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RONALD E. McNAIR
POST-BACCALAUREATE
ACHIEVEMENT PROGRAM

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WHO IS RONALD ERVIN MCNAIR?

Ronald E. McNair, the second African American to fly in space, was born on October 12, 1950 in Lake City, South Carolina. 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 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 under-represented in graduate schools, to expand their opportunities by pursuing doctoral studies.

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Director's Message

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May 14, 2002

The Georgia Southern University Ronald E. McNair Postbaccalaureate Achievement Program is pleased to present its second issue of the *McNair Research Journal*. This journal is a compilation of articles produced by the 2001 cohort of McNair Scholars during the Second Annual Summer Research Institute held May 14 – July 6, 2001. This scholarly work was completed with the assistance of a group of highly capable faculty mentors from Georgia Southern University. The *Journal* is designed to provide future doctoral students with a forum to publish their work. We are extremely proud of all of our McNair Scholars for their academic acumen and their thirst for learning.

The McNair staff and scholars are indebted to the numerous individuals who shared in shaping the direction of the program since its inception at Georgia Southern University in 1998. First, to Mrs. Mary Woods, Assistant Director of the McNair Program for her leadership and nurturing spirit. Secondly, Dr. Randy Gunter, Associate Vice President for Student Affairs and Dean of Students, for his untiring energy and encouragement. Thirdly, acknowledgement is due to Mr. Bill Neville, Coordinator of Student Media, for his technical support; a special salute to Mrs. Peggy Morgan, McNair Secretary/Data Clerk; thanks to Dr. Cordelia Douzenis, Associate Professor, Curriculum, Foundations and Research and Mr. Hubert Pulley, Associate Professor, Writing and Linguistics, for their editorial support, to the faculty mentors and the McNair Advisory Council members for their dedication and support over the past year. Also, special thanks to Dr. Lane Van Tassell, Associate Vice President of Academic Affairs and Dean of Graduate Studies and Dr. John Diebolt, Associate Dean of Graduate Studies for their efforts. Our appreciation goes to Ms. Jocelyn Ramirez, Graduate Assistant in the Office of Graduate School Admissions, for her work in organizing the journal.

Finally, a special thanks to the Educational Opportunity Programs staff for their support and encouragement during this past year.

You are invited to comment or make suggestions that may help to improve future issues of the *McNair Research Journal*. Direct any inquires to me at (912) 681-5458 or via e-mail at sfoster@gasou.edu. **This document is funded by U. S. Department of Education Grant No. 217A990126.**

Sincerely yours,

Sue Hawks-Foster

Ms. Sue Hawks-Foster

Director, Educational Opportunity Programs

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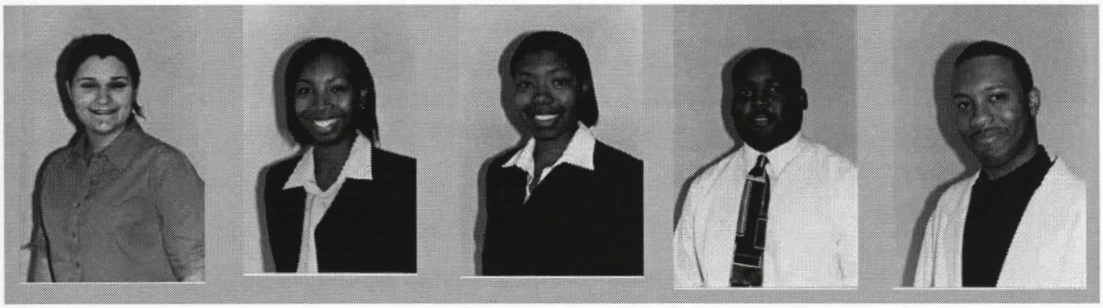

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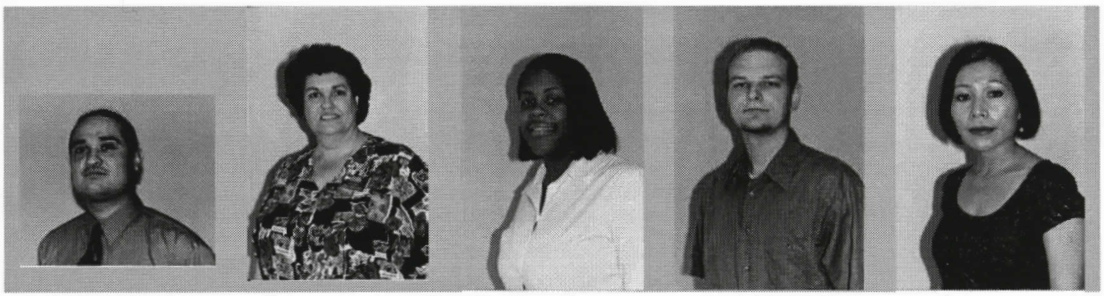

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COMPARING AEROBIC AND ANAEROBIC PHYSICAL ACTIVITY UTILIZING A THREE SITE SKINFOLD

Shawnae Allen, McNair Scholar

Dr. Drew Zwald, Research Mentor

Department of Health and Kinesiology

ABSTRACT

This study examines aerobic and anaerobic physical activity's affects on the body fat of Georgia Southern University students. From eating healthy foods to participating in daily exercise practices, both regimens are keys to maintaining good health and adequate amounts of fat. Body fat is a major concern for our population. Most turn to scale weighing when assessing their "fat". Dieters and exercisers become true believers of scale weight when they engage in this method. However, scale weighing is a very inaccurate way of measuring body fat. There are many body composition tests that give a more accurate assessment of body fat. One type of body composition test, the skin fold test, was used for this study. Skin folds were taken from three sites of the body (hipbone, triceps, quadriceps) for females, and (abdomen, triceps, quadriceps) for males. Information was gathered using the Lange skin fold caliper. Four physical activity courses, including two jogging (aerobic activity) classes and two badminton (anaerobic activity) classes were used for the four-week term. Volunteers from each class signed required consent forms at the beginning of the term, and the three-skin fold measures were taken. At the end of the four weeks, the skin folds were post tested and a health and fitness questionnaire was completed. This pre and post skin fold test method was used to identify any changes in the body fat measures given time and repeated participation in the jogging and badminton courses. The health and fitness questionnaires provided information on each of the student's eating and exercise habits outside of the course. All measurements and questionnaire responses were entered into SPSS computer software for analysis.

Introduction

Good health habits are an important factor in maintaining a productive life. Exercising, eating well-balanced meals, and visiting the doctor annually are good health practices. Studies have shown that regular exercise aids in the prevention of a variety of diseases that are detrimental to life and increases longevity (Williams & Wilkins, 1995). Body fat is a huge concern for Americans; especially college aged students (Surgeon General, 1996). There are many health problems associated with high levels of body fat such as high blood pressure, obesity, diabetes, heart disease, cardiovascular disease, gall bladder disease, arthritis, and morbidity. High levels of body fat and obesity are usually caused by prolonged inactivity (Litchford, 1987). The Surgeon General (1996) defined physical activity as movement produced by the skeletal muscles that increases human energy expenditure. Regular sessions (3 or more) of an exercise activity can prevent and improve these health related mishaps (American Heart Association, 1972). Research has shown that prolonged participation in physical activity will improve cardiorespiratory function, reduce the risk of coronary artery disease, decrease the chances of acquiring morbidity, and lowers mortalities (Williams & Wilkins, 1995). Physical activity regimens must be maintained throughout life to receive optimal health benefits (American Heart Association, 1972). However, we should not only be worried about our self perceived notions of being fat, but the health risks of acquiring unhealthy levels of body fat.

New inventions are created each year to decrease body fat. However, efforts should be placed on exercising regularly, rather than falling for the misconceptions about "weight loss" machines (Williams & Wilkins, 1995). Fad diets and miracle exercise machines are obviously invented to pursue body image distortions of health. Dieters and exercisers become true believers of scale weighing when they engage in these methods. Most do not realize that scale weighing is a very inaccurate way of measuring body fat. Body composition tests provide more information about body fat than scale weighing (ACSM, 1995). One type of body composition test is the skin fold test, which is used to get a moderately accurate measure of body fat. In research it is found that the most frequently used calipers in college physical activity courses are the Lange and Holtain skin fold calipers (Himes, 2001). Skin folds can be measured up to (65mm) using the Lange skin fold caliper. Regular skin fold measurements can be used to

determine how well a physical activity contributes to the significant changes in body fat percentage. Physical fitness evaluations also provide a pre-overview of physical health and a post- overview of the effects of exercise (Williams & Wilkins, 1995). Casperson, Powell, and Christenson (1985) defined physical fitness as the ability to perform physical activity.

Research is needed to examine the effectiveness of different types of physical activity on body fat. The two main types of physical activity that most participate in are anaerobic and aerobic activities. All segments of the population should be considered when assessing physical fitness and body composition. Health and physical educators show high interests in student's body fat levels because of the risk of health problems (Whitehead & Parker, 1993). Women naturally tend to have higher levels of body fat than men. Ideal body fat varies with age and gender (Karpay, 2000). There are ways for both men and women to obtain a healthy amount of body fat and lean body mass (Karpay, 2000). Past researchers seem more concerned with the body composition of the elderly and young children than college aged students. Most fail to realize that college students are at risk for hypokinetic diseases as well.

The purpose of this study was to determine whether or not physical activity courses at Georgia Southern University (aerobic or anaerobic) have an effect on body fat percentage. It will also compare aerobic and anaerobic physical activity utilizing a three-site skin fold test.

METHODS

Participants

Participants from this study included two types of physical activity courses from the summer semester at Georgia Southern University. Two jogging courses (aerobic) and two badminton courses (anaerobic) were used. There was no randomization for selecting the four courses or for selecting the participants involved in this study. Approval was received from the professors of both courses to conduct testing and surveys. Every participant in this study solely volunteered with no incentives. Only students from all four courses who were present for pretesting, posttesting, signed a consent form, and completed a Health and Fitness Questionnaire were used for the

results section. Students who managed to be enrolled in both courses were not used (Multiple Treatments). A total of sixty students participated in all aspects of this study. There were 22 participants in aerobic (jogging) class 1, 12 in aerobic (jogging) class 2, 15 in anaerobic (badminton) class 1, and 11 in anaerobic (badminton) class 2. Participants were required to read and sign a consent form to be a part of this study. Each class met for five sessions a week for a total of four weeks, and students were required by their professors to participate in the physical activities provided for their class. The jogging classes participated in daily jogging practices around Snooky's trail (approx. 2 miles), while the badminton classes played and learned the skills of badminton during the duration of the semester. All participants were informed that their names would be kept confidential and that only the data from the study would be used. Many asked for e-mails about their pre- and post- measurements. Most participants were curious about their total body fat percentage.

Procedures

Body fat measures were taken using the Lange skin fold caliper, one of the most widely used instruments for measuring body fat. Pretest measures were conducted at the beginning of the semester before the students engaged in their required physical activity. Posttest measures were taken when the required physical activity for the course was complete at the end of the semester. A Health and Fitness Questionnaire was also given out at the end of the semester to get a general idea about the participants' eating and fitness habits outside of their required course. The questionnaire was created using a four point Likert scale of strongly disagree, disagree, strongly agree, and agree. The researcher in this study developed the questionnaire. Measurements were taken from the abdomen, quadriceps, and triceps areas of the male participants and from the hip, triceps, and quadriceps areas of the female participants. All measures were taken from the right side of the body. Two to three measurements from each site were taken and an average was recorded. Each participant was encouraged to stay relaxed and to breathe normally while skin folds were conducted. They were also encouraged to stand erect with the best posture possible.

When measurements were taken from the quadriceps area, participants were told to place their body weight on the opposite leg to make sure that the muscles were

relaxed, preventing the muscles from tauting the skin. The body fat measurement was taken on the anterior side of the thigh, midway between the knee and the pelvis. A pinch of skin was gripped as firmly and painlessly as possible with three fingers, and the body fat was positioned between the caliper for recording. During the testing for body fat from the triceps area, the participants were instructed to let their arm hang freely. The pinch took place on the posterior side of the forearm, between the elbow and shoulder. Again the fat layer was positioned between the caliper and recorded. When the abdomen skin fold measure was taken, the participants were instructed to breathe normally and to relax their stomach muscles. The measurement was taken on the lateral right side of the navel. The pinching and positioning procedures took place, and a measurement was recorded. The skin fold for the hip area was conducted directly above the junction of the pelvis and femur bones. Participants were once again asked to place the weight of their body on the opposing leg. A skin fold measure was taken and recorded from this site.

During the previous spring semester, a pilot study of this research was performed. Participants included two types of physical activity courses at Georgia Southern University, an aerobics course and a badminton course. The skin fold and questionnaire results were analyzed utilizing the same procedures.

Data Analysis

All body fat measurements were converted from mm to % form using the Jackson and Pollock formulas. This formula required measurements from three sites and age to calculate body fat percentage. The QBASIC program was used to create a quick, short cut hand formula for mm to % conversions. All skin fold measurements and questionnaire data were entered into the SPSS 10 program for analysis. The outcome of this study was determined by the generated results. Graphs and charts were created to show the significant interaction relationships resulting from this study. The level of significance for all skin fold tests and the questionnaire was set at .05.

RESULTS

Table 1 presents the descriptive statistics associated with this study. In aerobic (jogging) class 1, there was a slight increase (+1.27%) in the mean body fat measures

from the beginning to the end of the semester. In aerobic (jogging) class 2, there was a decrease in the mean body fat percentage for this class during the semester (-1.81%).

Both anaerobic (badminton) classes 1 and 2 showed decreases in body fat percentage from pre- to posttesting. In anaerobic class 1, there was a 1.93% decrease in body fat; for anaerobic class 2, there was a 3.03% decrease. One must note that the students in the anaerobic classes had higher mean body fat percentages than those students in the aerobic classes at the beginning of the study, particularly those students in anaerobic class 2.

A three-way analysis of variance (ANOVA) with two between factors (type of course -- aerobic or anaerobic -- and class) and one within factor (time, i.e., pre or post). There was a significant two-way interaction between the course and class factor involved.

Table 1

Descriptive Statistics for Classes: Pre and Post

	PRETEST		**POSTTEST**	
COURSE/ CLASS	MEAN	SD	MEAN	SD
Aerobic				
- Class1	21.09	5.54	22.36	5.93
- Class2	17.33	7.04	15.52	6.08
- Total	19.76	6.27	19.95	6.76
Anaerobic				
- Class1	22.60	7.60	20.67	8.02
- Class2	31.00	6.12	27.97	6.36
- Total	26.15	8.08	23.76	8.11

in this study ($F = 28.05$, $p \leq .001$). This suggests that interaction of course (aerobic or anaerobic) and class (class 1 or 2) is associated with a difference in body fat percentage. The factor course was also significant in this analysis ($F = 27.27$, $p \leq .001$). This suggests that the course taken (aerobic or anaerobic) plays a role in the outcome of a participant's body fat percentage. There were no other significant factors or interactions.

Answers from the Health and Fitness Questionnaire added information to this study about the participants' eating and exercise habits outside of the classroom. For

the following questions or statements each of the four courses were analyzed for their responses. The four point Likert scale used for this questionnaire included the choices: strongly disagree, disagree, agree, and strongly agree.

Table 2

Responses to Health and Fitness Questionnaire

Item/Course/Class	SD	D	A	SA
1. I am a fitness freak.				
Aerobic (Class 1)	18.2%	54.5%	27.3%	0.0%
Aerobic (Class 2)	8.3	41.7	41.7	8.3
Anaerobic (Class 1)	20.0	46.7	20.0	13.3
Anaerobic (Class 2)	9.1	54.5	36.4	0.0
2. I work out at least three times per week.				
Aerobic (Class 1)	13.6	13.6	40.9	31.8
Aerobic (Class 2)	8.3	8.3	25.0	58.3
Anaerobic (Class 1)	13.3	20.0	40.0	26.7
Anaerobic (Class 2)	18.2	9.1	54.5	18.2
3. I work out only when required to by my fitness activity instructor.				
Aerobic (Class 1)	13.6	59.1	27.3	0.0
Aerobic (Class 2)	58.3	25.0	8.3	8.3
Anaerobic (Class 1)	26.7	13.3	40.0	20.0
Anaerobic (Class 2)	18.2	63.6	18.2	0.0
4. I stay away from foods high in saturated fat.				
Aerobic (Class 1)	13.6	54.5	22.7	9.1
Aerobic (Class 2)	0.0	25.0	50.0	25.0
Anaerobic (Class 1)	13.3	60.0	20.0	6.7
Anaerobic (Class 2)	18.2	18.2	36.4	27.3
5. I participate in fitness regimens outside of this physical activity course.				
Aerobic (Class 1)	9.1	13.6	59.1	18.2
Aerobic (Class 2)	16.7	8.3	25.0	50.0
Anaerobic (Class 1)	0.0	26.7	53.3	20.0
Anaerobic (Class 2)	0.0	27.3	54.5	18.2
6. I enjoy exercising.				
Aerobic (Class 1)	0.0%	9.1%	68.2%	22.7%
Aerobic (Class 2)	0.0	8.3	58.3	33.3
Anaerobic (Class 1)	0.0	26.7	66.7	6.7
Anaerobic (Class 2)	0.0	0.0	63.6	36.4

Table 2 (continued)

Responses to Health and Fitness Questionnaire

Item/Course/Class	SD	D	A	SA
7. I want to improve my physical fitness level.				
Aerobic (Class 1)	0.0	0.0	54.5	45.5
Aerobic (Class 2)	0.0	0.0	25.0	75.0
Anaerobic (Class 1)	6.7	0.0	40.0	53.3
Anaerobic (Class 2)	0.0	0.0	45.5	54.5
8. I do not work out outside of this physical fitness activity course.				
Aerobic (Class 1)	31.8	50.0	13.6	4.5
Aerobic (Class 2)	58.3	33.3	8.3	0.0
Anaerobic (Class 1)	46.7	20.0	33.3	0.0
Anaerobic (Class 2)	36.4	45.5	18.2	0.0

In addition to information about eating and exercise habits, the questionnaire also collected information about the gender and age of the respondents. The following gender ratios were seen for each of the classes: Aerobic Class 1 (Male 40.9%; Female 59.1%), Aerobic Class 2 (Male 66.7%; Female 59.1%), Anaerobic Class 1 (Male 40.0%; Female 60.0%), and Anaerobic Class 2 (Male 9.1%; Female 90.9%). The following age ranges were seen for each of the classes: Aerobic Class 1 (19 to 37 years); Aerobic Class 2 (18 to 31 years); Anaerobic Class 1 (19 to 23 years); and Anaerobic Class 2 (20 to 40 years).

A summary of the responses to the questionnaire items revealed the following: The majority of all four classes disagreed with the notions of being a fitness freak, agreed about working out at least three times per week, strongly disagreed about working out only when required to do so, disagreed about staying away from foods high in saturated fats, agreed about participating in fitness activities outside their required course, agreed about enjoying exercising, strongly agreed about wanting to improve their physical fitness levels, and strongly disagreed about working out outside of class.

Discussion

In conclusion, my research hypothesis was not supported. The anaerobic courses had a more significant change in their body fat percentages than the aerobic

courses. A number of factors could have played a role in the outcome of this study. Since the students were aware of the purpose of this study, some may have worked harder than others to show a decrease in body fat percentage. Others may have always worked hard to maintain adequate levels of body fat. Administering more than one test to the participants opens the doors for more error. However, conducting pre- and posttesting is the only way to see a change in results over time. The participants were not required to stay in this study. There were some students who decided not to participate in the beginning of the study, and some who dropped out after the study began. No control group was included in this study. Age may have played a factor in the outcome of this study, due to the fact that there were several non-traditional college-aged students present in three classes. Some classes also had higher ratios of male to female participants. Another limitation is that random assignment was not possible (i.e., students selected the classes in which they enrolled).

Recommendations for further research include the following:

- Comparing data from the spring and summer semesters
- Incorporating additional questionnaire data
- Utilizing a control group in a replication of this study

APPENDIX A

Research Hypothesis: Students participating in an aerobic physical activity course during the semester will have a significant change in body fat percentage, while students participating in an anaerobic physical activity course during the semester will have little or no change in body fat percentage.

Delimitations: The population of participants was narrowed down to two jogging classes and two badminton classes. Both males and females will be tested. The testing is taking place in a natural setting, during their physical activity class. Pre and posttest measures are taken at their appropriate times. There is only one researcher conducting the testing procedures.

Limitations: Participants were chosen using convenience sampling because the researcher interacted early with the professors of all courses to establish testing times. There is no randomization. Some participants may start to work harder in their

activity course to try to show some improvement in their body fat (Hawthorne Effect). Students may not want to participate due to the duration of the study (Mortality). Multiple tests may affect the results of the outcome of the physical activity course (Testing). No rewards may cause some participants to participate unfaithfully (Incentives). There is no control over the participant's diets before or during the research (History). There is no control over whether or not a student will be present during both pre and post testing. Some students may be enrolled in both courses. The researcher is experienced, but not trained in collecting skin fold calculations. No control groups are involved.

Assumption: Participants in the aerobic activity course will encounter a significant change in body fat percentage. Participants in the anaerobic activity course will encounter little or no change in body fat percentage. The participants will show up for all class sessions. The participants will show up for class on body fat testing days. They will participate fully in the course. The study will end with the same number of participants it began with. Students will be happy about their outcomes. All students will handle their results in a positive manner.

Appendix B

Health and Fitness Questionnaire

Circle the letter that best describes your answer.
SD – Somewhat disagree, D – disagree, A – Agree, SA – Somewhat agree

1. What type of physical fitness activity course do you participate in at Georgia Southern University? Circle (**Anaerobic or Aerobic**)
2. I am a fitness freak. Circle (**SD D A SA**)
3. I work out at least three times per week. Circle (**SD D A SA**)
4. I work out only when required to by my fitness activity instructor. Circle (**SD D A SA**)
5. I stay away from foods high in saturated fat. Circle (**SD D A SA**)
6. I participate in fitness regimens outside of this physical activity course. Circle (**SD D A SA**)

7. I enjoy exercising. Circle (**SD D A SA**)
8. What is your gender? Circle (Male **or Female**)
9. I want to improve my physical fitness level. Circle (**SD D A SA**)
10. I do not work out outside of this physical fitness activity course. Circle (**SD D A SA**)
11. How old are you?

Glossary

Aerobic: living, active, or occurring only in the presence of oxygen.

Anaerobic: living, active, or occurring in the absence of free oxygen.

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THEORY, LASER LIGHT, AND THE ADIABATIC APPROXIMATION

Shannon Anderson, McNair Scholar
Dr. Marvin Payne, Research Mentor
Department of Physics

ABSTRACT

This study examines how the adiabatic approximation can be used in physics problems involving the interaction of laser light with atoms. In particular, it is related to understanding theoretically an experiment that took place in Harvard University. This experiment involved an attempt to completely stop laser light. The experiment was performed using two laser pulses (one probe laser and one coupling laser), which interact with each other through their effect on the optical properties of an atomic vapor. The adiabatic approximation leads to analytical solutions to a theoretical model for the stopped light problem, which has been used in nearly all of the explanations of the effect. This contribution will involve delineating situations where the adiabatic approximation gives accurate results and situations where it fails. The stopped light problem involves a three-state quantum mechanical system where the probe laser and the coupling laser interact resonantly with the system. These three states that are involved are the ground state where all of the atomic population exists initially, the first excited state (the probe laser is resonantly tuned between these two states), and a second low lying excited state (the coupling laser is resonantly tuned between the two excited states). Simpler two-state systems will also be used to illustrate the conditions that must be satisfied in order to make the adiabatic approximation accurate for solving the time-dependent Schrödinger equation.

INTRODUCTION

This research that is being performed is related to the stopped light problem. This problem is based on the fact that speed of light has been attempted to be completely stopped from approximately 300 million meters per second to zero. This problem is being studied with the usage of the adiabatic approximation. There will be

an investigation about when it is best to use this certain approximation; this question involves the environment in which the process takes place. As this problem will be approached from the point of view of a theoretical physicist, the propagation of the laser will be negligible; this means that this feature will have no outcome on the results. Some of the characteristics of the lasers like their behaviors that are dependent on time will be considered. To clarify the idea that scientists are attempting to increase the speed of light, this is actually false. The idea is to slow down light, so this could help improve the technology in the world like quantum computers. This is based on the theory of relativity developed by Albert Einstein.

Background

Dr. Lene Hau

At Harvard University, Dr. Lene Hau and her colleagues attempted to slow the speed of light. First, she created a Bose-Einstein condensate, which is opaque to light, having a temperature of few billionths above absolute zero (-273.15°C); this allows the atoms to have the least amount of energy consistent with the ground state motion in a magnetic trap. Vacuums that are hundreds of trillions of times lower than the pressure of air at the surface of the Earth is also mandatory for this construction of the condensate. [2]

The group began with the injection of sodium atoms into a vacuum chamber. These atoms move at speeds of more than 1 600 kilometers per hour. Laser beams that have the speed of light make a collision with the sodium atoms. The speed of the atoms begins to decrease, when their absorption of the photons, or particles of light, takes place. The laser light dictates various movements; therefore, the atoms move in only one direction. [1-3]

When the atoms have a speed of approximately 160 kilometers per hour, the experimenters place them into a web of laser beams, known as optical molasses. For every collision that takes place between an atom and a photon, the atom is directed back to its path. This results in a decrease in speed and temperature. The atoms are packed densely in the shape of an ellipsoid. They are confined within the boundaries of their container by a powerful magnetic nonuniform field. In "evaporative cooling,"

atoms having a higher temperature than the condensate or more energy than is required are allowed to vacate the condensate by lowering the potential well. [1-3]

A laser is fired across the width of the cloud of condensate. This sets up quantum interference, so the moving light beams of the second laser interfere with each other. The previous laser beam dictates the speed of the second laser. If this is done properly, then the light can be slowed by a factor of 20 million. [2]

When the pulse of the first laser is enclosed, the information about that certain photon is taken from it. The speed of that laser is decreased due to the condensate. When the second laser enters the condensate and hits the pulse, the pulse departs from the cloud of gas due to a much increased group velocity due to the more powerful second pulse from the coupling laser. [1]

Hau claims that this could lead to improvements in the world of technology. She means that information could be delivered in less time with the use of less energy. This results in a higher frequency. One example includes the reduction of noise, which permits all types of information to be transmitted more effectively and efficiently.[1] Another example is that optical switches controlled by low intensity light could reduce power requirements a million times compared to switches now operating everything from telephone switches to supercomputers.

Hau shot a pulse of laser light 3 microseconds and one kilometer long into a Bose-Einstein condensate of sodium gas. The gas was about .2 millimeters (mm) long and decreased the velocity of light by a factor of ten million. When the pulse first enters the gas, its velocity is 30 m/s. Its length was reduced to one ten-millionth of its original length. [2]

The coupling laser is useful to alter the internal atomic energy levels; this causes the suppression of the ability of the atoms to absorb the probe light. A level of absorption is divided into two levels that terminate each other. This conception is called electromagentically-induced transparency. The index of refraction of the gas is dependent on the probe frequency, especially when it is about 100 000 times the index in a vacuum. [2]

Involving the theory of relativity of Albert Einstein, Hau states that the speed of light is the fastest speed that could exist. She mentions that slowing light could be beneficial in our comprehension in the state of matter of a Bose-Einstein condensate.

She also states that the equipment needed for this experiment will eventually be cheaper and more. [1-3]

The premiere procedures of cooling the laser were simple. Due to the fact that photons have momentum, light has the ability to exert forces on atoms. For example, a photon with a frequency of a value of f, its momentum is the following mathematical expression.

$$p_\gamma = \frac{E}{c} = \frac{hf}{c} \tag{1}$$

Concerning the tuning frequency of the laser, the only possibility for the absorption of light by the atoms can occur is that the laser must be tuned to frequency of resonance. Any atom that moves toward the direction of a laser beam having a velocity of a value of v will undergo an upward Doppler fractional frequency shift that is expressed by the following mathematical expression. [5]

$$\frac{\Delta f}{f} = \frac{v}{c} \tag{2}$$

When the atom decreases in velocity, the frequency of the laser has to be decreased continuously in order for the laser to remain in resonance. [5]

When the environment of the atoms is in reasonably cold temperatures, laser cooling is further achieved by surrounding the atom by counter propagating laser beams that are barely tuned to the low-frequency side of an atomic resonance, as it will be shown in Figure 1. The highest of photons that are absorbed will be opposite in direction of the motion of the beam. In 1985, Steven Chu and his colleagues at AT&T Bell Labs first experimentally demonstrated this previously mentioned procedure. Optical molasses, which are a group of photons, surrounded the atoms; the light field serves as a viscous damping medium that slows the motions of the atoms. [5]

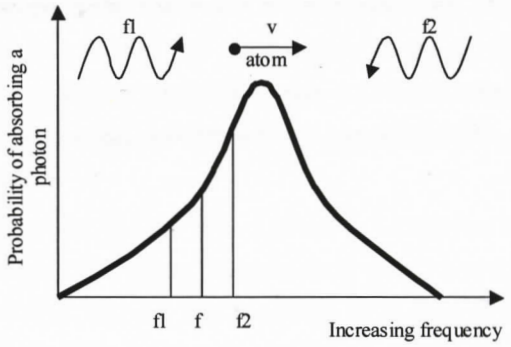

Figure 1. An atom irradiated by two counterpropagating laser beams tuned to a frequency f will have frequencies of f1=f-f' and f2=f+f'.

