth directly, there is an indirect and delayed negative effect of expenditures on growth (Mintz & Huang, 1990; Stroup & Heckelman, 2001). In the long term in the U.S. (at the minimum, five years), lower military spending encouraged investment, which promoted growth, while higher military spending eventually crowded out investment, thereby reducing growth (Mintz & Huang, 1990).

An analysis of the relationship between international wars, civil wars and income per capita is provided by Sevastianova (2009). Correlates of War (COW) data is used to measure war incidence and duration in a cross-section of 90 countries during the period 1970-2000. One, two, and five-year intervals are examined to establish the relationship between war and growth. Sevastianova finds that war tends to reduce income growth on average. Civil war has a negative effect in almost all cases, while the findings regarding international war are more complex-- the negative effects of war are greater in the short run (six month and one year intervals) than in the long run (five year intervals).

Conversely, in an examination of 114 countries, Koubi (2005) determines that the average rate of growth in per capita real output over the period 1960-89 was influenced by both inter-state and civil war. Koubi also explains how growth over the period 1975-89 was affected by the wars that took place in the previous period (1960-74). When all types of war are included, this research suggests that there is a positive relationship between war and long-term growth: the greater the duration and severity, the higher the subsequent growth, while contemporaneous growth is negative.

Analyzing a data set of 158 countries from 1960 to 2000, Yamarik, Johnson, and Compton (2010) study inter-state wars as well as incidents of "Use of Force" by examining 1,463 conflicts. A fatality weighted variable for conflict is constructed as well as independent variables that address levels of fractionalization, democracy, and rule of law, among others. The regression, using the dependent variable of real GDP per capita, finds that a one standard deviation increase in fatality-weighted conflict results in an average reduction in real GDP per capita of between 0.09 and 0.14 of a standard deviation. The authors claim that war permanently alters the economic potential of a country.

It is reasonable to conclude that a

variety of factors influence and mediate the effects of war on economic growth. Some ways in which the effects of war might vary include the size of the state economy prior to the war, the type of war, whether or not the war is waged on home territory, how the war is financed, and the severity and duration of the war, to name a few. Clearly, more research is needed in order to determine what variables mediate war effects, and how, especially in regard to economic effects of war.

Research Design

This paper examines the effects of increased military spending during civil and international war on the economies of 71 countries from 1956 to 2007 through a quantitative analysis of existing Milex data. Observations of changes in military spending before, during, and after war are made and compared to changes in the dependent variable of GDP per capita growth within nation-state economies. Only countries that experienced one type of war during the observation period were used in the statistical analysis.

Thirty-nine countries experienced inter-state or extra-state war, while 32 experienced civil war. The average duration of a war in the sample was 36 months. Inter-state and extra-state wars are treated identically for the purpose of this paper. This is justified on the basis that extra-state wars function very similarly to inter-state wars in regard to the state that is a system-member, and only system-member states are examined.

All definitions of war are those used by J. David Singer and Melvin Small for the Correlates of War (COW) project (Sarkees & Wayman, 2010).War is classified by COW as sustained combat between or among military organizations involving substantial casualties of 1,000 deaths. Inter-state war is defined as a war wherein two members of the inter-state system are engaged in combat. Extra-state war is defined as the involvement of a system-member state in combat with a political entity that is not a recognized member of the system. This may be a state that has not yet been recognized, or a non-state entity. Extra-state wars are fought outside the system-member's own territory (Sarkees & Wayman, 2010, 41-42). Civil Wars are defined as armed conflict that involves military action inside state borders between the national government and an entity within its borders. There must be effective resistance by both sides, and it must incur at least 1,000 battle deaths during each year of the war (Sarkees & Wayman, 2010, 43).

This cross-sectional Ordinary Least Squares multiple regression analysis consists of four independent variables and two dependent variables; units of analysis are countries at war. The independent variables are: total population of a state prior to the war as a control variable for state size, duration of the war as defined in months, cost of the war as defined in military expenditures or Milex, and battle deaths. Independent variables are necessarily restricted to the most meaningful due to the small sample size.

Data for the total population variable was gathered from the Penn World Tables, version 7.0 (2006). Data for cost (Milex), duration, and battle deaths were drawn from the Singer and Small COW project dataset version 4.0 (1994). Number of battle deaths are defined by COW as deaths of military personnel only and do not include the deaths of civilians. It is exceedingly difficult to locate reliable data regarding civilian casualties.

The cost variable requires some elaboration due to its complexity. Cost is defined as the direct cost of the wars as reflected in military spending. Milex spent during the war period was observed and compared to pre-war spending. For wars of one year or less, the second year before war began was used as a baseline for pre-war spending. For wars two years or longer, the four-year pre-war average was used, excluding the last year before the war began. Cost was derived from observed differences in spending. Negative cost, or a decrease in spending during a period of war, eliminated a state from the cost variable, and those cases were not observed in the model.

The first dependent variable is defined as short-term change in economic growth. This is measured by observing per capita GDP growth during the war period, then finding the difference between the average rate of growth during the war period and the average rate of growth during the five years prior to the war. The second dependent variable is defined as long-term change in economic growth, measured via the difference between the five year post-war average rate of growth and the five year pre-war average rate of growth. Data for the dependent variables were obtained from the University of Groenengin's Angus Maddison database of World Per Capita GDP (2003).

The sample size was affected by the strict inclusion criteria used to control for contiguity, as well as by the missing data for the variables of cost and battle deaths. Countries at war that experienced a simultaneous war of a different type were excluded, as were countries that experienced a war at any time during the five-year pre-war period or the five-year post-war period. This was necessary in order to observe the effects of a single war on the economic growth of a state during war and after war, while avoiding the distortion caused by the observation of multiple wars.

Results

There are no significant relationships observed between the independent variables and either short-term economic growth or long-term economic growth in the OLS multiple regression analysis. No linear relationship between the response variables and the parameters was observed. Because of this, we needed a way to descriptively explain the association between the variables. A table 1 displays Pearson's correlation for all wars across the entire sample and describes the relationship between the response variables and the parameters as well as the relationship between parameters.

TABLE 1- War Variables and Economic Growth All War-Pearson's Correlations

Independent Variable	*Short-Term Growth*	*Long-Term Growth*	*Population*	*Duration*	*Cost*	*BD*
Population	.095	-.061	1	-.145	-.062	.076
Duration	.002	.123	-.145	1	.295*	.180
Cost	.101	-.008	-.062	.295*	1	-.146
Battle Deaths	-.147	.059	.076	.180	-.146	1
No. of Observations	68	60	70	68	68	56

*denotes significance level of *p<0.05

We computed the OLS correlations (Pearson's Tables 1-3) and three significant relationships were observed. Within the first table above, cost and duration are significantly although weakly correlated. Table 2 describes the effects of inter-state and extra-state war, and an identical but slightly stronger correlation is observed.

TABLE 2- War Variables and Economic Growth Inter-state and Extra-state War-Pearson's Correlations

Independent Variable	*Short-Term Growth*	*Long-Term Growth*	*Population*	*Duration*	*Cost*	*BD*
Population	.000	-.172	1	-.170	-.116	.361
Duration	-.109	-.103	-.170	1	.380*	-.196
Cost	-.012	-.096	-.116	.380*	1	-.195
Battle Deaths	.135	.171	.361*	.196	-.195	1
No. of Observations	37	29	37	37	37	34

*denotes significance level of *p<0.05

Finally, within the third table that describes civil war effects, there is a moderate correlation observed between the duration of the war and increases in fatalities.

TABLE 3- War Variables and Economic Growth Civil War-Pearson's Correlations

Independent Variable	*Short-Term Growth*	*Long-Term Growth*	*Population*	*Duration*	*Cost*	*BD*
Population	.233	-.013	1	-.051	.115	-.186
Duration	.106	-.308	-.051	1	.334	-.529*
Cost	.146	-.074	-.115	.334	1	.190
Battle Deaths	-.062	.167	-.186	.529*	.190	1
No. of Observations	31	31	31	31	31	22

*denotes significance level of *p<0.05

Several interesting trends were observed utilizing paired t-tests (See Paired Sample Tests Tables 4-6). In Table 4, an average decrease in growth for all countries during all types of war (short-term growth) of 1.223 percent did not reach significance, but was observed at the .08 level. No change in long or short-term growth was observed for countries that waged inter-state and extra-state war (Table 5). GDP was observed to decrease significantly during civil war at the .009 level at an average of 3.495 percent (Table 6). However, during the 5 year postwar period after civil wars, no significant decreases in growth were observed.

TABLE 4- Paired Samples Test-All Wars

Difference Variable	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
AW Milex-BW Milex	61	3134961.37	1.085E731	2.2561	60	.028*
AWGrw-BWGrw (long-term growth)	60	602	4.397	1.061	59	.293
WarGrw-BWGrw (short-term growth)	68	-1.223	5.729	-1.76031	67	.083

*denotes significance level of *p<0.05

For all types of war, described in Table 4, there was an increase in Milex that predictably occurred during war, but that continued to climb in the postwar period. This finding was significant at the .028 level. The 95% confidence interval suggests that the increase is between 2.2% and 36.6%. By taking the mean difference between the post- and pre-war period and dividing it by average pre-war spending, it suggests that on average this upward trend was 19.4% more than the pre-war average. This effect was more pronounced with civil wars (.044) than with inter-state wars (.057); significance was lost when civil wars were removed.

It is worth noting that countries that experience civil war are generally lower in income than countries that experience inter- or extra-state war (Cerra & Saxena, 2008; Sevastianova 2009). Further investigation of long-term increases in military spending in lower income countries versus higher income countries could shed more light on the economic impacts of such spending.

These longer-term increases in Milex lend credence to the idea of the "ratchet effect" of military spending, which states that defense spending that rises during a war does not appear to return to pre-war levels (Diehl & Goertz, 1985). This suggests that the incidence of war stabilizes defense spending at a higher level, possibly reflecting a tendency for the defense sector of a state to resist retraction once it is expanded. This, by logical necessity, would mean a retraction within other sectors of an economy and an increase of the dependency of an economy on the defense sector.

There was an average decrease in short-term growth for all states (average growth during war). Using a simple t-test, it was observed that GDP per capita decreased by 1.2%, significant at the .04 level (Table 4). For all states, when pre-war growth was compared to post-war growth, there were no significant changes. However, when states experiencing civil war were examined independently, it was found (via t-test) that GDP per capita decreased during war-time by 3.5% on average, significant at the .009 level (Table 6).

TABLE 5- Paired Samples Test-Inter-state and Extra-state War

Difference Variable	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
AW Milex-BW Milex	33	4966899.667	1.443E7	1.977	32	.057
AWGrw-BWGrw (long-term growth)	29	1.195	3.451	1.865	28	.073
WarGrw-BWGrw (short-term growth)	37	.680	3.497	1.183	36	.245

*denotes significance level of *p<0.05

TABLE 6- Paired Samples Test-Civil War

Difference Variable	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
AW Milex-BW Milex	28	975891.250	2442227.405	2.114	27	.044*
AWGrw-BWGrw (long-term growth)	31	.048	5.123	.052	30	.959
WarGrw-BWGrw (short-term growth)	31	-3.495	6.988	-2.784	30	.009*

*denotes significance level of *p<0.05

This paper examines only the effects of increased government expenditures due to war on nation-state economy; there are many other avenues by which war can affect an economy either negatively or positively. Warfare can affect economies through massive loss of life, the destruction of physical infrastructure, increasing or slowing the development of technology, strengthening or weakening existing institutions, and affecting prices by raising the cost of capital. Additionally, the flow of refugees and illicit trade in drugs and arms stimulated by war are harmful not only to the states of origin but to the regions the states occupy (Blattman & Miguel, 2009).

All of this being said, there are many avenues by which an economy can be affected other than through the phenomena of war. Economic policies that boost production may induce further investment in physical capital and in human capital through education. Endogenous growth theory emphasizes the commitment to research and development and its positive effects on growth, as well as the many channels through which investment can influence levels of productivity and growth (Barro & Lee, 1994).

Many factors have the ability to negatively affect growth: low levels of physical capital investment or human capital investment (education, health care), and market distortions due to a variety of causes such as political instability or economic and capital market policy (Barro, 1991; Barro & Lee, 1994; Alesina, et al., 1996). A country may also experience economic decline due to financial crises (Cerra & Saxena, 2008) and natural disasters (West & Lenze, 1994).

Conclusion

This paper examines the relationship between cost of war as quantified through increases in Milex, battle deaths, duration of war, and the economic growth of states, as well as how that relationship changes over time. There were no significant correlations observed in the multiple regression analysis and no linear relationship was observed. After the Pearson's coefficients were computed, three significant relationships were observed.

For all types of war (Table 1) across the entire sample, cost and duration are significantly although weakly correlated. In regard to inter-state and extra-state war, an identical but slightly stronger correlation is observed (Table 2). Finally, concerning civil war effects, there is a moderate correlation observed between the duration of the war and increases in fatalities (Table 3).

In addition, some interesting relationships were observed after the computation of several simple t-tests. A significant decrease of 1.2 percent in average short-term growth rates (during war) occurred over the entire sample (Table 4). Military spending increases that occur during war may not return to pre-war levels, signifying a greater reliance on the military sector within state economies post-war. The average increase in Milex post-war was 19%. This effect was more significant for civil (.044) than for inter- or extra-state wars (.057).

This analysis is limited by sample size, and further research that uses methods that continue to control for the contiguity of conflicts while allowing for a larger sample size with greater depth may yield more information about the effects of war on economies. The sample could be enlarged by obtaining data on countries at war before 1960. In the present model, there are no significant relationships observed between increases in military expenditures during times of war and negative or positive growth in the economies of states.

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Philosophy's Contribution Toward Learning Beyond Specialization

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Introduction

The relationship between education and philosophy has changed dramatically between ancient and contemporary eras. In the ancient era, educated citizens were encouraged to practice philosophy as a way of life. Today, in American public higher education, philosophy, as well as other disciplines within the humanities, are classified as less practical and efficient. Therefore, philosophy's low job-market value renders a slim job perspective for students, mainly because of the highly specialized and market-driven education system. Yet disciplines with higher market values, such as the STEM[1] fields and other professional programs, lack sufficient guidance on the maturation of philosophical capacities, which require deliberate effort beyond what specialized expertise or technical education offers alone.

The deficiency of philosophical development across the disciplines leads to the perpetuation of the enduring conflicts within American higher education, as these conflicts are traced back to the ancient era. Students across many disciplines are deprived of the opportunity in their fields to regularly exercise their philosophical capacities. Exercising philosophical capacities, such as argument analysis, logical reasoning, decision making, identifying assumptions underlying methods and beliefs, sympathetic understanding, and adroit perspective shifting can foster a transformative learning experience that improves the personal, social, ethical, and cultural dimensions, while enhancing the quality of professional life.

My observations of philosophy's present role within American public higher education led me to further investigate two conflicts that contribute to philosophy's marginalization and devaluation today:

1. Traditional vs. Progressive values in educational approaches.[2]
2. Specialized job training vs. Philosophical development (self development).[3]

These two conflicts are deeply rooted in the ancient era and have carried on into our present day culture, consequently distorting the common conception of philosophy in a way that misrepresents the nature and function of philosophy's prospective role in academia and the larger society.

In recognizing the shift in philosophy's role between ancient and contemporary times, I draw a comparison between ancient Socratic and ancient Confucian educational approaches that suggest that philosophy, as an activity or practice, can become integrated as a foundational component of American public higher education.[4] Through the examination of these two ancient pedagogies, I emphasize that the two conflicts that currently contribute to philosophy's marginalization and devaluation were present in ancient times as well. The purpose of showing that the two conflicts existed in the two ancient cultures is to demonstrate that historically, philosophical pedagogy has become a foundational component of educational approaches despite the presence of these two conflicts, without necessarily abandoning cultural traditions and practical skills. Furthermore, because

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1. STEM refers to the Science, Technology, Engineering, and Mathematics fields.
2. Martha Nussbaum, Cultivating Humanity: A Classical Defense of Reform in Liberal Education, (Cambridge: Harvard University Press, 1997). Pierre Hadot, Philosophy as a Way of Life, trans. Michael Chase (Massachusetts: Blackwell Publishing, 1995).
3. Jane Addams, Democracy and Social Ethics (Chicago: University of Illinois Press, 2002). Judy Whipps, "'Learn to Earn': A Pragmatist Response to Contemporary Dialogues about Industrial Education," The Journal of Speculative Philosophy 22, no. 1 (2008): 59-67.
4. In this version, I include only a brief version of the ancient Socratic and ancient Confucian comparison as an introduction to a larger work that I plan to pursue in the future. In the larger work, I will include a detailed comparative analysis that thoroughly covers the depth and details of both ancient approaches in isolation from one another through the themes of Purpose of Education, Teacher/Student Relationship, Leaning/Attaining Knowledge, and Teaching/Attaining Knowledge.

of the very fact that both Socrates and Confucius valued and implemented philosophical development within their education, I argue that the present conflicts in academia are insufficient explanations for philosophy's present state of marginalization.

I use Socratic inquiry, textual analysis, and comparative techniques throughout this exploration. Socratic inquiry has been the initial and underlying method that I practice. Asking myself what "philosophy" is, what "education" is, and attempting to understand the present relation between the two in relation to the past has led me to critically analyze and reflect on my culture, my education, and my career. As I live in these conditions, I find myself compelled to inquire. I use textual analysis for gathering data, in which I interpret works of previous scholars and philosophers in order to ground my inquiries and situate myself in the broad topics of philosophy and education. I use comparison techniques not only to elucidate the value differences between ancient Socratic and ancient Confucian education in both cultures, but also to reiterate that these value conflicts between learning practical skills and philosophical development, as well as traditional and progressive values, existed within ancient pedagogy.

Before I proceed, I will first provide a brief overview of the background and significance regarding my concern for philosophical development in American higher education. In doing so, I illuminate some early reactions to the enduring conflicts that have manifested within contemporary American educational approaches. From there, I move on to discuss the dynamics of the value conflicts within and between ancient Socratic and ancient Confucian educational approaches, which leads into a discussion of Pierre Hadot's interpretation of the isolation of philosophy within universities and the consequences of that shift in philosophy's role. After describing Hadot's distinction between philosophical discourse and philosophy itself, I turn my focus back to American higher education through Martha Nussbaum's discussion of Liberal Education's persistent emphasis on personal, social, ethical, and cultural development and its intimate relationship with philosophy. I deduce from Nussbaum's interpretation that the Liberal Education tradition in American higher education serves as a model for how philosophical exercises can become implemented across all disciplines, or in an interdisciplinary context, without having to specialize in the field of philosophy.

Philosophy's Role in American Public Higher Education

Since public education funding primarily comes from government subsidies, and the government prioritizes funds that have higher market value, "administrators see little option except to respond to the marketplace, for if their institution does not react effectively, it will not have the necessary resources to offer high quality and diverse academic programs."[5] With job placement as the educational priority and the funding priorities directed toward the STEM fields because of higher job market values, curricula focus on producing highly specialized experts through means of memorization and technical job training in highly competitive environments. Due to the conditions of the learning environment, along with the requirements of those disciplines, students lack proficient training in developing philosophical capacities that aim at self-development, which complement their professional development.

During the rise of American industrialization in the 19th century, Jane Addams, an American social activist and philosopher, witnessed the disparities between the educational requirements at the time and the social cooperative skills required for progressive, industrialized work.[6] Addams captures how cultural values affected educational priorities during the Industrial Revolution. In doing this, she implies that the traditional societal values of rural culture could not maintain the demands of the new, industrial conditions of city life: "The early ideal of a city that it was a marketplace in which to exchange produce, and a mere trading-post for merchants, apparently still survives in our minds and is constantly reflected in our schools."[7] Subsequently, Addams describes how the societal priority of meeting the nature and demands of the marketplace hinders the quality of education citizens receive, which in turn perpetuates classism and the priority of narrow, specialized education within the culture: "We [Industrializing American society] admire much more the men who accumulate riches, and who gather to themselves the results of industry, than the men who actually carry forward industrial processes; and, as has been pointed out, our schools still prepare children almost exclusively for commercial and professional life."[8]

Around sixty years after Addams shared her concerns about the effects of new city-life demands in the midst of industrialization on the one hand, and educational values on the other, American psychologist Rachel M. Lauer observed that public school education in the United States "does not yet include in its curriculum one of the most exciting subjects known to man: the subject of his own inner life—his own feelings, reactions, and desires."[9] A low priority of fostering self-awareness and social engagement in American public education moves Lauer to challenge educators' assumptions about the primary function of education and illuminate the conditions of the learning environment that arise based on those assumptions. She critiques the educators that teach "under the assumption that everything worth learning lies outside the learner."[10] Here,

5. Peter D. Eckel and Jacqueline E. King, An Overview of Higher Education in the United States: Diversity, Access, and the Role of the Market Place (Washington D.C.: Springer, 2004), 16.

6. Jane Addams, Democracy and Social Ethics (Chicago: University of Illinois Press, 2002), 81-97.

7. Ibid, 86.

8. Ibid. Addams uses the term "industrial," to mean cooperative endeavors rather than how we commonly use the term in reference to factory manufacturing today. See Marilyn Fischer's "Introduction" to Newer Ideals of Peace, vol. 3 of Jane Addams' Writings on Peace (2003).

9. Rachel M. Lauer, "General Semantics and the Future of Education," ETC; a Review of General Semantics, 24, (1967): 391.

10. Ibid, 393.

11. Ibid.

Lauer criticizes a learning environment that consists of memorization, independence, and competition. The denial of self-development and interpersonal awareness in education "actually defeats the schools' most avowed purpose, which is to develop cognitive competency."[11]

Philosophical Discourse Vs. Philosophy Itself

With philosophy limited in its own specialized field, along with existing value conflicts within public education, a common misconception permeates throughout society and in many quarters of its academic institutions that philosophy, as an academic discipline, is limited to theoretical discourse and absent of praxis in occupational settings. Pierre Hadot believes the distinction between philosophy as an activity and philosophy as an intellectual discourse originated in the Middle Ages, when universities were established for "professionals who train professionals."[12] Consequently, educational pursuits shifted from cultivating one's life in relation to one's studies to intellectual and professional training.

Isolated into its own discipline and confined to the scholarship of philosophical discourse within public higher education, philosophy continues to remain isolated from a large proportion of students and generates the common misconception that philosophy itself is the same as the philosophical discourse. Hadot's distinction between philosophical discourse and philosophy itself attempts to reconcile the misunderstanding that the two are synonymous. In doing this, he accentuates the significance of philosophy within and beyond academia.

Philosophical discourse consists of theoretical instruction, dialogue with others, self-reflection, and spiritual exercises regarding sub-disciplines such as logic, ethics, and metaphysics each distinct from the other with its own compilation of theories. In educational settings, distinctions between these sub-disciplines are necessary in order for professors to efficiently teach the material, yet the subject material may appear extracted and sometimes even irrelevant from everyday life. However, Hadot also emphasizes the practical function of philosophical discourse since it is often times categorized as useless speculation that sends interlocutors on an endless merry-go-round ride: "Discourse always has, directly or indirectly, a function which is formative, educative, psychagogic, and therapeutic. It is always intended to produce an effect, to create a habitus within the soul, or to provoke a transformation of the self."[13] In this sense, philosophical discourse can be understood as an exercise that facilitates a transformation of one's life outside of academia.

Hadot describes philosophy itself, or as a way of life, as "the existential choice of a certain way of life, the experience of certain inner states and dispositions."[14] In other words, philosophy itself does not refer to a distinct way of life separate from the life of, for example, a natural scientist, psychologist, or engineer. Rather, philosophy is what makes up human life, no matter what field of study or education level. Living philosophically entails living, testing, and adjusting the theories that guide one's everyday life, learned within but not limited to the discourse encountered in educational establishments. For example, instead of only "philosophizing" (or thinking) about ethical and logical theories, a philosophical way of life entails living an ethical and logical life, with frequent validity-checks in the process. The totality of one's choices, influences, and beliefs make up a philosophy, which in turn define one's character and overall quality of life. As humans, we all live a philosophy in the most basic sense, and refining our lived philosophies can substantially change the conditions in our world. Hence, philosophy itself is no less important to humanity than the importance of an individual's life philosophy to him/herself.

Hadot describes the general relationship between philosophical discourse and philosophy itself as incommensurable, yet inseparable.[15] In other words, although they are different by definition, in that the discourse is abstracted from common life experience, both still influence one another simultaneously. Philosophical discourse "justifies, motivates, and influences" the philosophical life.[16] Our discourses inform our lived philosophies, and our lived philosophies are communicated and justified through discourse.

Overview of Ancient Socratic and Ancient Confucian Education

Before the rise of the university and the specialized discipline of philosophy branched off into its own separate department, tensions had already existed between educating for craft expertise and education for self-development. In Book VII of Plato's Republic, Socrates proclaims, "Education isn't what some people declare it to be, namely, putting knowledge into the souls that lack it, like putting sight into blind eyes (518b-c)."[17] Here, Socrates refers to an educational environment where an authority of knowledge claims knowledge and transmits information to students through a series of lectures in which students learn theories and skills to be applied to a craft or expertise. Socrates displays a similar disposition in the Symposium when he says, "If only wisdom were like water, which always flows from a full cup into an empty one when we connect them with a piece of yarn."[18] Socrates' disposition reflects his criticism of the Sophists for assuming knowledge to be something that students can pay tuition for and be guaranteed to obtain through memorization, imitation, and manipulation.