When the atoms cool to temperatures where the average Doppler shift is a small fraction of the resonance line width, the differential absorption and the force of cooling is decreased. A temperature of equilibrium is reached when the rate of cooling of optical photons is balanced with the rate of heating due to the random absorption and reemission of photons. Having a simple atom with one ground state and one excited state separated by a distance of $\hbar\omega$, the minimum equilibrium temperature has been calculated to be the following.

$$k_B T = \frac{1}{2}\hbar\omega \tag{4}$$

Contrary to this equation in 1988 at the National Institute of Standards and Technology (NIST), it was discovered in optical molasses that atoms could be cooled to temperatures far below this theoretical minimum temperature. [5]

Other methods of laser cooling use numerous quantum coherence tricks have cooled atoms to temperatures in the nanokelvin range where the average speed is less than the change of the speed an atom experiences if it recoils from a single photon. An example is Sisyphus cooling, which is optical molasses with polarization gradients.[5]

In space with static magnetic fields, laser fields, or a combination of a weak magnetic field and circularly polarized light, atoms that are cooled below a millikelvin can be held. Atom traps accumulate a large number of laser-cooled atoms, confine

them for more cooling, and use them for the observation of atomic collisions at very low temperatures. [5]

Forces are exerted by a magnetic trap on an atom through the magnetic moment of an atom. The following represents the potential energy of a magnetic dipole in a magnetic field **B**.

$$P.E._{mag} = -\vec{\mu} \cdot \vec{B} \tag{5}$$

The value **μ** is the magnetic moment, normally on the order of 1 μ_B. First in 1985, atoms were magnetically trapped by a NIST group with a spherical quadrupole field shown in Figure 2. At the center of the trapping coils, the magnetic field is nonexistent and increases as the atom increases its radius. In 1995, a group at the University of Colorado used a modified version of this apparatus to observe the spin of the atom. If a trapped atom goes close to where the magnetic field is zero, then the precession frequency gradually diminishes. The spin cannot follow in the direction of the field line further. The spin has the option of flipping to be parallel to the field and not trapped, since the trap has a hole at the center.[5]

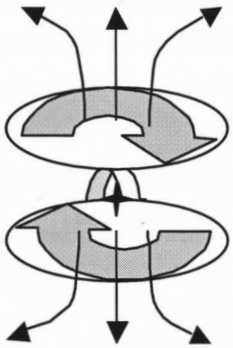

Figure 2. A spherical quadrupole field trap with the direction of the currents and movements of the magnetic field.

In 1986, the Bell Labs used the first optical trap with a single focused laser beam experimentally. The focal point of a laser beam can be easily moved with mirrors or lenses; this is known as optical tweezers. In 1987, the most widely utilized atom trap

uses a mixture of a weak spherical magnetic quadrupole field and circularly polarized light.[5] One advantage for this is that the combination of laser trapping, laser cooling, low-intensity laser light, and weak magnetic fields are extremely effective. Another advantage is that atoms can be loaded inside a low-pressure vapor cell with an atomic beam initially slowing down.

In 1995 at the University of Colorado, a group of scientists began by cooling and trapping atoms in a magneto-optic trap. More cooling was achieved by utilizing optical molasses and Sisyphus cooling without the presence of a magnetic field. During that time, the phase space atomic density was increased above that of an intense thermal atomic beam by thirteen orders of magnitude.[5]

The final cooling was achieved by evaporization from the magnetic trap, a cooling technique first demonstrated at the Massachusetts Institute of Technology (MIT) in 1989. Evaporization permits the very hottest atoms to depart the sample, decreasing the average energy of the remaining atoms. Collisions rethermalize the sample to produce more hot atoms, and as the evaporization continues, the evaporization barrier is lowered for the continuation of the process of cooling. Using this technique, the phase space density was increased by another five orders of magnitudes. Once the atoms are in a Bose condensate, the sum of their respective energies is defined as the following.

$$\Delta x \Delta p \geq \frac{1}{2}\hbar \tag{6}$$

Since the atoms remain in the Bose condensate as the confining forces of the trap are relaxed, the effective temperature can be brought into the picokelvin range.[5]

$$\frac{1}{2}k_B T = \frac{3\Delta p^2}{2m} \tag{7}$$

ADIABATIC APPROXIMATION

In this research, a case of the stopped light problem is studied in both a numerical and analytical manner. For the atomic response, the analytical approximation is performed with the adiabatic approximation. This method is used to reproduce the

general features of the resurgence of the probe laser. It does reproduce most of the significant details of the stopped light problem if care is taken to preserve the validity of the adiabatic approximation.[4]

Beginning with the lambda system shown in Figure 3, the probe and coupling lasers are tuned to resonance. The findings are these equations, where $\Omega_{c\phi}T$ and $\Omega_{p\phi}T$ represent the frequencies of the coupling and probe lasers, respectively.[4]

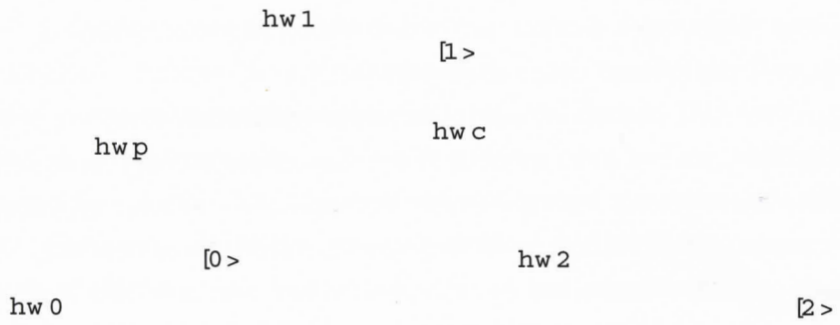

Figure 3. The lambda system with energies labeled at states and adjacent to the respective lasers.

In the adiabatic treatment, the following is the characteristic equation that determines the eigenvalues.

$$\lambda^3 - i\frac{\gamma_1}{2}\lambda^2 - (\left|\Omega_{c\phi}\right|^2 + \left|\Omega_{p\phi}\right|^2)\lambda = 0 \tag{8}$$

After solving, the following are its eigenvalues.

$$\lambda_0 = 0$$
$$\lambda_{\pm} = i\frac{\gamma_1}{4} \pm \sqrt{\left|\Omega_{c\phi}\right|^2 + \left|\Omega_{p\phi}\right|^2 - (\frac{\gamma_1}{4})^2} \tag{9}$$

The primary eigenvalue that needs the most focus is the eigenvalue that is equal to zero. This is due to the fact that it is in the adiabatic state that corresponds to the all of the atomic population being located in the ground state, before the laser pulses. In

the lowest order of adiabatic approximation, for atomic response, a_2=0 from the first and third equations. This yields the second equation to be the following.

$$a_0 = -\frac{\Omega^*_{c\phi}}{\Omega^*_{p\phi}} a_2 e^{i(k_c - k_p)z} \tag{10}$$

For the absence of atomic population in the first excited state, the following must be true since only [1> is affected by spontaneous decay.

$$|a_0|^2 + |a_1|^2 + |a_2|^2 = 1 \tag{11}$$

$$a_0(t_r) = \frac{\Omega^*_{c\phi}(t_r)}{\sqrt{|\Omega_{c\phi}(t_r)|^2 + |\Omega_{p\phi}(t_r)|^2}}$$

$$a_1(t_r) = 0 \tag{12}$$

$$a_2(t_r) = -\frac{\Omega^*_{p\phi}(t_r)}{\sqrt{|\Omega_{c\phi}(t_r)|^2 + |\Omega_{p\phi}(t_r)|^2}}$$

Bergmann proposed these approximations in 1985. For a three-level system with two pulses resonantly pumping it with time dependencies, the entire population could be relocated from the initial state to the third state.[4]

PROCEDURE

Characteristics of $\Omega_{c\phi}\tau$ and $\Omega_{p\phi}\tau$ are chosen to demonstrate when the adiabatic approximation works or fails. Using a computer program written in the program language of C or C++, the following data was placed into the computer: the frequency of the coupling laser times its pulse length, the frequency of the probe laser times its pulse length, the decay rate of state [2> times the pulse length of the probe laser, and the behavior of the two lasers. Either the coupling and probe lasers went to infinity in the same direction, or the probe laser decreased rapidly as time increased. When these values are entered into the program, they are in dimensionless units. Approximately five hundred points were produced for each case. All of the tables had the retarded time in the first left-handed column. One table had the analytical values of the first state. Another had the analytical values of the second state. A third table had the analytical

values of the third state. The fourth table had all of the analytical and numerical values, alternating in columns, calculated by the adiabatic approximation.

Data

The first example with graphs and tables that were mentioned in the section of procedures are located at the epilogue of the text. The frequency of the coupling laser, $\Omega_{c\phi}T$, is valued at 20, and the frequency of the probe laser times its pulse length, $\Omega_{p\phi}T$, is valued at 15. The value of the $\gamma_1 T$, in this case, is 5. The behavior of this is that the coupling and probe lasers go in the same direction to infinity.

The next table will show the results of the adiabatic approximation when the coupling pulse laser is not a factor; in other words, $\Omega_{c\phi}T$ is equivalent to zero. The value of the $\gamma_1 T$, in this case, will remain to be 5. The value of the $\Omega_{p\phi}T$, for this case, is 25. The probe laser goes to zero. The last example (not presented in a table) will not have the decay rate or the coupling pulse laser as a factor. The only given value is $\Omega_{p\phi}T$, which will be 20. Both the coupling and probe laser go toward infinity.

There were three cases used to determine the effectiveness of the adiabatic approximation. On the following pages after the conclusion and references, graphs were created to distinguish the behavior of the population with the values for each state and all of the values together for the first case. Tables are used for the second case. The numerical values (labeled "na" followed by the state) for each state have data points that are yellow with black outlines. The values that are done by the adiabatic approximation (labeled "aa" followed by the state) are blue.

Conclusion

After performing the research after giving the frequencies various values, the following happened with each case. If the probe laser had a shorter pulse length than the coupling laser, the adiabatic approximation was successful. On its graph would be a curve with a very smooth oscillation. If the coupling laser had a shorter pulse length than the pulse laser, then the adiabatic approximation would fail. On its graph would appear data points being sparse; this means that the oscillations are extremely rapid in this case. If the coupling laser and the probe laser have pulses that are equivalent in

length, then the only possibility for the adiabatic approximation to be successful is that there must be a time delay for the probe laser. If there were not an existent probe laser involved, the adiabatic approximation would fail; the only task that would be occurring is that the population would be optically pumped into the first excited state.

APPENDIX

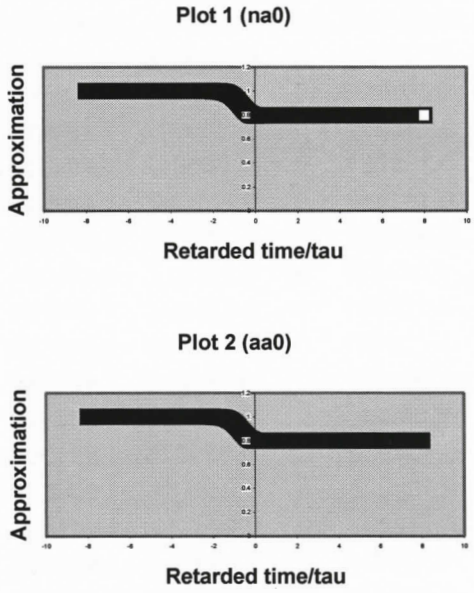

Figure 4. Two graphs showing the behavior at ground state using the adiabatic approximation with the left as numerical and the right as "adiabatic."

Table for Example 2

Tr/Tau	NA0	AA0	NA1	AA1	NA2	AA2
-0.51184	-0.235761	0	-0.10552	-1.#IND00	0	-1
-0.47984	-0.132916	0	-0.211207	-1.#IND00	0	-1
-0.44784	0.015134	0	-0.231591	-1.#IND00	0	-1
-0.41584	0.149148	0	-0.158218	-1.#IND00	0	-1
-0.38384	0.212517	0	-0.02218	-1.#IND00	0	-1
-0.35184	0.177752	0	0.115876	-1.#IND00	0	-1
-0.31984	0.062429	0	0.192099	-1.#IND00	0	-1
-0.28784	-0.076081	0	0.171021	-1.#IND00	0	-1
-0.25584	-0.167762	0	0.06569	-1.#IND00	0	-1
-0.22384	-0.166639	0	-0.066838	-1.#IND00	0	-1
-0.19184	-0.076768	0	-0.155085	-1.#IND00	0	-1
-0.15984	0.048977	0	-0.152812	-1.#IND00	0	-1
-0.12784	0.138751	0	-0.065612	-1.#IND00	0	-1
-0.09584	0.143549	0	0.052597	-1.#IND00	0	-1
-0.06384	0.065588	0	0.132123	-1.#IND00	0	-1
-0.03184	-0.044637	0	0.129317	-1.#IND00	0	-1
0.00016	-0.120621	0	0.051463	-1.#IND00	0	-1
0.03216	-0.120507	0	-0.050432	-1.#IND00	0	-1
0.06416	-0.050371	0	-0.115076	-1.#IND00	0	-1
0.09616	0.04328	0	-0.108125	-1.#IND00	0	-1
0.12816	0.104639	0	-0.039925	-1.#IND00	0	-1
0.16016	0.102028	0	0.045161	-1.#IND00	0	-1
0.19216	0.043232	0	0.098113	-1.#IND00	0	-1
0.22416	-0.033918	0	0.093414	-1.#IND00	0	-1
0.25616	-0.086495	0	0.039831	-1.#IND00	0	-1
0.28816	-0.090213	0	-0.029406	-1.#IND00	0	-1
0.32016	-0.04904	0	-0.077835	-1.#IND00	0	-1
0.35216	0.011667	0	-0.084698	-1.#IND00	0	-1
0.38416	0.061376	0	-0.052178	-1.#IND00	0	-1
0.41616	0.079633	0	0.000044	-1.#IND00	0	-1
0.44816	0.063153	0	0.047177	-1.#IND00	0	-1
0.48016	0.02354	0	0.071057	-1.#IND00	0	-1

Probe frequency=25; coupling frequency=0; decay rate=5.

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PERCEPTIONS OF ELEMENTARY GIFTED STUDENTS

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ABSTRACT

This research deals with the perceptions of elementary students that have been identified as gifted. Gifted education programs are implemented into school systems in order for gifted students to receive challenges necessary to further their developing talents. While gifted students are placed in regular classrooms with their peers of mixed-abilities, they benefit greatly from having a curriculum designed specially for them. My research included two mini-case studies, in which I interviewed two Black elementary males who are identified by their school system as being gifted. The face-to-face interviews consisted of a questionnaire and open-ended questions that allowed me to collect information about their perceptions of being gifted. This research is not comprehensive. A combination of books and articles were reviewed to complete this research project. These books and articles date from 1989 to 2001.

Key words: gifted elementary students, perceptions, gifted programming

There are many issues concerning education in America today. Teachers, administrators, and other professionals of education may have varying views on different issues. Each school district in each state has its own procedures or guidelines for handling situations or issues that arise and are similar throughout our nation. From how to deal with school violence to providing services to students with disabilities, schools have rules and regulations they follow to ensure the best environment possible in order to educate students. This research pertains to the gifted programs that are in existence in elementary schools. Gifted programs in elementary schools have been subjected to extensive research within the past few years.

Before going any further with this research, first some definitions of giftedness must be stated. There is no one standard definition of giftedness. Each state in the United States has its own definition of giftedness, which usually includes such words as leadership, high-ability in academics, and creativity (Pfeiffer, 2001). According to the State of Georgia guidelines for the Education Program for Gifted Students (1998), they are those individuals who possess exceptional abilities in academic areas as well as a high level of self-motivation and therefore need additional instruction to progress their intellectual abilities to the highest potential. Gifted individuals can be in any group in our society. They are not restricted to only a certain race, religion, ethnicity, or socio-economic level. The special programs are constructed for the gifted students as a nurturing tool for their performance of talents they have within them that need challenging or developing.

Identifying Gifted Students

Because the definition of giftedness can vary from one source to the next, the identification of gifted students can be somewhat difficult. Some gifted students would be those who make all A's in class and answer all the questions (Khatena, 2000). Assessment of a student's intelligence or higher abilities begins the process of identifying a gifted student (Esquivel & Houtz, 2000). Different methods of assessment are used to increase the number of gifted students who would otherwise be overlooked because of race, ethnicity, or religious affiliation (Shields, 1995). No matter what procedures are taken to distinguish whether a student is gifted or not, there will be cases where students will either be falsely identified or completely missed as being gifted (Parke, 1989).

Intelligence quotient (IQ) tests have primarily been an indicator of giftedness in students. In the state of Georgia, a student cannot be identified as gifted based solely on his or her scores on a standardized test (Krisel, 2001). There have to be more extensive observations and assessment results other than IQ tests in determining a student's giftedness (Naglieri & Kaufman, 2001). A high ranking in a certain percentile on a standardized test is a requirement to show abilities of gifted students (Krisel, 2001). Today, gifted students are being assessed not only on how well they perform

academically, but also on their performance outside of the regular classroom (Schwartz, 1997).

Nominating students for gifted education programs can come from a variety of sources. The giftedness usually is observed first by the parent of the student (Schwartz, 1997). Being that the student is in the presence of his or her parents the majority of time during early years of development, this would be an assumption. The Department of Education in the state of Georgia (1998) states that " Nominations are often made by classroom teachers; however, any responsible person who has knowledge of a student's intellectual functioning may nominate that student for further consideration."

Gifted Programming

When parents send their child to school, they believe that their child will be receiving adequate instruction from educators that will allow their child to learn and grow. Gifted programs were placed into school systems to ensure that students with high-ability levels were being challenged beyond the instructions and services they were receiving inside the regular classroom (Shields, 1995). The Education Program for Gifted Students (1998) states that a certified gifted education teacher is assigned a specific time of the day or week, usually in a classroom setting different from the regular classroom, to provide resources and materials to enhance the development of gifted students. A gifted program coordinator, usually one for every school district, is responsible for gifted programs being implemented when and where they are necessary (Hunsaker, 2000). In the state of Georgia, the gifted program coordinator recruits teachers, helps set up a curriculum and provides other services that are required for a gifted education program to operate properly (Krisel, 2001). Regulations are set at the state level; however, the exact nature of a gifted education program is decided on a local level, as long as it is in compliance with state regulations (Hunsaker, 2000).

Certain steps must be taken in order to continue educational opportunities for gifted students. To keep a gifted education program in existence, there must be evidence that the program is serving its purpose, according to the state of Georgia's Department of Education (1998). Gifted program coordinators and educators have to be prepared to display evidence that the program is able to supply and support the needs of all students participating in the program (Schwartz, 1997). Like any other program

provided in schools, there is a possibility it could be cut from the school's budget if there is not a demand or if programs and services are not meeting the standards (Hunsaker, 2000). Once gifted students are nominated, identified as gifted, and placed into gifted education programs, there must be an evaluation of the students as well as the program itself (Education Program for Gifted Students, 1998). Hunsaker (2000) explains the importance of evaluations of the gifted education and how government officials should be made aware of the evaluations in order keep funding for the gifted education programs.

Regular Classrooms

Gifted programming becomes a necessity when a student's educational needs are not being met in the regular classroom environment. In a regular classroom setting, where the teacher administers the curriculum of a general education, the intellectual abilities, interests, and talents vary from student to student (Parke, 1989). To one extreme, special education programs are provided with services outside the regular classroom. On the other extreme, services are rendered through gifted education programs outside of the regular classroom. The main idea is not to separate students from the regular classroom. In order for there to be a true learning experience, there must be a connection among students and teachers in both regular classrooms and gifted education programs (Tomlinson, Coleman, Allan, Udall, & Landrum, 1996).

Teachers have to be made aware of the different abilities in the regular classroom before they can meet the needs of the students (Westberg & Archambault, 1997). Next, teachers must ask themselves if they are able to differentiate and carry out an effective curriculum for the mixed ability students in the classroom. A variety of teaching styles and useful resources aids the teacher of mixed-ability students in a regular classroom (Gentry & Owen, 1999). Gifted students in regular classrooms are often unchallenged and require additional work to keep them occupied while their classmates finish assignments (Gentry & Owen, 1999). Regular classroom teachers may not be trained or certified with the skills to provide the necessary instruction for gifted students (Gentry & Owen, 1999). Therefore, the regular classroom teacher is not benefiting gifted students in terms of teaching students in such a way to enhance learning. Because gifted students are not achieving at their highest level in the regular

classroom, there is a demand for gifted education programs in the school systems. Gifted students are being properly served when there is a combination of learning experiences both in the regular classroom and in gifted education programs (Tomlinson et al., 1996).

There are advantages and disadvantages of having gifted students in regular classrooms. Gentry and Owen (1999) found that gifted students achieve at higher levels if they are in a setting of peers with the same ability. These students feel more comfortable and at ease when they are grouped with students who also have high achievement abilities (Tomlinson et al., 1996). However, we do not live in a society that allows us to surround ourselves with just the people of our ability. Therefore, gifted students have to be educated at some point in regular classrooms.

Perceptions of Gifted Students

It is very important for administrators, teachers, and parents to know how gifted students feel about themselves. In understanding the perceptions gifted students have about their giftedness or talents, the school and parents will be more aware of the type of services that would be best for a gifted student. Most gifted students see their giftedness as an opportunity to pursue educational challenges (Feldhusen & Dai, 1997). Viewing their high-ability as a positive rather than a negative aspect of their character, gifted students have more of an inclination to demonstrate and display their giftedness openly. The perception of gifted students eventually determines the elevation or holding back on the educational potential of the particular gifted student (Feldhusen & Dai, 1997).

Being able to "fit in" with their peers is a concern of many elementary students, gifted and non-gifted. Udvari and Rubin (1996) found that gifted students might often suppress their giftedness in order to remain sociable with their peers. Elementary students value peer relationships. Academic achievement can cause gifted students to be ostracized from students who are labeled as average (Feldhusen & Dai, 1997). Students' attitude and behavior oftentimes reflect how they perceive themselves. Feldhusen and Dai (1997) concluded that gifted students benefit from gifted education programs, but they also need interaction in the regular classroom with their non-gifted peers.

Perceptions of Individual Students: Two Mini-Case Studies

After obtaining permission from the parents and the students, two mini-case studies were developed on male elementary students who have been identified as gifted in a public elementary school in rural south Georgia. The participants in this study have been identified as gifted according to the guidelines for giftedness by the Georgia Department of Education (1998), making them eligible to participate in a gifted education program within their school. A 13-item questionnaire/survey (see Appendix A) was developed and administered in a university classroom to the two individuals during the summer. Face-to-face interviews were conducted, using questions on demographics and perceptions of giftedness. The interviews lasted approximately ten to fifteen minutes.

Case Study #1: Mouse

Mouse is an 8-year old African-American male, entering the third grade. He is the youngest sibling in his family of four, including his parents, and has a 9-year old brother. Mouse has recently completed his first year in a gifted education program. The public school, which he attends in a rural south Georgia community, begins accepting students into the gifted education program in the second grade.

Mouse's mother informed me that Mouse was nominated to participate in the gifted program by his first grade regular classroom teacher. She also told me that other parents, where the students attended school, could nominate them, if they believed that their child could benefit from the gifted education program. Before Mouse could enter the gifted education program, he had to pass an entrance exam, on which he succeeded. Students would be tested in the first grade if the teacher or parent thinks it is necessary. However, students could be tested throughout their second grade year. If a student demonstrates high ability in the classroom, he could enter the gifted education program in another grade. At this particular school, the gifted education program provided services, for an entire day (Monday or Tuesday, depending on the grade level) during the week, for students in the second through fifth grade.

Mouse responded to questions on the survey pertaining to his perceptions of the regular classroom curriculum. Mouse informed me that there were 17 students in his regular classroom. He was the only student in the class that was participating in the

gifted education program. Oftentimes, Mouse would finish his assignments before his classmates. He told me that his regular classroom teacher would not have anything for Mouse to occupy his time while he waited for his classmates. Bored with nothing constructive to engage in during this timeframe, Mouse would simply sit at his desk and wait patiently. Mouse thought that the instruction in the regular classroom could be improved by "making the work a little harder."

Mouse received gifted education programming every Monday. There were a total of 16 students in this gifted class. The gifted programming allowed students to surf the Internet for information, write stories, and learn Spanish. H.O.P.S. (Hands On Problem Solving) was a time during the day when students would have to use their abilities to solve challenging problems. The most enjoyable part of the gifted education class was creating PowerPoint projects. The teacher would let students choose from a selection of topics on which they were to research and prepare a PowerPoint presentation. Mouse admitted to being nervous while giving presentations, but he says the more he practices, the less nervous he is in front of his peers and others.

Mouse felt that he learned useful information in the gifted education class that he did not learn in the regular classroom. The only disadvantage of participating in the gifted education program was the amount of homework Mouse would have to complete on Mondays. Since he would be in the gifted education class all day on that particular day of the week, he would have to complete the work that was assigned in the regular classroom. Mouse had to read and complete any assignments that the regular classroom teacher assigned on Monday, in order for him to be aware of lessons that would be further discussed on Tuesday.

Case Study #2: Pooh Bear

Pooh Bear is a 9-year old African-American male. In August, he will enter the fourth grade. He is the older of the two children in his family, with a younger 8-year old brother. Pooh Bear has recently completed his second year of a gifted education program. He will continue to be enrolled in the gifted education program during his fourth grade year.

There were 20 students in Pooh Bear's regular classroom, four of whom participated in the gifted education program. Pooh Bear responded that he received no

extra privileges for being gifted in the regular classroom. Being a gifted student, Pooh Bear would find himself with free time in the regular classroom while he waited for other students to complete their assignments. During this time, he would read a book or put his head down on the desk. Pooh Bear informed me that he felt there should more writing assignments in the regular classroom. An avid writer, Pooh Bear participates in a creative writing program that meets every Tuesday after school. He enjoys writing poems and short stories.

Pooh Bear participates in a gifted education class with 15 other gifted students. They are involved in research projects, PowerPoint presentations, writing, and learning Spanish. Pooh Bear says that he likes to research topics and make presentations in front of his classmates, both in the gifted and regular classrooms. He wishes that there were more writing assignments and more spelling activities in the gifted programming. Since he has been in the program for a while, he is comfortable with the assignments and learns and demonstrates valuable skills that will be beneficial to him throughout his educational career.

Conclusion

Every classroom in this country has students with different ability levels. The regular classroom teachers may or may not be properly educated on how to carry out differentiated instruction in the classroom in order to meet the needs of the students. Teachers can be trained and certified on how to serve certain students who possess certain abilities. Gifted students in the regular classroom benefit greatly from gifted education programming implemented at their schools. It is very important for educators, lawmakers, and parents to know how students perceive themselves in gifted education programs. This was evident of the two mini-case studies used to complete this research. Educators, same as parents, want to provide the best educational opportunities for their students to ensure knowledgeable and promising men and women who will make up society in the near future.

The questionnaire/survey is available from the author upon request.

APPENDIX A

Gifted Student Survey/Questionnaire (Summer 2001)

1. Where and when were you born? Date of Birth_____ Age____
2. How many siblings do you have? How old is the oldest/youngest?
3. What grade are you in?
4. In what grade did you enter the gifted program?
5. How many students are in your gifted program? Describe in your words the gifted program?
6. How often do you participate in the gifted program?
7. Give some examples of what you do in the gifted program?
8. How do you feel about giving presentations in front of your peers?
9. How do you think your instruction could be improved in the gifted program?
10. What does your regular classroom teacher do when you finish your work before other students?
11. Do you get extra privileges in the regular classroom because you are gifted? If so, explain.
12. How many other students do you have in your regular classroom who are gifted?
13. How do you think your instruction could be improved in the regular classroom?

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POPULATION STRUCTURE OF THE BLACKLEGGED TICK, *IXODES SCAPULARIS*, IN EASTERN UNITED STATES USING MICROSATELLITE DNA MARKERS

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Abstract

The blacklegged tick, Ixodes scapularis, *is the vector of several infectious diseases of humans and livestock, such as Lyme disease, human granulocytic ehrlichiosis, and babesiosis. Numerous studies have been done on the vector biology of the ticks but only a few studies on the tick population genetics. The purpose of this research is to analyze the population structure of blacklegged ticks in the southeastern United States using one of the DNA fingerprinting techniques called microsatellite DNA markers. Tick samples have been collected from various sites in South Carolina, Georgia, and Florida. Genomic DNA was isolated from individual ticks in the lab. Polymerase Chain Reaction (PCR) was performed using primers specific for dinucleotide repeats of microsatellites DNA. The PCR products of DNA were separated by agarose gel electrophoresis and were visualized after staining under a UV light box. Six alleles have been detected from 181 tick samples. Twenty-one genotypes were found. Genetic variation is attributed primarily to individuals within populations, and there is no evidence of population structuring.*

Introduction

Ixodes scapularis Say (1821), the blacklegged tick, is distributed in the eastern part of North America, from Canada, south to Florida, westward to Texas, and north through Missouri. The range also extends to Arkansas, Tennessee, South Carolina, and Georgia (Kierans 1999). It belongs to the hard tick family Ixodidae, and is included in the *Ixodes ricinus* complex, a group of ticks with similar features, many of whom are

vectors of Lyme disease (Kierans 1999). In 1970, northern *I. scapularis* was designated as a separate species, *Ixodes dammini*, based on slight morphological variation. This separate designation was retained until 1993. Oliver *et al.* concluded that *I. dammini* was not a separate species, rather synonymous with *I. scapularis*, based on mating habits, life cycles, and chromosomes (1993).

Adults are about the size of a sesame seed. Males are all black, while females have a red abdomen with a black shield near the head. Festoons, ridges on the lower edge of the abdomen, are absent on *I. scapularis* (Smith-Fiola 1997). *I. scapularis* are three-host ticks; each stage requiring one blood meal. Six-legged larvae hatch from eggs in late summer. They prefer to feed on white-footed mice (*Percmyscus leucopus*), the primary carrier of the Lyme disease bacterium, (Smith-Fiola 1997) but will also feed on other small animals. Larvae can pick up and retain pathogenic agents from infected animals and retain them through their molts. The larvae drop to the ground and over winter several months. After molting, the nymphs feed for several days, again preferring the white-footed mouse. The final molt produces the adults that reach peak activity in October and November. Females feed primarily on white-tailed deer (*Odocoileus virginianus*), while males feed sparingly. During questing behavior, ticks balance on vegetation, and flail their legs to grab onto any potential host that brushes by, which sometimes makes humans the accidental hosts of ticks (Smith-Fiola 1997). Engorged females lay 1000-3000 eggs on the ground, after which she dies. Males also die after reproducing (Vredevoe 1998).