The Sophists, who Pierre Hadot describes as, "Traditionally, people who developed an apparently philosophical discourse without trying to live their lives

12. Pierre Hadot, Philosophy as a Way of Life, trans. Michael Chase (Massachusetts: Blackwell Publishing, 1995), 269.
13. Pierre Hadot, What is Ancient Philosophy,? trans. Michael Chase (Cambridge: Harvard University Press, 2002), 176.
14. Ibid, 173-174.
15. Ibid, 172.
16. Ibid.
17. Plato, Republic, trans. G.M.A. Grube (Indianapolis/Cambridge: Hackett Publishing Company 1992), 190.
18. Plato, Symposium, trans. Alexander Nehemas and Paul Woodruff (Indianapolis: Hackett Publishing Company, 1989), 5.

in accordance with their discourse, and without their discourse emanating from their life experience,"[19] and "democrats of knowledge, who claimed to be able to sell their knowledge to all comers," claimed to provide professional knowledge and wisdom to the sons of wealthy Athenian men.[20] The Sophists were professional educators who traveled and charged fees to teach rhetoric, politics, sciences, mathematics, and grammar in order to prepare their students for citizenship and professional life.[21] In these circumstances, the teacher/student roles were rigid, little dialogue occurred, and the students passively submitted to the expert.

In comparison to the Western tradition of Socrates, Confucius viewed learning similarly to both Socrates and the Sophists in that he "defined the aim of education to be more than just the acquisition of knowledge, but more fundamentally, a transformation of the person and preparation for public service." Similar to Socrates' pedagogy, Confucius viewed education as a lifelong cultivation, aiming toward living a virtuous life:[23] "Do not worry over not having an official position; worry about what it takes to have one. Do not worry that no one acknowledges you; seek to do what will earn you acknowledgment" (4.14).[24] Unlike Socrates, however, Confucius introduced the six arts to his students, which resembles what we call a "liberal education" today. The six arts included ritual, music, archery, charioteering, writing, and arithmetic. In this sense, Confucius focused more directly on the practical/or public service aspect of learning than Socrates. For example, in the Analects, the Master stresses the importance of embodying virtues through our actions toward others over simply engaging in intellectual study when he says:

(1.6) As a young brother and son, be filial at home and deferential in the community; be cautious in what you say and then make good on your word; love the multitude broadly and be intimate with those who are authoritative (ren) in their conduct. If in so behaving you still have energy left, use it to improve yourself through study.[25]

(13.5) If people recite all of the three hundred Songs and yet when given official responsibility, fail to perform effectively, or when sent to distant quarters, are unable to act on their own initiative, then even though they have mastered so many of them, what good are they to them?[26]

Socrates, on the other hand, denied his title of "teacher" to make the point that the knowledge he sought (moral knowledge) was not something that could be transferred from teacher to student, but instead drawn out from within oneself through rigorous questioning and self-examination:

(Apology, 29e) Socrates: And if some of you objects and claims that he does care (for intelligence, for truth, and for the best state of the soul), then I will not release him on the spot and go away, but I will question him, examine him, and refute him; and if he does not seem to me to have acquired virtue, but says that he has, I will reproach him with attributing the least importance to what is worth the most, and the most importance to what is most base[27]

The difference I highlight here between Socrates' and Confucius' pedagogies illustrates that although both sought virtue through philosophical discourse,

Confucius placed a larger emphasis on serving the community through learning the arts, mastering a set of skills, and directly serving society.

In regard to the tension between traditional and progressive values, Socrates' execution represents one of the consequences that arose from the traditional/progressive value conflicts, since he was accused of corrupting the youth because he "used skillful questions to bring his interlocutors to admit their ignorance and by doing so, he disturbed them so much that they were eventually led to question their entire lives."[28] Socrates thought that teaching only conventional or professional knowledge and skills used in hierarchal learning environments, where teachers have intellectual authority over passive students and solely teach rote learning, resulted in students acting "under the influence of prejudices without any basis in reflection,"[29] imprudently appealing to the authority of teachers, and arrogantly believing that they were experts in their profession. By denying the title of teacher, Socrates intentionally disrupted the teacher/student social hierarchy and implicitly communicated to the student that he assumed the role of a learner and searched for the same knowledge. Dialogue was the main form of interaction between the teacher and student in Socrates' approach and generally framed in a way that exempted the teacher's responsibility of the content, as opposed to a less interactive lecture-style.[30]

Similarly, Confucius' pedagogy was "progressive" for his time, for he "selectively and creatively"[31] used passages from the ancient texts in his teachings, rather than blindly following the texts as if the texts themselves had a predetermined, fixed meaning in all given contexts

19. Pierre Hadot, What is Ancient Philosophy?, 174.
20. Ibid, 26.
21. Jonathan Lavery, "Meet the Philosophers of Ancient Greece," (Surrey: Ashgate Publishing, 2005) "The Sophists," http://www.credoreference.com.ezproxy.gvsu.edu/entry/ashgtpag/the_sophists (accessed August 30, 2011).
22. Peimin Ni, On Confucius, (Belmont: Wadsworth, 2002), 6.
23. 23. Roger T. Ames and Henry Rosemont Jr., The Analects of Confucius: A Philosophical Translation, (New York: The Random House Publishing Group, 1998), 92.
24. Ibid, 72.
25. Ibid, 163.
26. Plato, The Dialogues of Plato, trans. R.E. Allen (New Haven: Yale University Press 1984), 95.
27. Pierre Hadot, Philosophy as a Way of Life, 149.
28. Pierre Hadot, What is Ancient Philosophy?, 26.
29. Paul Woodruff, "Socratic Education" in Philosophers on Education: New Historical Perspectives, ed. Amelie Oksenberg Rorty (New York: Routledge 1998), 19-20.
30. Karyn Lai, "Learning From The Confucians: Learning From The Past," Journal of Chinese Philosophy 35, no. 1 (2008): 101.
31. Roger T. Ames and Henry Rosemont Jr., The Analects of Confucius: A Philosophical Translation, 192.

and circumstances. Confucius even discouraged his disciples from following his own teachings in an unreflective manner. On this matter Confucius said, "In striving to be authoritative in your conduct, do not yield even to your teacher (15.36)."[32] He was known as the first to offer education to his disciples, whether they were wealthy or poor. However, his use of ancient texts as authority in his teachings, his transmission of culture, and his reinforcement of hierarchy can be considered more traditional in relation to the approach of Socratic education, which is grounded on doubting and questioning authorities. Although Confucius' pedagogy was progressive for his time, I reiterate my point that regardless of the progressive tendencies found in Confucius' teachings, his pedagogical style and methods were more traditional than Socrates' pedagogy when we look in retrospect at the broader historical context.

Conclusion

The overarching purpose of this exploration is to expose the two conflicts that affect the quality of American public higher education today that also arose within both ancient Socratic and Confucian pedagogies: Specialized training vs. philosophical development and traditional vs. progressive pedagogical values. Historically, philosophical pedagogy has become a foundational component of educational approaches despite the presence of these two conflicts. Moreover, in explaining how philosophical exercises are used in the Liberal Education tradition, I accentuate the point that philosophical development is interdisciplinary and can be extended out to other disciplines such as the STEM fields.

The two conflicts that contribute to philosophy's present state in academia are inadequate explanations for philosophy's present state of marginalization for the fact that these conflicts will always be present. They are inevitable, and can even be called "philosophical problems." Considering that the ancient Confucian approach is relatively more traditional AND more skill oriented in comparison to the ancient Socratic approach demonstrates

that philosophy itself is not polarized one way or another, since both Socrates and Confucius valued philosophical development and implemented it within their educational approaches.

Returning to the contemporary age, I do not suggest that American higher education entirely disregards self-development. In Cultivating Humanity: A Classical Defense of Reform in Liberal Education, Martha Nussbaum connects Liberal Education's persistent emphasis on personal, social, ethical, and cultural development, which historically and unavoidably connects to philosophy. The Liberal Education tradition in the United States serves as a model for how philosophical discourse can be utilized for developmental purposes, without students having to specialize in the field of philosophy. As a student studying within the Philosophy and Liberal Studies departments at Grand Valley State University, I notice that philosophy's role in its own distinct discipline differs from philosophy's role in the Liberal Education tradition.

In the discipline of philosophy, students learn the history, theories, problems, and methods of philosophical importance, which depends on the specialization of each department. Learning the methods of philosophy benefits students' knowledge of philosophical topics, but it does not equate to the benefits of practicing the discourses, which facilitates self-development by holding students logically, ethically, and socially accountable for their practices.

The Liberal Education tradition integrates all learning experiences and philosophical capacities into a cohesive whole, while constantly requiring the student to relate that integration of learning experiences back to his/her self. Not only does the Liberal Education tradition require students to integrate what they learn back to themselves, but it also aids students in developing capacities of analytical inquiry, moral judgment, and social responsibility. Professors of Liberal Education not only expect their students to learn philosophical methods of thinking, but also to practice those methods through the examination of many great historical

thinkers across a variety of disciplines, cultures, and lifestyles, connecting social issues from the past with the persisting social issues of today. Developing philosophical capacities through engaging historical problems sharpens the application of those capacities to the encounters we experience everyday.

Primarily because of the highly specialized nature of the disciplines within American higher education, few disciplines hold students accountable for developing their philosophical capacities. The advancement of philosophical capacities does not necessarily entail registering for a philosophy class or two and reading the "canon philosophers" of the Western philosophical tradition. Reading a philosopher's work may or may not influence a person philosophically because developing philosophical capacities requires more than simply a general reading of the texts. Rather, the advancement of philosophical skills requires a mentor's guidance on how to apply philosophical thought and skills to texts, everyday happenings, life circumstances, political affairs, and social issues. Whether the mentor's teaching approach is more comparable to a Socratic or a Confucian has little relevance in light of the enriching education a person could earn from developing his/her philosophical capacities to the fullest potential.

Through implementing philosophical discourse into the foundations of and across all disciplines in American public higher education as a requirement within each specialized field, students can have opportune access to the resources required for cultivating their philosophical capacities. Moreover, cultivating philosophical capacities can efficiently help us understand these nearly unsolvable conflicts and have the philosophical aptitudes to mediate them within the broadest contexts possible, rather than unknowingly drifting to one extreme or the other.

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Exploring Graphic Literature as a Genre and its Place in Academic Curricula

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Genre is a system of classification that defines the audience of a given work. It is the criteria consumers use to select new works. Amy Devitt, in her article on genre theory writes, "Based on our identification of genre, we make assumptions not only about the form, but also the text's purposes, its subject matter, its writer, and its expected reader" (Devitt 575). Genre can be a powerful thing when it comes to understanding and classifying various works in any medium. However, because of genre it becomes possible for audiences to look at graphic literature and see only the superhero. This would then prevent audiences who are not interested in that type of story from picking up a graphic novel. While superhero features are a large component of audience perception of comic books they are not the only examples of graphic literature in existence. For this study, I've classified graphic literature as any work that, through a combination of art and narrative, conveys a message simpler than words or tells some sort of story. That said, editorial cartoons, mythical images on Greek pottery, and even instruction manuals are all forms of graphic literature as well as the graphic novel. However, in spite of the almost limitless versatility and growing success of the graphic novel in the mainstream market, studies of graphic literature still are not prominent in academic curricula. The purpose of this study is to identify what place, if any, graphic literature should have in the academic curriculum. If nothing more can be gained from graphic literature than ideas for children's Halloween costumes, academic curricula will have no use for it. On the other hand, if graphic literature is better able to connect with the learning styles of certain students, it has to be utilized more than it is today.

Graphic literature has always been a highly stigmatized form. Critics and educators used to complain that comic books were juvenile trash that corrupted the minds of the kids reading them. As Paul Lopes, a sociologist from Colgate University, states, "For many critics the 'transgressive' mix of image and text in comic books undermined the supposedly superior quality of print culture as well as the unique qualities of visual culture" (Lopes 404). For some reason, combining image and text, two endeavors that when separated find their own academic departments, yields a product that is somehow less valuable.

Perhaps one of the most notable criticisms against graphic literature comes from psychiatrist Frederic Wertham. In 1953, Wertham published Seduction of the Innocent, a book attacking the comic books of the early fifties. In it, he listed several reasons why he believed comic books should have been taken off the newsstands. One problem he had with comic books was the supposed adverse effect it had on literacy in children: "A very large proportion of children who cannot read well habitually read comic books. They are not really readers, but gaze mostly at the pictures, picking up a word here and there. Among the worst readers is a very high percentage of comic-book addicts who spend very much time 'reading' comic books. They are bookworms without books" (qtd. in Jacobs, "Marveling" 186).

Although there have been many critics of graphic literature like Wertham, the form has survived and evolved. Works like Spigelman's Maus and Satrapi's Persepolis have introduced personal biography to the form. Underground comic labels steadily put out new and experimental works. Established journalist Joe Sacco has even found success with major publishing companies with his use of graphic literature in his journalism. Almost in spite of Wertham's criticism, graphic novels are now available on the shelves of libraries, major book stores and even high school classrooms as a way of getting more students excited about reading. It is clear a lot has changed since the fifties as stated by Dale Jacobs in his 2007 article on the benefits of graphic literature to literacy:

When I was growing up in the 1970s, I never saw comics in school or in the public library unless they were being read surreptitiously behind the cover of a novel or other officially sanctioned book. Over the last decade, however, there has been a movement to claim a value for comics in the literacy education of children. Comics have made their way into schools mainly as a scaffold for later learning that is perceived to be more difficult, in terms of both the literate practices and content involved. (Jacobs, "More than Words" 20)

With this shift in attitude, it is no surprise that graphic literature is slowly making its way into college curricula. Still, considering the popularity of graphic literature in the mainstream market, this process should be happening faster than it is. Generally, as new disciplines arise they begin as classes and then work their way into specialized programs such as those offered in technical and graduate studies. Graphic literature is experiencing something like that. Programs such as those offered by the Kubert School of Cartoon and Graphic Art and the Savannah College of Art and Design are geared toward not only studying but creating new works of graphic literature. However, there aren't many schools that offer this sort of program quite yet.

As for undergraduate opportunities for studying graphic literature, there are about as few opportunities as there are at the graduate level. The reason for the rarity of these programs is that graphic literature, as a blend of art and text, can be somewhat difficult to place in a curriculum. Academic disciplines are genres in that there are specific classifications for them. Since graphic literature is a form that is a mix of art and narrative, it seems to have difficulty landing in one department. Take, for example, the University of Michigan which recently offered two courses on graphic literature. The first was a high level course on graphic narrative which was offered in the art department in fall of 2010. In winter of 2011 this class disappeared only for a similar course to appear in the English department. This shift from one program to another keeps art students from taking this course unless they are double majoring in English. According to Grand Valley State University

Professor of Art Brett Colley, "We have some artists in the art department who are gifted writers, and I'm sure you have some writers in the writing department that are gifted artists, but we don't have that on a regular basis. We don't have collaboration. It would be hard to situate. When you do that you're just privileging one or the other" (Colley). In academia, it is quite difficult to teach students graphic literature because, historically, collaboration between departments is somewhat difficult to conduct. As it stands now, the only way for students to fully study both aspects of graphic literature is to hold a double major and even then they won't be given the opportunity to combine their experiences. So the question becomes this: if there is no collaboration between departments, and if graphic literature has a high enough demand, should it be given its own academic department?

Before answering this question, let's first see how it is currently used in departments other than English, writing or art. Certain professors have found value in using graphic literature to supplement other course materials. Professor Kelley J. Hall of the College of William and Mary and Professor Betsy Lucal of Indiana University, South Bend, co-authors of an article on teaching superhero comics in sociology classes, argue that "Given the visibility of comic book characters in American culture, it is surprising that more sociologists have not looked to comic books as another resource for teaching" (60). They specifically use superhero comic books to explore sociological issues such as gender, race and justice. Their reasoning for using comic books is that they are accessible to students and promote a different sort of creativity than standard sociology books would alone.

Hall and Lucal are not alone in this endeavor. Professor Sebastian Maisel from Grand Valley State University teaches a Middle East Studies course in which he uses works such as Marjane Satrapi's Persepolis and Joe Sacco's Palestine. Each semester Professor Maisel uses two different graphic novels as well as textbooks and articles from academic journals and news media: "I personally consider graphic novels a valuable asset to my classes. They give a personal visual

input to an otherwise broader theoretical topic and if you read too many academic texts and scholarly articles from my perspective as an anthropologist you lose your sense of reality" (Maisel). Along with Hall and Lucal, Professor Maisel believes that adding graphic literature to his course allows him to engage student learning in new ways.

In order to determine just how effective such a tactic is, I conducted a survey in one of Professor Maisel's MES 201 classes. Students were asked questions geared toward establishing their level of familiarity with the form as well as how effective they found it within the context of his course. Of the fifteen students surveyed, twelve admitted having no experience with any form of graphic narrative prior to taking Professor Maisel's course. However, even though the vast majority of this group was completely new to the idea of graphic narratives, fourteen students still found Persepolis to be as or more effective than standard narratives which means for these students, graphic literature is an easily accessible form. If these results prove to be typical of all of academia, then they could potentially indicate that, at least from the student point of view, there are engaging aspects of graphic literature that aid in learning even for those who have yet to experience it.

The survey went on to ask follow up questions about why students felt the way they did about Persepolis. Students found Persepolis to be more interesting, more compelling, and easier to understand than traditional narratives. While this does say something about accessibility, it is not a strong enough argument to say that reading graphic literature is easier without coming up with reasons to support that conclusion. Nor is it the goal of any professor to select materials simply because they are less challenging. For graphic literature to occupy a useful space in academic curricula there must be more compelling reasons to suggest that it is useful for students and professors.

In another part of the survey students were asked to define the term graphic literature. In answering this question, two students identified graphic literature as pictures with words while another two called it words with pictures. Though it

may seem semantic, these are actually two completely different responses. Defining graphic literature as pictures with words implies that the primary message comes from the images and that the text is only there as a supplement to that information; however, defining graphic literature as words with pictures implies the opposite. This difference of opinion probably comes from how students interact with the text. Students who first look at the pictures might see these as the primary information simply because it is what they processed first. The same is true for those who read the words first. The students still put the entire work together but may put a larger emphasis on what was processed first.

In order to gain more insight into this matter, I took another less formal survey of friends familiar with graphic literature but this time I asked only one question: "Do you consider graphic literature words with pictures or pictures with words?" In answering this question those surveyed were instructed to consider how they read graphic works and whether they looked at text or images first. As expected from a group that actively reads graphic literature, most of the responses were prefaced with, "I really think it's both but if I had to choose…" followed by a reluctant answer. I tallied the results and found that this particular group was split almost right down the middle. Those who called graphic literature pictures with words claimed that it's impossible to look at the text first simply because the images take up so much of the page. Those who argued the contrary claimed that in complex stories it's impossible to get enough information from the images alone. This contrast in response has led me to believe that there are different kinds of readers and that this might have something to do with how graphic literature can potentially be an asset to certain courses.

It seems that part of what causes readers to put more emphasis on either the text or image may come from how graphic literature is processed at the cognitive level. Professor Douglas Marschalek from the University of Wisconsin-Madison wrote an article, "A Review of Basic Cognitive Processes and Their Relevance to Understanding Responses to Works of Art," about how the brain learns to process art. In it he gives brief summations of a number of different psychologists' views on how visual stimuli is broken up and processed. The general consensus seems to be that while auditory processing is for the most part serial in nature, visual processing is more parallel, taking multiple aspects into account to determine meaning: "In parallel processing, numerous types of information can be processed simultaneously. Also Treisman indicates that attention can shift from one channel to another as information is processed. The latter research indicates that information is processed through a series of processing mechanisms. Each mechanism sorts and selects information prior to higher order cognitive processing" (Marschalek 24). Applying Marschalek's theory specifically to graphic literature, it would appear that words and text are separated but processed at the same time with the focus switching back and forth between the two. The brain then selects what is most important to the overall message and takes that into higher order processing.

Marschalek cites more theories that delve further into how the brain chooses what it believes to be the most important information. One such theory comes from Daniel Kahneman who suggests that much of what goes into visual processing comes from selective attention: "Following the formation of grouped units, some units receive more attention than others" (Marschalek 25). At this point in the processing of the graphic narrative, readers have already separated the text from the image and put both into separate categories in their minds. What Kahneman suggests is that before readers go on to select what is most meaningful or important to them, they subconsciously put more emphasis on one or the other. In other words, if readers examined the same graphic novel and analyzed the most important information, some readers would have more dialogue in their minds while others would have more sequential imagery. Although these different learning styles, for the most part, go unnoticed by students and professors, they are important to the way we interact with information.

In order to provide more specific evidence to support the ideas in Marschalek's article, Academic Coach Wendy Marty from Grand Valley State University allowed me to reproduce a test she created to determine whether her students learn better through text or images. The test is relatively simple. Students are given a piece of simple graphic literature, something with an easy shape and a few short sentences, and instructed to examine it for fifteen seconds and reproduce what they see. Once the time is up, they are to turn the page over so that they can no longer see the ad and then draw and write as much as they can remember. They are told that the test is not a measurement of how well they can draw but simply to see what they most remember. Once the test is completed, Ms. Marty looks at the results and places the student into one of three categories: heavy image, heavy text or balanced.

I had the opportunity, under Ms. Marty's guidance, to give this same test to a group of ten college students. We gave the students an old perfume ad as the image to be reproduced:
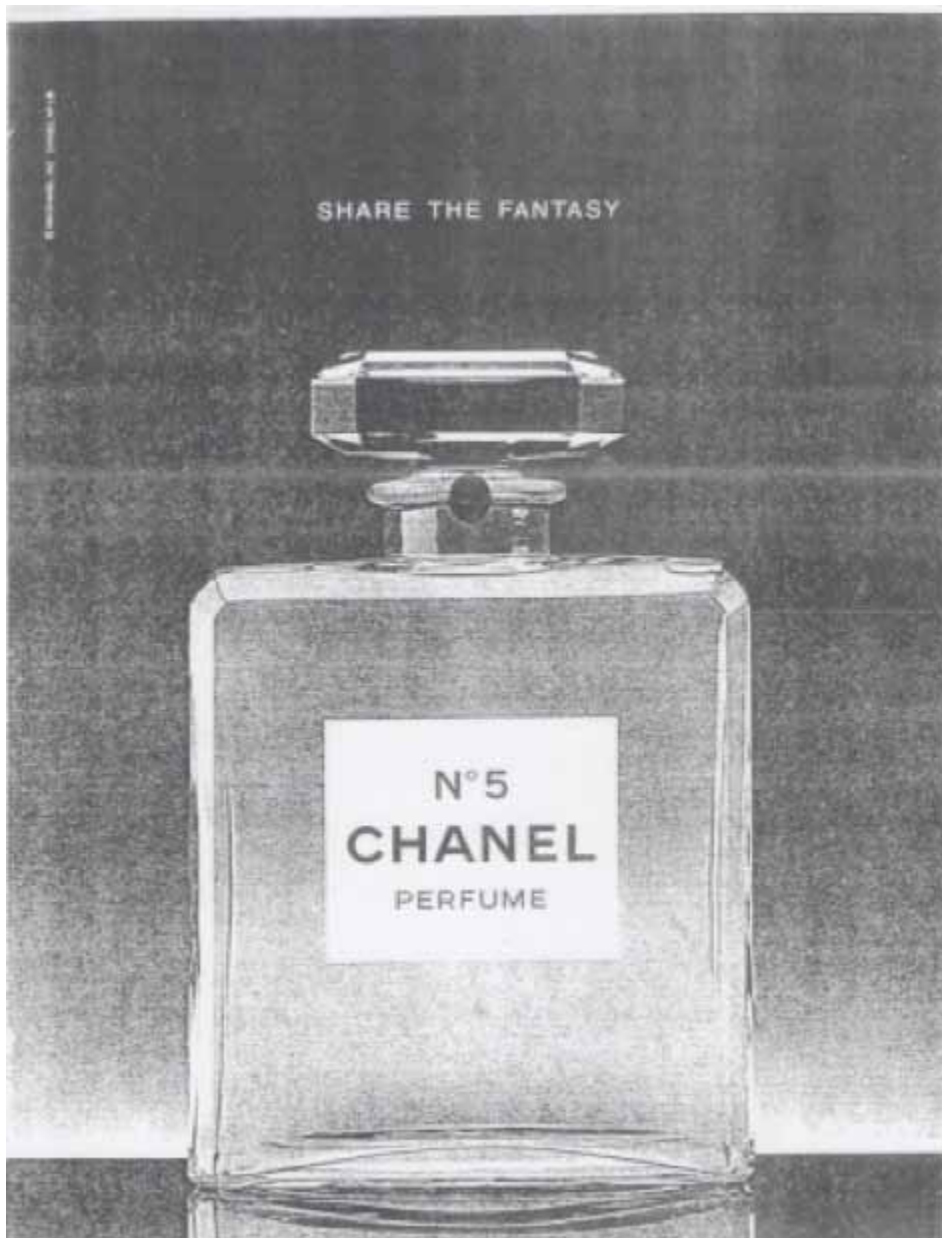
Fig. 1. An old advertisement for Chanel Perfume. The source image students were to study and replicate from memory.

There were several reasons for choosing this picture. First, it contains a large, fairly simple shape. Since the test isn't so much about perfectly recreating a piece of artwork, it's best to have something with standard shapes so that even people who do not draw well will have a better chance of being able to reproduce the images they remember. As for the text aspect of this image, it has a few words in different places that do not necessarily all fit together as a traditional narrative would with each idea contributing to the next. A brief sentence in traditional narrative format might be easy to remember, but this layout forces students to look in different places for different words and remember as many of them as they can. In this ad, none of the words are difficult to remember except perhaps the name of the perfume. So, with the simple words and pictures, this advertisement should be fairly manageable.

Still, as Ms. Marty and I predicted, in the group tested, we found an even spread of all three categories: heavy image, heavy text and balanced. Here are some examples.

Fig. 2. A heavy image test result

When analyzing these samples it's important to consider the parts of the ad the test taker forgot as well as remembered. For example, this one clearly falls into the heavy image category because the student remembered the image well and was able to reproduce it in three dimensions but was not able to remember anything about the words other than the "No. 5." This student did, however, feel the need to add text to the image because he or she knew the original had text. Unable to remember what the words were he or she probably wrote down something the perfume bottle brought to mind even though the word "perfect" appears nowhere on the original ad. So for this person, the words merely served as a placeholder that did not add any meaning to the image. He or she knew it was a picture of a perfume bottle and that is all that really mattered.
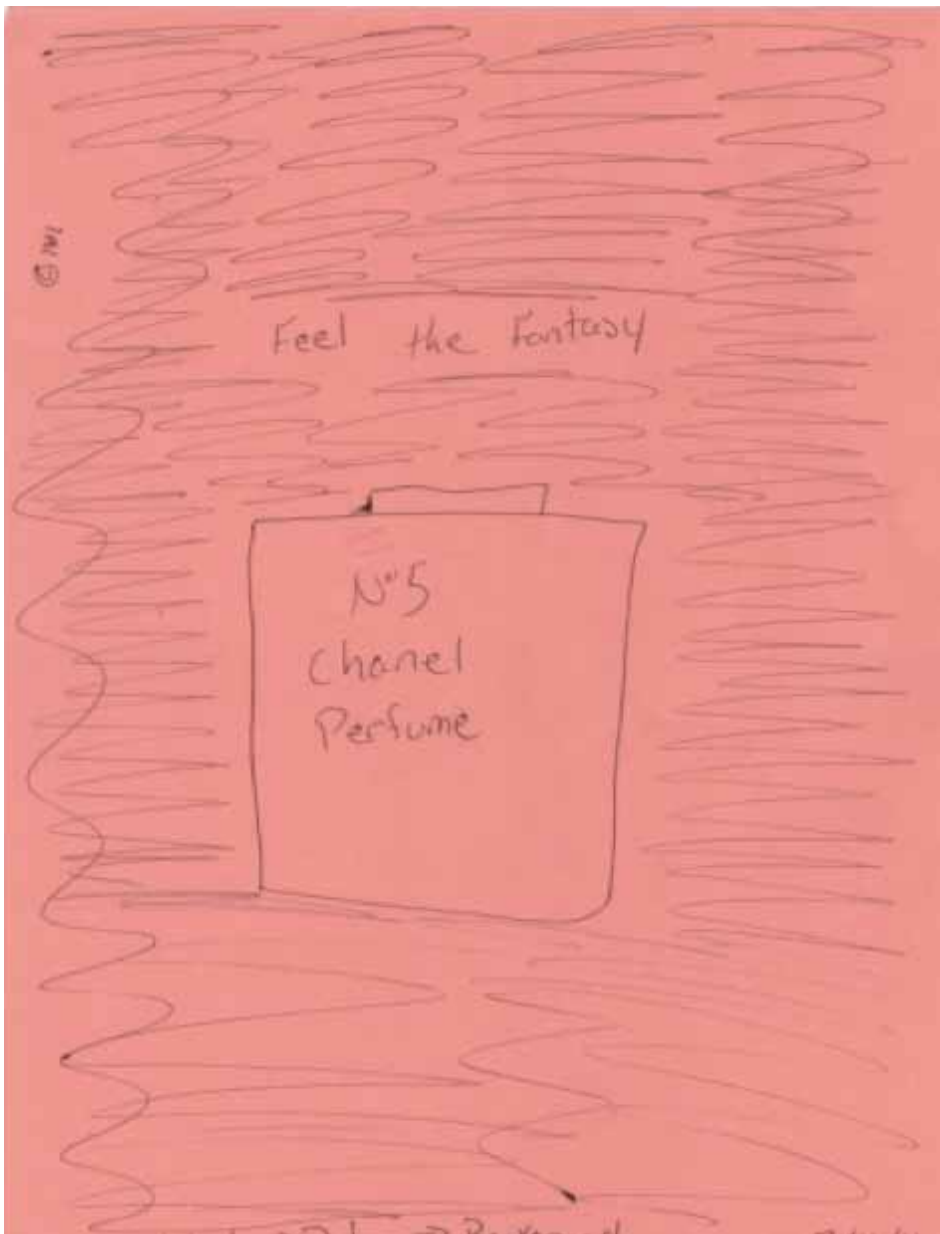
Fig. 3. A heavy text test result.

This next test falls into the heavy text category. While the test taker struggled to produce a solid picture, he or she remembered all of the words including some of the copyright information hidden in the top left corner. It seems though that this person had a bit of trouble remembering the shape of the bottle. It is likely that this person first wrote out all the words and where they belonged on the paper and then knew that the "No.5 Chanel Perfume" portion was in a box separate from "Feel the Fantasy." This would explain why there isn't a nozzle in this person's perfume bottle.

Fig. 4. A balanced test result.

The final test is more challenging but it's an example of someone with balanced focus. Looking first at the bottle, it's fairly well done but the test taker drew the top of the bottle slightly smaller and forgot to include the hole the spray comes from. As for the words, he or she remembered the name of the brand but forgot a few key words including the noun "fantasy" in the slogan and the word "perfume" on the bottle. This indicates that this person saw the picture and text as a whole when analyzing it so when given a limited amount of time, he or she remembered a fair amount about both aspects but also forgot certain aspects of the ad as well.

These tests have shown that there can be significant differences in the way student's process information. If colleges are truly geared toward providing the best possible learning experience for students, they need to account for this. Academic curricula have always been controlled by the professors who choose whatever materials they find most useful to their classes regardless of form or genre. These tests indicate that in addition to focusing on subject matter, professors need to engage students by incorporating as many modes of learning as possible. This is where graphic literature can be especially useful.

Dale Jacobs offers a new way of thinking about graphic literature in his discussion of multimodal literacy which he defines as, "The ability to create meaning with and from texts that operate in print form and in some combination of visual, audio, and spatial forms as well" (Jacobs, "Marveling" 181). Aside from graphic novels, there is a wide variety of multimodal texts available in various settings. Common examples include: magazine articles, instruction manuals, and sometimes even textbooks. The goal of a multimodal text is to help the reader synthesize visual and textual information to create a message stronger than words or pictures could alone. Multimodal texts are designed when there is a strong need for specificity on a certain topic. Magazine articles use multimodality to give the audience an image that connects to the text in order to establish the character and mood of the article. Instruction manuals and textbooks use it in order to provide as much information as possible so that upon reading, the audience is more knowledgeable about a topic or more able to perform a task.

The beauty of multimodal texts is that they compensate for the difference in processing of image and text among different readers. The New London Group, a group of ten academic scholars from the US, UK and Australia devoted to studying the shift in literacy pedagogy, has developed a theory explaining how multimodal texts specifically are processed that takes into account the personal experience of the reader. In their research they state that different readers will ultimately approach texts in different ways. We've already seen differences in the way readers approach graphic literature through the survey results in Professor Maisel's class and the test results from Wendy Marty's experiment. What the New London Group suggests is that how a reader responds to a text depends on what the reader has experienced before that text. With this new information, it is possible to draw further conclusions on what potential use graphic literature may have in academic curricula.

The New London Group refers to the process of drawing meaning from texts in terms of design, laying down

three important components of gathering meaning in multimodal texts: available designs, designing, and the redesigned. Available designs refer to the experiences readers bring to what is on the page. More specifically, they entail orders of discourse: "Within orders of discourse there are particular Design conventions - Available Designs - that take the form of discourses, styles, genres, dialects, and voices, to name a few key variables. A discourse is a configuration of knowledge and its habitual forms of expression, which represents a particular set of interests" (New London Group). Available designs are the experience each reader has to work with when it comes to tackling a text and as such are incredibly vital to the next step, designing.

Designing is the process of taking the available designs and the actual reading material and putting them together. This is where readers begin to form meaning out of the text: "They also draw upon their experience of other Available Designs as a resource for making new meanings from the texts they encounter" (New London Group). After designing, readers are left with the re-designed. This is the product of their new experience through the reading of the text and the available designs they started with. Since not everyone has the same available designs, not everyone will read the same way. This is what accounts for so many different interpretations of the same book, song or film. If everyone read everything the same way, there would be no need for literature courses.

In order to better understand this concept, take a look at the following example from Y: The Last Man written by Brian K. Vaughn: In this scene the three astronauts have realized that their equipment has malfunctioned and that their emergency landing might not go as well as they would hope. This page specifically is about the astronauts coming to terms with their possible demise. Thanks to the multimodal nature of this piece, most of the people who read this page come to a similar understanding of the plot. However, they may not necessarily come to this understanding in the same manner and as a result may draw different conclusions depending on their available designs. A reader with more textual

Fig. 5. An excerpt from Y: The Last Man
Source: Y: The Last Man The Deluxe Edition Book Two Page 53.

experience might see from the dialogue that the characters are praying and use the process of designing to determine that they're afraid of something. Another who has more of an art focus might instead look at the pictures reading the somber faces in the first three panels as indicative of a serious situation. He or she then might see how they are holding hands in the final panel as a sign of love or support for one another. So for the text reader, the fear becomes important whereas the art reader

might find the support to be the main focus. While these two different readers may ultimately come to two different conclusions, they still share the same understanding that these astronauts might not make it out alive.

The New London Group goes on to argue that as a society we're gradually adjusting to multimodal literacy in magazines, advertisements, instruction manuals and various other media. Not only that, but with the rise of technology, we're slowly being led to a more multimodal manner of not only reading but thinking and composing as well. We can readily interact with the internet by searching through pages of information for specific items or uploading our pictures and thoughts to social media sites. Even our smart phones and digital readers require users to physically move words around with our fingers. Because of the way students interact with information is changing, academia should incorporate these new modes of thinking into courses in order to better prepare this new generation of scholars. Given the multimodal nature of graphic literature, it can be a key component in this process.

Think about it this way. Comics are often treated the same as children's books: a sort of gateway drug into "real" literature. Take, for example, the words of Professor John Lowe from the Savannah College of Art and Design: "I started reading comics, and then I got into other types of fiction and literature. I stopped reading comics a little later, but I don't think I would have made the leap if it weren't for comics" (qtd. in "Using Comics"). Of course, Lowe is not the only one to think this way. There are other teachers who, contrary to the early warnings of Fredric Wertham, advocate the use of comic books to get students more interested in reading. Originally, it was my belief that this argument was a problem for graphic literature and that it suggested that at some point or another we should evolve beyond the form. I now see that is not the case. Jacobs says it well: "By examining comics as multimodal texts and reading comics as an exercise of multiliteracies or multimodal literacies, we can shed light not only on the literate practices that surround comics in particular but also on the literate practices that surround all multimodal texts and the ways in which engagement with such texts can and should affect our pedagogies" (Jacobs, "Marveling" 183).

Graphic literature does not need its own academic department. In fact, it would be a disservice to academic curricula to try to limit it to one area when it can prove useful outside of that. If schools use graphic literature as a part of other courses they can better teach to those who might be more visual thinkers and keep up with the genre of multimodal media. Graphic novels can be incredibly useful as basic texts to help build up multimodal literacy, or they can be used as they are in Professor Maisel's course as a different perspective on relevant issues. Ultimately, as evidenced by the New London Group and the studies conducted with Ms Marty, some readers will find the experience of reading a graphic novel less useful than others. Still, it should be the goal of academic curricula to effectively reach as many types of students as possible and that simply cannot be done without taking different modes of thinking into consideration. Once this happens, professors may even begin to notice an increase in the level of understanding and the quality of student work.

Graphic literature is a form just as versatile as film or traditional literature, but in order for it to fully make its way into academic curricula, professors and administrators have to look past the stigmas of the genre. Every genre has not only a target audience, but a purpose as well. When authors or artists decide to work within a specific form it's because they find that form to be the best for conveying their message. If that is the case, it also stands to reason that some readers will simply learn more from some genres than others. So if the goal of the university is really to provide the strongest possible learning environment for all students, graphic literature shouldn't ever be dismissed simply because of its genre.

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The Relationship Between Personality Characteristics and Acceptance of Minority Influence

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As early as the 1930's, psychologists have been interested in how people are persuaded by others (Sherif, 1935). At this early point in social psychology, scientists realized that individual's perceptions of their environments are in fact influenced by other people's perceptions. Asch (1951) designed a study in which participants, along with confederates, sat in a room and were asked to pair line segments with other line segments that they believed to be equal in length. He found that when the confederates were unanimous in their decision, even when wrong, the participants were much more inclined to agree with the confederates. This phenomenon had become known as the conformity effect and for a long time it was equivalent in meaning with that of social influence (Mass & Clark, 1984). In these cases, researchers have defined conformity as those instances where individuals side with whichever cause has the greater number of people supporting it (Allen, 1965; Maass & Clark, 1984; Nemeth & Wachtler, 1983).

Moscovici (1969, 1980) challenged the view that social influence and conformity were synonymous with one-another and demonstrated that minority groups were also strong sources of social influence (Smith & Tindale, 2010). Majority and minority viewpoints refer to the number of people who possess a given viewpoint regarding a subject (Nemeth, 1986). Hence, majority viewpoints are the opinions, ideas, and perspectives held by the greater number of individuals, the "majority," in a group context, as where minority viewpoints are held by the lesser number of individuals, the "minority." Researchers found that individuals who are exposed to minority sources of influence may be effected in a variety of ways that differ significantly from majority influence, such as showing an increase in divergent thought, thinking about issues from multiple viewpoints, and/or considering aspects of the problem that were previously overlooked (Nemeth, 1986; Nemeth & Wachtler, 1983; Smith, 2008; Smith & Tindale, 2010; Wood, Lundgran, Ouellette, Busceme, & Blackstone, 1994).

The research on minority influences is quite extensive (Maass & Clark, 1984; Nemeth, 1986; Smith, 2008; Smith & Tindale, 2010; Trost, Maass & Kendrick, 1992; Wood, 1999, 2000; Wood et al., 1994). However, researchers have not systematically looked at how personality characteristics may predispose individuals to be more susceptible to minority sources of influence. Thus, it is the contention of this study to examine how personality differences affect the degree to which individuals will be influenced by a minority source. However, first, we will review the existing literature that explains the differences between majority and minority viewpoints and how these social influence processes could possibly be related to individual personality characteristics.

Compliance vs. Acceptance, Direct vs. Indirect

Many researchers have found that there is a distinguishable difference between those forms of influence that create public compliance to a proposed position and those that create a private acceptance (Nemeth, 1986; Nemeth & Wachtler, 1983; Peterson & Nemeth, 1996; Wood et al., 1994). Public compliance is a transitory and possibly superficial change in behavior and attitudes in response to coercion, peer pressure and/or requests (Hogg & Vaughan, 2008; Wood, 1999). However, compliant behavior does not determine whether the request was actually accepted at the individual level. Hence, private acceptance, also called internalization, is a change in attitude that may or may not be overtly expressed (Manstead & Hewstone, 1996).

According to Moscovici's (1980) dual process theory, the behavior induced by majorities is compliance behavior, while the behavior induced by minorities is conversion behavior (i.e., trying to convert the majority members to a minority position). While he contends

that both forms of influence result in a posed conflict, the conflict that occurs is resolved in different ways (Moscovici, 1980; Nemeth, 1986).

These influence processes can also be either direct or indirect (Nemeth, 1986; Smith, 2008). Direct social influence occurs in those instances where members from one faction prevail over members of another (Nemeth, 1986). Past research indicates that majority influence is most often direct in nature. However, minority influence can be direct as well. For example, research indicates that minorities can potentially exert more influence when their counter-normative point of view is linked to a related notion widely held; that is, when the minority view is framed within a widely accepted principle (Smith & Tindale, 2010). Smith, Dykema-Engblade, Walker, Niven, and McGough (2000) conducted a study comparing minorities arguing either in favor of or against the death penalty and found that in instances where participants could identify with other participants via shared values, minorities could better validate their counter-normative position and in fact had greater influence. For instance, in this particular study, minorities arguing against the death penalty used religion to justify their position, and because the majority of participants in this study were Christian, their shared Christian identities were made salient. Even though the majority of Americans are in favor of capital punishment, the participants who found a shared identity (religion) were able to influence the majority with their arguments. These findings lead Smith et al. (2000) to the conclusion that when shared values are consistent with minority viewpoints, the minority may exert more influence than the majority. In this particular study, the minority did not out-influence the majority. The minority members who framed were more influential than the minority members who did not frame. Meaning the minority members who framed their argument in a way that made salient the participants shared Christian values, had more influence than the minority members who did not frame the argument in this way.

Although direct minority influence is found in a variety of contexts, much of the minority influence research indicates the effects of indirect minority influence (Nemeth, 1986). According to Nemeth (1986), minorities show their influence at a latent level, rather than at the manifest level. This latent level processing is often not as immediately apparent as majority influence, but it does seem to be a deeper and longer lasting process than the manifest processing exerted by majority influence.

Creativity & Divergent Thinking

It has been well established from the research that exposure to minority influences results in an increase in divergent thinking (DeDreu & DeVries, 1993; Nemeth, 1986; Nemeth & Kwan, 1985; Smith & Tindale, 2010). For example, sources of indirect minority influence may prompt majority members to think about the issue more abstractly, from multiple-perspectives or perhaps consider aspects of the problem that were previously overlooked (Nemeth, 1986; Smith et al., 2000; Smith & Tindale, 2010). Guilford (1956) first defined divergent thinking (DT) as having more ideas (i.e., fluency) and more classes of ideas (i.e., flexibility). This is best illustrated with a classic prompt for divergent thinking that involves asking people to name the various "uses for a brick" (Nemeth, 1986). If a person were to narrow their classification of ideas to "building," then perhaps they would generate such uses as building a home, fireplace, or patio. Although these are all separate ideas, they still fall within the classification of "building." However, if someone were to suggest that one use the brick as a missile by throwing it through a window to make a point, this would be considered a separate classification of ideas. The more fluency and flexibility that occurs, the more divergent thinking that is taking place (Nemeth, 1986; Nemeth & Kwan, 1985).

Other than being a measure of indirect minority influence, DT is also known to be a measure of creativity (Nemeth & Kwan, 1985; Kenworth, Hewstone, Levine, Martin, & Willis, 2008; Smith et al., 2000). Creativity can be defined in a multitude of ways. However, the most widely accepted definition involves developing solutions to problems that are novel and original (Batey & Furnham, 2006). Hence, highly creative individuals may illustrate more DT ability than low creative individuals. From this, we hypothesize that these highly creative individuals may also be more likely to entertain minority points of view, that is, they may be more likely to accept the minority viewpoint. Thus, in cases of indirect minority influence, individuals may still show compliance behavior and not accept the minority viewpoint at the public level but will be more likely to entertain minority points of view at the private level instead. If creative people share this link with minority influence as predicted, than perhaps other personality characteristics will share a similar link as well; specifically, it is hypothesized that certain personality characteristics may be associated with a stronger tendency to entertain minority points of view.

Openness to Experience

Researchers have been able to establish relatively consistent findings regarding the relationship between creativity and certain personality characteristics, especially those that contain novelty or originality as key components (Batey & Furnham, 2006; Batey, Furnham, & Safiullina, 2010). George and Zhou (2001) examined the extent to which the personality traits of the Five-Factor Model predicted an individual's creative behavior. They found that openness to experience had a strong relationship with creativity in their sample and that the presence of the trait positively encouraged creative behavior. McCrae (1987) also postulated that creativity would be linked to openness to experience. Openness to experience (OE) was defined as the degree to which individuals are independent thinkers, curious, imaginative, and amenable to novel ideas and unconventional perspectives (McCrae, 1996; McCrae & Costa, 1997; George & Zhou, 2001).

Interestingly, despite the obvious link between divergent thinking and creativity, no study has explored the extent to which this link extends to minority influences, being that creativity and DT are often the by-product of minority source influence. It is possible that individuals who possess certain personality characteristics (e.g., openness to experience), will also view the source of minority influence as creative,

and therefore will be more attracted to/ consider more seriously the point of view. Hence, an individual's personality characteristics may be a determinant of the degree to which they will be influenced by a minority source.

McCrae (1987) examined the relationship between creativity, divergent thinking, and openness to experience and found that DT and OE may be equally necessary conditions for creativity; however, they are not independent predictors of creativity by themselves. It is well established that DT is often the byproduct of minority source influence (DeDreu & DeVries, 1993; Nemeth, 1986; Nemeth & Kwan, 1985; Smith & Tindale, 2010) and because DT and OE do not predict creativity independently, it is likely the way DT and OE interact that produces creative acts. Hence, individuals who rank high in OE may be influenced to a higher degree by minority source due to the association they share with DT. If this is the case, other personality characteristics may also influence how individuals are affected by minority viewpoints, and these individuals may think more divergently as a result.

Need for Cognition

Need for cognition is a personality characteristic defined by individuals who engage in and enjoy effortful thinking (Cacioppo & Petty, 1982). Those individuals who are high in NFC may also have greater cognitive abilities, enabling the generation of creative ideas (Ivcevic & Mayer, 2007). A study conducted by Butler, Scherer, and Reiter-Palmon (2003), examined the relationship between NFC and elicitation aids (i.e. tools and techniques problem solvers used to foster ideation). They found that the effects of elicitation aids were reliant on characteristics (i.e., NFC) of the problem solver. Their results also show a significant relationship between DT and NFC, and that individuals high in NFC generated more solutions and more categories of solutions than individuals lower in this trait. Therefore, we see that the problem solvers' individual differences (regarding NFC) had a bearing on how participants were influenced by the elicitation aids.

Ivcevic & Mayer (2007) investigated this relationship in further detail and found that evaluation abilities are also significantly correlated with NFC. They concluded that DT abilities are accessed during the idea generation process and that evaluation abilities are accessed to judge the appropriateness of the generated product. It seems that DT is associated with NFC and OE in a similar fashion. Thus, we hypothesize that individuals who score high in need for cognition and openness to experience would be more influenced by a minority source of influence than would individuals who scored relatively lower on these two measures. That is, we imagined that individuals high in openness and need for cognition might be more inclined to construe the minority source of influence as a source of creative thinking and therefore gravitate towards the point of view expressed by the minority.

Tolerance for Ambiguity

Tolerance for ambiguity (TA) corresponds to how individuals perceive and deal with ambiguous situations or stimuli (Furham, 1994; Furnham & Ribchester, 1995). Zenasni, Besancon, and Lubart (2008), conducted a study to test the relationship between creativity and tolerance for ambiguity using three separate measures of creativity (e.g., DT task, a story-writing task, and a self-evaluation of creative attitudes and beliefs) and two self-report scales for TA. They found that there was a significant positive relation between TA and creativity. It is hypothesized that this relationship occurs because ambiguous situations often require creative thinking and that those individuals that can work through the problem solving of that situation may foster more creativity (Zenasni, Besancon, & Lubart, 2008). This relationship between TA and creativity suggests that creative individuals are more tolerant of ambiguous situations and that this creativity fostered divergent thinking. Therefore, we can posit that individuals that score higher in TA may be more likely to entertain minority viewpoints as they are already predisposed to think more divergently.

Need for Cognitive Closure

Need for cognitive closure (NCC) has been defined as the "desire for a quick firm answer, any answer, to a question" (Chirumbolo, Livi, Mannetti, Pierro, & Kruglanski, 2004; Kruglanski & Webster, 1996; Webster & Kruglanski, 1998). A study by Chirumbolo, Livi, Mannetti, Pierro, and Kruglanski (2004) examined the effects of NCC on creativity in a group context. They postulated that individuals under high (versus low) NCC would express less ideational fluency (an important component of both individual and group creativity). Thus, creativity and NCC would be negatively correlated. Previous research posits that this relationship exists because NCC limits the generation of alternative solutions and information processing, which are essential components of creativity (Mayseless & Kruglanski, 1987; Webster, Richter, & Kruglanski, 1996). Chirumbolo et al. (2004) found results consistent with their hypothesis that NCC and creativity were negatively correlated. From this we may predict that individuals low in NCC would be more likely to entertain minority viewpoints because their ideational fluency would be higher than those individuals high in this trait.