I. scapularis is the vector of several disease-causing pathogens including *Borrelia burgdorferi*, the Lyme disease spirochete, *Babesia microti*, the agent of human babesiosis, and the agent of human granulocytic ehrlichiosis (HGE). A recent study in New Jersey found that more than one of the above pathogens could be present in an individual tick at the same time (Varde *et al.* 1998). Lyme disease is the most prevalent of the three. Symptoms are flu-like and can develop within two days of a bite. They include a bull's eye rash around the bitten area, headache, and swelling of the joints (Smith-Fiola 1997).

Population genetics are used to investigate genetic variation among individuals and within groups, and how these patterns vary geographically and over time (Russell 1996). Studies have considered a variety of factors that influence ticks, including

climate, host movement, habitat associations, and human contact of vectors. However, these factors cannot fully explain the distribution or risk of infection from these vectors (Wilson 1998). Population genetics are needed to complete the picture and predict the spread of infection.

There are several hypotheses on the population genetics of ticks. White concludes that individuals in host-selective parasite populations have more genetic diversity (1978). Price, not taking host activity into account, concludes that genetic variation within parasite populations would be small and variability between populations would be large (1980). Conflicting studies include the work of Hillburn and Sattler (1986). Nine populations of *Amblyomana americanum* were found to be genetically homogenous and not consistent with Price's model. Hillburn and Sattler attribute this fact to the inappropriate application of Price's model to tick populations (1986). They highlighted the importance of host mobility, tick abundance, and selection of hosts as important parameters in determining genetic variation of parasites, and the importance of analysis of each species for accurate results.

One study of genetic variability in *I. scapularis* found a Southern clade and an American clade using randomly amplified polymorphic DNA-polymerase chain reaction (RAPD – PCR) on 12s and 16s mitochondrial DNA (Norris 1996). Similar studies in all regions of the United States are needed to uncover all the variations present. Mitochondrial markers can show lineages within species, so evidence of two lineages does not prove the presence reproduction isolation (Lane 1999). A similar study on the mosquito, *Aedes albifasciatus*, used RAPD-PCR to confirm the existence of north-south clines and differentiation of populations (De Sousa 1999). Genetic structuring of *Ixodes ricinus*, the European vector of Lyme disease, was investigated using allozymes. The study found low allozymic activity, coinciding with Price's (1980) finding because *I. ricinus* is not host specific (Delaye *et al.* 1997). It was determined that more powerful genetic markers should be used to better understand the dynamics of tick-borne diseases in Switzerland; this information can be extended to controlling Lyme disease in the United States. A possible solution was encountered by Hughes and Queller who found that highly polymorphic microsatellites could be present in species with little allozymic variation (1993).

Microsatellites are short pieces of DNA that consist of 2 to 10 nucleotide repeats that are effective in the study of population genetics (Ashley and Dow 1994). It is assumed that the majority of microsatellite loci are non-coding and are selectively neutral (Schribner and Pearce 2000). After PCR, polymorphisms can be scored on gels on the basis of allele size. Specific primers can be developed for the PCR to amplify the polymorphisms (Hoezel and Bancroft 1992, Viard *et al.* 1996). Microsatellites in combination with statistical analysis have been used to investigate the genetic drift of eastern collared lizards, resulting in the evolutionary dynamics of the lizard (Hutchinson and Templeton 1999). Delaye *et al.* revisited the genetics of *Ixodes ricinus* using microsatellites (1998). Five of six loci were found to be polymorphic. The same primers were used to perform PCR on two *I. dammini* individuals. Successful amplification of five out of six locus provided the possibility for use the primers developed for the species in the *Ixodes ricinus* complex. These and similar investigations can aid in discovering how evolutionary processes in vectors and pathogens interact with each other (Oliver *et al.* 1993).

Objectives

Numerous studies have been carried out on the vector biology of the ticks, but only a few studies have been attempted on tick population genetics. The purpose of this study is to determine the amount of genetic structuring in *I. scapularis* populations of the eastern United States. The primary goal is to use microsatellites to calculate genetic frequencies, followed by analyzing population structure using molecular variance and Wright's F-Statistics.

Methods And Materials

Tick Collection

Tick samples were previously collected from eight sites in South Carolina, Georgia, and Florida by Tonya Mixson (see Figure 1). The ticks were collected by dragging a 1x1 meter drag cloth over vegetation and were kept alive until returned to the laboratory where they were placed at –80°C for storage.

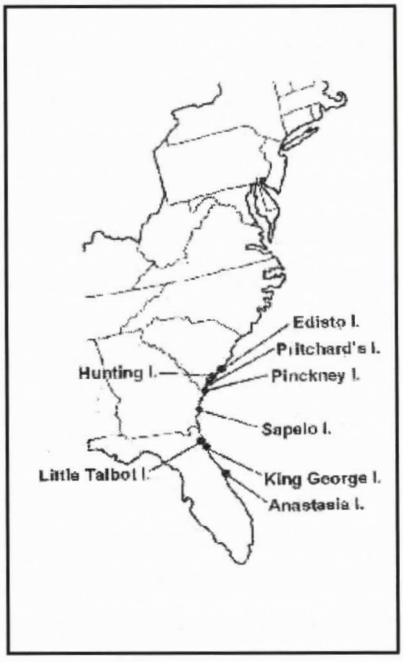

Figure 1. The map of Ixodes scapularis collection sites.

DNA Isolation

DNA was isolated using a method modified from Doyle and Doyle (1990). Individual ticks were ground in 250 µl of lysis buffer (4.5 M guadindine thiocyanate, 25mM sodium citrate, 0.5% lauryl sarcosine) and 250 µl of cetyltrimethylammonium-bromide (CTAB) buffer (100 mM Tris-HCl, pH 8.0; 1.4 M Nacl, 0.02 M EDTA, 2% (w/v) CTAB, and 0.2% (v/v) 2-mercaptoethanol). Samples were incubated for 20 minutes at 65ºC. Five hundred microliters of chloroform:isoamyl alcohol (24:1) was added and the samples were centrifuged at 15,800xg for five minutes. The supernatant was transferred into new microcentrifuge tubes and an equal amount of chloroform was added. The samples were centrifuged for five minutes at 15,800xg and the supernatant was transferred into new microcentrifuge tubes. One-tenth volume of 3M sodium acetate and an equal volume of cold isoproponal were added. Samples were refrigerated for 30 minutes and the DNA was pelleted by a third centrifugation. The pellets were washed with cold 70% ethanol and cold 100% ethanol. The pellets were

dried and resuspended in 50 µl of 10mM Tris-HCl (pH 8.0). The DNA isolation was verified by agarose gel electrophoresis.

Polymerase Chain Reaction and Microsatellite amplification

DNA was amplified in a 25 µl volume containing 1x *Taq* DNA Polymerase buffer (10 mM Tris-HCl, pH 8.5, 50 mM KCl), 2.5 mM $MgCl_2$, 200 µM of each of the four dNTP's, 2.5U of *Taq* DNA Polymerase, 0.2 µM of each primer, and approximately 0.1-0.5 µg of DNA template. PCR was performed on a M-J PTC 200 Block Thermal Cycler with Perkin Elmer reagents. The conditions were 30 cycles with denaturation at 94°C for 30 seconds, annealing at 60°C for 45 seconds, and extension at 72°C for 45 seconds. The primers used, IR32F (5'-TCG ACA AGT GCA GTG GAG AC) and IR32R (5'- GTT TCC TAC CAC AGA TTC TCC) target AG dinucleotide repeats.

To prevent contamination, the PCR reaction mixture was combined and separated into .02 ml tubes under a sterile hood designated only for PCR. The pipettes, tips, and tubes are used only for PCR and treated with UV light weekly. Negative controls, with sterile water instead of template, were run with each PCR reaction to verify the lack of contaminates. PCR products were visualized on 1% agarose gels with a 1kb standard DNA marker.

Microsatellite analysis was carried out on a nondenaturing agarose gel. Five microliters of PCR product were mixed with 5 µl of denaturing loading buffer (90% formamide, 2% (w/v) sodium hydroxide). Gels were stained with ethidium bromide and run at approximately 56 volts for two hours. Bands were visualized with a UV transilluminator and photographed for analysis.

Scoring of gels

Photographs of each gel were scored by hand. On the first (primary) gel, a ruler was used to determine the weight of each allele from the ladder. Each subsequent gel was analyzed and scored for only the original alleles found on the primary gel. The scoring reflected the number and type of alleles present in each individual tick sample.

Statistical analysis

Genotype frequencies were calculated. Population structure was analyzed using molecular variance and Wright's F-Statistics (AMOVA; Excolfier *et al.* 1992, Michalakis and Excoffier 1996) using Arlequin (Schnieder *et al.* 1997). The significance of the

fixation indices was determined using the nonparametric permutation approach described by Excoffier *et al.* (1992). Gene diversity levels were calculated for each population. Significance was determined with Mantel's tests (1023 permutations).

Results

Six alleles (refer to Figure 2) were detected from 181 tick samples and 21 haplotypes were found. Two groups were established for comparison: populations (each site) and groups (all populations in a state). The data was analyzed for variation at three levels: individuals in populations, among populations, and between states. Relative frequencies were calculated for these sources. Table 1 lists the frequencies acquired; sites are listed geographically from north to south and the haplotypes are numbered 1-21. Haplotype 8, individuals with only allele 4, was present in 26% of all individual ticks (regardless of site). Haplotype 1 was the second most frequent at 20.4%. Haplotypes 2 and 15 trail at 15.5% and 10.5%, respectively. The remaining haplotypes were present in only .1% to 6% of all the individuals analyzed.

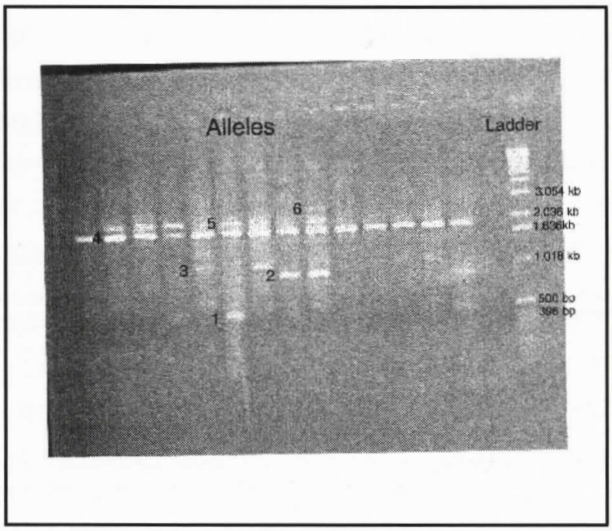

Figure 2. The alleles found in Ixodes scapularis. The alleles are numbered 1-6. The ladder on the right measures base pairs (bp) and kilo bases (kb). 1000bp = 1 kb

Table 1: The relative allele frequencies among popultions of Ixodes scapularis.

		Haplotype																			
Site	**n**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
SOUTH CAROLINA	120	.200	.175	.058	.017	.088	.033	.008	.283	.017	.017	.008	.088	.067	.017	.100	.008	.008	---	---	---	---
Edisto	22	.136	.364	.046	---	---	.046	---	.182	---	.046	---	---	.046	---	.136	---	---	---	---	---	---
Hunting	16	.188	.063	.063	---	---	.063	---	.375	---	---	---	---	.063	---	.188	---	---	---	---	---	---
Pritchard	40	.200	.050	.025	.050	.025	.050	.025	.250	.050	.025	.025	---	.100	.025	.075	.025	---	---	---	---	---
Pinckney	42	.238	.238	---	---	---	---	---	.333	---	---	---	.024	.048	.024	.071	---	.024	---	---	---	---
GEORGIA	16	.188	.063	.063	---	---	---	---	.063	.063	---	---	---	---	.063	---	---	---	.063	.063	.063	.063
Sapelo	16	.188	.063	.312	---	---	---	---	.063	.063	---	---	---	---	.063	---	---	---	.063	.063	.063	.063
FLORIDA	45	.222	.133	.067	---	.022	.044	---	.267	---	---	---	---	---	.022	.156	---	---	---	---	.044	.022
Talbot	17	.059	.118	.059	---	.059	.059	---	.235	---	---	---	---	---	.059	.235	---	---	---	---	.118	---
King George	7	.429	---	.286	---	---	---	---	.286	---	---	---	---	---	---	---	---	---	---	---	---	---
Anastasia	21	.286	.190	---	---	---	.048	---	.286	---	---	---	---	---	---	.143	---	---	---	---	---	.048
All Sites	181	.204	.155	.061	.011	.011	.033	.006	.260	.017	.011	.006	.006	.044	.022	.105	.006	.006	.006	.006	.017	.011

Genetic Population Structure

The results from AMOVA are recorded on Table 2. Results indicate that 97.73% of variation can be attributed to individuals within populations. Only 1% and 1.27% of variation is attributed to differences among populations and among states, respectively. The F-statistic values are also recorded on Table 2. Only the F_{ST} value of .02270 is statistically significant.

Table 2: The results of AMOVA for populations of Ixodes scapularis.

Source of variation	***Percentage of variation***	***F- Statistics***	***P- values***
Within Populations	*97.73*	F_{IS} =.01013	.17009
Among Populations	1.00	F_{ST} =.02270	.05279
Among States	1.27	F_{IT} = .01270	.16618

Only F_{ST} is statistically significant.

Discussion

High levels of diversity were found within and among populations. AMOVA results show that the vast majority of genetic structuring is due to the individuals within

populations. The F_{ST} value indicates the high amount of gene flow within populations and little variations between populations.

In addition to confirming two clades of *I. scapularis*, Norris concluded that the southern clade was older due to the large amount of variation. However, my study supports the hypothesis that there is no divergence between populations of ticks (Hillburn and Sattler 1986, Delaye *et al.* 1997, Kain *et al.* 1997). Lately, these studies have come under scrutiny; all three studies had small sample sizes and used allozyme proteins. Many of these proteins are monomorphic and may not detect synonymous changes in nucleotides. Due to the lack of variation, allozymes are impractical for studies requiring information about genetic diversity within populations (Parker 1998).

Overall, my results point to little divergence between populations of *I. scapularis*. Mixson's study of *I. scapularis* using single strand conformation polymorphism (SSCP) found differences in the amount of variation between populations (1999). The conclusions of the study, favoring Norris's (1996) ideas of clades, may have been the result of recent tick range expansion; northern ticks seem to be migrating south, while southern ticks seem to be migrating north. Host abundance and host preference may also be factors. Ticks in South Carolina showed greater genetic distance than those from Georgia and Florida, forming an intermediate zone between the clades. Evidence of gene flow between neighboring populations was attributed to tick migration (1999). I expected my results to be similar to Mixson's study because I studied the same species and locations as she did. The small sample size, under representation of specimens from Georgia and Florida, and the use of only one locus could have attributed the differences in results.

Future Implications

I plan to continue this study, adding more samples from different sites and examining multiple loci. Temporal studies, considering the same sites years later, will also be helpful in getting a better understanding of the genetic structure of *I. scapularis*.

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THE GROWING MINORITY: A STUDY OF LOCAL REACTIONS TO THE INCREASING LATINO POPULATION IN SOUTHEAST GEORGIA

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ABSTRACT

An explosive increase in the Latino population in the Deep South began in the early 1980s. Historically, this region has been split along black and white racial lines, but with an increase in the "brown" population the area is confronting new racial issues. Within the existing literature, questions of race, racial attitudes and racial perceptions emphasize the traditional black- white division. Research on the fast-growing Latino population in new areas of destination is a neglected area in the field of racial issues. This study attempts to address this neglect by exploring the local reactions to Latino migration in a county in South Georgia. Using survey and ethnographic methods, the study examines changing racial attitudes and perceptions among business owners. Based on a preliminary analysis of the data, the author concludes that Latino migration has yet to dramatically alter deep-seated racial attitudes. Perceptions and attitudes consistent with both symbolic and laissez-faire racism are evident in the data. Although Latinos are viewed more positively than Blacks, Latinos are blamed for increased crime, urban blight and depressed property values. Further research is needed to more firmly support these conclusions and to uncover potential relationships between demographic variables such as race, age, religion, and how these variables affect beliefs about the Latino minority.

INTRODUCTION

In the early 1980's, a new immigration wave began flowing into the southeastern region of the United States. This new group consisted mainly of Latino

immigrants, and many of those immigrants were Mexican. Immigration is not a new topic, nor is migrant labor, and Mexicans have traveled to the United States for many years, but what is interesting about this recent influx of immigrants is that many are choosing to settle into the deep South. Historically, the South has experienced little growth in the area of Mexican migration. Recently, however, the Latino community in the South has experienced the fastest population increase. According to the 2000 census data, Georgia has experienced one of the fastest increases in the country in terms of the Latino population-a 300% increase since 1990. As the Latino community continues to increase, this raises the question about how the traditionally black and white Southern region will respond to the issue of adjusting to a new and potentially large minority group.

Many Latinos travel to the United States in hope of finding job opportunities that were not available in their home countries. Many of the Latino population are legal immigrants and over 40% are first generation immigrants (Sierra, Carrillo, Desipio, & Jones-Correa, 2000). However, a large number do enter the United States illegally and a large number of these know little English. Because of a lack of proper and legal paperwork and language and cultural barriers, the tremendous growth of the Latino minority may cause some problems in the deep South. Not only do the Latinos face the possibility of encountering problems with the white community, but the white community is being forced to make adjustments culturally, socially, and economically.

The deep south is a region that, for many years, has been forced to deal with racial inequalities and problems. Historically, the South has faced black and white racial issues and has made significant progress only fairly recently (in the last 50 years or so) in the area of race relations. African-Americans have traditionally been the largest minority group, not only in the South but in all of the United States. Now, Latinos are approximately the size of the African-American minority. According to the 2000 census, over 12% of the U.S. population is of Hispanic origin (Wentz, 2001), almost the same as the African-Americans, and by the year 2050 the Latino minority is projected to make up 25% of the U.S. population (Houvouras, 2001). However, even though the demographics of the United States seem to be changing, most of the existing research on racial attitudes remains focused on white people's perceptions of African-Americans. Thus, the literature has neglected the question of Latinos in general and particularly the

Southeast. With the fast growth rate in the Latino minority group in the South, the problems caused by racial tensions can no longer be attributed solely to black and white issues.

Therefore, trying to understand how the shifting population demographics are affecting the South is becoming an urgent matter, especially because the Latino immigration is fairly new and quickly growing. The existing literature about racial attitudes and perceptions and also about immigration deals mostly with minorities other than Latinos or is about other regions of the country. This study addresses these gaps in the literature on racial attitudes and the demographics of the Southeastern region of the U.S., specifically reactions to increasing immigration by Latinos into the South. Using standard survey methods, business leaders in a county in South Georgia were given the opportunity to respond to various issues, allowing the researcher to analyze the local cultural, economic, and social effects of the increasing Latino population on the community.

OVERVIEW OF IMMIGRATION

Because the literature neglects the question of Latino immigration into the deep South, the literature that served as a foundation for this study is about general immigration, race relations, racial attitudes and perceptions, and what have been previous reactions to the increasing Latino immigration in other areas of the United States.

Mexican Immigration

For many years, public policies about Mexican immigration have been controversial topics. There are other immigrant groups besides Latinos, but because 45% of immigration since 1960 involved migrants from Latin America, this group is a main cause of concern for many people (Sierra et al., 2000). Although Latino immigration to the U.S. dates back to the 19th century, the major increase started after World War II when there was a tremendous need for labor because of a growing economy. Before that time, the immigration wave ebbed and flowed because of changes in the economy, such as during the Great Depression in the 1930s when there was a push to deport many immigrants (Ransford, 1994).

Today Latino immigration continues for many of the same economic and social reasons. There is a need in the United States for low-wage labor to fill many jobs in areas such as farm work and construction. The sending countries in Latin America also benefit from the out-migration by decreasing the needs for limited resources in those countries and also by bringing money in from those who work in the United States and send money back home. In Mexico, this practice of sending money home brings in around $2 billion a year (Sierra et al., 2000). Both the sending and receiving countries of the Latino immigrants benefit economically from the immigration to the U.S., but what is the cost to the workers themselves?

Immigration into the Deep South

For many Latino workers, the cost of migrating to the United States, and especially the South, is facing racism and discrimination daily. Because many Latinos are identifiable by skin color, more so than the early immigrants to the United States from Europe, they face discrimination in many aspects of their daily lives (Neckerman & Carter, 1999). Many Southern states do not have a large population of foreign-born immigrants, so this fast-growing "brown" population causes problems for some people. Some southern states, such as Mississippi and Kentucky, even have less than 2% of their population that is foreign-born (Chiswick & Sullivan, 1995). Studying the local reactions to these groups contributes to the literature about the demographics in the South and how people are reacting to different in-coming groups.

They're Here; Now What?

Once the Latino immigrants reach the United States, they very likely will encounter many hardships before, and even after in most cases, they find a place to settle and a place of employment. According to Portes and Zhou, the immigrants will enter into a very unwelcoming and intimidating world. Some states have even passed laws to make the immigrants feel unwelcome, such as Colorado, Arizona and Florida making English their official state language (Houvouras, 2001). Sixty percent of the citizens in California voted for Proposition 187, a proposed bill to deny education and medical treatment to illegal immigrants. This denial included treatment for deaf people,

people with AIDS and other diseases, prenatal care, and other much-needed medical care (Lipsitz, 1998).

Latino immigrants are also treated badly by many employers. Because of the vast supply of inexpensive labor, employers can pay very low wages to their Latino employees. Latinos, for reasons such as language barriers and lack of sufficient documentation, may have difficulty in expressing problems with employers and the wages they are paid. As a result of this, Latinos have experienced a higher poverty rate despite having a higher workforce rate than for whites and blacks (Suro, 1998).

Historical Overview of Racial Issues

The White Belief System

There have been numerous studies conducted on the topic of racial perceptions and attitudes. Most of the studies, though, have focused on either black or white or both racial groups. Being white, according to Lipsitz (1998), offers a monetary value to those who "invest" in their whiteness. Being white offers many privileges, and our society teaches that possessing that whiteness gives a person an advantage over all others. This way of thinking reinforces the attitude that "white" is better than any other color in areas such as success, potential, and, some believe, even intelligence and these beliefs contribute to racial tensions. One possible solution for decreasing these racist attitudes and tensions is education (Burns & Gimpel, 2000). Multicultural education, along with greater interaction with diverse cultures aids in lessening racial tension, misperceptions, and stereotypes.

Racial Issues Between Blacks and Latinos

Blacks have historically been discriminated against in the South, and only in 1965 were they granted full suffrage. Blacks have also historically been the largest minority group, but according to projections these numbers are changing. Latinos are expected to become the largest minority group in the United States by the year 2010 (Harrison & Bennett, 1995). With the Latino population rapidly growing, some theorize that racial tension and rivalry between the African-American and Latino minority groups will increase (Suro, 1998). For example, Blacks and Latinos are expected to be in

competition for the same jobs, which causes economic threat and a possible increase in racial tension. Latinos and Blacks are also sometimes stereotyped in their work ethic, which affects the hiring practices of employers. For instance, research indicates that employers are more likely to hire whites and Asians rather than blacks and Latinos (Moss & Tilly, 2001). Yet, Latinos are less likely than Blacks to experience discrimination in their social interaction with other races (Ransford, 1994).

Now That Things Aren't Just Black and White...

Although little research has been done on this specific area of reactions to recent Mexican immigrants into the deep South, there have been many studies conducted separately on the issues of immigration, minorities, and race relations. When there are two or more different ethnic groups, a hierarchy usually will form based on control of such variables as "power, wealth, and prestige" (Ransford, 1994, p. 3). Historically, the hierarchy is formed as a result of competition for the control of these variables (Ransford, 1994). The group that attains the largest portion of power, wealth, and prestige will be at the top of the hierarchy, which is traditionally the white Americans, and Black and Latino groups compete for the next-highest level on the hierarchy. Many people justify the existence and persistence of the racial hierarchy with their personal belief systems on race and ethnic characteristics. Some researchers suggest, however, that these belief systems and blatant forms of racism are slowly changing and are being replaced by different, more subtle, forms of racism.

Types of Racism

Because of personal belief systems that rationalize inequalities between races, the stratification system can be justified and considered fair. Historically, this apparent racism was accepted and many people did believe there were inherent differences between the races, which justified unequal treatment of minority groups. However, because these forms of racism are not longer socially acceptable, two different, more subtle, forms of racism have emerged. The first is laissez-faire racism, which "involves persistent negative stereotyping of African Americans, a tendency to blame blacks themselves for the black-white gap in socioeconomic standing, and resistance to meaningful policy efforts" (Bobo, Kluegel, & Smith, 1997) that would combat racism.

The second type of racism is symbolic racism. This type of racism includes the belief of whites that "blacks violate traditional U.S. values and thus do not deserve any help" (Hughes, 1997 p. 45). These two types of racism may apply to Latinos and other minorities, which would maintain a racial-based hierarchy in the United States. One of the purposes of the study is to assess the degree to which either of the forms of racism applies to Latinos, which would expand the awareness of the problems and would work to prevent or undermine the racial hierarchy and racism that may pertain to this "new" minority group.

Calle County

Calle County (a pseudonym) is a small county in Southeast Georgia with a population of 9,577 (Census, 2000). Although data vary, the county has experienced a large growth in Latino migration since the 1980s. Existing data suggest that more than 22% of the population was of Hispanic origin by the late 1990s (Georgia State, 1999). There are several possible explanations for this demographic development, such as social networks where many people who come to the county have friends or family already there. Another reason is that an interstate runs through the county, which makes travel more convenient. There is also agriculture and several businesses, such as a poultry factory, that employ the new immigrants. There is a small town in Calle where many Mexican immigrants live, shop, go to school, and where some even own businesses, and this town is the focus of the study.

Methodology

To assess local reactions in Southeast Georgia to the tremendous increase in the Latino population, data were collected using a standard mailed questionnaire and was supplemented with semi-structured follow-up interviews. Selection of the county was based on proximity and recent growth in the Latino population. Business owners were chosen as subjects given their position in the community and our interest in employer reactions to the new pattern of labor migration. Questionnaires were sent to each business listed with the county Chamber of Commerce.

Due to the sensitive nature of some questions and also to insure anonymity, the questionnaires that were sent out had no identifying marks. In order to identify those

who had not responded, a separate numbered information sheet addressed to the research office was included in the questionnaire packet. A separate envelope was included in the packet so that the respondent could return the information sheet and the questionnaire separately. On the information sheet was included an area for the respondent to indicate whether or not he or she wanted to be included in the follow-up interviews. After the information sheets were returned, those who had returned the questionnaire could be identified, interviews could be set up, and anonymity on the questionnaires could still be insured.

We sent the questionnaire to a total of 298 businesses, which was the entire universe of the population, excluding any Latino businesses. The questionnaire contained 48 questions on a wide variety of topics such as the education system, social services, racial perceptions, accommodations for different languages, religion, and general questions about the town and it's particular business. Numerous open-ended questions were included allowing the respondents to identify specific changes in their town and businesses they felt were due to the increase in the Latino population. Of the 298 questionnaires sent out, 75 were undeliverable due to problems with addresses. We have targeted 100 completed questionnaires as an acceptable return rate. Follow-up reminders are scheduled at 3 and 5 weeks after the initial mailing.

For this study, 33 completed questionnaires were analyzed to assess preliminary reactions to the increase in the Latino population. In addition, several in-depth face-to-face interviews of business owners were conducted, allowing respondents to go into more detail regarding their attitudes or changes they have made or have seen taken place because of the recent increase in the Latino population. All identifying information of the interviewees has been changed to maintain their privacy.

Preliminary Results

Preliminary results of the study revealed significant cultural, economic, and social changes in the community. The specific areas that have experienced changes respondents commented on include education, social services, accommodations for language barriers, religion, community changes, and racial perceptions.

Education

Several of the respondents felt that education in the county was focusing too much on the needs of non-English speaking children and 73% of respondents felt that classrooms should be taught only in English. According to one respondent, the focus of the teachers on non-English speaking students has led to a lowering of test scores across the board. The increasing Hispanic population has also led to overcrowded schools, which means the children are getting inadequate time and attention from their teachers. Many felt that Spanish-speakers needed to learn English if they were going to continue to live in the area so that there would not be so many communication problems. Of the 33 questionnaires analyzed for the preliminary results, 82% of respondents felt that people who speak English are generally more successful.

Social Services

Many respondents were unhappy with immigrants being able to receive free healthcare. One respondent even said that she could not afford healthcare and that Hispanics should not receive free healthcare because it was unfair. Debbie Smith (not her real name) claimed that "no one has ever come into my business and asked if my daughter was up-to-date on her shots," but that the healthcare workers in the county sought out the Mexicans to make sure they were receiving adequate medical attention. Over 45% of the respondents felt that the Latinos used too many public services, not just medical services, in the county. Interestingly, many felt that migrants used too much of the time of the police officers in the area.

Accommodations For Language Barriers

While many felt that Spanish speakers should learn English and that no special accommodations should be made for those who had problems communicating in English, 15% had changed some aspect of their business in order to accommodate the Latino population. One respondent even stated that she had added six or more Mexican products to her inventory that were in demand by the Mexican customers. Other respondents mentioned they added signs in Spanish and also looked for bilingual employees. One interviewee had even purchased a Spanish/English dictionary to look

up words and phrases she could use in communicating with her Spanish-speaking customers.

Religion

Some respondents felt that the Latino population added to the religious diversity of the community. Several remarked that churches that had ministries for the Spanish speakers had grown in size, especially the Catholic church. Overall, there were few comments made on the religious changes that had or had not taken place in their community.

Changes in the Community

Several respondents commented positively on the added diversity provided by the new ethnic businesses in the area (such as three Hispanic restaurants). The new ethnic group also added to the diversity of the area and forced whites and blacks to interact with a different ethnic group. Although stereotypical, but meant in a positive way, 82% suggested that the most of the Latino population are willing, hard workers, unlike how many respondents replied about African-American workers, and that they had brought an increase to the economy.