Primed Effectiveness of Argument

Aside from manipulating whether participants were exposed to majority or minority influence, we also manipulated the stated effectiveness of the argument. Meaning, participants were told that the minority viewpoint was viewed as either successful or unsuccessful by other individuals. There is little research that examines the effects minority source influence has on individuals when the stated effectiveness of the source has been primed. Thus, this study has the potential to reveal possible relationships between primed effectiveness of an argument and minority influence. Therefore, we hypothesize that individuals in either condition would be more likely to entertain minority points of view when the minority faction is considered successful rather than unsuccessful.

Overview of the Present Study

In the present study, we examined the possibility that entertaining and accepting minority points of view might be, in part, related to a variety of personality characteristics. Past literature suggests a relationship exists between the aforementioned personality characteristics and acceptance of minority influence with DT as the linking component. Current literature examining the relationship between minority influence and DT, as a function of personality characteristics, has been somewhat equivocal in nature, but we believe that this study will positively contribute to the body of research on minority influence that currently exists and will assist in clearing up any present ambiguities.

Methods

Participants

Participants were gathered from both the Introductory Psychology pool and other higher-level psychology classes via an online sign-up process in which students received class credit for their participation. Fifty-five subjects participated in this study (N=55). Participants were randomly assigned to one of four experimental conditions: minority-successful (N=14), minority-unsuccessful (N=14), majority-successful (N=15), or majority-unsuccessful (N=12).

Procedure & Materials

Participants were told that the purpose of this study was to examine the effects of certain individual differences on one's social behavior. Each participant was asked to complete a survey packet. The first section of the packet required participants to read a short vignette and answer the questions that followed. The vignette they read described the school newspaper's dilemma in deciding how much space should be allotted to each article in the next issue of the paper. There were three possible article lengths: full page, half page and quarter page. Participants then read a short synopsis about each of the different article topics, which included: student transportation to campus, new graduate programs, and a

newly designed foreign language proposal that would require students to complete two years, or four semesters, of a foreign language before graduation. We chose to use the foreign language proposal as our main item of interest because we reasoned that participants would form a counter attitudinal opinion towards the proposal. Similar studies have used the comprehensive final exam paradigm to achieve the same results (Mucchi-Faina & Cicoletti, 2006; Petty, Cacioppo, & Goldman, 1981; Trost, Maass, & Kenrick, 1992).

Participants were then exposed to the experimental manipulations. Participants were told that a reporter for the newspaper had interviewed several students and faculty members at other universities to see what they thought about the foreign language proposal that had already been implemented at those universities. The first manipulation occurred when subjects were told that either 85% (majority) or 15% (minority) of students were in favor of the foreign language proposal. They were also told that the effectiveness of the proposal was rated by the interviewees as either successful or unsuccessful.

After reviewing each article, participants were to choose which article should be allotted how much space (front page, half page, or quarter page) in the next issue of the paper (only one length could be selected for each article, so that each article would be assigned a different length). This measure was used to gauge how much attention participants were willing to give to each of the article topics and in doing so, they ranked ordered them by importance. Thus the topics they ranked as front page material were more important to them than the article they ranked at quarter of a page. This was followed by a five-item questionnaire regarding the foreign language proposal. Participants were then asked to what degree they were in favor of the foreign language proposal, which was measured using a scale from -40 (extremely against) to 40 (in favor) with five-point increments in-between. This was issued as our direct measure of influence in the context of this study.

The second section of the survey was comprised of a thought-listing task that served as our indirect measure of influence.

Participants were asked to list all of the thoughts they had regarding the foreign language proposal. Then participants were directed to place all of their thoughts in favor of the proposal in the "In Favor" column and all of their thoughts against the proposal in the "Against" column.

The third section of the packet consisted of our measure of personality variables, which were chosen based upon the known relationships they share with creativity and divergent thinking. We chose to use known and previously tested measures of these personality characteristics to ensure reliability.

Openness to experience. A 39-item openness to experience scale was administered to participants that measured degree to which individuals are independent thinkers, curious, imaginative, and amenable to novel ideas and unconventional perspectives (George & Zhou, 2001; Goldberg, 1999; McCrae, 1996; McCrae & Costa, 1997). Items were rated on a 5-point Likert scale and were added together to produce a total scale score.

Need for cognition. An 18-item need for cognition scale was administered to participants that measured the degree to which individuals engage in and enjoy effortful cognitive activity (Cacioppo & Petty, 1982; Cacioppo, Petty, & Kao, 1984). Items were rated on a 5-point Likert scale and were added together to produce a total scale score.

Tolerance for ambiguity. A 22-item tolerance for ambiguity scale was administered to participants that measured the extent to which individuals are tolerant of ambiguous situations and stimuli (McLain, 1993). Items were rated on a 7-point Likert scale and were added together to produce a total scale score.

Need for cognitive closure. A 42-item need for closure scale was administered to participants that measured an individual's desire for

cognitive closure opposed to enduring ambiguity (Kruglanski, Webster, & Klem, 1993). Items were rated on a 6-point Likert scale and were added together to produce a total scale score.

Results

The data were analyzed via a 2 (Status: Minority/Majority) X 2 (Primed Effectiveness: Success/Failure) X 2 (Personality Variable [Need for Cognition and Openness to Experience] High/Low) analyses of variance. We began our analysis by dichotomizing the personality variables in our design, which allowed us to differentiate between those individuals who were either high or low in each trait. This was done by finding the median of each personality data set and ranking everyone below the median as being low in the personality trait and everyone above the median as being high in the personality trait. There were also two independent coders who counted the number of arguments in each column of the divergent thinking task, and inter-rater reliably (percent agreement) was calculated by comparing their results, α=.97. Results indicated that no significant relationship was found between the dependent variables in our design and need for closure or tolerance for ambiguity. However, analysis of the personality variable NFC revealed two main effects. Main effects were found for both the number of thoughts generated in favor of the foreign language proposal [F(1)=5.403, p=.025; Figure 1] and total fluency during the divergent thinking task [F(1)=4.204, p=.046; Figure 2]. These results coincide with prior literature, and it is not surprising that individuals, who have higher need for cognition, also generate more thoughts during a divergent thinking task.

A significant interaction was also found between source status and stated effectiveness regarding the dependent variable number of arguments generated against the foreign language proposal [F(1)=3.94, p=.05; Figure 3]. This interaction between source status and stated effectiveness reveals that individuals in the majority condition generated more thoughts against the foreign language proposal when it was deemed successful rather than unsuccessful and

that the inverse was true of those in the minority condition. Thus, individuals in the minority condition generated more arguments against the proposal when it was deemed unsuccessful rather than successful. A significant 3-way interaction was also found between source status, stated effectiveness, and dichotomization of the variable NFC [F(1)=6.185, p=.017; Figure 4]. The relationship found for the status by stated effectiveness also held true in the 3-way interaction for those individuals that were low in need for cognition. However, those individuals who were high in NFC generated more thoughts against the foreign language proposal when it was deemed successful in both the majority and minority conditions.

It is not surprising that marginally significant relationships were also found between some of the dependent variables in our design and OE. There was a marginally significant interaction found between source status and stated effectiveness regarding the dependent variable and the number of arguments generated against the foreign language proposal [F(1)= 3.36, p=.074; Figure 5]. This relationship was similar to the source by effectiveness interaction illustrated in regard to need for cognition. Those individuals in the majority condition generated more thoughts against the proposal when it was deemed successful versus unsuccessful and the inverse was true of the minority condition.

A marginally significant 3-way interaction was also found for source status by stated effectiveness by dichotomization of the variable OE regarding the dependent variable "Issue 1," which was the questionnaire used as the direct measure of influence that gauged participants' overall acceptance of the foreign language proposal [F(1)=3.82, p=.057; Figure 6]. The results indicate that those individuals who were low in openness we more likely to accept the foreign language proposal if it was deemed unsuccessful rather than successful. Those individuals who were high in openness and in the majority condition also responded similarly, and in all three cases they viewed the foreign language proposal positively. However, those individuals who were high in openness to experience were more accepting of the

proposal when it was viewed as successful, rather than unsuccessful, and actually viewed the proposal negatively when it was viewed as unsuccessful.

This study was a promising first step at exploring how certain personality variables can help explain acceptance of minority influence. However, our results were somewhat inconsistent with our hypothesis. We hypothesized individuals would differ to the degree in which they entertained minority points of view, based on how low or high they scored on measures of certain personality characteristics, namely need for closure, tolerance for ambiguity, need for cognition, and openness to experience. Our results indicated that individuals who scored high in NFC were indeed more likely to entertain minority points, and that individuals who scored high on openness to experience were also influenced to a greater extent by minority sources. However, we did not find any significant relationships between the other personality characteristics of interest and acceptance of minority influence in this study.

Discussion

This study was a promising first step at exploring how certain personality variables can help explain acceptance of minority influence. However, our results were somewhat inconsistent with our hypotheses. We hypothesized individuals would differ to the degree in which they entertained minority points of view, based on how low or high they scored on measures of certain personality characteristics, namely need for closure, tolerance for ambiguity, need for cognition, and openness to experience. Our results indicated that individuals who scored high in NFC were indeed more likely to entertain minority points and that individuals who scored high on openness to experience were also influenced to a greater extent by minority sources. However, we did not find any significant relationships between the other personality characteristics of interest and acceptance of minority influence in this study.

We also hypothesized that individuals would be more accepting of the foreign language proposal and be more likely to entertain minority point of view if their arguments were primed as successful,

rather than unsuccessful. However, this hypothesis did not prove to be true in a variety of cases and our results regarding this manipulation were mixed.

Main effects for NFC were found for the independent variables number of thoughts in favor of the foreign language proposal and overall fluency, both of which are measures of DT. This is in line with previous research (Butler, Scherer, and Reiter-Palmon, 2003; Ivcevic & Mayer, 2007) examining the relationship between NFC and DT. A significant source by status interaction was also found for NCF, where individuals in the majority condition generated more arguments against the foreign language proposal when it was deemed successful versus unsuccessful. However, the inverse was true of the minority condition, as individuals generated more arguments against the proposal when it was deemed unsuccessful rather than successful. A similar marginally significant interaction was found for OE as well regarding these same independent variables. These relationships, once more, coincide with prior literature on minority influence in that there were some conditions in which individuals' group identity was threatened (Wood, 1999). Those individuals in the majority-successful and minority-unsuccessful had their group identities threatened; the majority condition was told that the minority faction was indeed successful or the minority condition was told that the minority viewpoint was not successful. In either case individuals generated more arguments against the proposal to help ensure their in-group identity was maintained.

We also found a significant 3-way interaction between source status, stated effectiveness, and dichotomization of the variable NFC, regarding the dependent variable number of thought against the foreign language proposal. For those individuals that were low in NFC, we see a similar relationship that we saw with the status by success interaction. However, for those individuals high in NFC, we see that in both the majority and minority condition, there were more arguments generated against the foreign language proposal when deemed successful rather than unsuccessful. This result is curious

because we would expect those individuals high in NFC to be more accepting of the minority viewpoints and hence less likely to generate more arguments against a successful versus an unsuccessful proposal.

A marginally significant 3-way interaction was also found between source status, stated effectiveness, and dichotomization of the variable OE, regarding the dependent variable overall acceptance of the foreign language proposal. The results indicate that individuals who were high in openness in the minority condition, were more likely to accept the proposal if it was deemed successful versus unsuccessful. However, we also found that individuals low in openness, in either status condition, were more likely to accept the foreign language proposal if it was previously deemed unsuccessful versus successful, and the same held true for those individuals who were high in openness and in the majority condition. This is also a curious result that does not coincide with the existing literature.

Implications & Future Research

Although our statistical power was weak, our results suggest that a definite relationship exists between these social influences processes and NFC and OE. Past research indicates insufficient findings regarding the interpretation of social influences as a reflection of possible motivational orientations (Wood, 1999). However, the implications of this study suggest that this link between social influences and identity motivations does exist and aligns nicely with past research regarding the formation of social group identity (Tajfel & Turner, 1979; Wood, 1999). In fact, social identity theory supports the possibility that influence originates, in part, from the motivation to align oneself with personally valued reference groups where individuals share similar views regarding topics (Tajfel, 1981, 1982; Tajfel & Turner, 1979; Wood, 1999).

Perhaps future research can examine the extent to which these similar viewpoints, that in-group members' share, relate to measurements of certain personality characteristics, such as NFC and OE. These findings would strengthen

the argument that identity motivations may contribute to the alignment of the self with a minority position and that personality variables affect the degree to which individuals will accept minority viewpoints.

Future studies should also look at the relationship between individual personality characteristics and acceptance of minority influence in contexts where the minority argument has been primed to be successful or unsuccessful. This further examination may help us better understand the unpredicted results that we achieved from our 3-way interactions. Thus, we would be better able to understand how minority sources of influence, personality, and primed effectiveness interact with one another.
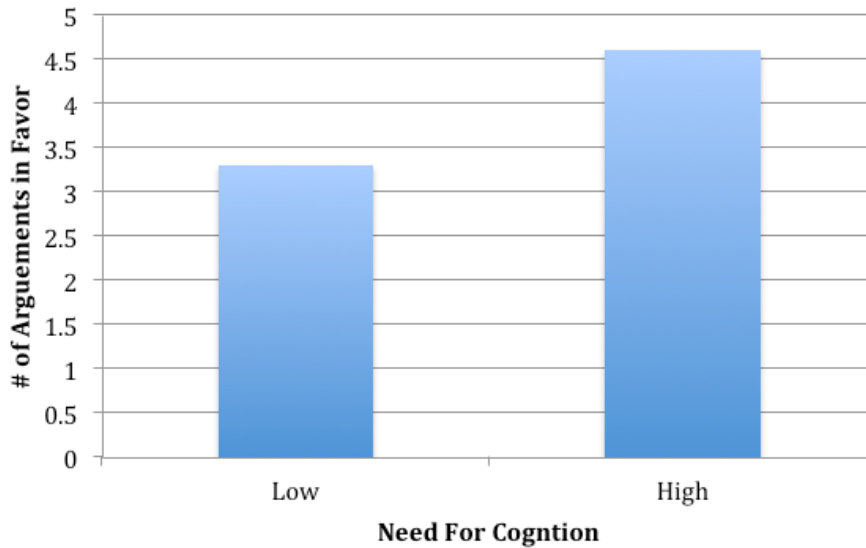
Main Effect NFC has on # Thoughts in Favor

Figure 1. Main Effect NFC has on # of Thoughts in Favor. A main effect was found for the number of thoughts generated in favor of the foreign language proposal [F(1)=5.403, p=.025].
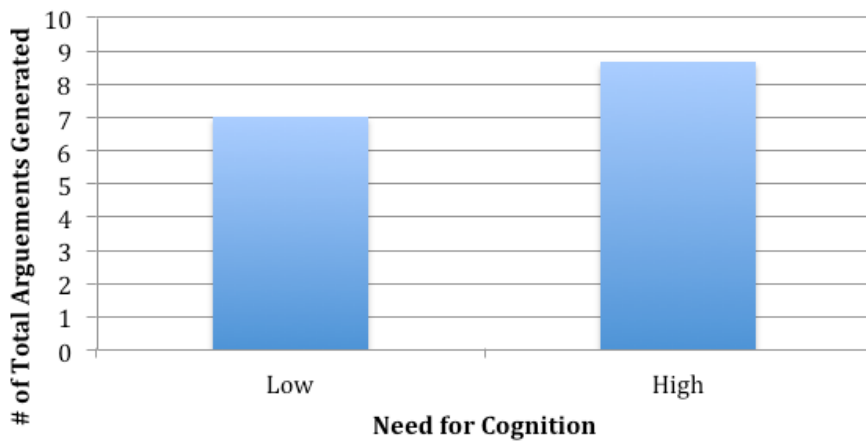

Main Effect NFC has on Fluency

Figure 2. Main Effect NFC has on Fluency. A main effect was also found for total fluency during the divergent thinking task [F(1)=4.204 ,p=.046]. This figure illustrates the relationship that exists between the variables NFC and total fluency.

Interaction of Status*Success

Figure 3. Status by success interaction for NFC. A significant interaction was also found between source status and stated effectiveness regarding the dependent variable number of arguments generated against the foreign language proposal [F(1)=3.94, p=.05].

Low Need for Cognition
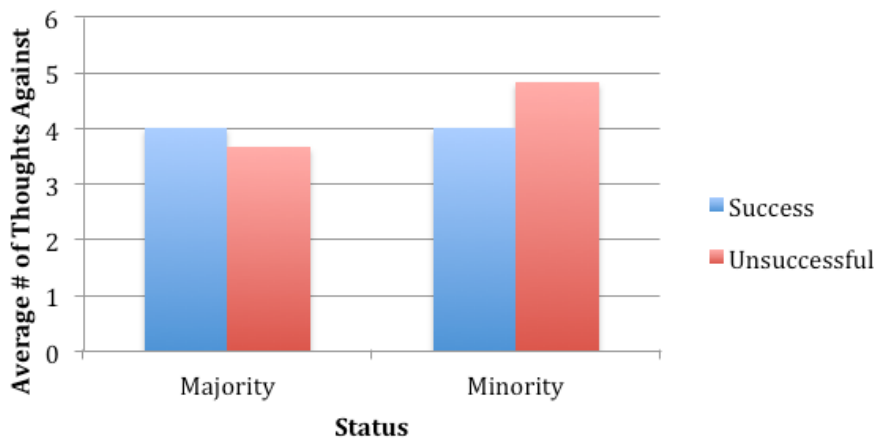
High Need For Cognition
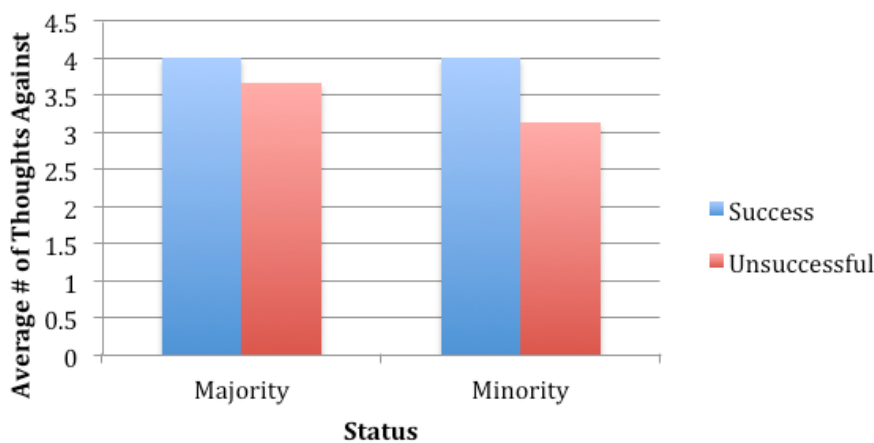
Figure 4. A status X success X dichotomization of the variable NFC three-way interaction. A significant 3-way interaction was also found between source status, stated effectiveness, and dichotomization of the variable NFC [F(1)=6.185, p=.017].
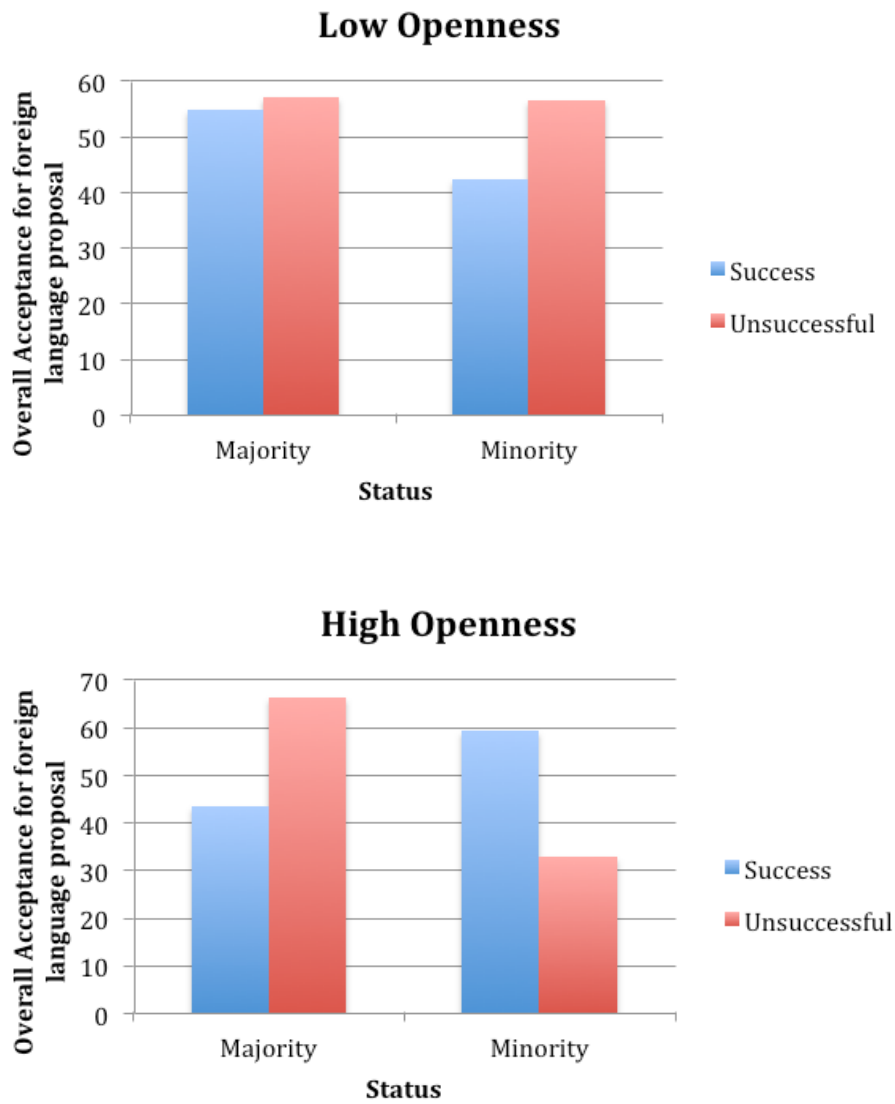
Figure 5. A status X success X Dichotomization of the variable OE three-way interaction. There was a marginally significant interaction found between source status and stated effectiveness regarding the dependent variable the number of arguments generated against the foreign language proposal [F(1)= 3.36, p=.074].

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The Frequency of Generic and Nongeneric Praise in the Sports and Academic Settings

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Over the last decade, research has shown a growing literature focusing on the effect of different types of praise on motivation in children. This is an important area of research because of the emphasis our society places on praise use. Generally, it is believed that praise should be used in all contexts and with different age groups (Henderlong & Lepper, 2002), but research indicates that we know little about the types of praise that are most effective in garnering adaptive motivational behaviors in children (Mueller & Dweck, 1998). If this is true, adults may not only be using praise ineffectively, but also in ways that could be detrimental to children; thus, this study aims to investigate natural rates of praise use.

The extant literature has focused on two types of praise: generic and nongeneric types. Generic statements are so named because they describe facts about whole categories (e.g., "Boys are good at math"; Cimpian, 2010; Gelman & Raman, 2003), but can also describe the general regularities of a specific person (e.g., "Joe is a good boy"). Conversely, nongeneric statements describe specific events (e.g., "Joe was good today;" Cimpian, Arce, Markman, & Dweck, 2007). Generic praise conveys that stable factors such as inherent abilities and traits are the reasons for achievement, while nongeneric praise conveys that more temporary factors such as effort or strategies are responsible for achievement (Kamins & Dweck, 1999; Mueller & Dweck, 1998; Zentall & Morris, 2010).

Evidence suggests that the implicit information conveyed in these types of praise may affect motivational responses in at least two ways. First, generic praise may influence children's goals for achievement (Mueller & Dweck, 1998; Zentall & Morris, 2010). The literature describes two goals that one may adopt in achievement settings: learning and performance goals (Duda, 1993; Dweck & Leggett, 1988; Elliott & Dweck, 1988). Sports psychologist Duda (1993), describes those who hold performance goals as judging competence normatively, or against one's peers. These children are externally driven and feel accomplished only when they have beaten someone or have demonstrated their competence. Children with learning goals, however, feel accomplished when they have mastered a challenging task, have exerted effort, or have demonstrated improvement.

In a study by Mueller and Dweck (1998), fifth graders were asked to solve a set of moderately difficult matrices and were given either generic or nongeneric praise after completion of the task; the children were then asked to complete a set of more difficult matrices and were lead to believe that they had been unsuccessful. Achievement goals in this study were measured after the unsuccessful trial by giving the students a choice of four tasks that represented learning and performance goals. Three of the four choices gave the children the option to work on easier matrices for various reasons (e.g., to get fewer wrong, demonstrate intelligence), and represented performance goals; the final choice gave children the option of working on matrices that would develop their abilities and represented the learning goal. This study found that those children who were given nongeneric praise were more likely to choose a learning goal, and those that were given generic praise were much more likely to choose a performance goal. Furthermore, the children in this study displayed fundamentally different behavioral responses after failing to solve the more difficult matrices, leading the researchers to conclude that these distinct goals have a profound impact not only on how children judge their own competence, but also on how they cope with failure.

Those children with performance goals were much more likely to exhibit a helpless pattern of behavioral responding after being unsuccessful; this helpless response pattern, or simply just helpless orientation, is characterized by an inclination to give up when a task becomes difficult, the development of negative self-cognitions about ability, less task

enjoyment, and worse performance over time, a startling phenomenon, given that children's performance on tasks should increase as they become more familiar with them, not decrease (Elliot & Dweck, 1988; Kamins & Dweck, 1999; Mueller & Dweck, 1998). Another response pattern was also evident in children who participated in this study; these children responded to failure by persisting and increasing performance through strategy development, while maintaining positive self-cognitions about their ability and were said to have a mastery orientation.

This research indicates that the information conveyed by generic and nongeneric praise may influence goals, but also attributions of success (Dweck & Leggett, 1988; Mueller & Dweck, 1998; Zentall & Morris, 2010). In the study by Dweck and Mueller (1998), children who were given nongeneric praise were much more likely to attribute success to controllable causes such as the effort they exerted or the strategy they implemented, leading them to develop different strategies when faced with adversity. Conversely, helpless children attributed success to uncontrollable causes such as inherent abilities and traits, leading them to give up when faced with the possibility of failure.

Although the effect of different types of praise on motivation has traditionally been a topic researched and applied in classroom settings, achievement goals have been a topic of interest in many other contexts. Indeed, studies in sports contexts have demonstrated that learning and performance goals influence athletes' persistence (Duda, 1988), performance (Van-Yperen & Duda, 1999), strategy formulation (Newton & Duda, 1993), and intrinsic motivation (Duda, Chi, Newton, Walling, & Catley, 1995). Also documented in this setting is the effect that goals seem to have on attributions of success. Studies by Sarrazin, Biddle, Famose, Cury, Fox, and Durand (1996) as well as Sefriz, Duda, and Chi (1992), found that athletes who held performance goals were more likely to make attributions of ability than those who held learning goals, a finding that echoes that of Mueller and Dweck (1998).

As we have discussed, the literature has demonstrated that praise plays an important role in the development of motivational patterns by influencing achievement goals and attributions of success, yet little observational research has studied praise use at the level of generic and nongeneric. Survey data suggest that over 80% of parents believe that praising children's traits and abilities is important (Mueller & Dweck, 1998), indicating that a majority of parents may be using generic praise. A study conducted by Reissland (1994) in the homes of children corroborates evidence for this survey. In this study, very young children were instructed to play a game while their mothers watched, and the type of praise given to the children was recorded. No mother used solely just person praise in this study, but 38% of mothers used inconsistent praise which contained both generic and nongeneric components. Thus far, the research on the effects of inconsistent praise are limited, but a study by Zentall and Morris (2010) suggests that 75% of the praise a child hears must be nongeneric in order for high persistence and self-evaluations to be preserved for failure situations.

Observational studies of generic and nongeneric praise in the classroom are just as scarce as those in children's homes, yet some general trends in the use of classroom praise and approval are well established. In a meta-analytic study of approval, disapproval, and praise, Beaman and Wheldall (2000) concluded that disapproval was more common than approval in the early studies they examined but that this trend had generally been shifting since the 1980s. Another interesting finding was that appropriate academic behaviors were much more likely to be praised than appropriate social behaviors. This same conclusion has been drawn by many other researchers of approval and praise (Brophy, 1981; Wyatt & Hawkins, 1987), and has been explained by White (1975) as the result of the lack of reinforcement that teachers receive for using praise in classroom settings.

Another trend evident in the literature is the increasing rates of praise. Brophy (1981) and White (1975) reported praise frequencies as low as 5 times per hour even in early grades, but in more recent studies praise frequency has been cited at more than once per minute in elementary classrooms (Harrop & Swinson, 2000). Although this trend may be the result of change in teacher behavior, we cannot rule out the possibility that the varying definitions of approval and praise are cause for this apparent change. Very few studies have documented generic and nongeneric praise, but a study conducted by Chalk and Bizo (2004) observed teachers during a math lesson, and found that all but one teacher used generic praise more often than specific praise, a type of praise defined similarly to nongeneric praise. Finally, in one relatively recent study of the classroom, researchers examined the rates of individual versus group praise and found that teachers gave individual praise at vastly greater rates than group praise (Harrop & Swinson, 2000), a tendency that may contribute to the overall low rates of praise found in the classroom.

Another context that few researchers of praise have focused on in recent decades is the sports context. It is estimated that over 46 million youth participate in sports (Smith, Smoll, & Cumming, 2009), and thus it seems an important area to continue praise research. Many of the studies that do examine praise in these settings are often broadly focused on a variety of coach behaviors. These observational studies consistently find that praise is used repeatedly by coaches in athletic practices and used more often than disapproval (Cushion & Jones, 2001; Smith, Zane, Smoll, & Coppel, 1983). In a study by Smith et al. (1983) over 22% of youth basketball coach behaviors fell into the category of reinforcement, and in another study examining little league coaches, 40% of behaviors consisted of praise or encouragement (Smith, Smoll, & Curtis, 1978). Despite this growing body of literature on coach behaviors and praise, we still know very little about the quality of praise that children are receiving.

A study by Chaumeton and Duda (1988) categorized praise used by coaches during basketball practices and games into praise that focused on performance outcomes and praise focused on the performance process. This study found that the level of praise from coaches who focus on performance outcomes increases as youth progress to higher levels of competition, but the level also depends

on whether coaches are observed during a practice or game. The study also found that the relative emphasis on mastery goals remains through all levels of competition examined, an optimistic finding.

In conclusion, the observational studies that examine the natural rates of generic and nongeneric praise are limited, although the importance of these types of praise for achievement goals and attributions of success is well-documented. Our study aims to add to the body of observational research on praise by investigating the frequency of generic and nongeneric praise in the academic and sports settings, specifically in the classroom and during the practices of elementary-aged children. Researchers know that certain types of praise are detrimental and others are beneficial, but what has not been investigated thoroughly is the frequency of these types of praise in natural contexts. Ultimately we attempt to answer some basic questions on the relationship between praise use and context. We would like to know if one context offers more of one type of praise than the other, and if frequency of praise is different between these contexts. Additionally this study aims to replicate some well-established trends in observational research, which include the use of social versus academic praise and individual versus group praise.

Method

Participants

The participants were recruited from three schools and two sports organizations in the Midwest and included four volunteer soccer coaches and four elementary school teachers. All of the teachers were female, and all of the coaches were male. The mean age of the coaches was 41.25 years (SD=2.63), and the mean age of the teachers was 27 years (SD=2.94). The children ranged in age from 6-10 years. The soccer players were female.

Procedure

On recording day we gave participants a digital audio recorder that was to be carried in their pocket and a lapel microphone which attached to the collar of their clothing. We demonstrated the basic functions of the audio recorder and asked coaches and teachers to record their lesson or practice for 45 minutes. This recording period was 15 minutes shorter than a normal soccer practice. A study by Wyatt and Hawkins (1987) suggests that there is little variation in praise from activity to activity in the classroom, and thus we gave teachers the option of choosing the lesson that was to be recorded.

We did not disclose to the coaches and teachers that the variable of interest was praise use but instead described to them that we were analyzing instruction techniques. All participants were reminded that they could pause the recording at any time they felt it was necessary; several coaches and teachers took advantage of this option. The investigator remained present for the full 45 minutes in case of questions, or emergency, but was outside of the recording location. After the recording, participants were thanked and fully debriefed.

Coding and Categories of Praise

The 8 recordings were coded by the principal investigator, and a second person was selected to code 20% of the recordings. Each praise event was classified into three categories: the type of praise used (i.e., generic, nongeneric, ambiguous), target of the praise (i.e., individual, group), and setting of the praise (i.e., social, academic) which applied only to teacher praise. Ambiguous praise, not discussed previously, was a necessary subcategory in "type of praise" because some praise events could not be categorized clearly as generic or nongeneric. Mean interrater agreement before discussion was type (93%), target (92%), and setting (97%). The categories are described in further detail below.

Type of Praise

Generic: A positive verbal evaluation focused on making an assessment of a specific trait or ability; this type of praise conveys to children that their success was due to an inherent ability or trait and leads them to believe that achievement is due to stable factors (e.g., "I think you would make an excellent defender;" "You're the best player on the team").

Nongeneric: A positive verbal evaluation focused on a particular behavior, event, or the effort used; this type of praise conveys to the child that the success was due to more temporary circumstances and leads children to believe that achievement is due to nonstable factors (e.g. "Good job;" "Nice try"; "Great kick"). Feedback that only provided the child with information on correctness of behavior was not recorded (e.g. "That's right").

Ambiguous praise: A positive verbal evaluation that cannot clearly be classified as generic or nongeneric praise. To date, the effects of this type of praise on children's motivation have not been researched. (e.g. "Nice!;" "There you go!"; "Way to go!")

Target of Praise

Individual: Praise directed at only one student or team member.

Group: Praise directed at more than one student or team member. (e.g., "You guys are a special team").

Setting of Praise (Teachers only)

Social: Praise for behaviors unrelated to academic work, including praise for following directions, conduct, and use of manners (e.g. I sure do like how you are facing forward).

Academic: Praise for behaviors related to academic work, including correct answers, reading, and writing (e.g. That was an excellent explanation of the answer).

Results

Proportion and Frequency of Praise

To make comparisons between and within the contexts we first calculated the absolute frequencies for each of the 7 subcategories of praise (Table 1). This data was then used to calculate the frequency of each subcategory of praise as a proportion of the total number of praise events in the larger category to which it belongs (Table 2). We also calculated the rate per minute that each subcategory of praise was observed (Table 3). A total of 776 praise events were recorded in the 360 minutes of audio collected. On average, coaches praised 3.4 times every minute, and teachers .89 times every minute. The most frequent type of praise was nongeneric (57%), followed by ambiguous (42%), and finally generic (1%).

Coaches used 4.4 times more nongeneric praise than teachers, and 3.2 times more ambiguous praise. Teachers and coaches tended to give larger amounts of nongeneric praise than ambiguous praise, but this trend was only significant

for coaches (t(3) = 8.3, p < .01; Figure 1). Academic praise given by teachers was found to be much more prevalent than social praise (t(3) = 6.1, p < .01). Teachers, on average, gave 8.5 praise statements for appropriate social behaviors and 30.75 praise statements for appropriate academic behaviors. Finally, an analysis of the targets of praise revealed that both coaches and teachers similarly directed praise to individuals more often than groups (t(7) = 4.8, p < .01). Over 85% of total praise was directed at individuals.

Discussion

The results of this study have given us important insight into praise use in two different contexts: the sports and academic contexts. The first of these insights was somewhat unexpected. The use of generic praise was infrequent in this study, occurring only 10 times in the 360 minutes of audio collected. Anderson, Evertson, and Bropny (1979), conducted an observational study of first grade reading groups and found that only 5 percent of praise was directed towards specific behaviors, or was nongeneric in nature, while Chalk and Bizoe (2004) found that generic praise before intervention was at least somewhat more common than nongeneric praise for 4 elementary school teachers who were observed twice in 15 minute sessions. We posit that this may be a cohort effect that is a result of the dissemination of the research on praise and motivation which began in the late 1970s. Only one participant in our study was over 40 years, and in an older sample we might find that generic praise is more frequent. An analysis such as this is likely as we expand the study further.

Another insight we gained by conducting this study was on the frequency of ambiguous praise. We do not know of any research that has studied the effects of this type of praise, although it seems to be quite frequent, accounting for 42% of total praise use in this study. The implications of research on ambiguous praise may be especially important for teachers, as we found no significant difference between their use of this type of praise, and nongeneric praise.

We also found that teachers and coaches directed their praise towards individuals a majority of times. Harrop and Swinson (2000) also differentiated between individual and group praise. These researchers contend that because teachers focus on the individual they may miss opportunities to praise; this may also be true of coaches who had similar proportions of group and individual praise. Social praise was also infrequent when compared to academic praise, as described in previous studies (Beaman & Wheldall, 2000; Chalk & Bizoe, 2004; Wyatt & Hawkins, 1987; Brophy, 1981), but in general it was much greater than previously found. In this study, social praise occurred approximately once every 5 minutes while in the studies analyzed by Brophy (1981) social praise occurred only once every 2-10 hours. The rates of social praise for early elementary classrooms observed in White's (1975) study were only slightly better. Social praise in these classrooms occurred only once every 30 minutes to 2 hours. Social praise is important so children learn what is considered appropriate conduct, and not just what is considered inappropriate conduct, as they do when they are punished. White (1975) suggested that disapproval or criticism may be more frequent than approval or praise in social situations because it is more reinforcing to a teacher. Teachers perceive that punishment extinguishes misbehavior immediately, while praise does not result in an outcome that a teacher can directly relate to its use. For example, a teacher may assume that a student became quiet because he or she was scolded but cannot confidently assume that a student was following directions because they had previously been praised.

Finally, there was a large difference between rates of praise use by coaches and teachers. Coaches used praise at a higher rate than teachers, a finding that is not too surprising in light of the extant observational research. Praise is consistently found to be a frequently observed coach behavior in practices (Cushion & Jones, 2001; Potter, 1988; Smith et al, 1983), while inconsistent levels of overall praise are often reported in classrooms (White, 1975; Wyatt & Hawkins, 2001). Although it seems that both teachers and coaches use large proportions of nongeneric praise, the greater rate at which young athletes hear nongeneric praise may have a role in promoting mastery orientations.

Studies by Smith, Smoll, et al. (2009) and Chaumeton and Duda (1988) found that in general, young athletes perceived that their basketball coaches were creating a much more mastery-oriented climate versus ego-oriented climate during games and practices, leading these researchers to speculate that coaches may be appropriately promoting continued involvement in sport. These are optimistic findings, but we cannot deemphasize the importance of praise that is sincere and contingent on desirable behaviors. Research findings suggest that praise is most effective when a child is not expecting it, and a large amount of praise that is insincere can have detrimental effects (Henderlong & Lepper, 2002).

Limitations and Future Research

Although the results are interesting, the small sample size and gender composition of the samples limit the generalizability of our findings. Future studies should analyze praise use by gender. Data suggest that gender differences of praise use in both classroom and sports settings may exist. In a study of the classroom conducted by Burnett (2002), boys received more praise from male teachers than from female teachers, and also more ability feedback. In the sports setting, Dubois (1981) reported that female coaches provided their team with 1/3 more positive feedback than male coaches.

There is also a need for praise research to continue in these and other contexts. A limited body of research explores praise at the level of generic and nongeneric, in spite of the evidence corroborating its importance in promoting positive motivational outcomes. Finally, the effect of ambiguous praise on motivation is another avenue of research that has been left unexplored by the extant literature. Research should focus on how this type of praise is interpreted by children in different contexts. An interesting question is if interpretation varies from individual to individual or if certain types of ambiguous praise be consistently identified as generic or nongeneric.

Conclusions and Implications

In conclusion, previous research has found that praise is an important predictor of motivational response patterns in the

face of failure (Mueller & Dweck, 1998; Kamins & Dweck, 1999). For this reason it is important for us to know what types of praise children are receiving in natural settings. The present study has added to the research on generic and nongeneric praise use in natural contexts. We found several similarities between the use of praise by teachers and coaches, most notably that both used nongeneric praise most frequently. There were notable differences as well, such as the significantly higher frequency of praise by coaches compared to teachers. This evidence suggests that the type and frequency of praise that a child hears depends on the setting the child is currently in.

An important implication of this research is identifying contexts that offer greater amounts of nongeneric praise so children can be encouraged to participate in these contexts, and interventions can be designed for the contexts that do not offer nongeneric praise. Interventions with the goal of modifying coach and teacher behaviors have been introduced in the past, with optimistic results. As we continue to expand this study, we hope to gather more conclusive evidence on the frequency of praise types in the academic and sports setting.

Table 1

Absolute Frequencies of Praise

Category	Teachers	Coaches
Generic	1	9
Nongeneric	81	358
Ambiguous	78	249
Other	0	0
Group	33	59
Individual	124	522
Other	3	35
Social	34	0
Academic	123	0
other	3	0

Table 2

Praise as a Proportion of the Total Number of Praise Events

Category	Teachers	Coaches
Generic	0.01	0.01
Nongeneric	0.51	0.58
Ambiguous	0.49	0.40
Other	0.00	0.00
Group	0.21	0.10
Individual	0.78	0.85
Other	0.02	0.06
Social	0.21	0.00
Academic	0.77	0.00
other	0.02	0.00

Table 3

Frequency of Praise in Number of Times Per Minute

Category	Teachers	Coaches
Generic	0.006	0.05
Nongeneric	0.45	1.99
Ambiguous	0.43	1.38
Group	0.18	0.33
Individual	0.69	2.9
Social	0.19	0
Academic	0.68	0
Total Praise	0.89	3.4
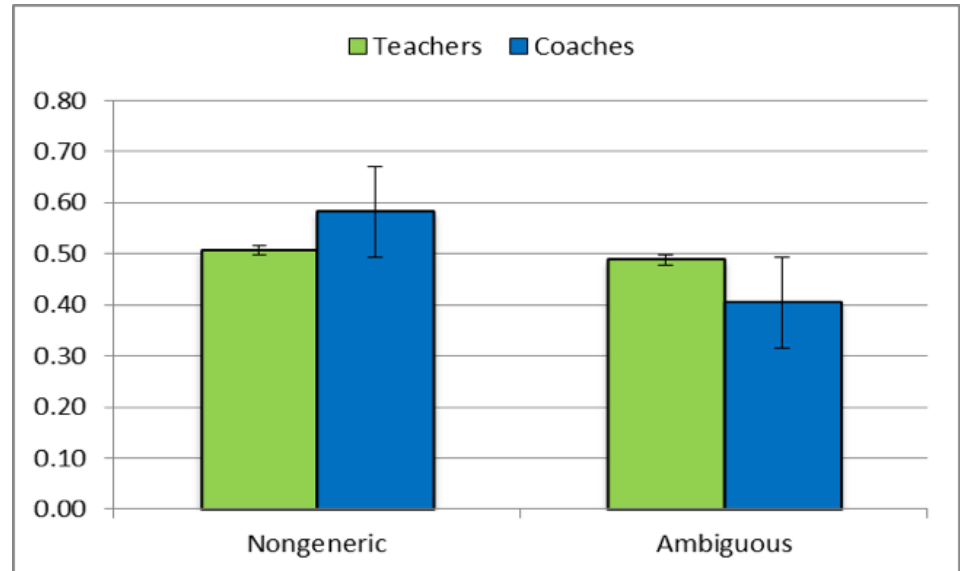
Figure 1. Proportion of generic and nongeneric praise across coaches and teachers

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Status of reintroduced American marten in the Manistee National Forest within Michigan's Northern Lower Peninsula

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Introduction

The American marten (Martes americana) was extirpated from Michigan's Lower Peninsula in the early 1900's due to habitat loss as a result of logging of old growth forests and overharvest by trappers (Buchanan 2008; McCann et al. 2010; Williams et al. 2007). The Michigan Department of Natural Resources and the United States Forest Service worked jointly to reintroduce martens in the Northern Lower Peninsula (NLP) of Michigan. They conducted a two part reintroduction with the release of 49 martens (24 female, 25 male) in the Pigeon River State Forest (PRSF) in December 1985 and the release of 36 martens (19 male, 17 female) in the Manistee National Forest (MNF) in March of 1986 (Buchanan 2008; Nelson 2006; Williams et al. 2007; [Figure 1]).

Since reintroduction in the NLP the two reintroduced populations of marten in the MNF and PRSF have genetically diverged from the source population in Ontario, Canada, into two genetically distinct populations (Nelson 2006). As a result of the genetic bottleneck associated with the reintroduction of a small number of martens, both populations have lost genetic diversity (Bicker 2007).

Martens prefer continuous old-growth mixed deciduous and coniferous forests with a canopy cover of 30 to 50% and ground cover that consists of coarse woody debris between 15 to 28 cm thick, which contains hollow trees and logs, ground burrows, and crevices to provide den sites (Buchanan 2008; Clark et al. 1987; Payer and Harrison 2002). This habitat complexity supports habitat for their prey, which consists of small mammals
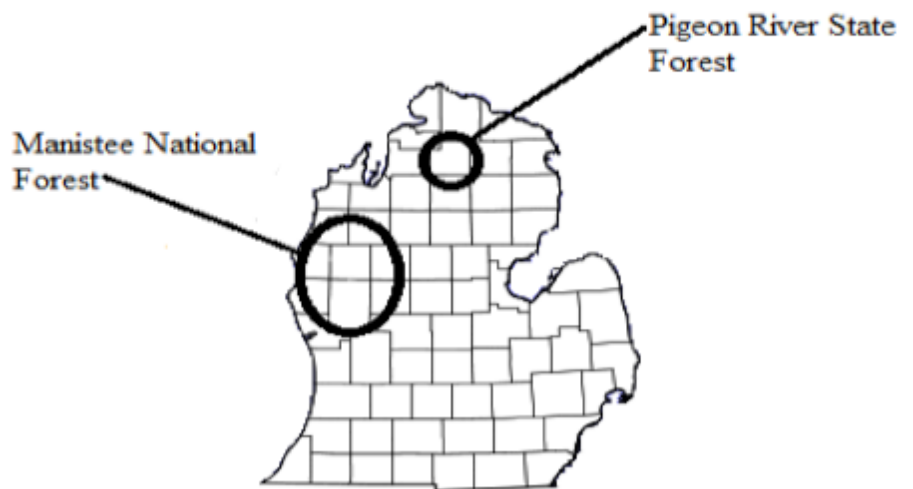
Figure 1. American marten release sites in the Manistee National Forest and Pigeon River State Forest.

such as voles, mice, chipmunks, and flying squirrels (Clark et al. 1987). Martens tend to avoid areas with large habitat openings due to their need of protection from aerial and land predators such as horned owls (Bubo virginianus), eagles (Haliaeetus leucocephalus), and coyotes (Canis latrans) (Clark et al. 1987).

Marten home ranges as calculated by McFadden (2007) using Kernel home-range estimators at 95 and 50% area contours were larger for males (avg. = 11.23 km2) than females (avg. = 7.70 km2) at the 95% area contour but were not different at the 50% area contour. The home ranges of the adult males overlap home ranges of two to six adult females, with intolerance of intrasexual competition from other adult males as evidenced by scarring in male pelts found in previous studies and the fur trade (Clark et al. 1987; McCann et al. 2010; McFadden 2007).

Many of the previously fragmented forests in the NLP of Michigan have reconnected, forming more viable habitat for martens; however, these forests are not old growth (Nelson 2006). Marten are considered to be an indicator of good forest health therefore their presence in MNF could indicate that the forests there are in good health.

In this pilot study we evaluated the success of marten in two areas within the MNF since reintroduction. Live trapping, health assessments, success of non-invasive hair snares to estimate population, DNA analysis for genetic variance and relatedness among marten were evaluated to determine if further genetic differentiation has occurred, as well as the need for corridors, translocations, and/or reintroduction of additional martens in order to increase the gene pool to prevent further genetic bottlenecking of the two smaller populations within MNF.

Materials and Methods

Study site. – The pilot study was conducted in two areas within the 530 km2 MNF release site (Buchanan 2008; Williams et al. 2007) (Figure 2). The first area, Ward Hills, was located in Lake County near Branch, MI. The second area, Caberfae, was located in Wexford County near Cadillac, MI (Figure 3).

Figure 2. Location of Lake and Wexford Counties in the State of Michigan where the two study areas were located. The marten reintroduction area encompassed both counties in an area 530 km2 (Buchanan 2008, Williams et al. 2007).

The forests in Ward Hills and Caberfae are fragmented by such activities as timber harvest, tree thinning, agriculture, resource acquisition, and residential and urban development. They consist of a mixture of deciduous and coniferous trees such as red maple (Acer rubrum), sugar maple (Acer saccharum), quaking aspen (Populus tremuloides), red oak (Quercus rubra), white oak (Quercus alba), and black cherry (Prunus serotina). The majority of the pine trees are older, interspersed red pine (Pinus resinosa) and Jack pine (Pinus banksiana) plantations (Buchanan 2008). These forests contain the habitat requirements necessary for marten such as an understory of fallen trees and logs, high canopy cover, and locations for resting sites.