Respondents also identified negative aspects about the Latino population. Many respondents felt that Latinos had brought more substandard housing to the community, which 79% of the respondents felt decreased property values. Many felt that the Latinos loitered around town, although one respondent pointed out that this is because there were not many places to go in the community. Some felt that the increase in the Latino community brought with it an increase in the crime rate, racial tension, litter, traffic accidents and violations, and taxes. One respondent stated that she felt that some of the Latinos have no respect for others and sometimes "blockade" the sidewalk "in front of white women" so that they can not pass by.

Racial Perceptions

When comparing whites, blacks, and Latinos, most respondents had much to say on the subject. One respondent, when comparing blacks and Latinos, stated that they felt blacks are more established and more comfortable in their surroundings. Others

stated that they believed that Latinos did not rely on welfare as much as Blacks did, had more family values than Blacks, and were more willing to work for what they had. When comparing Latinos to Whites, respondents said that Latinos had a lower standard of living and ethics (some suggested because of the way of life in Mexico), they were unclean, and also that Latinos were more likely to remember their ancestry and not forget as white people have. In general, Latinos were said to be focused on short-term goals (such as sending money back to Mexico) and to have very strong family values.

Implications

What do the preliminary results suggest about potential changes in racial attitudes and race relations? To begin, the many negative stereotypes that emerged in the survey does not suggest that there will be racial accord in the future, especially as the Latino population grows even more in the South. Along with increased migration come such potential problems as increased job competition and possible lower wages for employees. Both of these can easily strengthen existing stereotypes and increase racial tension. The negative stereotypes may potentially prevent Latinos from getting jobs that are higher paying and higher skilled. Negative stereotypes not only leads to discrimination, such as in employment practices, but also racially motivated acts and attitudes. If a certain group, such as the Latinos, is perceived to be a certain way by the majority, actions such as racial profiling and businesses refusing services to clients of a certain race can become common occurrences.

At the same time, there may well be a reshaping of old black and white racial lines with the growth in the Latino population. In other words, there are more people of different groups to interact with. This interaction could be positive or negative, a learning experience or a potentially violent situation. Tensions between different races could increase or decrease, possibly depending on the certain demographics or the economic condition of the area. For example, as the economic condition worsens and many people become unemployed, resentment and intolerance towards the group with the least amount of power (in this case, Latinos) that offers competition for those jobs may increase.

Discussion and Conclusion

The preliminary analysis of the survey and interview data revealed many local social, cultural, and economic reactions to the increasing Latino population in Southeast Georgia. Some businesses are changing products they offer and how they deal with non-English speakers. Some people are changing culturally, such as visiting a local Mexican restaurant when there is a Mariachi band playing. Still others are changing in how they think about and interact with different ethnic groups, which could be either negatively or positively.

Another important conclusion is that many racial stereotypes exist about Latinos. They were stereotyped to be hard workers and to be very family-oriented. Many respondents agreed with those stereotypes. Some stereotypes that are emerging about Latinos are negative. Generally, the respondents felt that Latinos were unclean and did not have the same level of ethics that white people do. They were also said to be satisfied living in substandard housing. Many respondents offered the background of the Mexicans as an explanation as to why they were satisfied living in these types of conditions. Not surprisingly, many respondents were willing to blame the incoming group for the living conditions instead of blaming local landlords and employers, which is an expression of laissez-faire racism. The ones that are blamed for the sub-standard conditions are the minority group themselves, not the group that holds the most power and is at the top of the racial hierarchy.

Not surprisingly, people who had lived in the area for many years were seemingly not as accepting of change as those who were born somewhere else and had lived in the area for a shorter amount of time. Overall, the preliminary results about local reactions to an increasing minority group were slightly negative. This suggests that there are still racial problems in the deep south, such as negative stereotyping and discrimination, and a recent increase in a fairly new minority may help or hinder these problems in the future. Further analysis of the data will be used to look for relationships between certain demographics and attitudes and the possible changes in these relationships. For future studies, patterns between variables such as race, age, religion, etc. and how these variables affect beliefs about the Latino minority could be further explored. Although the Latino population is increasing rapidly, because they are a

relatively new minority group in the region, there is still a level of uncertainty as to how they are going to be accepted by locals in the deep South.

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ASSESSING THE ECONOMIC IMPACT OF THE SCHOOL OF INFORMATION TECHNOLOGY AT GEORGIA SOUTHERN

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ABSTRACT

The establishment of a School of Information Technology at Georgia Southern University is part of a statewide economic development strategy to spread Atlanta's success in the new economy to other regions of Georgia. The school will prepare students for jobs in the new economy, and potentially serve as an anchor attracting new technology businesses to a corridor defined by I-16 from Statesboro to Savannah. How will the region's economy change as a result of new technology businesses? Will this create a structural change in the region's economy and if so, what are the implications of the particular changes? The objective is to model structural changes and discuss their implications. This analysis will provide economic developers with vital information on demand for new businesses.

INTRODUCTION

The establishment of a School of Information Technology at Georgia Southern University is part of a statewide economic development strategy to spread Atlanta's success in the 'New Economy' to other regions of Georgia. This School of Information Technology at Georgia Southern has the potential to build a national reputation for the latest in Information Technology education and will prepare students for jobs in the 'New Economy.' The school will also potentially serve as an anchor attracting technology businesses to a high-tech corridor defined by I-16 from Statesboro to Savannah.

The purposes of this research were to model structural changes in the region's economy and discuss their implications. This study assessed the following questions: How will the region's economy change as a result of new technology businesses? Will

this create a structural change in the region's economy, and if so, what are the implications of the particular changes?

This report evaluated the economic impacts of a new School of Information Technology in Southeast Georgia. In order to find the impact of the school, this study used REMI (Regional Economic Modeling Inc.). This economic model was assessed to find the economic effects of an introduction of a new activity. The analysis looked at three scenarios that provide the differences in economic activity caused by the introduction of the School of Information Technology. The findings of this report detail the results of the modeled changes in the economy, and the results of the scenarios are compared.

The significance of conducting research on the impact of a new School of Information Technology is that the region's economy will know the impact of the school before the project is implemented. By conducting research in this area, this study provides economic developers with vital information on what types of businesses are likely to grow and what types are likely to want to locate in the region. By knowing what types of growth will occur, economic developers can anticipate the infrastructure and support services which need to be in place to insure orderly sustainable development. This will in turn, entice potential Information Technology businesses to develop along southeast Georgia's high tech corridor.

The following report includes economic theory, economic development strategies, and macro models of economics, as well as an analysis of the economic impact of the School of Information Technology at Georgia Southern University.

Literature View

For an economic strategy to succeed it must harness some fundamental forces in the marketplace. Building a successful regional development strategy requires a sound understanding of key marketplace forces and effecting the location decision of economic agents whether these are businesses or households. The strategy, which has led to the establishment of a School of Information Technology (SIT) at Georgia Southern University, is based on the forces associated with agglomeration economies.

In this chapter, the evolution of economic understanding of agglomeration economies is discussed. This is followed by a discussion of how agglomeration economies result in the clustering of certain types of related and complementary economic activities. The chapter concludes with a discussion of the particular importance of agglomeration economies in the emerging Information Technology sector.

Defining the taxonomy of agglomeration economies:

Agglomeration economies are cost reductions and/or increases in productivity, which occur because economic activity is carried out at one place. An economy of agglomeration is the result of an activity enhancing the productivity of other economic activities. Examples of types of agglomeration economies include internal, localization, and urbanization economies.

Internal agglomeration economies are an expansion of activity at a certain location due to per unit cost reductions. Spreading of fixed costs over larger output, expanding the division of labor, potential for using other technologies, and reducing of costs through bulk purchases are sources for internal agglomeration. For example, some benefits may be increased for an activity through expansion, such as if a firm has the capacity to produce more of a certain product by increasing its labor force by a minimal amount, then the firm has more profit, increased productivity, and lower fixed costs associated with production.

Another type of agglomeration economy is a localization economy, which occurs when increases in the output of an entire group of firms at a particular location result in lower costs for firms in that industry at that particular place. One category of localization economies is a labor pool. This is when activities that are located together are able to contribute to a skilled labor pool. Another category is specialized machinery, which is when firms are able to share specialized machinery as well as other factors of production. Imitation, modification, and innovation are other sources of localization. If one firm in an industry makes a technological advance, then it may be possible for other similar firms to utilize the new innovation to enhance their productivity quicker than if they were isolated from the competition. This also could allow for other firms to modify the innovation to increase productivity even more. The last type of localization economy is comparison shopping and is the natural tendency of individuals to shop around to

compare products. For example, an additional children's clothing store in a shopping mall is a benefit to other children's clothing stores because this makes shopping for children's clothes at the shopping mall more desirable to the consumer, and this creates higher total sales and hence, higher profit (Blair, 1995).

The most widespread of agglomeration economies is urbanization economies. Hoover (1937) defined urbanization economies as cost reductions of all firms in a given location, which come about as an economic activity in general economies focused largely on the benefits of urban and industry size rather than with the specific synergies firms enjoy via spatial combination. Hoover also hypothesized that firms were more productive in larger cities and in industrial complexes. Infrastructure is one source of urbanization economies that results when economies of scale exist and sizeable increases in an urban area lower per-unit infrastructure costs. The division of labor is another source of urbanization economies and results if division of labor is more extensive due to locating in a region that has a large size as well as heavy activity. Urbanization economies may also be a source of internal economies; this type of economy allows establishments that sell to a variety of firms and households to attain cost reductions through urban expansion attributable to larger markets, allowing a firm to realize internal economies of scale. Also, averaging of random variables is a source of economies of urbanization. This is where urban areas prevent sizeable variations in economic activity. For example, if a firm is located in an urban area, then when a specialized worker retires, that worker will be easier to replace than if the firm were located in a small town (Pearce, 1992).

The Evolution of Understanding Agglomeration Economies

Eli Heckscher, a classical international trade theorist, wrote in 1919,"Thus trade must continue to expand until an equalization of the relative scarcity of the factors of production has occurred," which provided an opportunity for his student, Bertil Ohlin, to add new innovations by considering a relationship between trade theory and location theory. Ohlin sought to combine the two fields in order to attempt to explain the agglomeration of industries and made major breakthroughs by adding that there was no reason to assume the geographical units were countries and that international trade theories could be applied to inter-local trade. Heckscher and Ohlin sought to explain the economic effects of artificial boundaries on trade and used a method other than

conventional trade theory to attempt to explain how the factors of production could be implemented in international economic relations. Location theorist, Alfred Weber, further discussed agglomeration and created the general theory of trade and agglomeration. He discussed how factor prices tended to be unequal spatially between cities and the surrounding countryside, and how fixed costs give rise to increasing returns to scale in agglomeration.

Another location theorist, August Lösch, proposed a model to "discover whether and how, under rational assumptions, an economic boundary can be expected to arise," and began to develop a theory of 'market areas.' Lösch developed networks of hexagons representing market areas, and these areas were centers of clusters representing agglomerations of production also known as Löschian agglomeration. He explained that increasing returns of some kind must be central to an explanation of why we see spatial agglomerations of economic activity, which arises from the need of specialization. The specialization of an economic activity in turn, increases productivity and enhances profit due to innovations in production, furthering economies of agglomeration (Meardon, 2000).

Clustering: The Logical Conclusion of Agglomeration Economies

A cluster is a set of activities that share a common geography, common needs, markets, obstacles, and technologies. By definition, a cluster is a geographic proximate group of interconnected companies and associated institutions in a particular field, linked between commonalities and complementarities. In a targeted sector, efforts must be present through industry, educational facilities, economic developers, and governmental organizations to provide explicit support for a cluster.

For a cluster to form in a given industry, several of the following sources must be apparent. There must be strong industrial leadership that is an industry with representation of the industry and has an ongoing initiative to support the region and industry. Another source of clusters is established organization, with connection to science and technology resources, which includes public or private partnerships with representation from many sectors to support development of the cluster. To add to the criteria for a cluster, a strong industrial presence must be defined by the regional sector in comparison to the state. A cluster must have capacity for growth, and this includes

the development of resources to provide growth in the region. Also, a region needs complementary industries to the targeted sectors of industry to resist industry specific recessions as well as other problems (Florida Cluster Metrics Task Force, 2000).

Therefore, agglomeration economies occur due to an association of a large number of economic activities benefiting from geographical clustering. If there is to be agglomeration, its location is typically dependent on the initial conditions from which clustering begins. If history or chance gives a small advantage to one location, it will build upon itself and that will be the agglomeration site (Armstrong, Harvey, and Jim Taylor, 2000).

Comparative Advantage Clustering

A group of activities that share characteristics such as the geographical market and technological obstacles as well as others, known as a cluster, has a competitive advantage over other firms because the activities in the cluster can produce at a lower cost than activities outside of the cluster. Not only does the cluster have competitive advantage, but also clusters have comparative advantage, which is the relationship of one competitive advantage to another, or a comparison among competitive advantages. Comparative advantage clustering allows activities within the cluster to have more efficiency and productivity than other activities of the same sector. This advantage is highly sought out by firms to maximize production utility (Pearce, 1992).

Basic Principle/Cause of Agglomeration Economies

These theories have led to the modern definition of agglomeration economies, which is when activities strategically locate in close proximity to concentration of industry and other activities in particular locations to gain cost reductions and/or improvements in productivity (Pearce, 1992). To facilitate economies of agglomeration, a wide range of services and inputs must be available in a market area. Activities must locate in cities where communication facilities are available and inexpensive as well as access to financial institutions. Location in a city is also vital to the types of workers the activities wish to attract. Knowledge workers such as managers and technicians have preferences for the amenities of large cities (Perkins, et al, 2001).

For example, in an agglomerated region, costs of production are lower in the agglomerated region relative to other regions, because producers in the more agglomerated region do not have to pay for the additional transportation and shipping costs as well as delays. Also, if the supply of workers in the agglomerated region is high due to educational facilities, costs of production are decreased due to lower training and search costs.

Clustering for IT Advantage

The Information Technology sector is a rapidly expanding industry; however, South Georgia has lagged behind in this sector. Therefore, to create a structural change in the region's economy, the strategy is to build the School of IT to produce knowledge workers in a specific location (Bernat, 1999). Blair supports this idea; if a local industry has a substantial need for unique skill requirements, then sometimes it is feasible to develop a school or college major to produce knowledge workers. This type of training program would not only improve the quality and availability of labor but could also enhance the ability of workers to adapt to industrial change (Florida Cluster Metrics Task Force, 2000).

Rationality of Agglomeration Economies to Externalities

Agglomeration economies are dependent upon the existence of positive externalities among other things. The more positive externalities an activity has that could be internally extrapolated by other activities in the region, the stronger the agglomeration of the activities in that economy. In other words, the positive externality generating activity increases the utility of another activity. Agglomeration economies are an example of a positive externality of external economy where one activity confers the benefits of other activities.

An externality is defined as "a cost or benefit that the voluntary actions of one or more people impose or confer on a third party or parties without their consent." A positive externality is the benefit to one activity provided by another activity without consent. For example, if one firm is established in a specific location and another firm decides to locate in the same vicinity, the second firm does not have to incur the costs of roads, utilities, etc. The costs that the first firm had to incur to locate in the specific

location are the positive externalities that the second firm could take advantage of by locating in the specific location. In addition, if the two firms are alike industries, they may choose to share costs such as training, shipping, and other costs in order to reduce the cost of production. Since these industries can produce the same amount of output with less cost, then the industries acquire more profit (Cooter and Ulen, 1988). Other similar activities may then locate near the first two firms and take advantage of the positive externalities as well. This new set of firms is representative of an agglomeration economy. This example has explained how positive externalities can enhance and/or initiate agglomeration economies.

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THE DESEGREGATION OF LAW ENFORCEMENT IN A RURAL COMMUNITY: STATESBORO, GEORGIA

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ABSTRACT

This study will seek to show the extent to which the Civil Rights Movement had an impact on Statesboro, particularly in the area of law enforcement, as reflected in the Statesboro Police Department. It will also show the differences in the department over time. It is widely held that the police force is the backbone of the community and should represent the community as a whole. However, it is theorized that the Statesboro Police Department has not always represented the interests of the entire community. Through the use of oral history interviews, census data, and secondary sources, an examination of the history of law enforcement and the Civil Rights Movement in Statesboro was completed.

INTRODUCTION

As the new millennium unfolds the face of law enforcement officers may not represent the communities they are sworn to protect. In analyzing the small, rural community of Statesboro, Georgia, seeking to measure change was not an easy topic. The community had not experienced direct involvement by outside activists such as Dr. Martin Luther King Jr. However, the indirect influence of the movement perhaps inspired African Americans in Statesboro to seek change.

Within the most organized black community in 1803, those African Americans who were considered free were able to serve as members in the system of constabulary and as city guards in the city of New Orleans, Louisiana. Much later Savannah hired its first African American in the 1940s. Why was the community of Statesboro so behind in

"the times" of change and not appoint their first African American to a position of authority until 1966? That is what the study seeks to answer

Small Town Policing

When examining a police department, categorization of its size can be done in three ways. These three are: size, jurisdiction population, and the degree of social interaction with the officers and the community (Sims, 1988). When using the technique of purely size a department can be deemed small with numbers ranging from 15-75 officers (Sims, 1988). Within the rural police departments a certain bond develops, one that can be coined fraternal. This could possibly be why the departments of the South were not so apt to change the composition of their department, composition of not only race, but gender as well. This reluctance to change was evident in a report produced by the U.S. Civil Rights Commission. In this report it was found that the local law enforcement failed to provide equal protection under the law (1965). Whites in the communities with these rural departments were noted for being aggressive in keeping the African American community from gaining status, and those in the positions as law enforcement officers had the law on their sides to do it. The call for affirmative action in hiring practices and lawsuits brought against departments it helped to steer integration along quickly. Yet, the small town departments were still the slowest of the slow to change, but eventually change came painfully (Sims, 1988). When looking at the changes and how slow departments were to integrate nonwhites in law enforcement agencies, there are still some communities that remain relatively unchanged. The tradition of having an all white force has cost some communities the benefit of having a diverse police force. When examining further into the reasons why they still do not have minorities, and looking at the population that they serve, it does not necessarily mean that there is true discrimination, but rather a true representation of the community (Sims, 1988). Regardless of size and the traditions that the department may hold, a community's population should be represented in every part of the governing body of that community, in some way, shape or form.

Hiring Practices

Hiring practices of law enforcement agencies are looked at in several ways, and regardless of the times, have always been an issue. With the development of the first modern policing unit by Sir Robert Peel, hiring practices were an issue but never one of color. When the United States adopted the method introduced by Peel, it then developed into an issue of color, particularly in the Southern states where racial oppression was prevalent. In hiring individuals to become members of the police department, favoritism seemed to be the basis, rather than actual skill, although, who one knows can play a major role (Decker and Huckabee, 1999). Thus, the role played by favoritism was discussed with former Statesboro police officer Gary Lewis. He felt that he was hired because his family was well known and were prominent members of the African American community. When he went applied for the position he did so because he heard that there was a position available for "another African American on the force."

In reviewing an article that described modern systematic policing efforts in hiring from a pool of qualified applicants, it was found that the Statesboro Police Department at the time during the 1970's hired an African American that would "appease the Black community," rather than for his skill. Even now when looking at the hiring practices among the most modern and largest police departments, those that are most likely to finish in the successful pool of applicants were white females compared to black females (Decker and Huckabee, 1999). This holds true for Black males as well.

History of African American Police

The history of African American police is rich and detailed. That is why the Statesboro Police Department needed to be explored. During and shortly after Reconstruction in the South, there was a rise in the number of African Americans who held prominent positions in the South. This all changed following the disputed election of 1876 and the withdrawal of federal troops from the South. African Americans were systematically removed from their office holdings. This situation continued up until the 1940's in the Deep South (Georgia, Florida, South Carolina, Mississippi, Louisiana, and Alabama) (Dulaney 1996). Out of Deep South cities, the first one to use political power and voters' influence to gain several positions for African Americans in their police

department was Savannah, Georgia. This city was the first to appoint African Americans to the police force, despite many attempts by the citizens in Atlanta. This appointment took place in May 1947. When one looks at the research for Statesboro, a city only forty-five minutes from Savannah, that change did not take place until 1966. Although African American officers were hired in several Southern cities during the 1940's and 1950's, race continued to be a problem as indicated in what Dulaney refers to as being "Separate but Equal"(1996). Although these officers were on the force, they only had arresting power for black citizens, they met in separate substations, were put on black beats, and worked late into the morning. This was also the case in Statesboro as well. Nathan Tremble, the first African American police officer hired in Statesboro, endured some of these hardships until two years after his hire. There were many other problems the officers endured that were more intrinsic in value. In the book, *Black in Blue*, Alex Nicholas identified the problems that the officer's struggled with. Dilemmas of contradicting racial beliefs, and the ties they held with their jobs and those in their community (1969). The officers were hired and swore to uphold the laws and control social order. The civil rights movement presented this dilemma for them head on: being put at the forefront of their own kind to control demonstrations against racial injustice that held them in such oppression. The officers often wanted to be fighting with them instead of against them (Alex 1996).

METHODOLOGY

This study analyzed over time qualitatively the process by which the first African American was hired by the Statesboro Police Department. The area that was studied is a small rural community that shows sign of little signs of change. The study used the perspectives and voice of civil rights activists gained through oral interviews, as well as the perspective of the third African American hired to be instated as a law enforcement officer in Statesboro. Additionally, the study included the use of census data and secondary works such as journal articles and books on civil rights and law enforcement history, practices and policies.

Quantitatively, data on the present composition of the Statesboro Police Department was gathered, seeking to find out whether the department actually

represents the community. The population of Statesboro was also analyzed using the past five decades of census reporting.

Mainly, due to the limited information on the history of civil rights in this rural Southern community, and the changes that Statesboro went through during the 1960's and 1970's, the gathering of information was very limited. The local newspaper, The Statesboro Herald, was not very helpful. It tended not to cover the programs of African Americans or lack there-of in Statesboro.

This researcher encountered trouble in obtaining public documents from city hall that was needed for this project. There was not a warm reception when looking for this information; reasoning may be due to not wanting to bring out old skeletons. However, the department's July organization chart was obtained by an unidentifiable source.

RESULTS

From the well-known African American areas of Statesboro, Jones Street, Blitch Street, Inman Street, and Gordon, the lives of many were pressed for change. The Civil Rights Movement in Statesboro was not as noticeable as those going on around the country and also occurred at a later date. Yet the movement came at a time that the black community was ready for. The NAACP came to Statesboro more than once and was quietly suppressed the first time around. The second time came in 1965, when the NAACP Charter was accepted and a willing president was found, under the leadership of the Rev. Patrick Jones. The first meeting of the NAACP was held in Brannen Chapel United Methodist Church. Other churches were reluctant to become involved with the NAACP, fearing white retaliation against their churches. They formed a coalition of five men and began to demand change. Their first priority was to demand the integration of local businesses. They went to each business and kindly asked them to allow African Americans to eat or shop in their establishments. Most businesses thought that it would be a simple solution to a problem that would not necessarily have to get larger, replicating the incidents in larger cities. One local business did decide, however, that the change was not for them and they would continue to make African Americans come to the back door to purchase food; that business was Vandy's Barbeque. One of the repercussions of their decision was a sit-in of that establishment, which later resulted in a federal court case regarding their actions. In the end, and after monies were spent on

the local town lawyers, a decision was rendered that Vandy's could not legally keep African Americans out of their establishments. That led to a major loss of finances and the brothers split their restaurants, the old Vandy's changing its name to Boyd's, and the opening of a new Vandy's. The Vandy's known as Boyd's was eventually burned down by an unknown group of African Americans.

The next agenda that was put forth during this quiet struggle was to integrate local and state law enforcement agencies. The background for this new struggle came when the local sheriff shot an African American in Statesboro. The sheriff went to arrest this mentally ill woman and said that she was accidentally shot in the process. The sheriff was known in the African American community as violent, and possibly a cold-blooded murderer of others in the community (his name cannot be disclosed). The black community became outraged and began to protest with the assistance of the NAACP. The Reverend Patrick Jones was very adamant about this particular area of the struggle and vowed that he "would not purchase another driver's license until the state patrol and the police department were integrated".

The Rev. Jones could not formally bring the request to the mayor himself because they were not on the best of terms. So BJ Clifton and Grady Lovett took the request. The mayor, Bill Bowens, greeted the request at that time as a reasonable one, and they went out searching for the best candidate. So the group searched for a candidate and found Nathan Tremble. At first Nathan Tremble was not an acceptable candidate because he did not live within the city of Statesboro. But the men argued against the residency clause with the argument that a retired military police officer can serve his country abroad but cannot even serve in his own county. Following this argument the mayor agreed to bring the issue before the city council. When offered the position, Tremble gladly accepted an opportunity to serve his community. He was put on the force in 1966, the exact date unknown. At this time the police department did not require an officer to go to a training academy to be formally trained, which meant that he learned on the job. Former officer Gary Lewis was not under that system and attended a training academy in Atlanta in 1974. Although the request for an integrated force was answered, it did not come without the presence of racism. Nathan Tremble, regardless of his military police experience and actually being selected, was not allowed to drive the patrol car for the first two years. He was able to carry a weapon while on

duty. Because he was unable to arrest anyone without a car, any arrests he did want to make had to be called in. His patrol shift was called the black shift; he patrolled the streets between the hours of 12am-8pm, and walked through the city doing door checks and making sure that there were no suspicious activities going on. This job gave him the nickname in the community as the "door shaker." The businesses often put out merchandise and left doors unlocked to see if he would report it or steal it. Nathan Tremble reported the merchandise and the unlocked doors to his superiors immediately, and eventually the businesses grew to know that he was not interested in their merchandise. In April 1968, Dr. Martin Luther King Jr. was assassinated. The impact of his death brought tension to Statesboro and protests and marches began. As a result, Mr. Tremble was allowed to drive the police car. They allowed him to do so only because they thought that it would calm the community. From that point on he was allowed to drive the police car and make arrests on his shift. Although late in the game in comparison to other cities, the NAACP gained an appointment to the police force only one year after they were chartered in Bulloch County.

The next, and not the last, agenda for NAACP was to totally integrate the schools. A former twelve-year NAACP president, Athelia Lewis, was one of the organizers of the First 32. The First 32 was the name given to the Movement to begin a slow integration into two of the local Statesboro schools. Although they had 32 enrolled African-American children, in 1971 they wanted total integration. *Brown v Board of Education* (1954) overturned the *Plessy v Ferguson* (1896) decision of the Separate but Equal law. Now it was time for total integration. The NAACP fought and won the battle for school integration, but not without opposition. When opposition came, the African American community was ready for it. They decided to hurt the school system, by holding out 99.1 percent of their children, children that they needed to remain open in the county as a whole. It worked and the administration decided to come up to par and do as the federal government said, years after they said it. It was later discovered, through an interview, that the newspaper was not interested in reporting information on the civil rights struggle that was happening in their small town. The NAACP put out information in the community through a 15-minute radio show that Mrs. Lewis was the voice of, as well as Rev. Patrick Jones. The local television station also had its communication problems when it came to those in the African American community. It

was hard to get the news to report the changes that the community was dealing with. When the schools were being integrated and violence was a factor, independent news agencies were called in to report on the incidences; the most commonly called were the Augusta television stations.

The results that were found throughout the course of the study were eye opening and deserve much more research in the future studies of Statesboro and the upheaval of the oppression that the African-American community felt.

Discussion

The Statesboro community has come a long way, but still has a long way to go. When looking at the department now and trying to find whether or not it reflects the community, you find unsettling results. When looking at Tables 1 and 2 in the appendix, you see that there has been a large population growth in the community, and it will continue to grow. In 1960, there was an African American population of more than 30 percent, but there were no African American police officers. With the addition of Mr. Tremble in 1966, it still did not provide the accurate representation a community should have. When you look at the population now and the increase in the number of people in the community, there is still not an accurate representation. Not surprising is that out of 61 officers on the force, only 8 are African Americans. When counting the officers from the organization report, I used only those that actually did real police work, which excluded dispatch. This means that there is only a 13 percent representation of African Americans on the force, and there is a 28.8 percent representation of African Americans in the community. Although this research is on African American history, I will have to say that there is an influx of Latinos in the area and they are not represented, as well as women.

These findings suggest that the hiring policies of individuals within the department continue to raise questions and concerns regarding the diversity of the police department. As we enter into the 21st Century with such a diverse population, I feel that the African American community should be represented in every aspect of public life.

Appendix A

Interview Questions

1. What was the political climate in Statesboro through the civil rights movement, compared to that of per say Montgomery or Birmingham?
2. When did civil rights action come into effect in Statesboro?
3. How did the blacks in the community respond to the civil rights movement coming to Statesboro? Whites?
4. Did the civil rights movement in Statesboro have any effect on the Statesboro Police Department adding an African American to the force?
5. Was the push from members in the NAACP or community members trying to gain equality in the community?
6. What type of activities did those in the community do to add Mr. Tremble to the force?
7. Who actually got involved in getting him on the force?
8. How did the community feel about his addition to the force? Blacks and Whites?
9. What made him decide to attempt to become a member of the all white force?
10. What type of person was he?
11. What types of activities did he have to participate in to get on the force?
12. Did he apply or did members in the community choose him?
13. Why was it important for him to be on the force?
14. When was the exact date (if known) of his addition to the force?
15. Why did the newspaper not have any items listed on the civil rights movement in Statesboro community?
16. Who ran the newspaper?
17. What items if any were printed on the movement activities in the community?
18. What was the issue with the newspapers having limited information in them on the African Americans in the community?
19. Did the African Americans in the community have anything written for their own information?
20. How do you feel the community is in the stance of racial problems?
21. Do you feel that there are any problems within the department? Racial?

22. Do you feel that the department is an actual representation of the community?

Appendix B

Census Table

Table 1: The population of Statesboro, Georgia represented in a condensed data table.

Year	Total Population	Total Whites	Percentage	Total Blacks	Percentage
1960	14273	9216	64.5%	5049	35.3%
1970	21186	13133	61.9%	8031	37.9%

Appendix C

Census Table

Table 2: The population of Bulloch County represented in a condensed Census data table.