Live trapping. – Live trapping was conducted in May and August 2011 using Tomahawk live traps (Models 103 – 105;

National Live Trap Company, Tomahawk, WI, U.S.A.) that were positioned near or in coarse woody debris piles that marten would naturally use for cover while foraging. Traps were covered with tree bark, leaves, pine needles, fallen branches and other natural debris found in the nearby area to keep captured marten dry (Figure 4). Traps were baited with beaver meat or pork fat that was attached by a wire to the back of the trap to prevent it from being easily stolen by marten or other scavengers. A small amount of long distance call lure made from scent glands from skunk, beaver and fox (Caven's Gusto, F & T Harvest Trading Post), was placed on a nearby branch to attract marten to the area.
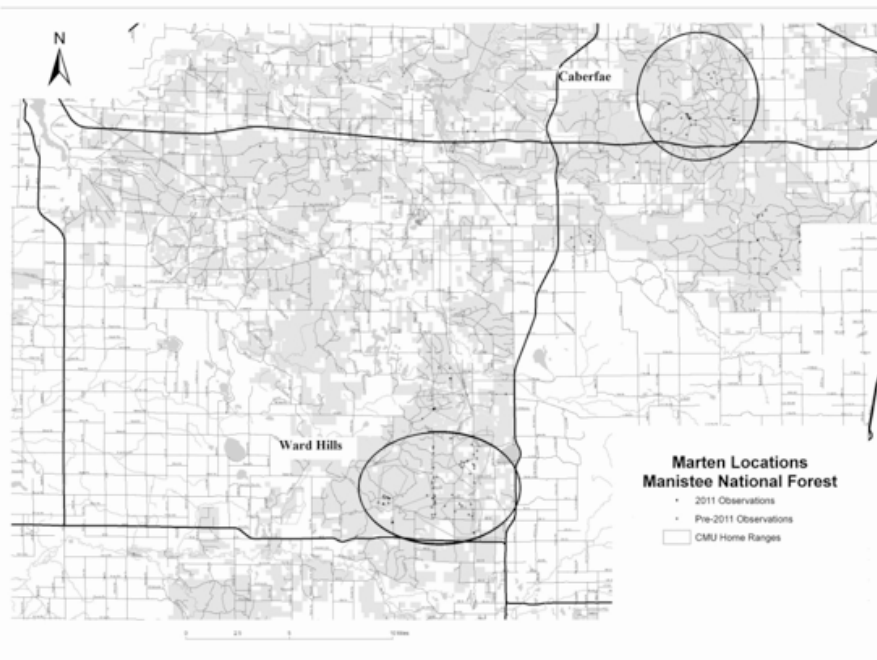
Figure 3. The two areas, Ward Hills and Caberfae, in which traps were placed in suitable marten habitat within Manistee National Forest. The black dots represent marten observations made in 2011 and the gray dots represent marten observations made prior to 2011.

Figure 4. Placement of a live trap covered with natural debris for marten.

A total of 43 traps were deployed May 11 – 14, 2011 in what appeared to be suitable marten habitat in the Ward Hills study area. The traps were checked in the morning and evening each day. On the evening of May 14, twelve traps were relocated to the Caberfae study area (Figure 3). Trap checks continued in both Ward Hills and Caberfae using the same intervals, May 15- 17, for a total trapping period from May 11, 2011 to May 17, 2011. A second trapping session following the same schedule was conducted from July 30, 2011 to August 2, 2011. The total number of trap nights for the pilot study equaled 473.

Captured marten were first transported to a mobile field laboratory where they were safely allowed to exit the trap into a denim cone (Figures 5a and 5b) that fit over the opening of the trap. Once a marten reached the end of the cone, they were sedated using Isoflurane inhalation anesthesia (Desmarchelier et al. 2007) overseen by Dr. Maria Spriggs, DVM, from Mesker Park Zoo, Evansville, Indiana. Marten were given an overall health assessment in which hair samples, blood samples and data such as body mass, gender, age, ectoparasites, fecal, urine, ear, pictures of dentition and throat patterns were recorded. Captured males were fitted with a radio-collar (Holohil Systems Ltd., Ontario, Canada) and micro-chipped (AVID Personal Identification Tag [PIT], Norco, California). Captured females were micro-chipped with AVID PIT tags only. All research on live marten captured in this study followed ASM guidelines (Gannon et al. 2007) and was approved by institutional animal care and use committee (IUCAC).

Hair snares. – Hair snares (Figures 6a and 6b) were based on the design used by Mowat and Paetkau (2002) with a few modifications. They were made of 1.27 cm thick plywood and secured with screws so they were more structurally stable. Also, two holes were drilled in the roof where a U-shaped wire was used to attach the bait instead of the side location recommended by Mowat and Paetkau (2002). Four equal-sized glue patches were cut from a Victorinox mouse trap, a cardboard backed non-toxic adhesive laced with peanut butter, and attached with a staple gun. The glue patches were placed in the

Figure 5. (a) The opening at the end of the denim cone where the marten is sedated using the Isoflurane unit.

Figure 5. (b) The denim cone shown wrapped around the cage front and tightened with heavy duty Velcro.
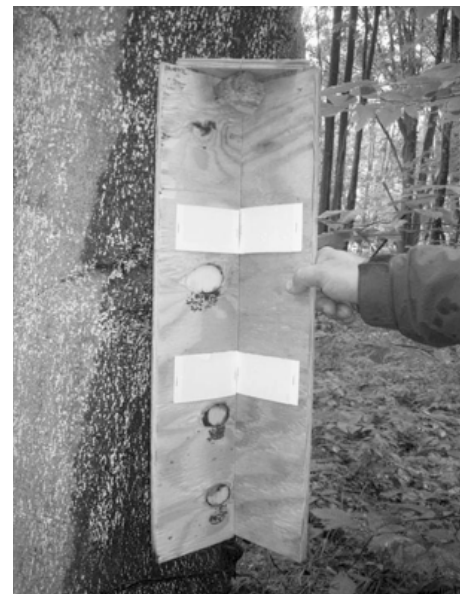
Figure 6. (a) Inside of hair snare showing positioning of glue patches.

(b) Image of the outside of a snare when mounted vertically on a tree.

approximate locations where the shoulders and mid- back of the marten would be while eating the bait. A roof was nailed on the top end to help prevent debris such as pieces of bark and rain from falling in and sticking to or wetting the glue patches, rendering them useless. The hair snares were baited with a piece of salted pork by inserting the U-shaped wire into the salted pork, through the two holes drilled into the roof, and twisted on the outside to secure. They were then mounted vertically to the tree with wood screws and spaced 2 km apart when deployed in the field. Gusto was placed approximately 2 meters from the snare location to attract the marten.

Thirty-three hair snares were deployed in known marten habitat within the Caberfae study area to collect marten hair samples. Hair snares were checked every seven days for a total of 10 checks during the 2011 summer field season. Collected hair samples were covered with wax paper and placed in a clean, dry envelope that was labeled with the snare location and date of sample collection. Samples were stored in the freezer at -80° C until examination.

Using a stereo microscope, we visually compared collected hair samples to known marten hair samples and to other possible non-target mammals in the study area. These included southern flying squirrels, red squirrels, eastern gray squirrels and mice. We then sorted the samples based on color and morphology (i.e., texture, thickness, etc.) (Mowat and Paetkau 2002).

DNA extraction and amplification. – We extracted DNA from blood samples using the QIAGEN DNeasy Blood & Tissue Kit (Qiagen, Valencia, CA) following the extraction protocol for blood with non-nucleated erythrocytes (Spin-Column). Twenty percent diluted DNA was used for PCR in a 1.5 ml microcentrifuge tube for each sample. The diluted samples were stored at 20 C and the remainder of the undiluted DNA was stored at -80 C.

Blood samples were genotyped using forward and reverse primers for 8 microsatellite loci: Ma-1, Ma-2, Ma-5, Ma-8, Ma-9, Ma-10, Ma-18, and Ma-19. We selected these primers due to their success in previous studies on marten (Bicker 2007; Davis and Strobeck 1998; Mowat and Paetkau 2002; Smith 2007; Williams et al. 2007).

We amplified PCR products using a tailed protocol. PCR was performed using 20 µl reactions which included 9.2 µl deionized (ddH2O), 2.0 µl 10x buffer (1.5 mM MgCl2), 1.6 µl 2.5 mM dNTPs, 2.0 µl 1 µM forward and reverse primer mix, 2.0 µl M13F (-29) labeled primer (FAM, NED, VIC or PET), 0.2 µl Syzygy DNA Polymerase (Syzygy Biotech, Grand Rapids, MI), and 3.0 µl genomic DNA. Two microsatellite loci (Ma-1 all samples and Ma-2 sample 8) were amplified once more using the original master mix reagent except for 7.0 µl DNA, 5.1 µl ddH2O, and 0.3 µl Syzygy DNA Polymerase in the 20 µl PCR sample. Amplification of the microsatellite loci was done using a BIO-RAD MyCycler ThermoCycler with the following cycling protocol: Initial cycle of 95 C for 5 min, 46 cycles of 95 C for 20 sec, 50 C for 20 sec, and 72 C for 30 sec, a termination step of 72 C for 3 min, and a final holding temperature of 4 C. For microsatellite locus Ma-18, an additional protocol was attempted with the same procedures except for the annealing temperature of 52 C. PCR products were visualized using an Applied Biosystems 3130xl Genetic Analyzer, GS-500 LIZ 3130 size standard, and PeakScanner software (Applied Biosystems, Foster City, CA).

We extracted DNA from four marten hair samples obtained during live trapping using the QIAGEN DNeasy Blood & Tissue Kit following a user-developed protocol for purification of total DNA from nails, hair, or feathers. Hair samples were tested in increasing increments to determine if there was a minimum (smallest tested = 5 - 10 hairs) or maximum (largest tested = 20 - 30 hairs) of hair that could be used for extraction. After DNA extraction, samples were amplified using the PCR master reagent mix above.

Genetic analysis. -- The program KINGROUP (Konovalov et al. 2004) was used to calculate relatedness among individual marten within Ward Hills and Caberfae populations and to determine whether any were more likely to be full-siblings or unrelated, as well as whether they were more likely parent-offspring or unrelated at a significance level of $p < 0.05$. The program Arlequin (version 3.5) was used to calculate a pairwise FST value between the Ward Hills and Caberfae populations to measure the genetic

difference and dispersal between them (Konovalov et al. 2004). The number of alleles and expected heterozygosity (HE) at each microsatellite locus was calculated to determine if there had been any loss in heterozygosity of the alleles or allelic dropout at these loci since the last similar genetic study of MNF martens (Bicker 2007; Davis and Strobeck 1998; Mowat and Paetkau 2002; Nelson 2006; Smith 2007).

Results

Six martens (4 female, 2 male) were captured in Ward Hills at 5 different trap locations during the May 2011 trapping period. Two of these martens (1 male, 1 female) were caught in the same trap on different days. Four martens (3 male, 1 female) were captured in two traps (3 males in same trap, 1 female in nearby trap) in Caberfae. One additional male was caught in the Ward Hills area during the second trapping period in August 2011. The sample size for this study was 11 martens.

DNA extraction was successful for all blood samples. Three microsatellite loci (Ma-1, Ma-5, Ma-19) amplified successfully for all eleven samples. A fourth microsatellite locus (Ma-2) amplified 10 of 11 samples successfully. Locus Ma-10 was considered unreliable for analysis due to inconsistent binning of alleles. Locus Ma-9 was also unreliable in this study because it was monomorphic. We used six loci (Ma-1, Ma-2, Ma-5, Ma-9, Ma-10, and Ma-19) for final calculations of gene diversity and FST. The number of alleles and HE for each loci were A = 5; HE = 0.72, A = 4; HE = 0.66, A = 4; HE = 0.62, A = 1; HE = 0, A = 2; HE = 0.49, A = 6; HE = 0.81, respectively. The number of alleles was lower for each locus in this study except in Ma-19, in which the number of alleles remained the same. Similarly, the HE was lower at each locus except for locus Ma-19, in which it was slightly higher than in previous studies (Bicker 2007, Nelson 2006). A comparison of the number of alleles and the expected heterozygosity for each microsatellite loci used in this study and in previous studies is shown in Table 1.

DNA extraction from known marten hair samples was also successful and was weakly amplified in PCR for three of the

four samples tested. The amount of DNA extracted seemed to be independent of the amount of hair used for extraction until a minimum was reached. The largest sample tested took longer for the non-DNA components to be broken down during incubation without significantly increasing the amount of DNA extracted. However, the smallest sample tested was too small and barely produced products during PCR amplification.

Five marten from Ward Hills (IDs: 2, 3, 5, 8, and 9) were more likely to be full-siblings with each other than unrelated with a type II error of 36%. Two martens (IDs 9 and 5) from Ward Hills and three martens (with IDs 7, 6, and 10) from Caberfae were more likely to be parent-offspring than unrelated with a type II error of 32% (Tables 2a and 2b). Type II error for comparison of parent-offspring versus full-siblings in related martens was 73%.

A calculated FST value of 0.141 represents a small genetic difference among the two populations with little differences among the alleles that exist in each. Statistical analysis shows no significance (p = 0.054) in the genetic difference between Ward Hills and Caberfae populations. Despite not showing significance, the FST value does indicate a trend of genetic differentiation between the two study sites.

The hair snares produced 37 total samples with 10 classified as rodent (flying squirrel or unidentified mice), 17 red squirrels, and 8 possible martens.

Discussion

The loss of alleles and decreased heterozygosity at sampled loci (Table 1) suggested the genetic diversity in the two populations has decreased since previous genetic evaluations (Bicker 2007). Interestingly, the MNF population founded with a smaller number of individuals had not experienced a bottleneck effect as severe as the larger PRSF population. This could be due to a greater amount of habitat fragmentation in the PRSF area and a smaller reintroduction area (Nelson 2006). The fact that we caught mostly relatives within each site, but not between sites suggests that dispersal may be limited between the Ward Hills and Caberfae populations. Relatedness could explain why

martens with IDs 6 and 10, two males, were captured in the same trap and potentially share all or a portion of their home ranges, which is uncharacteristic of usual marten behavior (Clark et al. 1987). All of these observances in behavior could also be representative of phylopatric behavior, meaning that the two populations have become more or less two family groups that experience little dispersion between them.

When trying to clarify if related martens are more likely to be parent-offspring or full-siblings a type II error of 73% is calculated for the results. This indicates that we had low power and would likely miss 73% of these relationships given our small sample size.

Four of the loci I screened during this study need to be further analyzed for their usefulness in additional studies. Microsatellite locus Ma-8 failed to amplify with multiple attempts so there may be an issue with using a tailed protocol which could alter the dynamics of PCR causing amplification to fail. It could be resolved by directly labeling these loci, rather than using a tailed protocol. Microsatellite locus Ma-9 should be included in further analysis on marten in the MNF despite being monomorphic in this study. A larger sample size may result in limited polymorphism at this locus or reveal whether the locus is truly monomorphic where it was previously polymorphic, which would suggest a loss in diversity. The alleles at locus Ma-10 did not consistently bin, did not amplify for two of the eleven samples, and therefore may not be a worthwhile addition to future studies. Locus Ma-18 was used successfully on marten from the same geographic area by increasing the annealing temperature (Tann) to 58 C to decrease the amount of secondary amplification at that locus (Bicker 2007). We only increased the Tann to 52 C for samples at locus Ma-18 which still produced too much secondary amplification. In addition to experimenting with a touch-down protocol for locus Ma-18, other loci included in Appendix I should be screened to increase the number of alleles genotyped for each individual and increase the ability to determine genetic relatedness among individual marten.

DNA extraction from known marten hair samples was not thoroughly explored during this study. Only four samples were

analyzed based on being the largest so they would not be exhausted during the screening process. The protocol used for the hair samples needs to be more thoroughly tested by making modifications to components within the master mix reagent and attempting a touch-down protocol to determine the most effective means for extraction and amplification of even the smallest hair sample acquired.

In our study, marten were caught in May even though trapping is not usually attempted or successful during the summer months (Mowat and Paetkau 2002; Nelson 2006). The hair snare design we used was successful in a study by Mowat and Paetkau (2002) during drier winter months but not during the summer months. The low number of marten hair samples acquired in locations where martens were previously captured may suggest that the use of snares to gather data on martens during the summer season is not effective. The increase in their prey selection during these months may prevent them from seeking food elsewhere as in winter months. Since our study was conducted in more humid summer months that experienced greater rainfall than usual, hair snares may have worked better with a few modifications.

One modification we suggest is the addition of water sealant before deployment to prevent the cardboard backing on the glue patches from becoming soaked. A better hair snare to use in the summer months may be found by experimenting with the design used by Pauli et al. (2008), which is made of plastic, substitutes the use of the glue patches for a bristled brush, and has a door that prevents multiple visits to the same snare between checks. These snares should also be checked at a higher frequency to refresh bait and re-set them if they have been visited and are found closed. Experiments with additional snare designs should be attempted during the summer months before the use of snares for non-invasive data collection should be abandoned.

The bait, salted pork, used in the hair snares was not effective for use in the wettest or hottest part of the summer field season. The roof may have prevented rain from falling into the snares. However, the rain soaked into the wood and absorbed into the cardboard backing on the glue

patches, causing mold to grow. The salted pork would mold rather quickly in the wettest weather and reached its melting point during episodes of high temperatures causing it to liquefy and run down the tree on which the snare was mounted. I would recommend bait with less fat such as canned tuna, chicken, beef or beaver to prevent loss of hair samples due to the absence of bait in the snare between visits.

Continued investigation of marten in the MNF would potentially increase the sample size in this study, which would increase our statistical power and produce more accurate calculations on population structure and health. Martens could benefit from management plans that attempts to develop and preserve existing corridors that connect Ward Hills and Caberfae, two areas of high quality habitat. The FST value of 0.141 could display a bias toward higher levels of relatedness within the two populations than between them. Translocation of some of the members in each population could help overcome phylopatric behavior exhibited by marten, lack of dispersal, and enable gene flow, increasing genetic diversity within both populations. However, further investigation of the fragmentation between the two populations in social structure, home range use, habitat selection, genetic variation, and population demographics need to be conducted to understand the best care and management guidelines for marten in the Manistee National Forest.

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An Analysis of an Appalachian Metamorphic Suite

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Introduction

The Eastern Blue Ridge Mountains of North Carolina are home to high-grade Taconian metamorphic rock suites in the Appalachian Mountains. The significant pressures and temperatures experienced by these rocks suggest that they are formed in the lower crust. The rocks of interest to this study are found in the areas of Winding Stair Gap and Chunky Gal Mountain in southwestern North Carolina (Figure 1). Rocks from the Winding Stair Gap preserve granulite facies conditions (850°C, 8kbar) while data from the Chunky Gal complex preserve lower P-T conditions (520°C-725°C, 4-6 kbar) typical of amphibolite facies (McElhaney and McSween, 1983). The mineral textures and compositions are examined to determine pressures and temperatures of peak metamorphism. The presence of particular minerals can be useful in determining these peak conditions because different mineral assemblages are stable at different pressures and temperatures. There can be difficulty with determining the temperatures and pressures of formation during mountain building processes because minerals can re-equilibrate as they are brought toward the surface by uplift and erosion which removes the history of previously formed minerals. For this study, I examined the mineral texture and composition of rocks from the Jake Ridge exposure to characterize the deformation history and compare the metamorphic conditions to rocks from the Winding Stair Gap.

Regional Setting and Previous Work

Rocks from the Jake Ridge outcrop located along the Chunky Gal Mountain fault are very aluminous with similar mineral assemblages and compare to rocks from the Winding Stair Gap outcrop. A focus of this project is to determine whether the difference in P-T estimates at Winding Stair Gap and the Chunky Gal area are true or due to differences in rock composition and mineral assemblage or re-equilibration. Examining mineral assemblages and textures in rocks from Jake Ridge to determine if the rocks underwent similar deformation to aluminous rocks from Winding Stair Gap without preserving peak metamorphism may help to further constrain metamorphic zones in this region. If Jake Ridge rocks found along the Chunky Gal Mountain Fault preserve evidence of granulite-facies metamorphism, it is possible that a greater extent of Central Blue Ridge rocks have been more deeply buried than previously thought.

Previous work in the Central Blue Ridge has examined the peak metamorphic conditions of rocks in the vicinity of the Winding Stair Gap and Chunky Gal Mountain metamorphic suites. Moecher et al. (2004) determined peak metamorphism in Winding Stair Gap to be at 850°C and 8kbar. McElhaney and McSween (1983) determined peak metamorphic condition in the amphibolites of the Chunky Gal Mountain complex to be 520°C-725°C and 4-6 kbar. The temperatures and pressures of peak metamorphism of the Buck Creek Complex have been constrained to 850°C and 9-10 kbar based on sapphirine replacement of spinel (Tenthorey et al., 1996). This supports the theory that rocks outside of the current zone of granulite facies may have reached higher peak metamorphic conditions than indicated by the Chunky Gal Mountain data. Preservation of a complex metamorphic history in Jake Ridge samples may provide further constraints on the metamorphic and tectonic history of this part of the Central Blue Ridge.

Methods

Sample Analysis: Jake Ridge

Descriptive analysis was conducted on an oriented sample from the Jake Ridge outcrop to characterize the mineralogy and textures (Figure 2). Thin section observations helped identify key areas for analysis using the scanning electron microscope (SEM) with energy dispersive spectroscopy (EDS).

X-ray Mapping

The Jake Ridge thin section was examined using a Hitachi 9300 SEM/EDS at Hope College. The SEM/EDS was used to obtain x-ray maps and point analyses. The slide was carbon coated because rock thin sections were non-conductive. Thin-section slides were mounted onto a pedestal and placed within the evacuation chamber of the SEM. Air is then evacuated from the SEM over a period of approximately two minutes. Once the air is removed, the cathode lens of the microscope began to create a focused beam of electrons that hit and bounced off the surface of the slide. The beams of electrons were at different angles that depended on the elemental composition of the target. These refracted beams were detected and used to produce an image of the slide surface. The elemental composition was also detected and recorded (Figure 3). X-ray maps were created by counting electrons over an area on the slide for a longer period of time in order to observe any variations in mineral chemistry within and among grains.

Point Analysis

To determine the composition of specific points within a mineral grain, the beam was focused on a very small area of the grain. To constrain data for thermobarometry, the elements that were recorded for point analysis were oxygen (O), silicon (Si), aluminum (Al), magnesium (Mg), potassium (K), iron (Fe), Titanium (Ti), sodium (Na), calcium (Ca), and manganese (Mn.) Point analysis was performed on sites identified in the thin section based equilibrium composition. Point analyses that represent peak metamorphic equilibrium conditions were collected from a garnet core with biotite and plagioclase inclusions. The atomic wt% of each element was converted to wt% oxides and used with the Thermobarometry with Estimation of Equilibrium State (TWQ) computer program. The garnet, biotite and sillimanite weight % oxides, which were determined from SEM/ EDS data, were used to obtain preliminary pressures and temperatures for peak metamorphism for the Jake Ridge sample.

TWQ Analysis

The TWQ computer program facilitated the calculation of mineral-fluid equilibria by using an internally consistent thermodynamic database for metamorphic minerals in chemical-equilibrium (Berman 2007). Selected elemental data obtained with the SEM/EDS were input into the TWQ program. The oxide data from garnet and biotite grains, namely the exchange between Fe and Mg, were used for thermometry. Oxide data from the Al-Si exchange between garnet and plagioclase were used for barometry.

Results

Descriptive Analysis

Hand sample and thin section analysis of the Jake Ridge rock show that the rock-forming minerals abundant in the sample are garnet, sillimanite, biotite, plagioclase and quartz. In thin section, garnet grains form large porphyroclasts and compose approximately 40% of the slide. None of the garnets exhibit a euhedral crystal form. They range from 2-5 mm in size and some grains contain inclusions. The cores of the garnet grains are approximately 0.5 mm in diameter and contain inclusions of biotite, plagioclase, quartz, and accessory minerals (Figure 4). In some grains, the inclusions seem oriented in a position perpendicular to the matrix fabric. The zone surrounding the cores of the garnets is inclusion-free. These zones extend to the rims and tails of the garnet grains and are approximately 1 mm wide. Garnet crystals which have tails contain thin, fibrous sillimanite grains within those tails. The fibrous sillimanite inclusions are oriented parallel to the sillimanite grains within the matrix. Figure 3 is an x-ray map of a garnet with inclusions and Figure 4 are examples of the garnet grains with an inclusion rich core, an inclusion free zone surrounding the core and the sillimanite-rich tails.

A final stage of mineral ground can be identified within the fractured zones of garnet grains. Some minerals in these zones are not found as garnet inclusions or within the ground mass. K-feldspar grains that are rimmed by grains with a myrmekitic texture are found in these fractured zones. The photomicrographs in Figure 5 show a specific location in both plain and cross-polarized light. In this area, the k-feldspar appears at the borders of fractured garnet crystals. There are also mica grains found in the fractured zones that are pleochroic, ranging from colorless to a pale green color in plain polarized light. Figure 6 shows two locations in the thin section where these grains can be identified. In both areas, the pale green mica is located in the cracks of broken garnet crystals along with biotite. The mica can be found in several other locations in the thin section but is always found within or along the edges of fractured garnet crystals.

The groundmass of the sample is primarily comprised of sillimanite, biotite, plagioclase and quartz. Sillimanite forms as coarser prismatic grains and are thicker than those found as fibrous inclusions in the garnet tails. Platy biotite grains are interspersed with the sillimanite grains and the two minerals sweep around garnet grains as shown in Figure 2.

Compositional Mapping

A magnesium (Mg) x-ray map was produced for a garnet porphyroblast that contained biotite and sillimanite inclusions (Figure 3). The map shows that Mg is concentrated uniformly across the grain but is slightly less concentrated at the rim of the grain. Similar homogeneity is observed for other elements. The map shows that Mg concentration becomes lower in the garnet at grain edges where biotite in the groundmass is adjacent to the garnet grain. Mg concentration is high in the biotite but depleted in the garnet. The point analyses that were completed using the EDS produced data tables showing the distribution of selected elements (O, Si, Al, Mg, K, Fe, Ti, Na, Ca, and Mn). Point analyses were also used to confirm the mineralogy of accessory minerals which include monazite, apatite, and illmenite.

Discussion

Textural Analysis

The textures of garnet porphyroblasts along with compositional zoning suggest that there are multiple stages of distinct garnet growth and deformation (Tracy and Robinson, 1976). This zoning can be seen in the photomicrographs of the garnet grain in figure 4. In that grain, the core is inclusion rich and it is surrounded by a zone that is void of inclusions. In the tail of the garnet, fibrous sillimanite inclusions can be identified. This could be proof that

the garnet experienced multiple growth stages: (i) initial growth that encompassed the grains at its center, (ii) a period of growth with no inclusions, and (iii) a final growth stage which included fibrous sillimanite in the tails.

The inclusion-rich garnet cores appear to preserve evidence of the earliest stage of growth. The next stage of growth could be defined by the inclusion-free zone surrounding the garnet's core. Because there are no inclusions within this area, it can be inferred that during this stage, no excess material was left to form inclusions. A third stage in the garnet's growth can be identified in the tails of the garnet grains where we find fibrous sillimanite inclusions. These sillimanite crystals are not prismatic as found in the matrix and this suggests that they formed along with the tails of the garnets, separate from the matrix material. The orientation of the fibrous sillimanite inclusions is parallel to the matrix fabric which suggests that they formed during the same deformation event that produced the mylonitic foliation in the matrix.

Some garnet grains have green mica located within the fracture zones of the grain (Figures 5 and 6). This shows that the mica mineralized as the garnet fractured and did not form prior to the garnet like the biotite inclusions. In this sample, the light green mica is only present within fracture zones of garnet crystals (Figure 6). The formation of these fracture zones could indicate the final deformation period for minerals in the Jake Ridge exposure in which garnet grains cooled and were fractured. K-feldspar was also identified in the fractured zones of the garnet grains, but it was not abundant in the sample. K-feldspar was only observed within the fractured zones of garnet grains within the sample (Figure 5). In this figure, K-feldspar can be observed with myrmekitic texture lining the rim of the grains.

X-ray Analysis and Thermobarometry

The x-ray map obtained using EDS (Figure 3) does not show a fluctuation in Mg across the garnet grain containing the large biotite inclusion. This does not reveal the zoning that was expected to exist between the inclusion-rich and inclusion-free zones of the garnet. However, it does show homogenization across the garnet grain. Plagioclase and biotite could possibly serve as a key for maximum pressure of metamorphism. The garnet-plagioclase-sillimanite-quartz (GASP) barometer would be used to get pressure estimates and those estimates would be compared with values real values (Spear and Florence, 1992). Microprobe data will be necessary to identify this. Oxide data obtained from point analysis in and around the garnet grain in Figure 3 were used with TWQ to get P-T data. Figure 7 shows a pressure and temperature of peak metamorphism as well as the aluminosilicate phase diagram. The current P-T of 5.5-6 kbar and 600°C is not accurate given the element data. Due to homogeneity that we see across the x-ray maps, we expected to see higher temperatures and pressures with the TWQ plot. Further analysis with an Electron Microprobe should produce more accurate results.

Conclusions

The rocks from Jake Ridge are similar to rocks from Winding Stair Gap in regard to rock forming minerals (sillimanite, biotite, garnet, plagioclase, and quartz). Distinct zoning in garnet grains highlight multiple stages of crystallization and a final deformation event during which garnet grains cooled and fractured. Preliminary P-T data shows that rocks from Jake Ridge (600°C, 5.5-6 Kbar) did not reach temperatures and pressures as high as the rocks at Winding Stair Gap (850°C, 8 kbar). However, this is preliminary data and more specific P-T calculations may yield different results that could provide a better explanation for the history of rocks at the Jake Ridge and the overall history of the Central Blue Ridge Mountains.
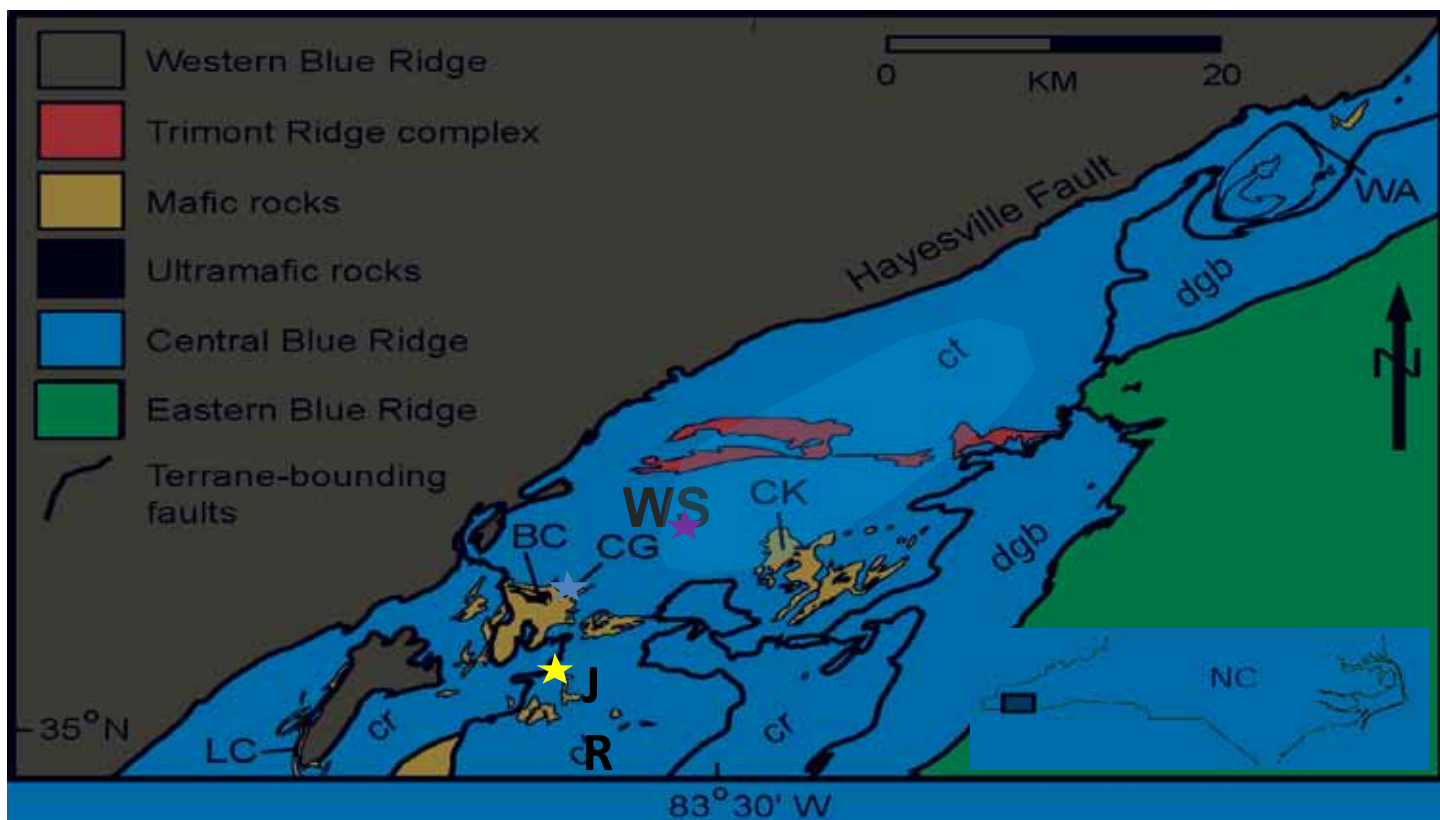
Figure 1: This map shows the study area in the Blue Ridge Mountains of Southwestern North Carolina. JR: Jake Ridge, CG: Chunky Gal, WSG: Winding Stair Gap, BC: Buck Creek, LC: Lake Chatuge. The blue area represents the constraints of gruanlite-facies metamorphism in the Central Blue Ridge. Adapted from Peterson and Ryan (2009).
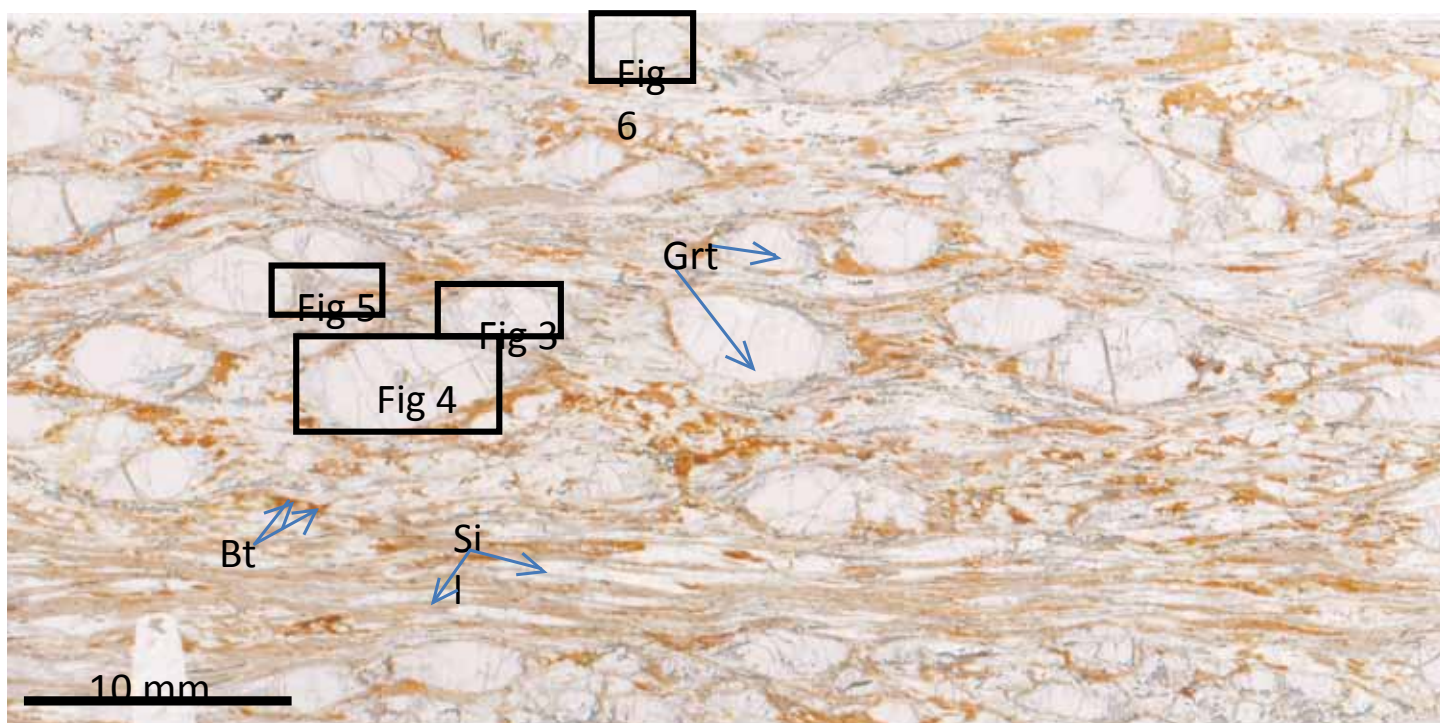

Figure 2: A scan of the Jake Ridge thin section. Garnet grains appear as porphyroblasts with unusual tails. Sillimanite and Biotite form around garnet grains in the matrix. The boxes highlight the locations of other figures that show pertinent mineral assemblages.
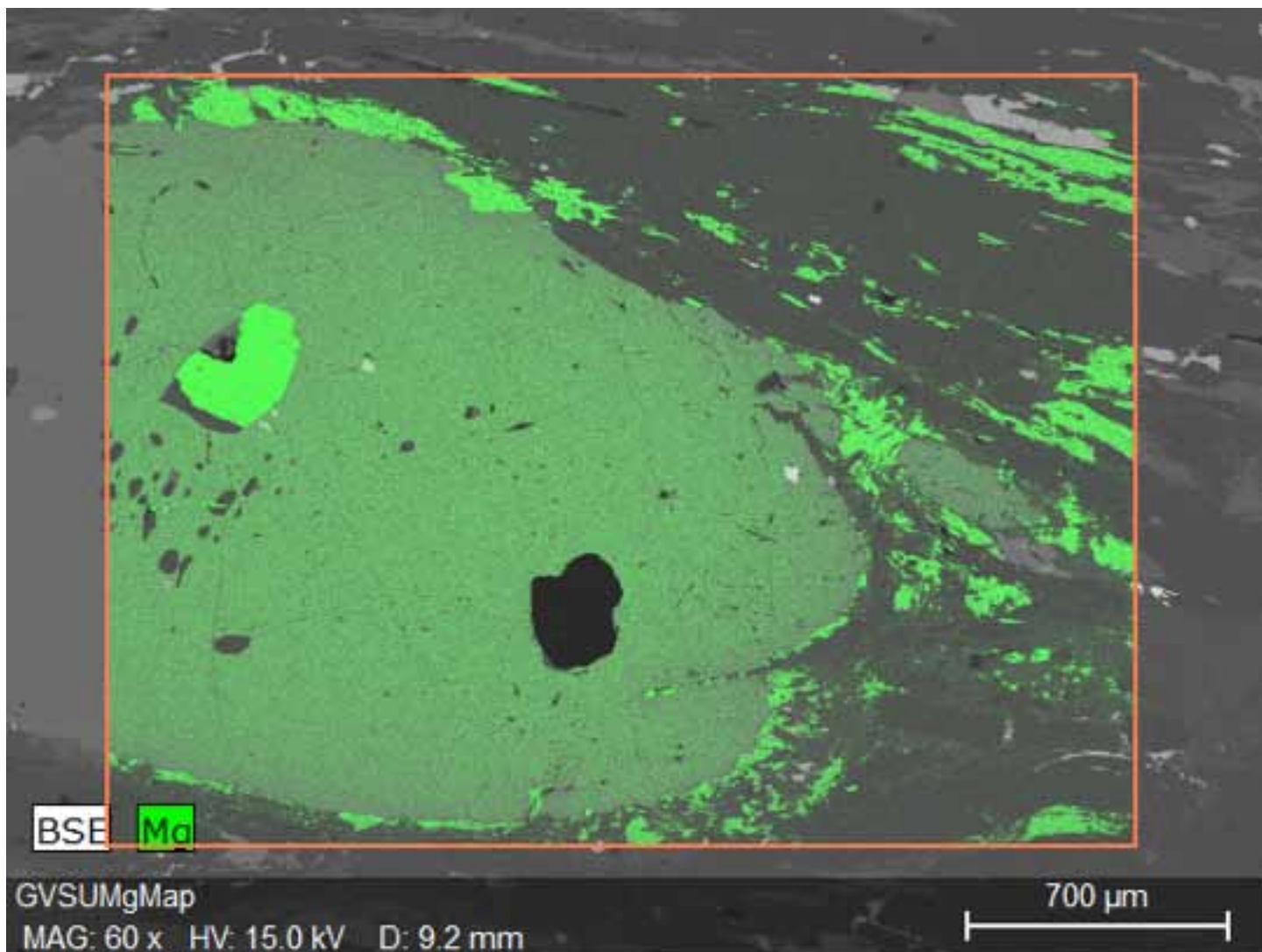
Figure 3: Mg x-ray map of garnet 7. The green coloring indicates the magnesium-rich biotite grains. Some homogeneity of Mg concentrations is visible across the garnet grain. Core inclusions are plagioclase, quartz, biotite and accessory minerals (monazite, apatite, illmenite).
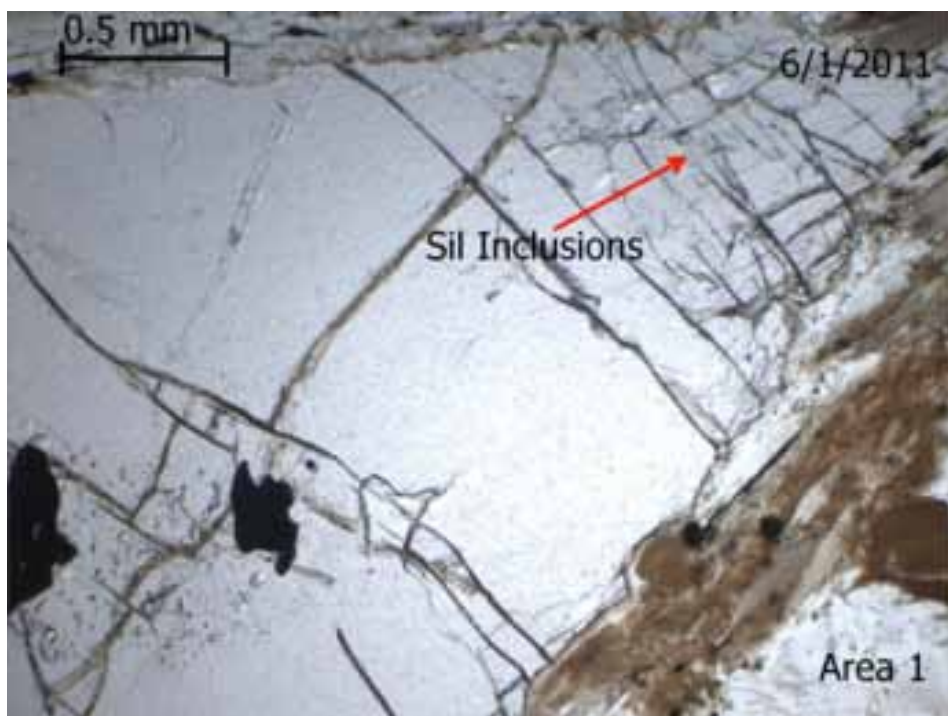
Figure 4: Photomicrographs showing a garnet grain in plain polarized light with inclusions in the center of the grain and the tail of the grain. The arrows in the left photo indicate the orientation of sillimanite inclusions. The area encompassed by red in the right photos shows the inclusion rich garnet core.
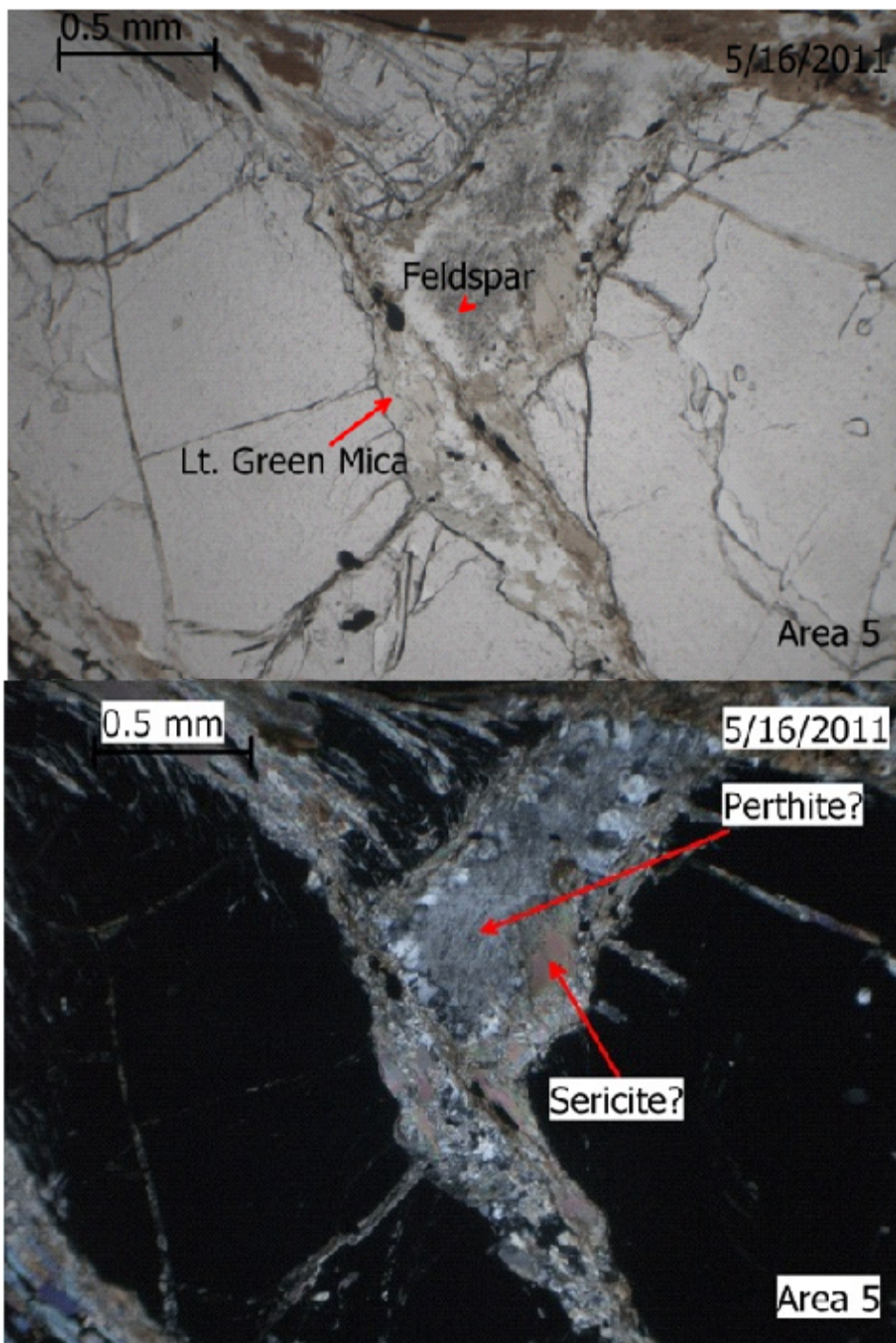
Figure 5: Microphoto of feldspar grains positioned within garnet crystals (Top: plain polarized light, Bottom: cross polarized light). A perthitic texture can be identified in the feldspar grains indicating that these are k-feldspar grains. Light green mica grains are also visible along the borders of the fractured garnet grains.
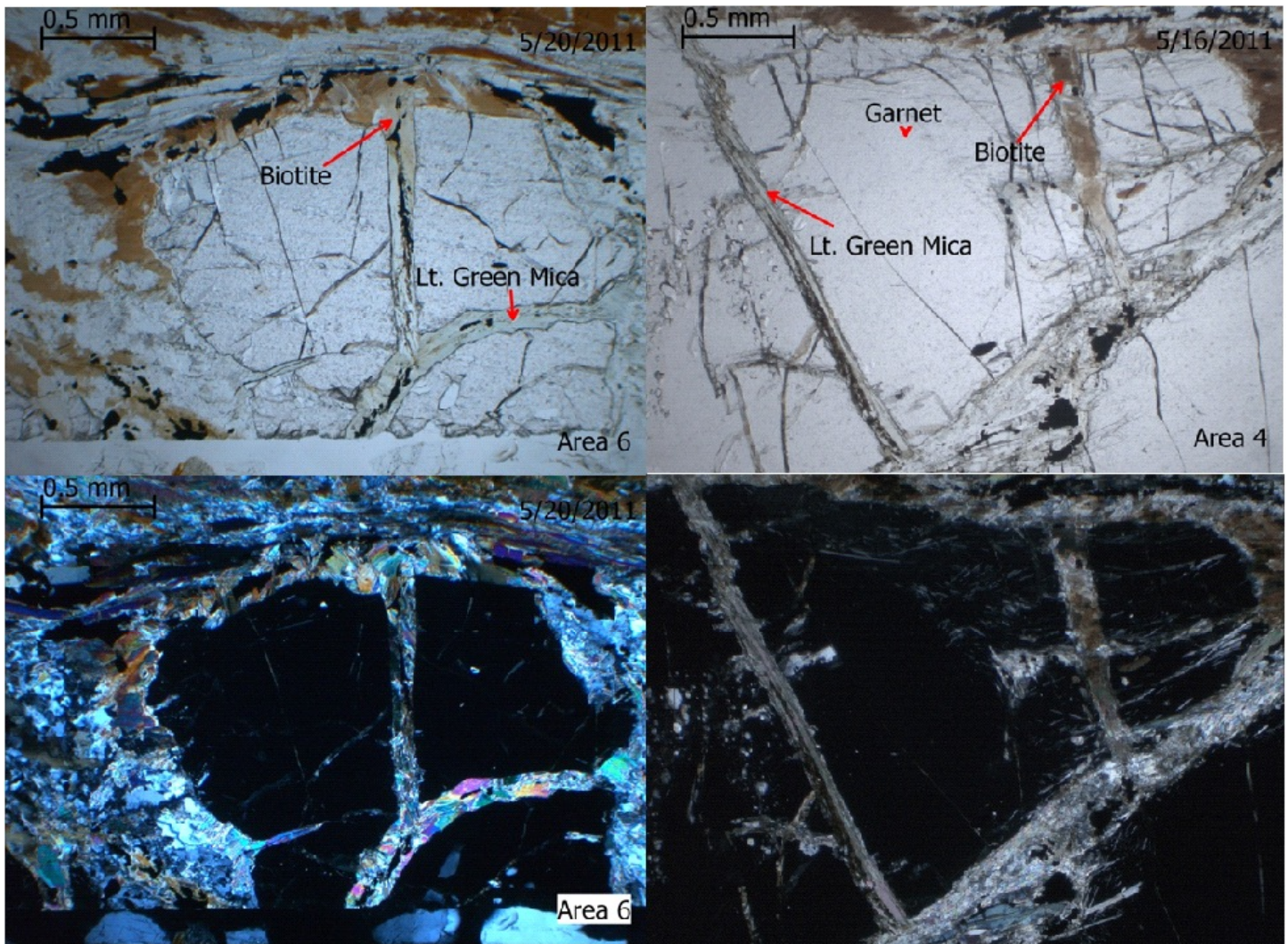
Figure 6: Photomicrographs of two fractured garnet grains viewed in plain polarized light (Top Left and Top Right) and cross polarized light (Bottom Left and Bottom Right). The light green mica is located in between fragments of garnet grains which were one at some point during crystallization.
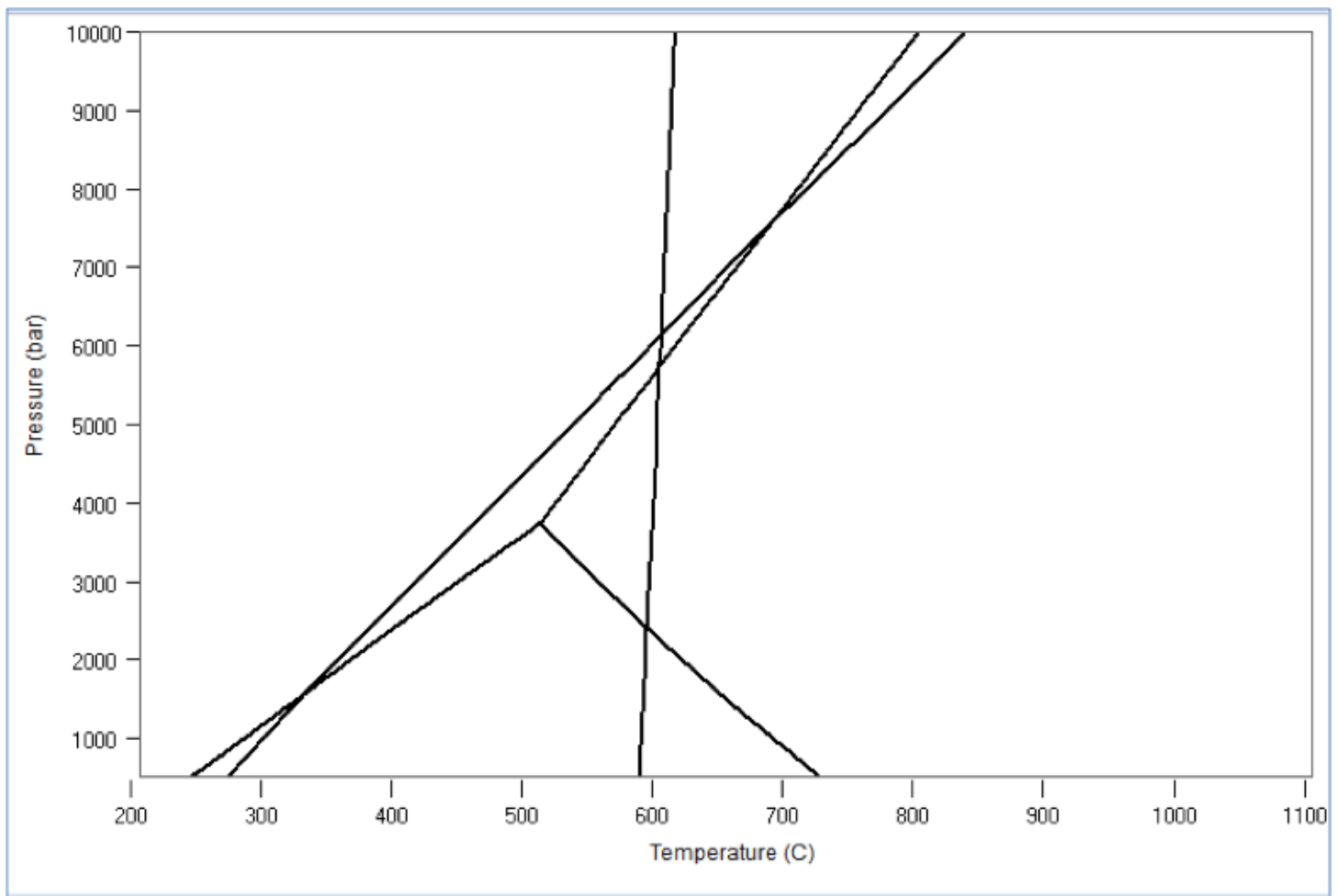
Figure7: This is a P-T plot produced using the TWQ program. The lines that form a triple point indicate the P-T borders between the polymorphs kyanite, sillimanite and andalusite. The lines that intersect just above the kyanite and sillimanite border indicate an estimate for the Jake Ridge peak metamorphic conditions (600°C, 5.5-6 Kbar).