Year	Total Population	Total Whites	Percentage	Total Blacks	Percentage
1980	35785	26039	72.7%	9556	26.7%
1990	43125	31464	73%	11226	26%
2000	55983	38460	68.7%	16101	28.8%

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UNDERSTANDING THE RACIAL GAP IN HEALTHCARE: IN-DEPTH INTERVIEWS WITH AFRICAN-AMERICAN WOMEN

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ABSTRACT

Research indicates health disparities in ethnic and racial groups despite the overall improvement in health care. African-American communities generally lack the necessary knowledge and trust to receive adequate health care. The purpose of this study is to examine this perceived lack of knowledge and trust, especially to determine whether cultural barriers have an impact on health care information received. This research focuses on determining both vehicles of communication and language that can cross these cultural barriers. Interviews were conducted with African-American women who lived in a rural setting to investigate this topic further.

INTRODUCTION

We are living in a day and time in which everyone is concerned about his health and is looking for easier ways to shed a few pounds. Still, regional eating habits and lifestyles mean that additional health care issues-diabetes, high blood pressure, cancer-remain critical health issues. Although health care in the nation is on the rise, there are minorities who remain unaffected by this steady trend. There are concerns over disparities in health care received by racial and ethnic minorities.

Of the issues faced by racial and ethnic groups, African-Americans tend to be affected the hardest. Put on the 1998 agenda of President Clinton to figure out ways to decrease the gap in racial health care disparities, these groups of people are still receiving unequal treatment in a world of "liberty and justice for all," or are they?

According to the *National Center for Cultural Competence,* President Clinton chose six areas of health disparities to address: cancer, diabetes, heart disease,

HIV/AIDS, infant mortality, and child and adult immunizations (1998). A report by the *U. S. Department of Health and Human Services (2000)* states, "We feel ultimately, the entire minority health picture will improve if we narrow these six important gaps" (p.1).

The purpose of this study is to find out if there are racial gaps in this rural setting and what these gaps can be attributed to: cultural barriers, language, traditions, location, etc. With the knowledge of how these barriers can be crossed, the quality of health care among minorities can be raised, leading into future research, focusing on aspects of the African-American community that might not have been as obvious before this research was conducted.

Literature Review

According to Johnson-Wells, Randolph, and Ricketts III (1999), "There are serious differences between races in access and outcome measure, nationally, and there are even wider gaps when rural and urban comparisons are made at the regional level" (p. 20). Research shows that these differences in the health care received by minority patients focus on certain factors that affect non-Hispanic minorities more than whites. Many studies that focus on black minorities have been conducted to understand why there are differences and what changes can be made to improve issues facing African-Americans.

Researchers have examined health beliefs, lack of diversity, spirituality, racial matching, and rural areas as contributing factors to many of the health care based problems within the African-American community (Clark, 1994; Coffman, Grumbach, & Rosenoff, 2001; Howard, Konrad, Porter, & Stevens, 2001, Weitzel, Hudak, Becker, Waller, & Stuifbergern, 1994). The *National Center for Cultural Competence* suggests "disproportionate poverty, discrimination in the delivery of health services and the failure of health care organizations and programs to provide culturally competent health care to diverse racial, ethnic and cultural populations are all contributing factors".

Health care organizations are not completely to blame for the lack of adequate and equitable health care within many African-American communities. Coffman et al. (2001) suggest the gap in education received by African-Americans plays an important part in the lack of diversity within the medical field itself. Studies show that minority providers tend to serve minority patients, suggesting that more minorities are needed

within the medical field to help the problem of minority health care. Howard et al. (2001) studied the effects of health care with black and white patients with both black and white physicians. This study concluded that African-Americans would actually report taking their medication prescribed by their physician of the same race more than African-American patients with white physicians, therefore reporting fewer heart problems.

> "It is important, nonetheless, to comment on the findings that African-American elders with African-American physicians were least likely to be very satisfied with their care and that patients overall of African-American physicians are less satisfied with care" (Howard, 2001, p. 93).

One explanation for this truth could be that African-Americans are more comfortable with physicians of the same race, but still perceive white physicians as better doctors primarily because medicine is a practice that was at one time legally performed by only white doctors, suggesting that:

> "Like researchers, practitioners should also be cognizant of the effects of potential differences in health beliefs and behaviors among minorities. Sensitivity to these differences and the design of nursing approaches that are appropriately responsive could positively affect the health of clients from ethnic minority backgrounds" (Weitzel et al., 1994, p. 34).

It is not believed that race, beliefs, education or behaviors are the only factors. Hayward, Miles, Crimmins, & Yang (2000) suggest that the life cycle of minorities plays a large part in the health of minorities, especially as they increase in age. Looking at the origin of the racial gap within middle-aged persons with chronic health, this study found that many blacks are in poorer health than whites due to socioeconomic factors. Researchers suggest environment and achievements throughout the lifetime are reasons why blacks have more health problems by the time they reach middle age. They propose a study looking at the health and achievements of blacks and whites over childhood and adolescence to see where changes in health care begin. As a result, one could know which segment of the African-American community to target, so that the racial gaps in health care can be closed earlier and more effectively--before African-Americans reach the stage of diabetes, heart attacks, breast cancer and numerous other diseases causing pre-mature death in blacks.

Targeting African-Americans was the focus of a study conducted by Sylvester (1997). In this study, hypotheses were put forth targeting the way that African-Americans receive information concerning health care along with their attitudes versus those of Caucasian descent and their primary media. Also taken into consideration was the economic bracket to see if this played a part in the health care they received along with the media through which they received information. The researcher concluded that there are attitudinal differences when it comes to health care based upon the beliefs of individual African-Americans along with their economic status.

Based upon the findings within this literature review, the following research questions were addressed in this study:

1. Are there really cultural barriers within health care communications for African-Americans in this area?
2. If so, what are they?
3. In which area is this perceived lack of knowledge mostly credited toward: tradition, language, place of residence, education, etc.?
4. In what ways can they be crossed (what are the most trusted sources of information; what kinds of information do members of this community perceive as available, and what kind of information do they initiate requests for versus receive)?

METHODOLOGY

Background interviews with two public relations professionals within the health care field, one African-American and one Caucasian, were conducted to begin this research. The knowledge obtained from them concerned appropriate questions that could be addressed during the in-depth interviews within the community along with their perspectives of cultural barriers amongst the African-American community.

Focusing this research on the existence or non-existence of cultural barriers, the form of in-depth interviews chosen for this research was ethnographic. Marshall and Rossman (1995) state:

> The value of the ethnographic interview lies in its focus on culture through a firsthand encounter and the participant's perspective. Ethnographic questions

are used to gather...cultural data...and is especially useful for eliciting participant meaning for events and behaviors" (pp. 81-82).

The question design for the in-depth interviews consisted of interview schedules that "elicit open-ended responses and uniformity of question wording" (Lindlof, 1995, p. 185). Questions for the interview were based upon the literature review and suggestions from background interviews. With this type of question design, according to Lindlof, "freedom exists for the interviewer to employ optional questions [and] pass on others.... Especially when it comes to interviewing informants, whose experiences can vary..."(p. 185).

A local church minister referred three participants selected for this interview, and three other participants were recruited from a food program that the author coordinates. The request of African-American women whom they deemed willing to talk about the subject of health care was the only information given to the pastor. This research focused on in-depth interviews with African-American women because by history and nature women are considered the primary caretakers. Of the women participants, four were from the local community and two from surrounding counties. They ranged in age 22 to 55 years old. All had received medical care at least within the last year. Of these interviews, four were conducted face-to-face with two declining to be taped, while the last two interviews were conducted on the phone due to personal reasons of the interviewees. Detailed notes were taken during all of the interviews. Initial questions for the in-depth interview were slightly adjusted after a trial interview was conducted with an African-American woman; the results of this interview were not incorporated but were used only to assess question worthiness and determine possible follow-up questions.

The questions asked during the interview focused on the primary way in which health care information is received, anything that might hinder the search for information, along with the interviewees' last experience receiving medical treatment and that site's location. The interviewees' opinions were also sought concerning how they felt race, age, gender, and their physicians' race affected their health care. (See the Appendix for exact questions and probes.)

Results

Focusing on the first and second research questions of whether there are really cultural barriers within health care communications for African-Americans in this area and what they are, results showed that any barriers found within the African-American community in this area are the result of the individual. During the in-depth interviews, all the women stated they were not afraid to ask questions or seek information concerning the reason as to why they visited the hospital or the doctor. Even so, two of the women preferred to have a doctor of their race, someone with whom they could identify. One indicated she was not exactly sure why and said, "I've never tried a white doctor before." Another interviewee stated, "There is consistency in the physician's race across the board--no favoritism, or at least none was shown."

The reason why many do not receive health care, or not very often, is because of cost and they would rather wait to see if they can take something before going to the doctor. On average, the women would wait about a week before they would decide to visit the doctor. During this time, the women stated they would seek advice from family, church [members], the Internet, magazines, the radio and pamphlets received from their jobs. One interviewee said,

> "We're an open target because we cannot get certain medicine unless we go to the doctor. It's like a scam. I have to pay $20 to see the doctor for him to give me one prescription that may cost $50-$60."

Once the information they were seeking was found, the women felt as if their age, race or gender did not affect the health care they received. One interviewee did suggest that weight plays a part in the health care she received. She elaborated by stressing that your weight normally determines your health and, therefore, can affect your health care.

If the women were stating that they were receiving the information they need, then where is the perceived lack of knowledge and in what area can it be credited: tradition, language, place of residence, education, etc.? The women did state that where they received health care depended on where their health plans were accepted. Waiting to see if they could take something or if the pain would subside by itself before going to the doctor also played a major part in this perceived lack of knowledge. "A lot of times, we're not necessarily comfortable with the physician," stated one participant. Another

interviewee stated, "I do not have health care because it costs too much," while three suggested that the health plans should come with a package to cover someone other than their spouse to help those family members who cannot afford health care so they may receive the proper treatment. It was also suggested that the health plan should include a routine physical every year along with coverage if you do go out of town. An interviewee was also concerned that "emphasis is on the younger generation and should be on the older generation where Medicare is being cut back."

Another interviewee felt as if there are "...too many choices about health care when it comes to your illness." This participant referred to a part of her health plan entitled nurse call. With nurse call, you are supposed to call a number given to you that entitles you to speak to a nurse and describe your problem before you go to the hospital. In the participants' opinions, most of them did not see the need for this part of their coverage even though the incentive of a $50 fee waiver is given on their hospital bill. To them, this waiver was not worth the trouble of having to call someone to be told if their condition was worth going to the hospital.

The notion of knowing when to visit the hospital or doctor all boiled down to education. Participants agreed that education played a part in their health care. They felt that not only knowing what to look for, but also knowing their body in general would minimize having to seek medical attention for every little ailment.

Referencing their last medical experience, all the interviewees from this rural area, with the exception of one, stated their experience was good regardless of physician's race. The one bad experience was credited to change of health plans accepted by her doctor along with the way he was now seeing patients. The other interviewees stated that even though their experiences were good, the doctors were in too much of a hurry. They needed to "show concern for people because if we are not happy with the service, we will switch," stated one interviewee. When treated elsewhere, one participant mentioned she had been treated in two cities close to here and the experiences were like night and day. This interviewee stated in the specialized center, her treatment was better and she was more at liberty to move around, but when admitted into a nearby hospital she was confined to her bed.

With the realization that any cultural barrier within this community comes from the individual, the question arises as to how these barriers can be crossed? What are

the most trusted sources of information; what kind of information do members of this community perceive as available, and what kind of information do they initiate requests for versus receive? Every woman stated in one way or another the need to look for information concerning high blood pressure, cancer (particularly breast), and STD's. Most indicated they wished they knew more ways to take care of themselves so they would not have to go to the doctor.

The most trusted sources for these women seem to be faith and family. Each woman stated a family member she would call to get the information she desired along with prayer, but when it came to family, there was no consistency in which member was called. Relatives such as a husband, daughter, mother, or friends who were in the health field were the responses given. Magazines, radio and pamphlets were also mentioned. Many of the women stated that they would begin to look or ask for information when they saw commercials on TV advertising pills to cure some type of disease. However, one interviewee stated, "If I'm not sick [then it is] out of sight, out of mind."

It is interesting to note that one interviewee stated her job sends her health pamphlets. She said she does actually look at the pamphlets when she is concerned about her health or the health of her family. She did not go into detail as to the types of pamphlets she receives.

Conclusion

As one interviewee stated, "Health care is what I make it" and it appears that these African-American women are making the most of it. As with any individual and anything, cost plays a large part in what one receives. These African-American women are taking advantage of the mediums available to them, especially family and friends, and are seeking ways to avoid the cost if possible. This research shows that barriers within the African-American community are based on the individual. It concurs with the findings of Sylvester (1997) that attitudinal differences are based upon the beliefs of individual African-Americans when it comes to health care.

One observation was the consistency of each interviewee to state that she would wait before visiting the doctor. Essentially, if there were a cultural barrier among this community, it would be the issue of time. Instead of seeking medical attention right away, the consensus reaction was to seek advice from relatives or friends who

were in the medical field. On average, the women waited about a week or until the condition worsened, when treatment was unavoidable.

Waiting to receive treatment causes a perceived lack of knowledge among this community. This is conclusive with Whisnant (1998), "People in rural counties are less likely to seek preventive health services or ask their doctors essential questions" (p. 22). Throughout each interview, two-way communication became evident as each individual stated she would seek out information pertaining to her concerns by going to relatives, friends, magazines, the Internet, or the radio first. One interviewee even stated that when she goes to the doctor she knows what is wrong and what she needs, but refuses to tell the doctor so that he will do his job. It appears as if the information about health care is getting into the African-American community, but through family and other mediums that are less expensive and possibly less accurate.

When looking at the main vehicles of communication for this community, family and friends should become the focus for those presenting information to the African-American community. These vehicles bring up the trust factor issue. This community trusts and respects members of their families. As a result, they will wait to see if the advice given to them by their family will help their situation before they seek medical attention. Many women acknowledge that they do not run to the doctor for every small ailment because the cost is so great.

Efforts should be continued in producing materials, but there might need to be a slight change in the way they are made available. Some suggestions would include having health fairs at churches as well as local job sites. Also identifying when one should go to the doctor in the pamphlets would save money for the patient and time for both the doctor and patient.

The Appendix

Interview Questions

1) **How do you get information concerning health care?**
   Probe: TV, doctors, relatives, church, magazines, friends, etc.
   Is there anything that keeps you from seeking information concerning health care? access to resources, language used, not sure what to ask, scared of what the doctor might think or say

2) **What type of health information are you most concerned about?**
   Probe: STD's, AIDS, breast cancer, etc.

3) **If you were sick whom would be the first person you would call upon?**
   Probe: At what stage do you determine to go to the doctor?

4) **When was the last time you received medical treatment? Could you tell me about your experience?**
   Probe: doctor vs. hospital

5) **Have you been treated in another town? Where? How did it compare to your hometown experience? (If never been treated in town then why?)**
   Probe: atmosphere, heard they were better, needed a specialist, health plan

6) **From your last experience, are there any questions that you would have asked or anything you wished you had been told?**

7) **Do you feel your age affects the health care you receive? Race? Gender?**
   Probe: higher cost for health insurance, lack of information, stereotyping through information received

8) **Do you perceive your education as playing a major part in the health care you receive?**

   Probe: annual visits, knowing questions to ask, things to look for

9) **If you could make changes in your health care what would it be?**

   Probe: cost, adequacy, physicians race, location of where health plan is accepted

10) **What do you think are the biggest health concerns for black women?**

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ENVIRONMENT RACISM AND SOUTH EAST GEORGIA; AN OVERVIEW

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ABSTRACT

This study will examine the nature and foundations of environmental racism as it appears in South Georgia. For many poor, minority and non-white communities throughout the south, living amidst toxic waste is reality. I will explore the nature of the power relationships involved in the locating of toxic waste in order to identify suspected incidents of racism. We will analyze data from various case studies and conduct interviews in order to discover if the disproportionate placement of toxic facilities is racially motivated such that it could truly be called "racism."

INTRODUCTION

Despite the fact that the United States represents only 4.6% of the total world population, we consume over 33% of the world's energy (IMF Report, 99). Countries of the Northern Hemisphere are consuming the world's energy at a rate which all leading scientists agree is unsustainable (Hayden, 99). We never stop to think that every cup, trash bag and rug we buy contributes to the world's environmental problems. For every article of consumption there exists a toxic by-product- from the dyes in our clothes, the plastics in our cups and garbage bags, to the chemicals in our foods. Each of these items leaves a toxic trail on the journey to consumers.

In the midst of species extinction, acid rain, wet land loss and global warming, ads beckon citizens to buy more, consume more, make more trash. The United States is responsible for more than 58% of the world's total carbon monoxide emissions which are the result of the massive consumption of fossil fuels needed for our automobiles, expensive gas grills and the like (Szaz, 94). Uncontrolled consumerism lies at the root

of our environmental situation. The truth is, Americans have been transformed into consumer specialists.

Citizens of the United States are working harder and longer in order to get more, yet they remain unsatisfied (Schor, 00). For many, buying has become a recreation in itself, a way to escape from their hurried pace of life. Americans are the most wasteful people on the earth, and there are substantial studies to justify this fact. Many Americans fill their gluttonous eyes with their "what I want when I grow up wish lists," as children across town in inner cities suffer from emphysema, malnutrition, and asthma. For example, when African American children are compared to their white counterparts, they are two to three times more likely to suffer from lead poisoning. This way of life does not come without a price and solutions are a world away. The Northern Hemisphere will put out more atmospheric emissions, engage in more environmentally damaging forms of tourism and produce more garbage than technology can keep up with (Hayden, 99).

The most recent calls to create a global environmentally sustainable world is for the developing countries to reduce their populations (IMF Report, 99). Those in developed countries responsible for producing much of the world's pollution, are now calling for citizens to be environmentally-minded. Many developing nations are pursuing the paths that led the powerful countries of the Northern Hemisphere to their privileged global position. (IMF Report, 99). Furthermore, the call for population reduction is, prima facie, hypocritical, especially in light of the fact that one citizen in the United States can be more of an ecological strain than fifty in some parts of Africa (Westra, 96).

Some scholars argue that the more earth-friendly a corporation is, the greater its market value will be (Bhat, 96). In other words, earth-friendly corporations will increase their bottom line. This would seem to be a great incentive for companies to "go green," but it does not appear that way. It is simpler, and initially cheaper, for corporations to dump their trash in urban and low income communities than to invest in research and development to find cleaner, more earth safe ways to produce.

A few scholars propose that economic growth and environmental care are compatible. Such a notion has been termed sustainable development (Weaver, 97). As corporations scurry to meet investor demands, they create more consumer products to

boost corporate profits. Because we live in a country whose economy's life source is consumer spending, toxic waste is the natural by-product. For many citizens of the United States of America, to live is to pollute. This waste must be stored somewhere and its home is often made in the communities of minority citizens which has led to the coining of the term environmental racism.

REVIEW OF LITERATURE

Environmental racism refers to any policy, practice or directive that differentially affects or disadvantages, whether intended or unintended, individuals, groups, or communities based on race or color (Bullard, 00). When analyzing environmental racism, one must ask about the possible ethical justifications of such a practice. What reasoning permits such a debilitating practice to persist in our democracy? How can it be claimed that race is the overriding factor in deciding where toxic waste sites are located? In analyzing these questions, we get to see the underside of the environmental justice movement and understand its concerns.

One of the tenets of the environmental justice movement is that race is the overriding factor in the unequal distribution of toxic waste (Wenz, 95). Many scholars argue that even if the placements of hazardous wastes are determined more by income than race, the practice is still unethical. There are several popular rationalizations for locating toxic waste in poorer communities.

Defenders of siting practices which disproportionately affect African-Americans and other minorities argue that such practices are justifiable on economic grounds. Usually these defenders ascribe to what is known as the Doctrine of Double Effect. This principle explains that a secondary result, a result which is only incidental, is blameless when incidentally and even predictably bound with any primary result, the main or intended result, whose production is morally justifiable (Wenz, 95). In other words, there is one action with two effects. One effect is morally reprehensible. The other is acceptable. Why? Because it is widely held to be morally justifiable. When the first is predictably linked with a second, incidental effect, the latter also becomes morally justifiable. For example, in a justified war, the loss of non-combatant life in an air strike is acceptable if the non-combatants live near a military supply station. In this

case, the death of the non-combatants is the secondary and unintentional result, while the bombing of the military installation is the primary result.

In arguing this way, proponents of these types of practices claim that income and not race is the overriding factor in the siting of toxic waste sites (Wenz, 95). But neither race nor income are ethical reasons for disproportionately locating toxic facilities in minority communities. The problem with the Doctrine of Double Effect is that it assumes that the first effect itself is morally justifiable. In the previous example, one must first question if the war itself is justified. If the war is justified, then so is the unintentional killing of innocent civilians. If the war is not justified, neither is the killing of innocent civilians.

Since siting of toxic waste facilities in neighborhoods lowers property values, it is argued that toxic waste should be placed in an area where property values are already low so that such an action will not dramatically affect those property values. This area just happens to be located in minority communities. Instead, a more just system needs to be devised whereby those who benefit the most from toxic waste would bear the burden for it. Those who make the trash should live with it.

Excessive consumerism in the United States is not enjoyed by all. Rather, the costs of consumerism are often passed on to other, more disadvantaged sectors of society. The toxic waste resulting from the manufacturing process must be stored somewhere, and minority and low income communities become the favorite target. Through unregulated zoning practices and political corruption, citizens of color are strapped with the result of bourgeoisie benefits (Bullard, 00). The questions central to the environmental justice struggles are, Who pays for current environmental policy? Who benefits from current environmental policy? Forcing non-white, low income citizen to bear the burden for benefits received by white middle and upper class citizens is little more than modern day slavery: Basic human rights of minority citizens are violated, they are robbed of their dignity, and the system of environmental racism is exploitive.

Environmental racism takes on a unique character in the South. Public officials in the South have prostituted its lands, lakes and streams for the sake of tax revenues, favors and economic growth. The poorest people in the South live in some of the most toxic areas of the nation (Novotny, 99). Due to the legacy of institutionalized slavery and Jim crow, non-white low income minorities become the explicit target of corporate

toxic dumping. Minority communities are over-represented as host sites for toxic dumps.

At the heart of the environmental justice movement is the premise that toxic waste is being forced upon low income and minority communities (Mitchell, 99). No one wants a toxic waste site in his "backyard," but given the nature of our economy it has to go somewhere. Toxic dumping has historically followed the path of least resistance (Bullard, 00). In their search for waste sites, corporations and public officials join together in locating an area in which the people are poor, uneducated or non-white. Public officials and corporations will unite to find the most politically disenfranchised community to host the toxic dump. This means that more often than not, minority communities become the target for such Locally Unwanted Land Uses (LULU's).

Mainstream environmentalist groups have often been guilty of contributing more to the problem of environmental racism than to its solution. By thinking of the environment as wilderness recreation areas and not where we live, work and play, they have moved the pollution problem to areas which are uninhabited by people who need jobs, services, decent housing and the like (Novotny, 99). Mainstream environmentalists are more interested in protecting recreational areas than the homes of the nation's poorest citizens (Bullard, 00). This type of mentality undergirds the notion that the home of minorities and the urban poor is the proper location for trash. Racism has a historical perspective to it. From the beginning of the American settlement of the "New World," a system was set in place to privilege whites (Feagin, 00). One must not forget that governments are set up by humans to serve human ends. For whites this system has generated a legion of benefits including greater resources, a wider range of choices, more power and self esteem (Feagin, 00). Whites in power will often take advantage of this system, viewing it as what is "normal" and "right." This translates to unjust treatment in policy decisions. Bill Lawson, a leading scholar in the study of environmental racism, argues that due to negative historical images of our cities and their inhabitants, policies are formed which adversely affect its poorest people (Lawson, 00). These categorizations of poor, urban minorities "justify" the placement of toxic waste in their communities. The reasoning is that since the cities are already "polluted," it is okay to pollute them even more (Lawson, 00). Due to the power and

pervasive influence of white privilege alone, race is the overriding factor in determining the location of toxic waste sites.

When minority populations in the United States are compared to their white counterparts, minorities seem to be disproportionately adversely affected by pollution. For example, even when income is kept constant, African American children are two to three times more likely to suffer from lead poisoning (Novotny, 98). Furthermore, more than 40% of the nation's total estimated landfill capacity is located in African American or Latino communities (Bullard, 00). Some scholars conclude from their studies that no relationship exists between the location of a toxic facility and the race or income of the host community (Mitchell, 99). These scholars are swimming upstream. A substantial number of studies indicate that race is a primary factor in determining the location of toxic facilities.

Eleven of the top twenty-five most polluted states are located in the South including Georgia, Tennessee, Alabama, Texas, South Carolina, Mississippi and Florida. This region is home to over half of the country's African American population (Bullard, 00). Growth was stimulated in the South in the 70's due to pleasant climate, weak labor unions and strong right to work politics, cheap labor and land, attractive geography, aggressive self-promotion and lax environmental regulations (Novotny, 99). Often industry was invited to the South with the promise of being able to exploit the region's resources without restraint: This became one of the key selling points for luring manufacturers (Cobb, 82). Savannah was one of the most aggressive pursuers of industry by pledging to have legislation passed which would prevent litigation against Union Camp (Cobb, 82). For this type of pandering the Savannah area paid a substantial price. By 1969, Union Camp was accountable for 80% of the total pollution in Savannah.

My Research

Although extensive research has been performed analyzing the nature of environmental racism in larger cities, not much of it has explored its nature in the rural areas of the South. We cannot assume that what has been found in some rural areas is what we will be observed in other similar circumstances. In my research I will explore the nature of environmental justice issues in South Georgia, attempting to discern

whether or not they fit into the patterns of environmental racism found across the country.

Savannah is one of the most polluted cities in the entire South, and it is the most polluted city south of Macon. Savannah is ranked 6th statewide in overall sources of pollution including Carbon Monoxide emissions, Nitrogen Oxides emissions, PM-10 emissions, Sulfur Dioxide emissions, and Volatile Organic Compound emissions (TRI, 99). Chatham county ranks in the top 10% as one of the dirtiest counties in the United States in terms of environmental pollution (TRI, 99). In a few areas of the city, 50% of children are way over the CDC standards for unacceptable lead-contamination (Novotny, 99). The city's economy shifted in the early 1900's from primarily shipping to paper and pulp wood mills and plants. Savannah's public officials heavily pursued industry in the early 1900's, promising property tax relief and protection from litigation (Novotny, 98).

Union camp, a paper mill, came to Savannah in 1935 and is the city's biggest polluter. Union Camp disperses 2,931,260 lbs. of toxic by-product annually, and its main emission is Acetaldehyde, a highly toxic substance (TRI, 99). It is a recognized carcinogen and developmental toxicant and a suspected kidney toxicant, neurotoxicant, respitory toxicant, and skin or sense organ toxicant (TRI, 99). It is more hazardous than most chemicals in six out of 12 ranking systems (TRI, 99). Acetaldehyde is known to be one of the most hazardous compounds (worst 10%) to ecosystems and human health and can be found in Industrial particle board (furniture, fixtures, cabinets, etc.), scatter rugs, bath-mats, bath sets and the like (TRI 99). Chatham county ranks tenth in the entire nation in terms of Acetaldehyde emissions at 212,965 lbs. per year (TRI, 99). From 1988 to 1998, Union camp total cancer risk scores have increased 754% (TRI, 99).

Hudson Hill, a predominantly African American community, stands 50 feet outside of the front gate of Union Camp. Of Savannah's 75,072 residents, 1,083 live in Hudson Hill on West Lathrop Street; the community is 97.5% African American (Census, 00). While there is little information on Hudson Hill, preliminary indicators suggest that the community was founded after the arrival of Union Camp for workers. The question that must be asked is What role did race play in the establishment of this neighborhood from its conception? In order to address these questions and other issues, the independent group named Citizens for Environmental Justice was started.

On the heels of a tritium leak in 1991 and through the concerted efforts of Rev. Vernell Cutter and Dr. Mildred McClain, Citizens for Environmental Justice became a major center of mobilization of community efforts. Dr. McClain, the Executive Director, received a B.A. from the University of Massachusetts, an M.A. from Antioch Graduate School of Education Administration and an Ed.D. from Harvard Graduate School of Education. Dr. McClain is widely regarded as a leader in the environmental justice field and is heavily sought after worldwide to present at conferences and to sit on councils.

The Citizens for Environmental Justice action group organizes communities to barter with polluting facilities in order to get them to clean up contaminated sites. Furthermore the group demands heath studies which will accurately measure the extent to which host community members' health have been adversely affected. The object of the strategy employed by the Citizens for Environmental Justice is to ensure community involvement. The Citizens for Environmental Justice have helped develop a network of grassroots organizations throughout Georgia and South Carolina and they have done several workshops, collaborating with the DOE, EPA and the CDC- Radiation Branch, among others Their primary purpose is the increase awareness among citizens, cooperation between other grassroots organizations and participation in environmental justice issues.

METHODS

First, I identified the ten most polluted counties in South Georgia in order to come closer to an area where unequal distribution of burdens might occur. The emission categories used to determine county rankings are: Carbon Monoxide, Sulfur Dioxide, Volatile Organic Compound, and a toxic substance referred to as PM- 10.

After I identify the home of major sources of pollution in South Georgia, I will ascertain the identity of corporate polluters. I intend to catalogue the kinds of waste they produce in order to determine the harm their waste poses. Then I want to learn where and how they dispose of their waste. This will help me to determine if the waste is purposefully being placed in minority and low income communities. Then I will determine if the placement of toxic sites in Savannah fits into patterns of Environmental racism found across the country. In other words, are minorities carrying a disproportionate share of consumer burdens for other's benefit?

Next, I intend to interview a representative number of citizens from the Hudson Hill community of Savannah. I will conduct a survey using a random sample of household heads, and supplement it with interviews from local community leaders. The data will give us insight into how these African-American residents view local disputes and actions concerning a toxic waste facility in their community. I intend to ask them several questions related to their environmental situation. Such as their education level, where they work, if they had any input with the plant being located across the river from them, whether or not they had full and informed consent, if they have had any toxic waste related illnesses, and if there has been any community compensation for toxic wastes.