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Investigating the role of Nrg1p and Tup1p during Candida albicans Chlamydospore Formation

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Introduction

Candida albicans exists and thrives on mucosal surfaces of the gastrointestinal tract and urogenital tract in healthy persons, but it can also cause severe and life-threatening infections, especially in immunocompromised patients (4), and thus has become a relevant topic in the medical community. A wide range of factors leads to various degrees of immunosuppression that predispose patients to infection by Candida. These factors include a severe underlying disease (e.g., AIDS or leukaemia), impaired phagocytic function (i.e., granulocytopenia or neutropenia), and exogenous factors (e.g., wide spectrum antibiotic treatment, i.v. drug use, transplantation medicine, trauma, abdominal surgery [5]). Also, candidiasis, a systemic yeast infection, now represents the third to fourth most frequent hospital acquired infection in the US and worldwide, and C. albicans remains the most frequent causative agent of candidiasis (1). These infections carry unacceptably high morbidity and mortality rates and important economic repercussions with an estimated total direct cost of approximately 2 billion dollars in 1998 in US hospitals alone (14). Even treatments using available antifungal agents, mortality rates lie in the 30-50% range for these infected patients (13). Although several other Candida species are also human pathogens that have been found with increasing frequency, C. albicans remains by far the most medically important member of the genus (7).

C. albicans can transition between yeast cells, psuedohyphae or hyphae. Filamentation of yeast cells to hyphal growth is directly linked to its pathogenicity and cells that cannot make the transition are known to be avirulent. C. albicans is known to form chlamydospores when low levels of nutrients comprise its environment. Chlamydospores are thick-walled, spherical cells that are three to four times larger than normal yeast cells and are produced from suspensor cells at the end of what are likely pseudohyphal elements ([10] Figure 1).
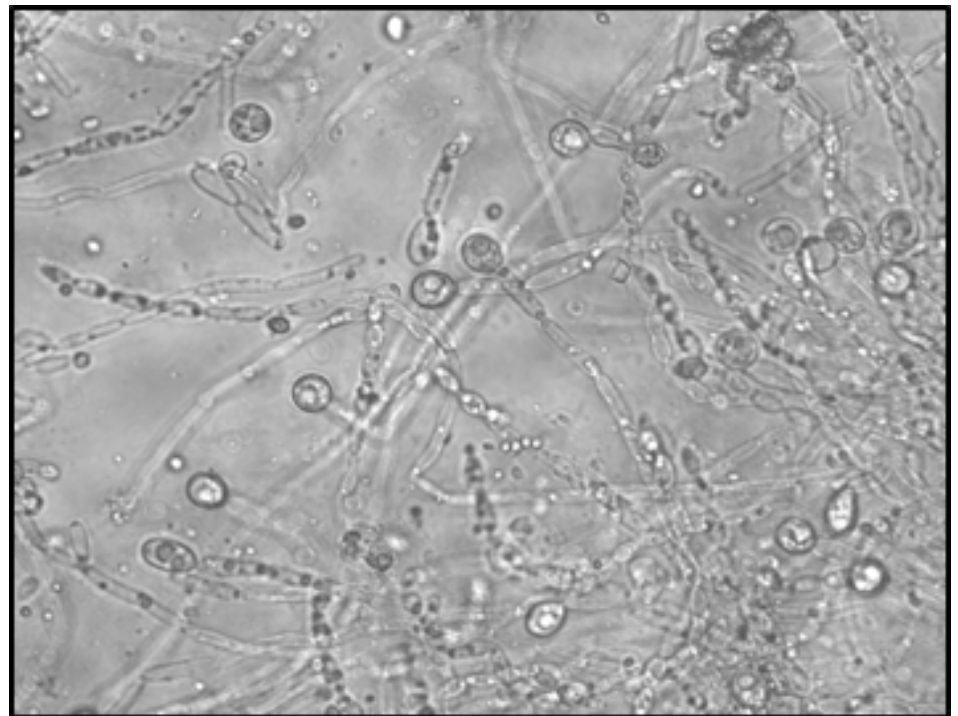
Figure 1: Chlamydospore formation of C. albicans

Because chlamydospores arise in conditions of nutrient depletion, they are believed to be dormant growth forms that can be induced to germinate by changing environmental conditions (6).

Chlamydospore-like structures have been detected occasionally in the human host, however, whether chlamydospores contribute to colonization or pathogenicity of C. albicans is unknown (4). Examining the regulation of the gene NRG1p and its direct relationship to filamentation (hyphal growth) and chlamydospore formation, will contribute greatly to the understanding of this virulence factor of C. albicans and what its biological role is. This study aims to fill in the gaps in our understanding of the mechanisms which underpin this important biological phenomenon, the genetic regulation of chlamydospore formation in relation to filament formation. The gene NRG1 is a known inhibitor, or repressor, of the Hyphal Specific Genes (HSG) and has been strongly implicated in chlamydospore formation. It has been shown that differential regulation of the single gene NRG1 in C. albicans and (closely related species) Candida dubliniensis is responsible for their species-specific response to environmental signals that induce chlamydospore development (12). Furthermore, morphogenesis (yeast to psuedohyphal/hyphal transition) is repressed by transcriptional inhibitors such as Tup1p, which associates with its DNA-binding partners NRG1p and Rfg1p (3). However, the nature by which this gene is regulated is in question; thus, in this study we intended to investigate (1) the hyphal specific genes regulated in chlamydospore formation and (2) the necessity or dependency of coupling with the gene TUP1 during chlamydospore formation.

Materials and Methods

Strains. A comparison of four C. albicans strains and one C. dubliniensis strain were used. C. albicans wild-type strain SC5314 was used as a control along with C. dubliniensis wild-type strain. These strains were chosen based on their known performance in Staib medium, as published by Staib and Morschhäuser. Comparison strains used were C. albicans strains DPTY2 (NRG1/NRG1 tet-NRG1), SSY50b (ΔNRG1/NRG1 tet-NRG1), and

ICY49 (Δtup1/Δtup1).

Culture media and growth conditions for preparation of RNA analysis. All strains were grown overnight in liquid YPD (yeast, peptone, dextrose media) at 28ºC. Cultures were then washed with phosphate buffered NaCl (PBS) x 2 (as described by Jansons and Nickerson, [6]). Various dilutions of each strain yeilded a cell count of 10^{-6}/mL. A 20:1 diluted subculture of each strain was added to liquid Staib media (syn. Guizotia abyssinica, creatinine, glucose, KH_2PO_4), (12). In addition, two subcultures of DPTY2 and SSY50b were made, one with the tetracycline analog, doxycycline, and the other without. These cultures were then grown at 32ºC for 48 hours in a shaking water bath.

RNA isolation was achieved with our adapted methodology and the Masterpure yeast isolation kit (Epicentre™). 1μg of this RNA was used to generate cDNA using the first strand synthesis kit (Five-prime™), and the cDNA was quantitatively compared by real-time PCR using GoTaq™ Sybr™ green (Promega™) on an Mx3000P real-time machine (Stratagene™). The relative expression of the ACT1 (actin) gene was used to normalize the data across samples.

Culture media and growth conditions for NRG1/Tup1 association assay. Initial steps up to and including PBS wash were the same as above. Each strain was inoculated to plates of Staib agar, with and without doxycycline and Rice Tween 80 agar (RTW), with and without doxycycline. RTW plates were housed in a candle jar. Plates were incubated at 28ºC, in darkness, for 14 days. Cultures were analyzed by microscopy at 48 hours, 7 days and 14 days.

Results

Analysis of genetic expression of Hyphal Specific Genes in tet-regulated NRG1 strains. Quantitative real-time PCR analysis of DPTY2 and SSY50b, with and without doxycycline, reveals a difference in expression of the major hyphal-specific genes on chlamydospore formation. This data shows that when complete repression of NRG1 (DPTY2) occurs within the first 48hrs, the major hyphal-specific genes are

affected differently from the filamentation pathway, as seen by the control effects of SSY50b (Fig. 2).

Analysis of dependency of NRG1 in chlamydospore formation. In order to determine whether the association of NRG1p and Tup1p is involved in the development of chlamydospores in C. albicans, we used two types of media. Using staib agar, which is known to stifle chlamysdospore formation in C. albicans but not in C. dubliniensis, we created one plate with the addition of doxycycline and the other plate without. Since comparisons of C. albicans and C. dubliniensis have been found to regulate NRG1p differently (12), we took advantage of the wild-type strains SC5314 (C. albicans) and C. dubliniensis as controls to our variable strains DPTY2 (ΔNRG1/tet-NRG1), SSY50b (NRG1/tet-NRG1) and ICY49 (ΔTup1/ΔTup1). Another way we controlled the experiment was to use a nutrient-poor media, Rice Tween 80 agar, in a candle jar to limit the oxygen availibility, which supports chlamydospore formation in C. albicans. The RTW plates were made with and without doxycycline.

Each strain was innoculated onto the plain Staib and RTW plates, with the tet-regulateable strains DPTY2 and SSY50b added to the doxycycline plates. All cultures were grown at 28ºC in darkness for 14 days. Comparison assessments were documented via microscopy at 48 hours, 7 days and 14 days (Fig. 3).

In the Staib agar, we were able to induce chlamydospore formation in C. albicans that is indistinguishable from the C. dubliniensis wild-type. However, for SSY50b, which has one regulateable allele of NRG1 and one wild-type allele, we were unable to induce chlamydospore formation. SSY50b acts the same as SC5314 (wild-type), which grows a neglible amount of chlamydospores (1-5% 10μL-1). This data shows that expression of NRG1 has a significant negative repression on chlamydospore formation in C. albicans, and when it is inhibited, chlamydospore formation is induced.

If TUP1 is a crucial binding partner to NRG1 to induce chlamydospore formation, deleting the gene should show similar results to the complete repression of NRG1. Our results show the contrary.

When ICY49 is grown in the same conditions described above on Rice Tween 80 agar plus doxycycline, chlamydospore formation is no more significant than the wild-type expression of SC5314. This leads to the conclusion that TUP1 is not a significant participant in chlamydospore formation. Further investigations will focus on if NRG1 alone regulates chlamydospore formation or if it binds with any other gene during this regulation.
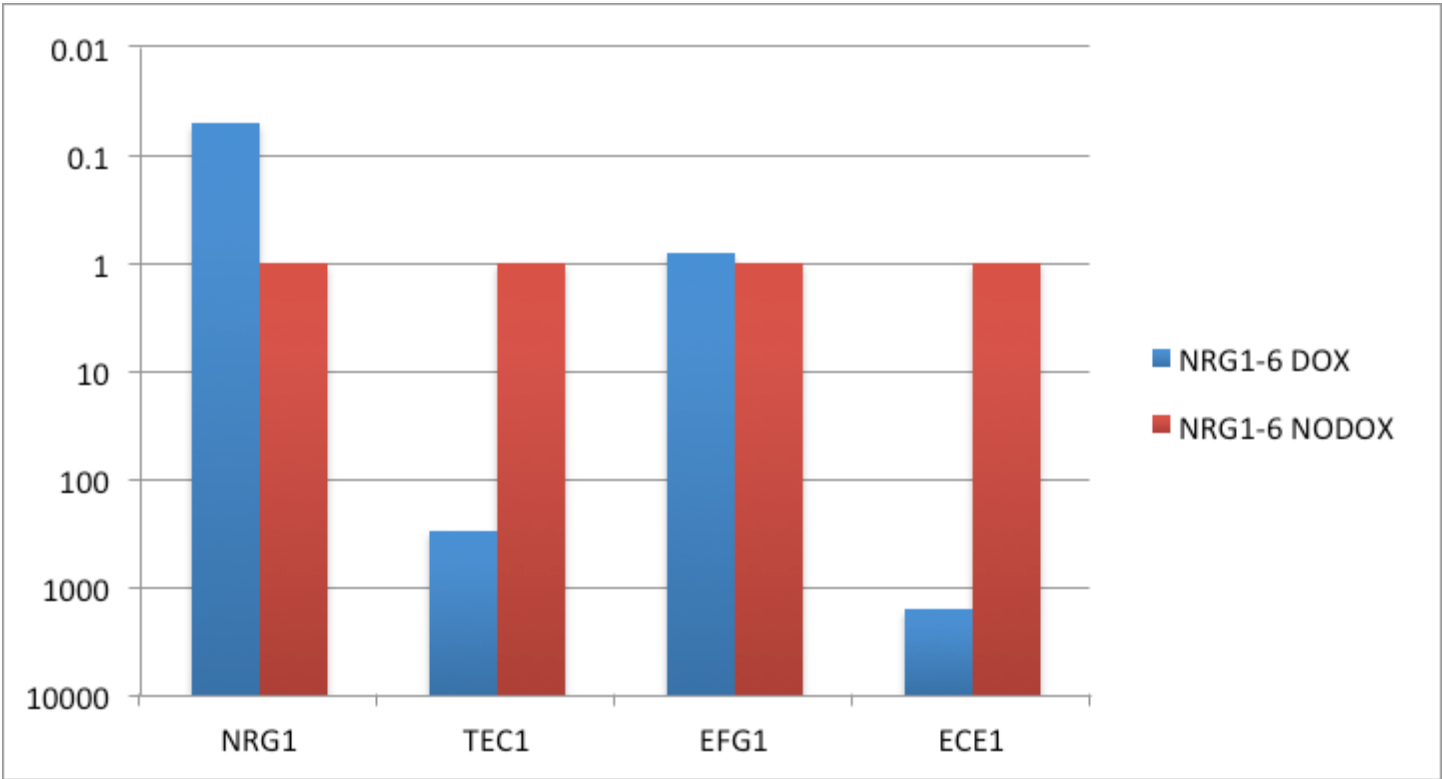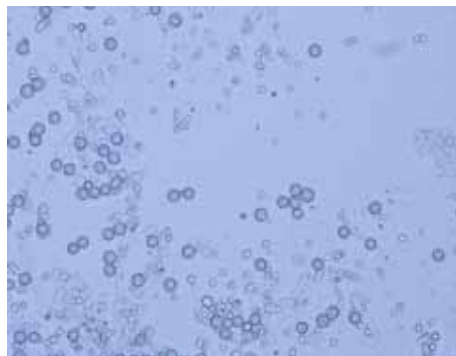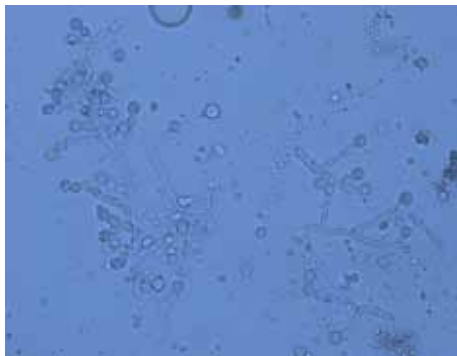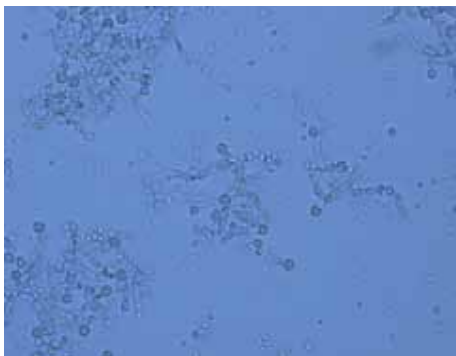

Figure 2: Differential expression of hyphal specific genes on NRG1p

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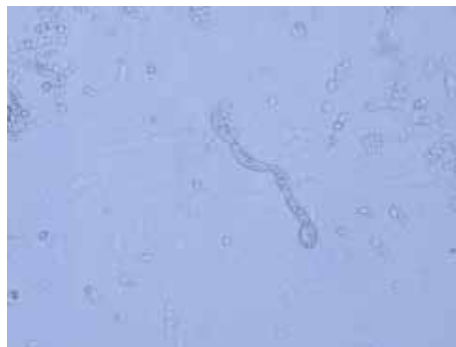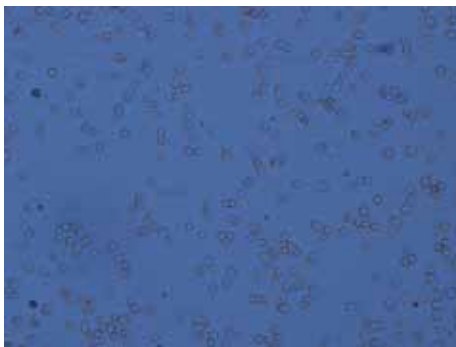
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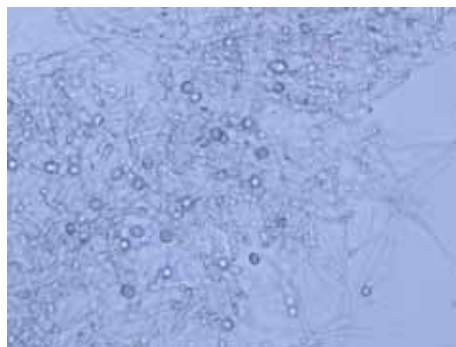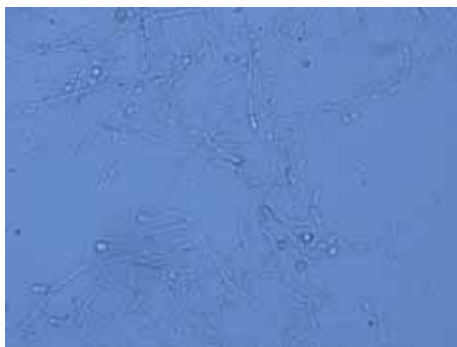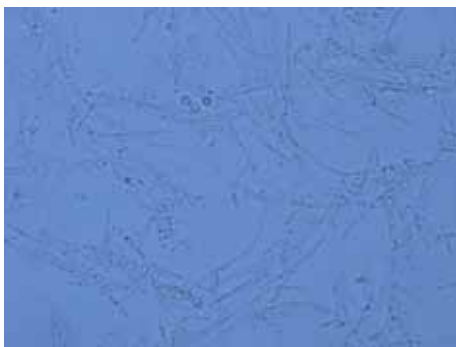
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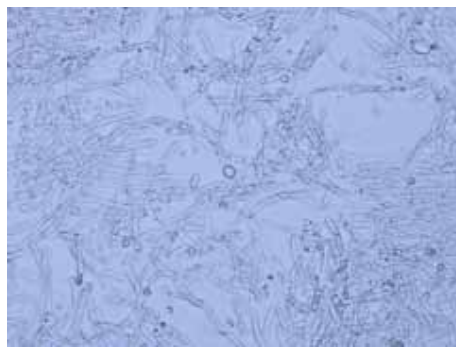
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About the TRiO Programs

To fight the war on poverty, our nation made a commitment to provide education for all Americans, regardless of background or economic circumstances. In support of this commitment, Congress established several programs in 1965 to help those from low-income backgrounds and families with no previous college graduates (first generation). The first three programs established were Talent Search, Upward Bound, and Student Support Services. Thus, they are known as the TRiO Programs.

Since then, other programs have been added, including Upward Bound Math and Science, Educational Opportunity Center, The Training Authority, and in 1989, The Ronald E. McNair Post-Baccalaureate Achievement Program. The goal of all of the programs is to provide educational opportunity for all.

The Ronald E. McNair Post-Baccalaureate Achievement Program is designed to prepare highly talented undergraduates to pursue doctoral degrees. In addition, the goal is to increase the number of students from low-income backgrounds, first generation college students, and under-represented minorities on college and university faculties.

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