An on-site interview has already been conducted with the Citizens for Environmental Justice group of Savannah. The purpose of this interview was to get an overview of the environmental justice situation in Savannah. Next, I will review a report done on Hudson Hill community by the Reverend Vernell Cutter to interpret the data to determine the extent of the possible dangers facing Hudson Hill.

Research Questions

My questions focus on environmental racism as a theoretical and practical issue. First, one must ask, What is environmental racism? How does it come about? How can it be claimed that race is the overriding factor in deciding where toxic waste sites are located?

Second, I am inquiring about the nature of environmental racism as it appears in South Georgia. Are the power relationships the same as in inner cities, or are they different? What are the environmental concerns of minorities in South Georgia- animal waste, toxic waste, lead, or emissions? What are the major sources of pollution in these towns? Do we find LULU's in highly populated minority communities or do we find something different? Is environmental racism present South Georgia? Is housing discrimination an issue? What about zoning practices? Does the fact that there is more open land in south Georgia make its situation different from cities? Are whites just as likely to be subject to environmental hazards as non-whites in South Georgia? What are the differences between environmental hazards facing whites and non-whites? I will explore the nature of the interaction between communities and corporations.

Preliminary Results

The picture of environmental racism in South Georgia is different from what we find in inner cities. Citizens of color in South Georgia cannot avail themselves of an empathetic political infrastructure as their urban counterparts, and their complaints are regularly never fielded by anyone who shares their interests. Cities are filled with numerous non profit and advocacy groups to help fight injustices of various kinds. In the rural areas of the South, citizens are left to the "good ole boy" system which hides pertinent information. Generally speaking, non-white, or low income citizens in South Georgia are not as educated or affluent as minorities in cities and do not have the political clout to make a difference. This lack of education may translate into a lack of concern, leaving the community open to environmental injustices and difficult to mobilize. The legacy and impact of blatant racism, institutional and otherwise, is a part of life. After centuries of open and institutionalized racial abuse, many nonwhites accept it as the norm of southern life.

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ORDERED ANALYSIS OF GRADE DISTRIBUTIONS DATA

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ABSTRACT

In this note, the issue of ordinal association and modeling of categorical data from Pre-Calculus and College Algebra courses at Georgia Southern University for the fall and spring semesters of 1999 and 2000 is addressed. A distribution of grades for each subject was collected over a period of four semesters. In addition to descriptive statistical analysis, tests for ordinal association and goodness of fit were conducted. The proportional odds model was fitted to the data.

INTRODUCTION

According to a recent article by Stratton from Georgia State University, the retention rates in college algebra courses are high.

As with many first year university courses, college algebra has a very high withdrawal and failure rate. It has been reported (Stone, 1995) that failure and withdrawal rates sometimes reach as high as 50%. The retention rate of an institution can be seriously affected when students who meet these freshman level courses head-on fail or withdraw. Traditionally, academicians thought of these first year courses as weeding-out courses, but with reemphasis on retention and equal access to education, postsecondary institutions are rethinking this attitude. (See References)

Many students are more concerned about the grade received rather than fears of taking the course. In this study, we want to determine if there exists an advantage of taking college algebra each semester or if an alternative class is more appropriate.

Source of Data

Recent grade distributions of MATH 1111 (College Algebra) and MATH 1113 (Pre-Calculus) were collected over a period of four semesters (two years). Summer grade distributions were excluded from this case. The source of data was provided by, Dr. Donald Fausett, Chair of the Department of Mathematics & Computer Science. The data was categorized according to grade and semester. Below is the following data:

Table 1: Grade Distributions

S 99'	A	B	C	D	F	I	W	WF	Total
Math 1111	123	180	282	131	245	4	396	7	1368
Math 1113	52	97	99	55	74	2	93	3	475
F 99'									
Math 1111	228	441	546	284	500	7	390	6	2402
Math 1113	48	93	96	89	128	1	120	1	576
S 00'									
Math 1111	109	209	292	209	251	5	309	6	1390
Math 1113	59	99	133	71	104	1	104	3	571
F 00'									
Math 1111	283	416	498	234	407	4	403	4	2249
Math 1113	77	98	117	75	122	0	163	0	652

Categories A through F represent the number of students receiving the appropriate grade for that course. Category I means that the student has not completed all for the necessary requirements to complete the taken course due to an emergency. Category W means that a student has followed the correct procedures in withdrawing from a course and has withdrawn for that semester. Category WF means one of the following cases: (1) the student has exceeded the maximum number of absences allowed for the course and has failed, or (2) the student did not follow the correct procedures in withdrawing from the course. In this instance, the student received a grade of F. Because categories I, W, and WF similarly mean that the student did not complete the course, I condensed the chart to combine these categories into a G* column. Below is the condensed version:

Table 2: Condensed Grade Distributions

S 99'	A	B	C	D	F	G*	Total
Math 1111	123	180	282	131	245	407	1368
Math 1113	52	97	99	55	74	98	475
F 99'							
Math 1111	228	441	546	284	500	403	2402
Math 1113	48	93	96	89	128	122	576
S 00'							
Math 1111	109	209	292	209	251	320	1390
Math 1113	59	99	133	71	104	108	571
F 00'							
Math 1111	283	416	498	234	407	411	2249
Math 1113	77	98	117	75	122	163	652

DATA ANALYSIS

As an icebreaker in the research, we present some descriptive statistical values. Table 3 below shows the sample proportions by subject and semester. We also abbreviate the college algebra and pre-calculus courses as M1111 and M1113 respectively.

Table 3: Proportions of Grades Distributed By Semester

	A	B	C	D	F	I	W	WF	Total
M1111 S99	.0899	.1316	.2061	.0958	.1791	.0029	.2895	.0051	1
M1113 S99	.1095	.2042	.2084	.1158	.1558	.0042	.1958	.0063	1
M1111 F99	.0949	.1836	.2273	.1182	.2082	.0029	.1624	.0025	1
M1113 F99	.0833	.1615	.1667	.1545	.2222	.0017	.2083	.0017	1
M1111 S00	.0784	.1504	.2101	.1504	.1806	.0036	.2223	.0043	1
M1113 S00	.0981	.1734	.2329	.1243	.1821	.0018	.1821	.0053	1
M1111 F00	.1258	.1850	.2214	.1040	.1810	.0018	.1792	.0018	1
M1113 F00	.1181	.1503	.1794	.1150	.1871	0	.2500	0	1

According to Table 3, for example, 8.99% of students who took college algebra received a grade of A in Spring 1999. Accompanying Table 3 is a bar graph (Graph 1) of these proportions.

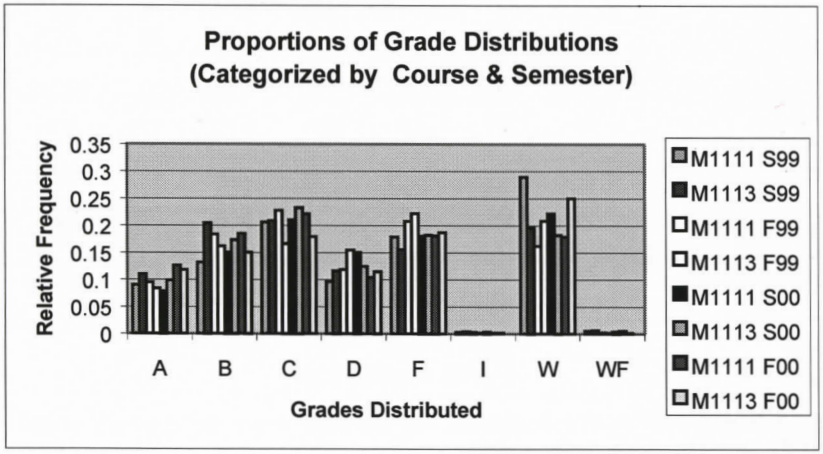

Figure 1. Proportions of Grade Distributions

After observing these descriptive statistics, I wanted to determine if there was a significant association between the course taken and the grade outcome (test of independence). The use of the chi-square test of independence takes no account on the natural ordering. Since the grades A,B,C,D, and F are naturally ordered, other procedures with a higher degree of significance should be used to detect such a trend. In this case, the best option was to use the *2 x k* Test of Association.

In order to conduct such a test, an appropriate hypothesis was created. In this case,

Ho: There is no association between the course taken and the grade outcome.

Ha: There is an association between the course taken and the grade outcome.

The number of concordant and discordant pairs were calculated, and a test statistic, S, that is the difference in the concordant and discordant pairs was calculated as well. Given the following chart that displays the data's arrangement, the number of concordant and discordant pairs is calculated by the following formula:

Table 4: Data Arrangement

	Column Level					
Row	1	2	...	...	k	Total
1	a_1	a_2	...	...	a_k	A
2	b_1	b_2	...	...	b_k	B
Total	n_1	n_2	...	...	n_k	N

Formula 1

$$C = a_1(b_2 + ... + b_k) + a_2(b_3 + ... + b_k) + ... + a_{k-1}b_k$$
$$D = b_1(a_2 + ... + a_k) + b_2(a_3 + ... + a_k) + ... + b_{k-1}a_k$$

Using Spring 99 (Table 2), for example, the number of concordant and discordant pairs values are *C=221265* and *D=311540*.

$$C = 123(97 + ... + 98) + 180(99 + ... + 98) + ... + 245(98)$$
$$= 221265$$
$$D = 52(180 + ... + 407) + 97(282 + ... + 407) + ... + 74(407)$$
$$= 311540$$

The S statistic, which is the difference of these values, is S= ***-90275***. The next thing is to normalize the test statistic. The mean under the null hypothesis is zero. This is because if we assume that there is no association, then the number of concordances and discordances are tied. Their difference would equal zero. However, the standard deviation must be calculated by

$$\mu_S = 0$$
$$\sigma_S = \sqrt{\frac{AB}{3N(N-1)}\left[N^3 - n_1^3 - n_2^3 - ... - n_k^3\right]}$$
$$\sigma_S = \sqrt{\frac{649800}{10184418}\left[6010420218\right]} = 19582.77$$

where A and B are the marginal totals respectively. So, according to the example, the standard deviation in the difference of the number of concordant and discordant pairs is 19582.77. With a test statistic, mean and standard deviation, the value, S, can be normalized using the Z-score formula.

$$Z = \frac{S - \mu_S}{\sigma_S}$$

$$Z = \frac{-90275 - 0}{19582.77}$$

$$Z = -4.61$$

In the example, a high Z value (p=.000002) was calculated and concluded that there is an association in the course taken and the grade received. For all four semesters, a Z score value was calculated. We conclude that at the five percent level of significance there is some association between the course taken and the grade received.

Table 5: Concordance/Discordance Test of Association

All Four Semesters

	C	D	S			Assoc?
Sp 99	221265	311540	-90275	19582.77	4.61	Yes
Fl 99	660993	544424	149569	37289.19	4.01	Yes
Sp 00	297131	355425	-58294	22393.79	2.60	Yes
Fl 00	673468	537858	135610	37054.42	3.66	Yes

Next, I wanted to determine if the proportional odds model was the fit for this data. Let ***x*** be a dummy variable for the subject and ***u*** the grade, where ***x=1*** for M1111 (College Algebra) and ***x=0*** (Pre-Calculus). Let the cumulative probabilities be ***P (Y ≤ j)*** and

$$\text{logit}[P(Y \le j)] = \log\left[\frac{p_1 + p_2 + p_3}{p_4 + p_5 + p_6 + p_7 + p_8}\right] \quad (2).$$

The proportional odds model can be mapped linearly by

$$\text{logit}\left[P(Y \le j)\right] = \alpha j + \beta x \quad (3), \text{ where } \mathbf{j=1, 2, \ldots, k-1}.$$ For each

semester, SAS calculated the intercept (alpha) and beta parameters as the following:

Table 6: Proportional Odds Models

All Four Semester

	α_j	β	Equation
Spring 1999	.1239	-.4302	.1239-.4302x
Fall 1999	-.2746	.3275	-.2746-.3275x
Spring 2000	-.00799	-.2265	-.00799-.2265x
Fall 2000	-.1761	.2931	-.1761+.2931x

After creating these models, we now test them to see if they are applicable to the semester data. To test the claim, we start with the hypothesis:

Ho: Proportional odds model is applicable.

Ha: Proportional odds model is not applicable.

Looking at the Fall 2000 semester, for example, we use the Chi-Square goodness of fit test statistic. From the SAS output, χ^2=6.9637 under six degrees of freedom *(p=.3242)*. We fail to reject the null hypothesis and conclude that the proportional odds model would be applicable. For all four semesters, the Chi-Square test statistics and conclusions are presented:

Table 7: Chi-Square Fit Test

All Four Semesters

	χ^2	df	p-value	Applicable?
Spring 1999	6.9637	6	.3242	Yes
Fall 1999	10.0844	6	.1211	Yes
Spring 2000	3.3599	6	.7625	Yes
Fall 2000	691.2191	6	<.0001	No

To test the hypothesis Ho:β=0 for all four semesters, we incorporated Wald's test statistic that is approximately a Chi-Square test statistic with one degree of freedom. Viewing the Spring 1999 data, for example, Wald's test statistic was calculated as the following (8):

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	13.7061	1	0.0002
Score	13.3940	1	0.0003
Wald	13.9304	1	0.0002

In conclusion, there is strong evidence between the course taken and the grade given.

I wanted to identify the degree of outcome for the course taken. In other words, is poor grade outcome more likely for college algebra or pre-calculus? We also wanted to determine which course had a greater chance of being passed with a grade of

C or higher by an incoming freshman. The odds ratio was used to answer this question for each of the four semesters. With data ordered in the format of Table 4, the odds ratio utilizes cumulative probabilities and their compliments (4).

$$\theta = \frac{\dfrac{P(Y \le j \mid X = x_1)}{P(Y > j \mid X = x_1)}}{\dfrac{P(Y \le j \mid X = x_0)}{P(Y > j \mid X = x_0)}}$$

Four our data, the odds ratio is simplified to

$$\theta = \frac{\dfrac{P(Y \le C \mid X = x_1)}{P(Y > C \mid X = x_1)}}{\dfrac{P(Y \le C \mid X = x_0)}{P(Y > C \mid X = x_0)}} \qquad (5).$$

SAS was programmed to calculate the odds ratios and 95% odds ratio confidence intervals for each semester. However, we look closely at the odds ratio and confidence interval for Fall 2000 semester (9):

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
course	1.341	1.149	1.564

Specifically, a good interpretation of the odds ratio is that a freshman is 1.341 times more likely to pass college algebra rather than pre-calculus with a grade of C or higher. The following 95% confidence interval confirms that college algebra has a higher chance of being passed because all parts of the interval are above the value one.

For all four semesters, the odds ratios and 95% confidence intervals were the following:

Table 11: Odds ratios & 95% Confidence Intervals
All Four Semesters

Semester	Odds Ratio	95% confidence interval
Spring 1999	.650 (1.538)	(0.541, 0.782)
Fall 1999	1.387	(1.182, 1.629)
Spring 2000	.797 (1.255)	(0.671, 0.947)
Fall 2000	1.341	(1.149, 1.564)

Odds ratios less than one mean that the chances of passing with a grade of C or higher were in favor for the pre-calculus course. The values in parenthesis represent the odds ratios in favor of pre-calculus. We conclude that a student is more likely to pass college algebra (MATH 1111) than pre-calculus with a grade of C or better when taken during the semesters. However, a student is more likely to pass pre-calculus with a grade of C or better during the spring semesters.

"QUE ESTA PASANDO AQUI?: A STUDY OF THE RECENT LATINO MIGRATION INTO THE DEEP SOUTH."

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ABSTRACT

Mexican migration into the United States has a long history, yet only recently have Latinos begun to settle in non-traditional places in the United States, like the Deep South. While research has been conducted on Latinos in traditional gateway states, such as California, Texas, Arizona, there has been little research on Latino migration to new destinations. This study seeks to examine the social, cultural, and economic effects of the new migration in one new destination area in South Georgia. Using historical and ethnographic data supplemented with personal interviews, the author analyzes the migration and settlement process from the vantage point of the Latino community. Two central questions guiding the study are 1) Why has the South (and/or Georgia) attracted such a large migration; and 2) What effects will this migration have on the receiving area? Preliminary results from the study support social capital theories emphasizing the importance of social networks and challenges neoclassic economic explanations. Growing Latino migration does not appear to exacerbate discrimination or tension between the White majority and the "Brown" minority. Further study is necessary to more clearly establish these trends.

INTRODUCTION

The migration of Latinos into the United States is a movement that has deep roots in American history. Throughout the centuries, and for a variety of reasons, Latinos have been immigrating into the United States. In fact, immigration is "the principal mechanism that has connected Mexico with the United States" (Donato p.52,

1999). Thus, contrary to popular belief, Latinos have been working in the U.S. for a long time, contributing substantially to the construction of the U.S. railroad system, the development of agriculture, manufacturing and the urban service economy (Roberts p.238, 1999).

Historically, migrants have crossed the border into and set up communities in the gateway states of California, Texas, and Arizona. These "pioneers" began to settle and eventually bring their families, or in some cases start one, mainly in the southwest region of the United States. As a result, research on Latino migration has typically emphasized this region and focused on topics ranging from the sending regions (Durand 2001, Roberts 1999) to the factors contributing to the decision to come to the United States (Donato 1999, Massey 1997) to problems in the receiving region of the southwest.

Despite burgeoning literature on migration, little or no research has been conducted on the "new" migration of Latinos, particularly Mexicans, in regions beyond the gateway states. What information we have "about the rise of atypical locations of Mexican labor and settlement has come from journalistic reports, which have noticed the growing presence of persons of Mexican origin in states like ...Georgia and Alabama, and in cities like New York, Atlanta, and Nashville" (Hernandez-Leon p.50, 2000). Questions regarding the South's newfound popularity among immigrants are not being addressed. As a result, we know little about the factors contributing to this new pattern, or the social, cultural, and economic effects in this region of the United States. This study addresses this gap and contributes to the literature on migration by focusing on the impact of Latino migration to the Deep South.

The Region

The location for this study is a county situated in South Georgia that prides itself as having, "something for everyone." The county is the third largest agricultural producer in Georgia, raising cotton, corn, soybean, and peanuts. Also, located throughout the county are numerous manufacturing plants that assemble a variety of products ranging from gasoline engines and valves to finished wood products. Among the many service facilities is one of the largest distribution centers in the world.

Together, these facilities have been responsible for creating over 2500 new jobs and generating over 300 million dollars in tax revenue for the city in the last few years.

As a result of these economic changes, the county is experiencing tremendous population growth due to migration, especially Latino migration. According to 2000 census statistics, the population in the state of Georgia was estimated at 8,186,453, of which Latinos represented 5.5% or 435,227 (other estimates place this number over 750,000). Although this number is small compared to the historical gateway states, this represents a 300% increase since 1990, and one of the largest increases in the U.S. (http://www.census.gov/Press-Release/www2001/tables/gs_tab_1.PDF). While much of this growth has been concentrated in the counties surrounding Atlanta, counties in South Georgia have also begun to experience a rapid influx of Spanish speaking migrants. The Latino population in this study's county, for instance, increased from 361 in 1990 to 1052 in 2000. Even though this is slightly more than 2% of the county's population, it represents a 300% increase, compared to an aggregate county population growth of 23% (http://www2.census.gov/census_2000/datasets/demographic_profile/Georgia/2hk13.pdf). Clearly, the demographic characteristics of the state and this county are changing, which raises questions about the underlying forces, the characteristics of the new population group and the local impact of the new group.

The main objective of this analysis is to address the following questions: What is the social impact of this movement? What are some of the demographic characteristics of the immigrants moving into this area? Where did they come from and how long have they been here? Have they experienced negative or positive reactions since their arrival? What is their perception of the area in which they live?

REVIEW OF LITERATURE

There is vast literature on the growth of Latino migration. Donato summarizes this literature as having "evolved from one that began largely as demand-pull recruitment into a more complex migration relationship in which supply-push and network factors play ever larger roles" (Donato p. 53, 1999).

One of the earliest attempts at explaining the migration into the United States is neoclassical economics. According to this model, prospective migrants base their move on "cost-benefit calculations" (Massey 1997). In other words, estimates are done on

what they will earn in the sending country, and then another estimate is done on what they will earn if they work in the U.S. Taken into consideration are other cost variables such as transportation, food and related expenses. If the cost of migration is acceptable relative to future earnings, the odds of migration are high.

The approach, however, has been criticized for ignoring crucial social and structural variables, including language barriers and imperfect knowledge (Hytrek 1990), which may explain why the data on Mexican migration fail to support the neoclassical model (see also Massey and Espinosa 1997). One alternative explanation, social capital theory, emphasizes social networks (Massey 1997, Wilson 1998). In this approach people tend to move into communities where they have ties with some of the residents. In the case of Mexican-U.S. migration, research suggests "Mexicans who are related to migrants are more likely to migrate themselves" (Donato 1999). The existence of social networks reduces the uncertainty of the migrating process, such as locating jobs and housing. Also, the information derived may help migrants along the journey at various points. For example, knowledge of soft spots along the border and safe routes can help make the trip less problematic and will help keep costs low.

According to Massey and Espinosa (1997, p.989) a related variable is human capital formation. For undocumented migrants, the most important element of human capital is migration experience itself (Massey and Espinosa 1997). As Donato (1999) argues, the longer one stays in the United States, the more knowledge he accumulate about housing, locating jobs, and in general about how things run in the United States. Using this human capital they are more likely to experience upward social mobility, or avoid deportation, for instance, by knowing what answers to give to any person of authority, from local police officials to airport officials. The importance of this lies in the danger of deportation that exists beyond the U.S. border. However, not all human capital is rewarded. If the experience is obtained while in Mexico, it will matter little, especially if the person is undocumented. In order for human capital to work in the United States, the person will have had to be a direct participant of the U.S. economy. Therefore it does not come into "play until that person migrates into the United States" (Massey p.948, 1997).

These brief summaries suggest two explanations for Latino migration. The first explanation derived from neoclassical economics posits that the wage gap differential is

the primary motivation for Latinos to migrate northward. The second explanation based on social and human capital emphasizes the emergence of social networks and experience gained through the process of migration. Both social and human capital explanations are used simultaneously to inform and educate immigrants on a variety of topics ranging from the laws of the land to places of employment.

This study addresses these theoretical and empirical issues by including an analysis of a new migration pattern, the Deep South, an area neglected in the literature. More research needs to be aimed at explaining how new destinations of migration occur in non-traditional receiving areas of the United States. Thus, this study will contribute to the literature in several ways: first, by expanding our understanding of the formation of new communities of destination; second, by examining post-1986 Immigration Reform Control Act (IRCA) patterns based on secondary moves of Latinos within the U.S.; and third, by identifying some of the characteristics of the emergent pattern in the Deep South.

METHODOLOGY

Data collection for this study relied on ethnographic fieldwork using a questionnaire completed during face-to-face interviews. The questionnaire asked a broad range of questions focusing on basic demographic information, to real or apparent discriminatory treatment, to perceptions of how Latinos are viewed in a region historically framed by a black-white racial cleavage. In order to insure anonymity, the questionnaire had no identifying marks, and the researcher took care to ensure the interviewees that no attempt was made to link responses with specific subjects.

Subjects were identified through a snowball sampling technique. For snowball sampling, a researcher first identifies one member of the population and uses that person to identify other potential subjects in a snowball fashion. The technique is often used in ethnographic research focused on hard-to-reach, or hard-to-identify, interconnected populations (Schutt 2001, p.134). Initial access to the population was facilitated by the fact that the researcher had worked within the Latino community and knows many of the subjects. Using the snowball technique, the researcher was able to complete 25 interviews that will serve as the basis for this paper. It should be noted

that this is a preliminary analysis of an in-progress study; thus, the results are necessarily preliminary as well.

Results

The data gathered supports aspects of the existing research. One surprising fact was the age of some immigrants. Of all the respondents, a little over a third of them were less than 22 years of age, suggesting that new immigrants to this region of the United States are younger than previous waves. Many of the people interviewed stated they came to the U.S. when they were as young as fourteen years of age.

Consistent with existing literature, the majority of respondents in this study were Mexican. In contrast, however, the sending region appears to differ from the primary pattern in the literature, and with the exception of one subject, all participants in the study indicated they were from the non-traditional sending regions of central to south central Mexico.

Household patterns among the respondents also varied. Some indicated that they were living with family members. Most however, live with friends that they either knew from the sending region or new ones they made after arrival. None of the respondents live by themselves; all live with other people to avoid the high cost of living. Again this is consistent with the social capital theories and the literature on urban survival strategies that include forming households with non-family members (See Roberts 1994).

A second important discovery is that a person's age tends to reflect his feelings towards the United States. Many of the older generation that came to the U.S. stated they do not like it here. Some claimed that they miss their families, while others said they could not get used to the culture. The earlier generation appears to have arrived because of necessity rather than choice. The majority came because their job required them to, which may explain their feelings toward the U.S. Many of the younger generation appear to have a different point of view, they like living in the United States. Many even stated that they do not want to go home, possibly reflecting the volunteer nature of the move or a greater awareness of the U.S. due to the globalization of U.S. culture. Nonetheless, even the recent arrivals are highly committed to the family. Many send money home on a weekly basis to help with their family's basic needs.

One challenge to the social capital theory came from responses to the question, "How important was it that you knew someone here before you moved?" Most indicated that this was not that important. However, when pressed further, respondents qualified this response. Many stated they learned about this region as a result of phone calls to other acquaintances, and other means of communication, supporting the social capital theory. Equally surprising was that many stated it was not difficult to move and adjust to their new destination. Some said they may not have liked it at first, but they quickly felt at ease with their new place, which may suggest the importance of social networks and acquisition of human capital. One of the major difficulties was the lack of communication skills needed to carry out day-to-day activities.

Responses to questions regarding employment status were often met with skepticism, most likely due to the legal status of many respondents. However, many reported to be working more than fifty hours a week. One even stated that they are being used more like a machine and less like a human when it comes to working in general. Still, few overtly complained about their circumstances.

Responses relating to previous human capital issues indicated that many had little formal education. However, many indicated that they would like to have access to some schooling, such as English, which would allow them to broaden their knowledge and increase their survival chances in the U.S.

Not surprising given the geographical location and the absence of an extended network within the Latino community, few knew the location of the nearest medical facility. Many respondents did not know the location of the nearest doctor or where to go in case medical help is needed. Some, upon hearing this question, stated that the nearest doctor known to them is the hospital, but when asked about its location, few gave the right answers. Many stated they have just heard of it but have never actually seen it! Another issue concerning health is many do not seek medical help because of financial reasons, while others have complained of being put aside in the doctor's office because of communication barriers. The latter caused feelings of frustration, and as a result many do not seek further medical treatment. The majority, however, stated they feel in excellent health and to their knowledge do not need any sort of medical assistance. The major medical need appears to be dental.

The most interesting information reflected the respondent's attitudes. Many feel that most people in the area consider Latinos to be hard workers that contribute to the economy in some way. When it comes to migrants taking employment opportunities away from others, they feel the jobs migrants do are those no one else wants; that they have been "handed the job because Americans won't do it," as one respondent suggested.

When it came to the questions regarding discrimination many migrants do not feel they have been discriminated against or that the community harbors unjust feelings towards them. While many people may give questioning looks at them upon entering a store, few respondents indicated that they encountered overt acts of discrimination. In fact, of those that answered this particular question, half stated that they have never experienced any type of discrimination. Some mentioned that when compared to other states where they have lived, such as California, Texas, and North Carolina, this region is more hospitable.

Discussion

Latino migration into the United States is a movement that has been ongoing for generations. Early patterns reflected movement from the Central and Northern regions of Mexico to the traditional states of the U.S. southwest. Only recently, however, has a new pattern emerged with migrants coming from the Central and Southern regions of Mexico and settling in non-traditional states in the Deep South. Many explanations have been used to account for this new phenomenon.

One prominent explanation comes from neoclassic economics. Simply stated, the wage differentials were thought to attract Latinos to move northward. However, this does not appear to be the case involving migration patterns of new destinations. During the interviews, no subject discussed wages as a primary motivating factor. Other reasons were offered, however, including the desire to be with family members.

By comparison, the data suggests support for social capital theory. Subjects did not come to this area because of higher wages. Most do not know where they are living by just looking at a map, let alone how much they are going to earn. Responses indicated that the majority of respondents moved to this new region because they got

word that someone is looking for people who are willing to work. Upon arrival many do not know they have taken part in this intricate social capital driven process.

Another example supporting social capital theory is that migrants do not show up at random places, but arrive at specific locations because they know someone that resides in the area. In past conversations, many stated that simply knowing some of the people living in the location played a major role in their decision to move to that location. This is especially true for those that already have some family living in the U.S. One of the main reasons they move with so much confidence is the realization that while it may be tough to get used to their new environment, they will have a support group to help them along. This is consistent with previous research about the use of networks in migration decisions (Donato 1999, Massey and Espinosa 1997, Wilson 1998).

Another possible variable underlying the new pattern is the threat Latinos feel as a result of such legislation as the 1986 IRCA and Proposition 187 in California. In the aftermath of this kind of legislation, many saw the United States as taking more drastic steps toward cracking down "on illegal immigration and that if they were to arrive in the U.S. they would have to migrate as soon as possible"(Massey p.963, 2000). So, many embarked on the journey to gain entry while they still could.

In the questionnaire many immigrants stated that they felt that there was more hospitality in this region than in other places where they have lived. This may be the result of legislation that was aimed at disrupting the patterns of migration. When IRCA was passed, it legalized many existing undocumented migrants and made it illegal for employers to hire undocumented workers. As a result, it saturated local job markets with people who had been recently legalized, forcing many to move to non-traditional regions for new opportunities, while at the same time causing hostility among employers and immigrants because these new laws made it more difficult to hire undocumented workers. Further research is necessary, however, to clearly establish this as a cause of the shifting pattern to the U.S. southeast.

In the new areas that immigrants are now residing, the story is different. Although more data needs to be collected, subjects perceive that employers in the region under study are less concerned with legislation. As a result, many feel more at

ease because they feel less threatened. While employers ask for documentation, uncertainty of what is needed may in fact make it easier for migrants to find work.

Conclusion

Earlier studies focusing on migration into the United States were based on neoclassic economics, emphasizing wage differentials as the cause for movement north from Mexico. In this study, however, the data do not support this connection. The result from this exploratory study supports social and human capital theories. Consistent with Massey and Espinosa (1997), migration into this region seems to be structured by existing social networks, trough which migrants locate opportunities for employment and places to live.

The study is suggestive of future areas of analysis to more fully understand the patterns identified in this study. First, future research should focus on the effects of globalization on the sending regions of Mexico and Central America. A second issue is whether the trend toward younger migrations is temporary or a more permanent development. One potentially fruitful strategy would be to use oral histories that will allow us to better understand the process, the construction of new ethnic communities and to trace the reasons why Latino migrants choose this region of the United States.

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WEAVING A FUTURE, BUILDING A DREAM: MODIFICATION IN TRADITIONAL HAND WEAVING AND DRY STONE WALL CONSTRUCTION OF GLEANNCHOLMCILLE, CO. DONEGAL

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ABSTRACT

During the last century, traditional folk-crafts in the regional parish of Gleanncholmcille, Co. Donegal, Ireland have changed. Two of the most traditional of these local skills, hand-weaving and dry stone wall construction, have under-gone some extreme modifications. This preliminary study examines the most recent modifications in these traditional crafts and looks at how internal and external factors have influenced these changes. Data collection methods employed in this research were participant observation, personal interviews, as well as historical and literary review. Research into these modifications will provide insight into some of the factors that influence change within a region's material culture, and how these changes are linked to the basic needs of the community.

INTRODUCTION

During the last century, traditional folk-crafts in the regional parish of Gleann Cholm Cille, County Donegal, Republic of Ireland have changed. Two of the most traditional of these local skills, hand weaving and dry stone wall construction, experienced extensive modification in a variety of areas. While alterations in the finished product provide the most obvious view of this change, they represent only a small portion of the total modification process. Changes in fabrication methods, creative design, and construction technologies all play major roles in remolding these crafts. Responding not only to the pressures of modernization, but also to a community eager to preserve its local heritage and stimulate its economic growth, these crafts were

revitalized and redefined in an attempt to incorporate them into the backbone of the community's economic base (McDyer, 93). Traditional crafts, once worked to suit the taste of a single individual, are now created for their marketability and visual appeal (Hoad, 79). Fence structures built to separate and enclose now serve as cultural links between generations. Weaving variations appear in production methods and in the acquisition of raw materials. Factories now supply the yarn used in local weaving. It once was homespun. Machine powered cutting tools and modern cements reshaped the traditional skills used in dry stone construction. Reworked and redefined, these vocations of the past now serve to preserve and revitalize the present (Cuinneagain, 4). The focus of this preliminary study is threefold: 1) to examine the changes that have taken place over the last century in the traditional folk-crafts of hand weaving and dry stone wall construction, 2) to explore the local factors associated with these changes and, 3)to examine some effects these modifications had on this rural community. Data for this study was gathered in Gleann Cholm Cille between June 22, 1999 and July 8, 2001.

Background Geography and History

The parish of Gleann Cholm Cille is a small rural farming community located in the southwest region of County Donegal, Republic of Ireland. A Gaeltacht region, Gaelic was spoken as a first language here until the mid 1900s. Set back into the mountainous landscape of Ireland's northwest coastline, Gleann Cholm Cille's landscape is a combination of some of Ireland's most rustic yet picturesque terrain (O'Cuinneagain, 1,3). A quote by a local priest found in Eugenia Shanklin's Ethnography, Donegal's Changing Traditions, illustrates this contrast well, " When God was creating the Earth, he had used up most of the fertile land by the time he got to Donegal.... So he compensated by giving us all the scenery he had left over; we got cliffs rising out of the sea, high mountains, waterfalls, and white beaches..."(3).

During the 17th and 18th centuries, the region's rugged topography combined with its limited accessibility isolated it from many outside influences experienced by other regions in Ireland. It was this isolation that allowed many of the area's local traditions and folk crafts to remain unaffected by the influence of the outside world. In

this setting, Irish culture and traditional life ways were preserved- held in a kind of trust for the future.

In the Gleann, fertile land has always been scarce (Shanklin, I, 7). The agricultural resources are limited. The high acid content of the soil combined with an unusually rainy climate makes the small farm holdings particularly difficult to farm (Gallagher, Prendiville and Robinson, 7). "As late as the1880s much of the Gleann's economy remained primitive" (Hoad, 3). Although farm rent was relatively low, "the only source of income, besides the produce of the farm, was the ninepence a day available to a man earned for working on the roads and the one penny a day available to a woman for embroidering" (Manning, 78). With rent to pay and employment opportunities almost non-existent, by the early 1900s emigration was common throughout the Gleann. By the mid-1950s, young people were leaving the area at an alarming rate (McDyer, 48).

In 1951, Father James McDyer came to the impoverished farming parish of Gleann Cholm Cille to serve as curate priest. There he found a community, although rich in Irish tradition and cultural pride, "dying" for the lack of jobs. The young people of the area were being forced to leave and find employment elsewhere. One woman who was in her twenties at this time expressed this migration pattern to me saying, "The way it was normally, was each child would leave as they left school, and the last would usually take the parent with them"(Informant 1, Personal interview, 29 May, 2001). Father McDyer understood that without available jobs there would be no hope for the survival of this community. He vowed to work to establish an infrastructure that would provide employment to this region and thereby halt this migration (Dyer, 48). As expressed by one of my informants, "He wanted to improve the living conditions of everyone in this area and he wanted to do it in such a way that it would preserve the rich traditions and heritage" (Informant 1, Personal interview, 29 May, 2001).

During his lifetime, he spearheaded several ventures aimed at providing an economic base to accomplish these dreams. One of his last achievements was the construction of the Gleann Cholm Cille Folk Museum. Dedicated in 1967, the Folk Village continues to draw many tourists to the area. (Dyer, 93.) Tourism is important because it provides a real economic base for the community and serves to educate the world about Ireland's heritage.

Hundreds of "day trippers" visit the museum during the summer months. One gentleman associated with the museum told me, "the number of visitors increase every year"(Informant 2, Personal interview, 1 June, 2001). This increase makes it difficult for him to keep the teahouse and craft center staffed during the summer. As he pointed to the young female tour guide who appeared to be around seventeen or eighteen he said, "The village employs a good amount of the school children looking for jobs during the summer like [this young lady] who has worked with us for a couple of years now"(Informant 2, Personal interview, 1 June, 2001). He explained the problems caused when tourism to the "Village" creates a demand for increased staffing just around the time these young people take their exit exams from school.

Father McDyer's entrepreneurial spirit continued in 1984 when the Oideas Gael Language Institute opened at Gleann Cholm Cille. Established "with the objective of strengthening the local economy through language and cultural interventions," the Institute rapidly expanded to "become a vibrant and strong economic force in the ... region of Gleann Cholm Cille" (Oideas Gael, 2-4).

In 1993 and in 1995 the school sponsored two community projects aimed at training local people in the "traditional skills" of hand weaving and dry stone wall construction (Oideas Gael, 5). Implemented not only as a means of creating employment opportunity, these classes were intended to serve as a way of passing on the traditional skills of these crafts. In the case of hand weaving, the ancient skills of natural dyeing, carding and spinning were blended in tapestry weaving to create an art form deeply rooted in the area's traditional past. (Oideas Gael, 5). One of the local tapestry weavers explained to me that during the course she was taught the steps necessary to make the yarn used in her art (Informant 3, Personal interview, 4 June, 2001). They (the weavers) were even taught how to dye wool using an outdoor fire.

Stoneworkers participating in a similar project learned ancient, stone fence construction techniques. They were taught these skills not only as a way of preserving the craft, but also in the hope of creating "an awareness of the economic opportunities in the culture/heritage areas"(Oideas Gael, 80). It was hoped that the traditional look of the dry stone constructed fences could be incorporated into modern construction designs, creating a demand for this building skill. Modifications were made in the craft for this purpose. These changes were confirmed by an interview with two local

residents. Both talked at length with me concerning their disapproval of the modifications made in this craft. One ended our conversation with the statement, "Those really aren't traditional fences, they are just built to look like them" (Informant 4, Personal interview, 6 May, 2001).

These projects' main goals were to generate employment opportunities in the Gleann by teaching the people traditional skills that would produce a finished product that was both marketable and profitable. To achieve these goals, some modifications had to be made in the methodology of the crafts. These changes are visible in the crafts today. Whether traditional, modern, or both, the people of the Gleann remain proud of the culture heritage manifested in craft production. They believe that as these crafts are used in the present they are also preserved for the future. History will tell if this belief is true, and if tradition can supply community need.

Methodology

As cultural researchers interested in understanding the multitude of cultural variation in the world, it is recognized that change is inevitable. Adaptation is a defining term of culture. While change can be observed in all aspects of a culture, modifications to physical objects such as local crafts are especially easy to recognize. Understanding the reasons these changes occur presents challenges. To achieve the broadest possible understanding, it is important to examine all aspects of change. Collier and Collier point out, "...A cultural inventory can go beyond material items to become a detailing of human functions..."(72). Inevitably, it is through cultural change a society adapts to the environment and provides for its needs (Haviland, 730). Change in the local craft culture will reflect the needs of the community. The community's perception of its needs will be reflected in local craft modification.

The preliminary data used in this study was collected using established qualitative field research methods of participant observation, semi-structured interviews, archival research and literary review. Before beginning the research, two questionnaires were developed. Each questionnaire consisted of ten questions. One questionnaire was developed with questions tailored for more traditional craft persons and the other was designed to be used by craft persons engaging in more modified craft styles. A coding

system grouped the responses into broad categories. Literature addressing the history of the area and the folk crafts was reviewed. I was fortunate to have had an associate living in Gleann Cholm Cille community. Before I arrived on site, I contacted him asking for help with my project.

During a two and one-half week stay, in 2001, in the community of Gleann Cholm Cille, I attended several local functions. In addition, I participated in a weekend class offered at the Culture Institute. During these events, I spoke with as many people as possible and asked them both generalized and specific questions related to my research topic. Field notes were kept on these contacts and reviewed and coded as time permitted.

Personal interviews were developed at first from a list of possible contacts provided to me by my associate in the Gleann. I began with phone contacts, basic introductions, and then moved on to scheduling interviews. As I arrived at the appointment location, I introduced myself again and took a few minutes to explain my research project. I took notes during the interviews and made audio recordings when possible. After completing the interviews, many of the people provided me with names of other people they thought I should contact. Even the parish priest took the time to set up an appointment for me with the "local church historian." In all, eleven semi-structured interviews were conducted during this data gathering phase of my research project.

Local business establishments served as contact points for informants. Dinner at one of the local restaurants provided several opportunities for me to talk with both the owner of the restaurant and visitors to the Gleann. At the local pub, I spoke with a gentleman who considered signing up for the dry stone fence construction course offered at the Culture School. I walked almost everywhere I went or caught a ride with the few local people I came to know in the Gleann. This slow means of transport allowed me to talk with the people along the way. It also provided an opportunity to "go native," traveling as most of the locals. I kept field notes of all my meetings, took photographs, and video recorded some of my observations.

Analyzation of the data collected from this project revealed patterns of change in both the hand weaving and dry stone fence construction of the area. It also revealed some of the reasons these changes were made. Interpreting these patterns allows me

to group these changes in hand weaving and dry stone wall construction into several broad categories and provides the basis for my observations below.

Modification in Traditional Hand-weaving

The preliminary data collected during my research permits me to define four main sections of modification within the traditional craft of hand weaving of this area. Modification is noted in the production of weaving materials, the style, creativity, and design of the finished product. Change is also observed in the technology and techniques of weaving and in the choice of production location. Data reveals several changes in craft instruction and skill acquisition. This modification is noted both in the blended craft of tapestry weaving and in remaining cloth production done in the area.

Production of Materials

Research shows the greatest modification to be within the material used to create the craft. Both cloth and tapestry production have incorporated factory spun yarn or thread into their finished products. Traditionally all the yarn used on the loom would have been homespun. In her book, This is Donegal Tweed, Judith Hoad explains the care with which the family's wool was clipped, washed and carded before being spun into the yarn and thread used by the weaver to produce the cloth (38). Everyone shared in the production cycle, and each member of the family had assigned tasks. Men and boys hand-sheared the sheep; the women dyed, carded and spun the wool into yarn and thread. One 72 year-old man I spoke with in the village confirmed this process. He explained how each family clipped its own sheep for the wool used for their weaving. He told me that shearing wasn't the hard part to him. The worst part was collecting the "crotal" (Irish Gaelic for lichen that grows natural on most rocks) used in the dyeing of the wool. He said, "I would be all day at it, I had a spoon and I wore an apron and scraped it [the moss] into the apron and then from the apron I filled my bag" (Informant 5, Personal interview, 28 May, 2001). Local materials such as "yellow gorse, red fushia, and purple blackberries" were gathered as dyeing agents (www.mageehshop.com 25, June 2001). Howeve, my informant told me his family collected heather for purple dye and the "crotal" for yellow. When asked to explain the dyeing process, he told me dyeing was done in a big pot fired by turf. "First you would

put a layer of wool in the hot water then a layer of "crotal" then wool then another layer of "crotal" (Personal interview, 28 May, 2001). All this gets boiled together for several hours until the dye is set. The tapestry weavers at Taipeis Gael (the tapestry weaving studio established by the students trained at Oideas Gael Culture Institute) confirmed the dyeing properties of the native flora and dyeing process. He said his mother did all the cleaning and dyeing of the wool, with the help of the children of the family, while his uncle did the weaving. His father, he confessed, "had not the patience to work the loom" (Personal interview, 28 May, 2001).

This data does not suggest that no homespun yarn is used in weaving today. However, data does suggest that since factory yarn is easier to acquire and provides a greater variety of colors, it is being used more frequently. Hoad notes that factory spun thread has replaced much of the yarn used in the "warp" (all the longitudinal threads on the loom) of the cloth because it has a more uniform and tighter twist (61). All three tapestry weavers acknowledged they use factory spun yarn in their work. One stated that natural dyed wool would not provide the bright colors she liked to use. An interview with a local cloth weaver revealed that he used factory spun thread exclusively (Informant 3, Personal interview, 4 June, 2001).

Style, Creativity and Design

Style, creativity and design, is another area where modification is easily observed. Traditionally style and design of the cloth was the province of the weaver. Cloth was woven according to the weaver's taste and the raw materials available to him. This was pointed out to me in an interview with one of the last remaining practicing weavers in the Gleann. When asked how he selected the colors of the cloth, he replied, " They just come to me. Whatever I like or have at the time, that's what I put into the bobbin" (Informant 7, Personal interview, 31 May, 2001). By the early 1990s, cottage industry home weaving was a major source of income for many families around the Gleann. The marketability of the cloth was mandated by its appeal to the consumer; retailers provided classes and patterns for weavers to assure that both the quality and look produced a profit (Hoad, 97).

Today, because of large demand for traditional produced goods and the limited number in production, all weavers have a considerable amount of creative freedom in

the craft. During my tour of the tapestry weaver's studio, work was being done on two large pieces that had been commissioned by a Belfast church. The original designs were created in the studio and then sent to the church where both tapestry designs were approved for production. This same type of freedom and control can be seen in the way the weavers describe their craft. Each one referred to their work as their "Art" instead of their "Work." These comments reflect personal control over the creativity used in production and the increased status this craft now holds in society.

Technique and Technology

In modern times, change in technology is a given. Modernization can be attributed to many changes seen in the material culture of many regions. Howeve,r not all modification can be explained by modernization. Within the craft of hand weaving in the Gleann, modification appears in the development of new equipment, while it is true that the addition of metal parts may be seen as merely modernization in action. The addition of tools developed specifically to improve design and creativity is arguably not. At the Taipeis Gael studio, a new loom framing system was designed so several heights of tapestry could be woven using the one loom. While I was visiting with them, one of the weavers demonstrated the use of a fishing swivel to separate the plies of yarn so colors could be blended. They also showed me a new tool created especially for them to use when packing the thread down on the piece (Appendix III, Fig. 1). This same type of technology is present in traditional cloth weaving with the addition of the fly shuttle. Modernization, in these cases, may supply the technology to produce the new tools, but the design is mandated by the change in the craft.

Production Location and Preservation of the Craft

The fourth category where modification is observed combines two changes closely linked to each other. Traditionally this folk craft would be done either in the home or in a small out-building. All weaving would have been done by the male of the household (Hoad, 77). Today in this area, it is hard to find a working loom set up at an individual's home. One exception to this statement is a gentleman in the village who weaves rugs for sale to the Gleann's summer tourists. He still has a working loom, which he told me is over 100 years old, set up in a small out-building beside his house.

He also conducts weaving demonstrations at two local area locations for the tourist in the summer. When asked if someone else in the area wove at home, he looked at me and shook his head no, (Informant 7, Personal Interview, 31 May, 2001). In the case of the tapestry weavers, three of whom are female, all their production is done away from their residence at the studio. This fact is directly linked to the last noticeable change observed in this craft-the ways in which weaving skills are passed on and preserved. A generation or two ago, all the necessary skills associated with weaving was transmitted by observation, beginning in childhood. Children in the family watched adults working with this craft almost daily. Over time, the skills would have become second nature. It would have seemed natural to take up the craft as one got older. When a young person began weaving he benefited from first-hand observation of and guidance from the adults. This is not the case today. Classes have taken the place of home instruction. When I talked with a local weaver, I asked him who taught him to weave? He replied, "I just picked it up from watching my brother. He was older than me and I think he learned it from one of our uncles" (Informant 5, Personal interview, 28 May, 2001). When asked how many people he had taught to weave, his replied that one guy had come by to learn but he didn't think he was weaving now. The tapestry weavers on the other hand, give lessons to groups from the local school and offer classes for adults from around the world during the year.

Modification in Dry Stone Wall Construction

The second half of this research focused on modifications made in the traditional folk craft of dry stone fence construction. Similar to the traditional craft of weaving, modifications noted in this traditional craft can be grouped into four general categories. These four categories are: 1) types of stones used in construction along with general fence design, 2) method of production, 3) purpose or use of the finished fence, and 4) a very broad category dedicated to the stone craftsman, craft preservation and production cost.

Type of Stone Used and General Fence Design

Fences built using the dry stone construction method are not seen in great number in Ireland until recently (Anderson, 1). The breakup of the Rundale System (a

system of open land communal farming and grazing) by British colonization marks their entrance on the Irish's landscape (Anderson, 8). Until then most land was open and unfenced (McAfee, 10). When fencing began, most rural fences were constructed using stones that were readily available. In the rocky terrain of Gleann Cholm Cille, most of the land surface was covered with rocks or a good supply of stone lay just below the surface. To farm the land, these stones had to be removed. This clearing process made a good supply of stone available for fence construction.

The most traditional style of fence seen in the Gleann is the single-width stone fence (Appendix III, Fig. 4). This fence, built with local stone, usually contains gaping holes that let the gale force Atlantic winds blow through without pummeling the fence's face. This probably increases the fence's life. Another advantage of the hole in the fence is that sheep will not attempt to jump this type of fence (McAfee, 102). A traditional stone wall builder told me that he saw this type of fence as being part of the landscape. It (the style of fence) looks like it belongs (Informant 3, Personal interview, 4 June, 2001). This was confirmed when an older informant showed me a picture of an old Irish farmstead. He told me his family's farm looked very much like the one in the picture. He pointed to the fences in the picture and said, "that's the way all the farms looked." The fences portrayed in the picture were all made of field stone. When questioned about the stone construction done for his family, he told me there was one man in the area that was fairly skilled at stone construction and his family would always call him. "He would come if he wasn't busy," he said. "But it's not much to stone work," he continued. "I built an addition on the house at the farm," he said. The stones used in the construction were procured at the communal quarry some distance away and packed in using the family's donkey. "It was an all day job," he said (Informant 5, Personal interview). There were no cars in the Gleann then and only a few good roads. The data suggest that this procurement process would have been time consuming and labor intensive. Few people would have used this method to collect field fence stones. However the dry stone fences being built today in Gleann use quarried stones exclusively. Photographs taken of several newly-constructed buildings in the area show boundary walls built using "random rubble stone built to course" (McAfee, 13). This means that stones, generally collected from a quarry, are placed in the wall in such a way as to form several vertical layers or courses parallel to the ground. This type

of wall has increased in popularity since the 19th century and is very popular today (McAfee, 42). This type of mortared wall is one of the easiest to construct, but because it is constructed using quarried stone, this type of wall construction would have been used mainly in the construction of dwellings.

Another area where change in dry stone construction can be seen is in fence style. One good example appears in fence work used by the 1995 stone building class at Oideas Gael. This fence is built using a stone not normally found in the area. The fence's face curves inwards from bottom to top, pulling the top to a point. The look of the fence is very stylized, and it does not match any type of structure built nearby. Because of the sharpness at the top of the fence, no capstone is used. A capstone (usually a large flat stone placed horizontally across the top of the fence to protect the fence from weathering), is one of the defining marks of traditional Irish dry stone fences. One of my informants made a point of letting me know that there were only two traditional types of capstones used in the Gleann area. One is the long flat stone that covers both sides of a double-width fence, and the other is a short upright stone placed back to back along the entire length of a fence (Appendix III, Fig. 3). This modern fence, along with many other styles I observed, although a wonderful example of stone masonry, can in no way be termed a traditional dry-stone fence.

Use of the fence

Another area where modification appears is in the area of function. Traditional dry stone fences served as boundary or enclosure walls-holding animals either in or out of planted fields or residential areas. Some were situated so field animals could find shelter beside them during strong winds (McAfee, 104). MacWeeney writes that they were later used as "drying racks, clotheslines, coat-hooks, scratching posts, hiding places for poteen (an alcohol drink), and dumps for weapons (36). Two of the fences built by the dry stone fence construction class at the Culture Institute are open on both ends and serve only as decorative features (Appendix III Fig. 5). This observation was confirmed with the statement of a local man of about 45 years old. While discussing the stone fence class, he commented that he had not observed the style of fence built by the students around the area until they (the students) began building. He did not believe they should be called traditional. That stone fences were part of the

construction plans of new homes was not a big surprise to him. What did appear to upset him was the use of the term "traditional" in stone construction to generate sales and increase price (Informant 8, Personal interview, 2 June, 2001).

Stone Workers, Preservation of the Craft and Cost of Construction

The final change in the tradition of dry stone fence construction appears by answering three questions: 1) Who is building the fences now? 2) How much does it cost to build a fence? 3) How are the craft skills being passed along? Today, most stone fences, whether dry stone or mortar constructed are being built by crews of stone workers. These people work together on a project and are trained in the techniques and methods of laying stone. Traditionally this job would have been the work of one man. His family or friends may have assisted him, but ultimately final construction would be the "job" of the individual. Many times one individual would stand out as the local fence builder because of his skill and knowledge in stone construction. This person would be someone who understood the landscape and had a feel for the surroundings, a truly skilled individual that could take a pile of stones and transform them into a welcome part of the landscape (MacWeeney, 137). The oldest stone worker I spoke with summed this up when he said, "There is not a lot to building stones, but there are a lot of people out there building stones that do not know how "(Informant 5, Personal interview, 28 May, 2001). Because modern builders have shifted this tradition over to the realm of trade labor, the cost of production has increased greatly. Material delivery cost, heavy machinery, and work crews all drive up the cost of construction. This increase combined with the cost of design mandated by a customer makes a newly constructed stone fence very expensive. A discussion with one of the newly trained stone workmen revealed that the fences he built were priced by the linear foot and could be rather expensive if covering a large run of ground (Informant 10, Personal interview, 6-24-1999). In comparison, traditional fences were mainly built using stone removed from the planting field. These stones would have been free (MacWeeney, 37).

Finally, masonry skills used in dry stone fence construction, as in the case of many of the traditional crafts of the area, are not being taught at home. In the past, boys would help their fathers or other men build these fences. Through observation and hands-on experience, they would learn the skills required to become builders. Today,

formal class instruction takes the place of observation. Construction projects substitute for the hands-on experience of yesterday (Oideas, 6). Today workers receive certification upon completing their courses and begin work in a studio with a blueprint design. In this way, it is believed that the traditional craft of dry stone construction is maintained and preserved for future generations.

The Effect on the Community

Small changes in one part of a community can modify other parts of that community. This is especially true in the modifications made in the folk crafts of Gleann Cholm Cille. Economic increase and population growth appear to be strongly influenced by these modifications. Although not directly related to craft modification, increases in these indicators can be directly linked to the awareness these crafts have brought to the region. Modification made to increase marketability and promote interest in the crafts have succeeded (Oideas Gael, 4). Awareness of the landscape and culture of the Gleann has grown as more people drawn by the folk-crafts come into the area. Tourism appears to be one of the driving forces in the local economy. Great numbers of people come into the Gleann for short periods of time each year. Some visitors come on holidays; others come to explore cultural roots. While no one complained about the tourist, two locals expressed concerns about everything focusing around tourism. One lady complained to me that the local store didn't bother to carry what "we need, they only worry about the tourist" (Informant 12, Personal interview, 31 May, 2001). This may be a genuine concern, during my data gathering visit, travel into the Gleann seemed to revolve around the local Bank Holidays and classes offered at the Culture Institute.

The increase of people in the area is not just limited to tourists. There is a growing trend in the Gleann for outsiders to purchase land and build holiday homes. They use these houses for vacation or for weekend getaways in the summer, so the houses remain emptied during the winter. This trend appears to upset many locals. They would prefer to see the houses occupied year round (Informant 11, Personal interview, 30 May, 2001).

Today, one of the biggest fears people have is that outside influence will cause a negative change in their community and way of life. Tourism has increased the economy. Improvements made in the infrastructure draw people of different

backgrounds to the area. Their presence brings local change, which may eventually change or modify other local traditions. Many locals worried that this type of change would mean a total lost of cultural identity (Informant 2,11, Personal interview, 30 May, 2001).

Conclusion

Preliminary research data collected during this field study suggest that modification has occurred in the traditional folk crafts of hand weaving and dry stone wall construction in the regional parish of Gleann Cholm Cille. Hand weaving modifications fall into four categories: 1) materials used in weaving, 2) style, creativity, and design, 3) technique and technology associated with production, and 4) production site and preservation of the craft. Preliminary data show a change in the materials used in craft production. Factory spun yarn and thread has replaced home spun in many instances. The availability and the color variety of factory yarn appear as main reasons for change. Changes noted in the style, creativity and design of the finished product is attributed to increased demand and limited production. Demand is higher than supply. Tool design shows modification in the technology and technique of weaving. A metal packing instrument, designed to pack each thread of yarn tightly down into the body of the work has been developed along with an easily adjustable loom. Change is also noted in the location of production and in the preservation of the craft. Traditional weaving was done in the home with craft skill being passed from generation to generation. Data show modern weavers use studios, local shops or tourist centers as weaving and formal instruction locations.

Research allows dry stone wall modifications to be grouped into three broad categories: 1) stone use and general fence design, 2) fence use, and 3) stone workers, preservation of craft and construction cost. A change from field to quarried stone, rustic to stylized design, and capped to non-capped tops were noted in modern fence construction. The production of traditional single-width and double-width field stone fences is limited. Modern fences are built with flatter stone in a more uniform manner. Data reveals modification in fence use and purpose. Modern fences are constructed with visual appeal in mind. Diagrams are used for construction, and fences are built to achieve a specific look. Research shows traditional fences were built as field or livestock

enclosures, providing shelter for field animals. New designs and styles are seen in many of the newly constructed homes across the Gleann. Research also shows modification in the function of the stone workers as well as in fence construction cost and skill preservation. Modern fences are constructed by work crews. Traditional fences are usually built using the talents of a single individual. Field fences cost little to construct because the stone is readily available and friends or family provide additional labor at a minimum cost. Modified fence can be very expensive. Expenses such as power tools and transportation cost make newly constructed stone fence expensive. Data analysis also shows increased modification in the instruction of the craft. Modern fence builders acquire skill in a formalized classroom setting. Class work makes up much of the hands-on received by modern stone workers. Traditional stone workers would have received instruction in the field, the observation and practice gained in childhood providing the craft knowledge used later in life.

As a part of the community's material culture, traditional folk crafts are used in a variety of ways. More than just material objects, traditional crafts serve to preserve heritage and supply basic needs. As a part material culture, traditional folk crafts must adapt to changes experienced in the community they serve (Haviland, 436). Understanding this process is an important part of understanding the way a society works. This preliminary study supports the need for future research into the modification of traditional crafts of the region.

Appendix I

Research Questions # 1 for more modern/modified crafts

Date:

Full name:

Age/Birthday:

How long have you lived in the village:

Where were you born?

1. What led you to decide to learn/ open _____?
   What Do you/ do not you like about this craft/ business?
   What are some of the rewards or problems associated with the _____?
2. How did you learn to _____? Who taught you and How long have you been _____?
3. What kinds of materials do you use in your craft?
   Do you make them or buy them ready-made?
4. How do you select your patterns, colors, styles, and techniques?
   Do you create them or use already established designs, patterns, and techniques?
5. What do you think you would be doing if you weren't doing what you are doing now?
6. When you are not _____ what are you doing/ What other interests do you have?
7. Would you consider moving away from Glean Cholm Cille? Why/why not?
8. Will you or have you taught or encouraged your children to learn this craft/business or have you taught anyone else?
9. What changes have you noticed in the area over the last 10 years? What do you see for this area in the next 10 years?
10. Is there anything you would like to tell me or you think I should know, but didn't ask?

Appendix II

Research Questions # 2 for more traditional crafts

Date:

Full name:

Age/Birthday:

How long have you lived in the village:

Where were you born?

1. How did you learn weaving/fence construction?
   What Do you/ do not you like about this craft?
   What are some of the rewards or problems associated with the _____?
2. Who taught you, How long have you been _____, and are you still doing _____ today?
3. What kinds of materials do you use in your craft?
   Do you make them or buy them ready-made?
   Did you always use the same type of materials or have they changed over time?
4. Were you taught your craft as part of your daily life (what was used around the house/farm) or did you learn it as a hobby or past time?
5. How do you select your patterns, colors, styles, and techniques? Do you create them or use already established designs, patterns, and techniques?
6. Will you or have you taught or encouraged your children to learn this craft/business or have you taught anyone else?
7. When you are not _____ what are you doing/ what other interests do you have?
8. Would you/ or have you ever considered moving away from Glean Cholm Cille? Why/why not?
9. What changes have you noticed in the area over the last 10 years? What do you see for this area in the next 10 years?
10. Is there anything you would like to tell me or you think I should know, but didn't ask?

Appendix III

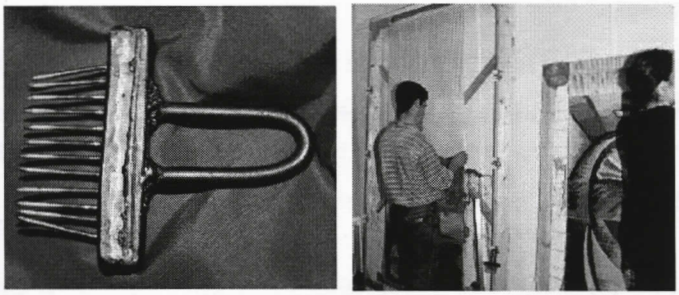

Figure 1. Left: Tool built to pack yarn in to tapestry, and right: Example of loom modification. Developed by local craftsman. Note: Bolts along side of loom used to securing height adjustment bars.

Figure 2. Traditional double-width dry stone construction

Figure 3. Traditional single-width dry stone construction. Note: Gapes in fence

Figure 4. Fence built during dry stone construction training

Appendix IV

List of Informants

(Below is a list of interviews conducted during the project. All interviews were conducted in Gleann Cholm Cille, County Donegal, Republic of Ireland. All names have been replaced with pseudonyms to protect the informant's anonymity. Dates reflect the actual interview day.)

Informant 1, Personal Interview, 29 May, 2001.
Informant 2, Personal Interview, 1 June, 2001.
Informant 3, Personal Interview, 4 June, 2001.
Informant 4, Personal Interview, 8 June, 2001.
Informant 5, Personal Interview, 28 May, 2001.
Informant 6, Personal Interview, 4 June, 2001.
Informant 7, Personal Interview, 31 May, 2001.
Informant 8, Personal Interview, 2 June, 2001.
Informant 10, Personal Interview, 24 June 1999.
Informant 11, Personal Interview, 28 May, 2001.
Informant 12, Personal Interview, 31 May, 2001.

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THE IMPACT OF RACE, GENDER, AND PHYSICAL ATTRACTIVENESS ON EDUCATION MAJORS' AND TEACHERS' PERCEPTIONS OF STUDENTS

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ABSTRACT

The purpose of this study was to investigate the claim that students' perceived social and academic competence is partially based upon superficial characteristics such as race, gender, and physical attractiveness. Stereotypical thinking and prejudgments from teachers have been found to hinder students' academic and social performance. It was also hypothesized that teachers would be influenced more by a child's physical features than undergraduate education majors would. Participants included 72 individuals (51 teachers/21 undergraduate education majors) at a mid-sized university. Participants viewed eight scenarios (varying by race, gender, and physical attractiveness) in which a child's picture is displayed. Participants were then asked to rate the child's competence on an eight-question, 5-point Likert-type scale. A 4-way (gender x race x physical attractiveness x educational level) mixed factorial design was used to test the hypotheses. Results showed that the lowest competency ratings were for unattractive boys, particularly as rated by men. No differences were found for ratings by race or education level. These findings have implications for training of classroom teachers.

There are many influences that affect how we perceive each other. Many factors such as physical attractiveness, gender, age, socioeconomic status, and race have all have been found to affect our perceptions of others (Adams, 1978; Bennet, 1976; Clifford, 1975; Dion, Berschied & Walster, 1972; Gollub & Sloan, 1973). These factors all seem to make individuals more prone to preconceptions about others. Dion, et al. (1972) did a classic study in which their findings later become known as the "what is beautiful is good" phenomenon. The researchers in this study found that participants

had a tendency to rate individuals who were attractive as being better people, to have more satisfying and fulfilling lives, and to be more likely to succeed as opposed to unattractive people. It would seem that people who fit the ideal standard for beauty would be considered to possess more positive traits and characteristics than unattractive people.

Prejudgments that we have of people have also been seen in educational settings. Previous studies (e.g., Clifford, 1975; Ritts, Patterson, & Tubbs, 1972) about teachers' expectations coincide with the notion of the "what is beautiful is good" theory in the classroom. These studies suggest that teachers do in fact have a tendency to rate attractive students more favorably in regard to intelligence, social skills, academic capabilities, and achievement rates. When individuals such as teachers have biases or make assumptions about students' capabilities and behavior, it can have both major and subtle implications for students' social and academic outcomes (Davidson & Lang, 1960; Rist, 1970). Stereotyping and biases may cause children to be treated differently, and their behavior may become affected in an on-going spiral where less is expected of them and less is produced by them, thus confirming the original expectations of the perceiver (Davidson & Lang, 1960). In 1960, Davidson and Lang looked at how teachers' attitudes toward students affected the children's self-concepts of themselves. The study revealed a correlation between a teacher's attitude and student academic achievement. Students who felt that the teachers were supportive of their work efforts and attentive to their needs tended to excel better academically as opposed to students who felt the teacher was non-supportive.

The subtle and sometimes blatant opinions that we have of others can affect their self-concepts. The self-fulfilling prophecy emphasizes the fact that a correct or incorrect belief can affect the outcome of a situation (Brophy, 1983). Therefore, if students are treated unfairly or discriminated against because of superficial characteristics, their educational career might be hampered (Rist, 1970). Research has identified three factors that have a recurring theme in teachers' perceptions of their students: race, gender, and physical attractiveness.

Research has shown that the race of a student has a large effect on a teacher's opinion (Adams, 1978; Bennett, 1976; Haller, 1985). Adams' study (1978) indicated that some teachers possessed cultural stereotypes that made a significant difference in

the expectancy of their students' academic capabilities. Photographs of black and white children were placed on a page along with a general description of the child. Teachers were asked to rate the children based upon intellectual capabilities, academic achievement, classroom behavior and social skills. The teachers viewed the black students as being less capable as opposed to their white counterparts. Other studies report that black students have been placed in reading groups according to race and socioeconomic status with little regard to academic capabilities (Rist, 1970). Rubovitis and Maehr (1973) found that black gifted children received less praise and were more prone to criticisms and being ignored by their teachers as opposed to white gifted children. Black students are also more likely to be subjected to corporal punishment for misbehavior in school (Kennedy, 1995).

In regard to gender, girls are seen as being more responsible and more dedicated in their studies than boys are, which makes them excel more so in academics (Fabregat, Almacellas, & Beltri, 1999; Kenealy, Frude, & Shaw, 1987; Smith, 1998). Adams and LaVoie (1974) found that teachers believed that boys have decreased interest in school and have poorer work habits than girls. A recent study by Fabregat et al. (1999) yielded similar results. The participants were asked to fill out a questionnaire based upon their perceptions of student attitudes and behavior. Girls were assessed as being more serious about their school work and receiving better academic scores than boys. Voivodos (1983) reported that teachers had a tendency to interact with girls in a more favorable light than boys. Also, the manner of tone and pitch of voice used by teachers in correcting students seemed to be dictated to students based upon their gender (Sears & Feldman, 1966). More specifically, boys seem to be spoken to in a harsh tone while girls are chastised in a normal voice.

Numerous studies have demonstrated that there are clear biases between attractive and unattractive children in terms of academic expectancies and intellectual capabilities (Clifford, 1975; Dion et al. 1972; Marwit, Marwit, & Walker, 1978). Attractive children have a tendency to be viewed as more intellectually competent than unattractive children. Clifford (1975) found that there was a significant difference in the intellectual expectancy for attractive children. More specifically, it was noted that they received higher marks for academic achievement. Kenealy et al. (1987) found that in addition to attractive children receiving higher IQ expectancies, they were also

perceived to be more outgoing, had more leadership potential, and higher self-esteem. Moreover the transgressions of attractive children are not rated as severely as those committed by unattractive students (Dion et al. 1972). When given a scenario with a picture of an unattractive or attractive student, participants were more lenient in rating the transgressions of attractive students and attributed their behavior to external factors (Dion, 1972). The unattractive students were looked upon as being more prone to behavioral problems.

The above factors have all been cited as having an impact on teachers' perceptions of students. The present research built upon past research. The purpose was to assess whether these biases are still prevalent among teachers and education majors. For this study, it was hypothesized that (a) White children would be rated as more competent than black children. (b) Girls would receive higher competence scores than boys. (c) Attractive children would be rated as more competent than unattractive children. Differences between perceptions of teachers and undergraduate education majors was also examined. Past studies emphasize teachers' expectations with no research done to look at education majors' perceptions. Mawit, Marwit, and Walker (1978) found that prior to student teaching, education majors did not seem to be affected by children's race in regard to their judgments about student transgressions. However, after student teaching their perceptions changed. Based upon this research, it was expected that teachers would be influenced more by a child's race, sex, and attractiveness than undergraduate education majors would.

METHOD

Participants

Students who were undergraduate education majors as well as graduate students at Georgia Southern University participated in the study. There were 72 participants (51 teachers/21 undergraduate education majors). Out of 72 participants, 81% were women and 19% were men. Eighty-five percent were white and 15% were black. The mean age for the participants was 29.96 years (SD = 8.37).

Materials

An informed consent form was given to all participants to tell them about the experiment and what they would be asked to do. There were eight different written scenarios typed on eight different pieces of white paper. A picture of a student was placed above the scenario. The scenarios contained two to three sentences that informed the participants about the student's grade level, school, hobbies, and interests. After the scenario had been given, each participant was asked to complete a short rating scale of the child's perceived social and academic competence. Participants rated the child's competence on an eight-question, 5-point Likert-type scale. A higher score reflected higher ratings of competence. For four of the questions, the experimenter used reverse scoring.

Procedure

The participants were first asked to read and sign an Informed Consent Form. Afterwards, the experimenter asked the participants if they had any questions or concerns and addressed them accordingly. The experimenter placed a packet on their desks face down until all participants had received the material. Then the following instructions were given:

> Please view each of the following pictures carefully on each page, then read the scenario given. After you have done this, please answer the questions to the best of your abilities. Once you have completed the first page, proceed to the next page and follow the same directions until you have completed the whole packet. Take as much time as you need to answer the questions. However, upon the completion of each page, DO NOT GO BACK and change any of your answers. If you have any further questions, please raise your hand for assistance.

Upon the completion of the experiment, the pages were taken up, and the participants were debriefed. Any questions from the participants were addressed by the experimenter.

Design

For the present study, a 4-way mixed factorial design was used. The dependent variable was perception of the student's social and academic competence as measured by the competence scale. There were three within-subjects variables: race (black/white), gender (boy/girl), and physical attractiveness (attractive/unattractive) and one between-subjects variable (educational level). Attractiveness was defined by a panel of 10 judges who rated 100 randomly selected student photographs from a yearbook on a 10-point scale with "1" the least attractive and "10" the most attractive. All of the judges who participated consisted of faculty, graduate students, and staff in the Psychology Department at Georgia Southern University. Pictures of children within each category (race/gender) who had the highest and lowest attractiveness ratings were selected as stimulus materials for the present study.

Results

Table 1 shows the overall mean competence scores for each of the eight photographs. In order to determine whether variables of educational level, child sex, child attractiveness, and child race predicted ratings of competence, a 4-way analysis of variance was conducted, in which there was one between-subjects variable (participant education level) and three within-subjects variables (child sex, child attractiveness, and child race). Although a significant effect was not found overall, univariate tests showed a three-way interaction for sex of participant, child attractiveness, and child sex, $F(1,67) = 6.46$, $p = .01$. Post-hoc analyses showed unattractive boys were rated as lower in competence than other groups, especially by men (see Table 2). There was no effect for educational level of participant.

A trend was found for one variable: A race x sex interaction, $F(1,67 = 3.78$, $p = .06$ was found. Post-hoc analysis showed that black boys were rated lower in competence than were children in other categories (see Table 3).

Discussion

No evidence was given to support the notion that teachers and education majors differed in their competence ratings of students. However, the study did reveal the fact that teachers' perceptions of students are affected by their own sex and the student's

gender and physical attractiveness. Black unattractive boys received the lowest competency scores in all of the categories, particularly by men.

It is also worthy to note that black boys received the overall lowest competency scores while white girls received the highest ratings. These findings give further support to earlier studies that support the claim that sex and race have an affect on the perception of teachers.

It is evident that teachers still possess certain perceptions of students based upon external characteristics. Because teachers play such a critical role in a child's academic and personal growth, it is very important that teachers and education majors become aware that the expectations or different perceptions that they have for children can be supportive or detrimental to a child's academic career (Rist, 1970; Smith, 1998). If teachers become more knowledgeable about the effect that stereotypical thinking can have in the classrooms, then they may become more cognizant of their own biases and in turn reduce them. More diversity workshops and multi-cultural programs for teachers need to be implemented to increase the appreciation of other people's cultures and ethic backgrounds. Also, these programs can help teachers learn how to be more creative in their teaching styles to meet each child's needs, and they will show them how to be more responsive and supportive in their interactions with different children. Diversity training can also help break down cultural barriers or perceptions that may be present. The implementation of teacher self-evaluations would also be beneficial because it would allow teachers the chance to evaluate or monitor their behavior in the classroom to insure that they do not spend a lot of time with just one particular group, or interact with one group differently from the other based upon biased expectations.

Appendix I

Table 1. Overall Competence Scores by Race, Sex, and Physical Attractiveness

Photograph	M	SD
Black Girl Unattractive	26.64	3.11
Black Boy Unattractive	25.21	3.08
Black Girl Attractive	26.97	2.82
Black Boy Attractive	27.97	2.83
White Girl Unattractive	27.67	3.09
White Boy Unattractive	27.68	2.97
White Girl Attractive	29.15	3.32
White Boy Attractive	27.37	2.93

Note: M = Mean and SD = Standard deviation.

Table 2.Competency Scores by Sex of Participants, Child Attractiveness, and Child Sex

	Child Sex	
Sex of Participant	**Girl**	**Boy**
Women		
Attractive Child	28.06 (2.59)	27.51(2.44)
Unattractive Child	26.91 (2.44)	26.53 (2.50)
Men		
Attractive Child	28.29 (3.07)	28.32 (3.45)
Unattractive Child	28.14 (3.36)	26.11 (3.30)

Note: Standard deviations are given in parentheses.

Table 3. Competency Scores by Race and Child Sex

	Child Race	
Child Sex	**Black**	**White**
Girls	27.02 (2.58)	28.54 (3.06)
Boys	26.77 (3.06)	27.80 (3.00)

Note: Standard deviations are given in parentheses.

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PROPERTIES OF LASER PULSES IN A RESONANT MEDIUM UNDER CIRCUMSTANCES WHERE LASER INDUCED TRANSPARENCY ARE SATISFIED

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ABSTRACT

This is a study of the propagation of laser pulses in a resonant medium made up of a very cold atomic vapor. By using two lasers tuned resonantly between the energy levels of a lambda system, the velocity of propagation can be slowed by many orders of magnitude relative to the vacuum speed of light. Under other circumstances, the two laser pulses can store information in the medium in the form of coherent populations in the two lower states of the lambda system. By bringing back the coupling laser after a relatively large time delay, coherent light is also revived at the frequency of the first (probe) laser. An approximate analytical solution to this problem, in which the probe laser is much weaker than the coupling laser, is the subject of this study.

INTRODUCTION

The purpose of this study is to find an approximate analytical solution where the situation has the probe laser much weaker than the coupling laser. Before one can look into the subject matter head-on, one must look at some of the background theory involved.

THEORY

The Laser

Niels Bohr, a Danish physicist, developed the classical model of the atom. It included a nucleus at the center and electrons in discrete orbits around the nucleus. It was reminiscent of a planetary model (see figure 1).

The discrete orbits just mentioned can be thought of as energy levels. Initially all of the electrons are at their ground state level, but when energy is added to this system they become excited. In this excited state, the ground state electron jumps to a higher transitional state. This jump is only temporary, as the electron wants to return to its original ground state level. While returning to the ground state, it will emit a photon – a particle of light (see figure 1). This simple phenomenon was the modest beginning of the Laser.

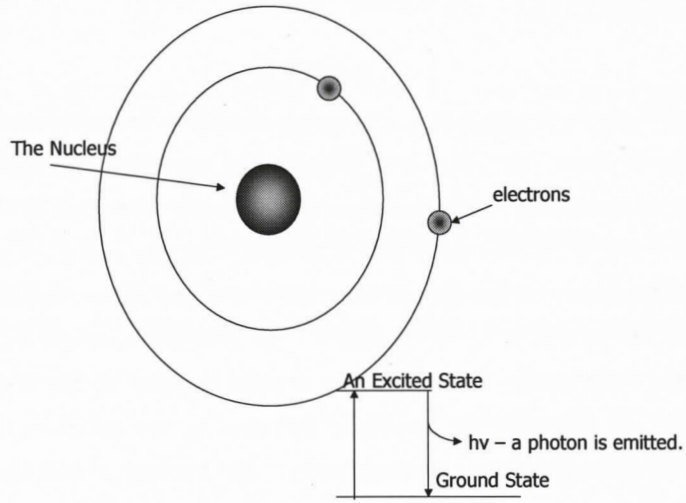


Figure 1. The Bohr Model of the atom. The nucleus at the center with electrons orbiting it. Below is a simple diagram used to show the emission of a photon. An electron is excited and then relaxes to emit a photon. E = hv represent the energy of the photon.

The word Laser stands for Light Amplification by Stimulated Emission of Radiation. The term is self-explanatory. All Lasers have a lasing medium pumped into them to get the atoms in an excited state. Usually some outside power source is used to collect a large number of excited electrons. Sometimes exciting the atom two or three levels above ground state is desired. The term population inversion refers to the number of atoms in the excited states as compared to the ground state[1].

Once the electron is excited, it can begin to relax and emit some of the stored energy in the form of photons. This photon has a specific wavelength. The medium of atoms, for example Sodium, will all emit photons with the same frequency[1].

Laser light has some different properties than that of light that is seen everyday. It is monochromatic. It contains one specific wavelength. This light is also called coherent, which means that it is organized. All of the photons wavelengths move in unison and do not interfere with one another. Finally, the laser light is very tightly focused and does not move in all directions[1].

What creates these properties is something called Stimulated Emission, an idea that came about by Einstein forty years prior to the invention of the laser. Stimulated Emission is what organizes photon emission; it does not allow it to be random. It works like this: If a photon possessing the same energy and phase encounters another atom that has an electron in the same excited state, the first photon stimulates or induces emission from the second atom so that its photon will vibrate at the same frequency and go in the same direction as the initial photon[1].

The final step in making a laser work is a pair of mirrors. Looking at figures 2a-b, we can follow the steps into what results in Stimulated Emission. The mirrors are placed at each side of the container holding the medium. The photons will reflect off the mirrors and go back through the medium, causing more electrons to be stimulated. One of the ends of the mirror is "half-silvered," meaning it reflects some light and let us some light through. The light that leaves is the laser light[1].

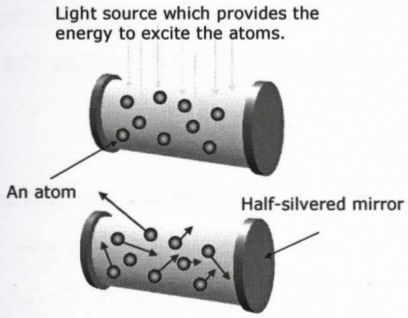


Figure 2a. Energy being added to a medium of atoms. They become excited and emit photons. The light source which excites the atoms must be continuous in order to continue to excite them.

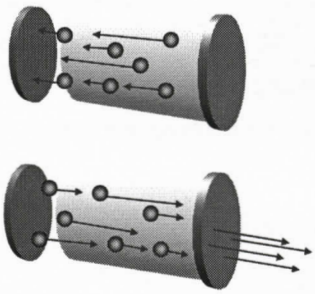


Figure2b. The excited atoms jump a level and then relax to emit a photon. All of the photons have the same wavelength. It's coherent light and eventually becomes focused and all move in the same direction. The photons will reflect off of the mirrors and the ones that escape through the half-silvered mirror are the laser beam.

Electromagnetic Waves

In general, when talking about electromagnetism it would be a crime not to mention Maxwell's Equations. Maxwell's Equations are to electromagnetic theory as animals are to a zoo.

Here are Maxwell's Equations in their most useful form:

Gauss's Law

$$\nabla \circ \vec{E} = \rho/\varepsilon_o \qquad (1)$$

No magnetic monopoles

$$\nabla \circ \vec{B} = 0 \qquad (2)$$

Faraday's Law

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \qquad (3)$$

Ampere's Law

$$\nabla \times \vec{B} = \mu_o \vec{J} + \mu_o \varepsilon_o \frac{\partial \vec{E}}{\partial t} \qquad (4)$$

Now let us take these equations and show what good can come of them. First, let us see them as wave equations. Remember that electricity and magnetism are one in the same; they are components of one another. These waves are electromagnetic radiation and travel at the speed of light (footnote: these derivations follow the second [2] reference).

Let us start with Faraday's Law.

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

$$\nabla \times (\nabla \times \vec{E}) = -\frac{\partial (\nabla \times \vec{B})}{\partial t}$$

$$remember \Rightarrow \nabla \times (\nabla \times \vec{E}) = \nabla(\nabla \circ \vec{E}) - \nabla^2 \vec{E}$$

$$\nabla(\nabla \circ \vec{E}) - \nabla^2 \vec{E} = -\frac{\partial (\nabla \times \vec{B})}{\partial t}$$

Now apply Ampere's Law.

$$\nabla \times \vec{B} = \mu_o \vec{J} + \mu_o \varepsilon_o \frac{\partial \vec{E}}{\partial t}$$

rearrange

$$\nabla^2 \vec{E} - \nabla(\nabla \circ \vec{E}) = \mu_o \frac{\partial(\vec{J} + \varepsilon_o \frac{\partial \vec{E}}{\partial t})}{\partial t}$$

$$\nabla^2 \vec{E} - \nabla(\nabla \circ \vec{E}) = \frac{\partial(\mu_o \vec{J} + \mu_o \varepsilon_o \frac{\partial \vec{E}}{\partial t})}{\partial t}$$ apply Gausss Law

$$\nabla^2 \vec{E} - \frac{\nabla \rho}{\varepsilon_o} = \mu_o \frac{\partial(\vec{J} + \varepsilon_o \frac{\partial \vec{E}}{\partial t})}{\partial t}$$

$$\nabla^2 \vec{E} - \mu_o \varepsilon_o \frac{\partial \vec{E}}{\partial t} = \mu_o \frac{\partial \vec{J}}{\partial t} + \frac{\nabla \rho}{\varepsilon_o} \Leftarrow (5)$$

This is now a nonhomogenous wave equation. Let us now apply the conditions of free space – that means that the current density and free charge are zero. We get:

$$\nabla^2 \vec{E} - \mu_o \varepsilon_o \frac{\partial \vec{E}}{\partial t} = 0 \Leftarrow (6)$$

Now this time we will start with Ampere's Law.

$$\nabla \times \vec{B} = \mu_o \vec{J} + \mu_o \varepsilon_o \frac{\partial \vec{E}}{\partial t}$$

$$\nabla \times (\nabla \times \vec{B}) = \nabla \times \mu_o \vec{J} + \mu_o \varepsilon_o \frac{\partial (\nabla \times \vec{E})}{\partial t}$$

Applying same identity on the left hand side we get:

$$-\nabla^2\vec{B}+\nabla(\nabla\circ\vec{B})=\nabla\times\mu_o\vec{J}+\mu_o\varepsilon_o\frac{\partial(\nabla\times\vec{E})}{\partial t}$$

Apply Faraday's Law on the right hand side and on the left hand side apply the idea of no monopoles.

$$-\nabla^2\vec{B}=\nabla\times\mu_o\vec{J}-\mu_o\varepsilon_o\frac{\partial^2\vec{B}}{\partial t^2}$$

$$-\nabla^2\vec{B}+\mu_o\varepsilon_o\frac{\partial^2\vec{B}}{\partial t^2}=\nabla\times\mu_o\vec{J}$$

$$\nabla^2\vec{B}-\mu_o\varepsilon_o\frac{\partial^2\vec{B}}{\partial t^2}=-\mu_o\nabla\times\vec{J}\Leftarrow(7)$$

Applying the conditions of free space we get:

$$\nabla^2\vec{B}-\mu_o\varepsilon_o\frac{\partial^2\vec{B}}{\partial t^2}=0\Leftarrow(8)$$

The results both times are similar and tell us that these waves travel together and at the same speed.

Let us now look at a plane wave. We will idealize a plane wave of the electric field moving in the z-direction with the absence of free charge and current. This equation can be seen as a result of Maxwell's Equations and will represent a light wave.

$$\frac{\partial^2\vec{E}}{\partial z^2}=\mu\varepsilon\frac{\partial^2\vec{E}}{\partial t^2}\qquad(9)$$

A solution to it will be:

$$\vec{E}=\vec{E}_o\sin(kz-\omega t),\quad(10)$$

where E_o is an arbitrary constant and

$k=2\pi/\lambda$. Return the solution back to the original equation.

$$\frac{\partial^2\vec{E}}{\partial z^2}=\mu\varepsilon\frac{\partial^2\vec{E}}{\partial t^2}$$

$$\frac{\partial^2(\vec{E}=\vec{E}_o\sin(kz-\omega t))}{\partial z^2}=\mu\varepsilon\frac{\partial^2(\vec{E}=\vec{E}_o\sin(kz-\omega t))}{\partial t^2}$$

We take the first derivative and get:

$$k\vec{E}_o\cos(kz-\omega t)=-\mu_o\varepsilon_o\omega\vec{E}_o\cos(kz-\omega t)$$

Now take the second derivative and get:

$$-k^2\vec{E}_o\sin(kz-\omega t)=-\mu_o\varepsilon_o\omega^2\vec{E}_o\sin(kz-\omega t)$$

$$-k^2\vec{E}_o=-\mu_o\varepsilon_o\omega^2\vec{E}_o$$

$$k^2=\mu_o\varepsilon_o\omega^2$$

$$1=\mu_o\varepsilon_o\frac{\omega^2}{k^2}$$

$$1=\mu_o\varepsilon_o v_p^2$$

$$\sqrt{\frac{1}{\mu_o\varepsilon_o}}=v_p=c \qquad (11)$$

The value of c ($3*10^8$m/s) is the speed of light, a triumph for theoretical physics! Phase velocity, v_p, was defined above as ω/k. In free space the phase velocity is the same speed as the group velocity. The group velocity is the classical representation of the particle velocity.

Finally, let us make a definitive connection between the electric and the magnetic field.

$$\vec{E}=\vec{E}_o e^{i(kz-\omega t)} \qquad (12)$$

$$\vec{B}=\vec{B}_o e^{i(kz-\omega t)} \qquad (13)$$

Here is an E and a B field in complex notation. Let us now shoot for something called the Poynting vector.

Remember Euler's relationship:

$$e^{i\theta}=\cos\theta+i\sin\theta \qquad (14)$$

Relating the E field to the B field, Faraday's Law will be used.

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

$$\nabla \times (\vec{E}_o e^{i(kz-\omega t)}) = -\frac{\partial (\vec{B}_o e^{i(kz-\omega t)})}{\partial t}$$

Remember the identity: $\nabla \times (f\vec{A}) = f\nabla \times \vec{A} - \vec{A} \times \nabla f$

$$e^{i(kz-\omega t)} \nabla \times \vec{E}_o - \vec{E}_o \times \nabla e^{i(kz-\omega t)} = i\omega \vec{B}_o e^{i(kz-\omega t)}$$

$$\nabla \times \vec{E} = 0 \Leftarrow \text{Since } E_o \text{ is a constant vector.}$$

$$-\vec{E}_o \times (ike^{i(kz-\omega t)} \hat{z}) = i\omega \vec{B}_o e^{i(kz-\omega t)}$$

$$-\vec{E} \times k\hat{z} = \omega \vec{B}$$

$$\hat{z} \times \vec{E} = \frac{\omega}{k} \vec{B} \qquad (15)$$

It shows that B is perpendicular to $\hat{z}$ to E. Though it is important also to show that E is perpendicular to $\hat{z}$. To do this start with Ampere's Law and follow the same procedure as before.

$$\nabla \times \vec{B} = \mu\varepsilon \frac{\partial \vec{E}}{\partial t} \Rightarrow \vec{B} \times \hat{z} = \frac{k}{\omega} \vec{E} \quad (16)$$

Now we can define the Poynting vector. This vector is the cross product and the electric field and magnetic field and thus shows its direction of propagation (see figure 4).

$$\vec{S} = \vec{E} \times \vec{B} / \mu_o \qquad (17)$$

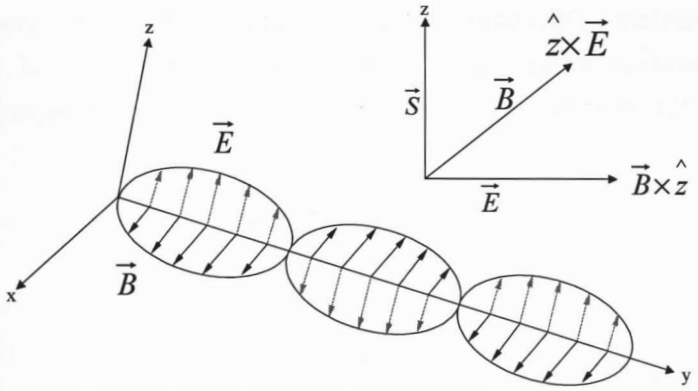


Figure 4: The first is a diagram of an electromagnetic wave. The E field is perpendicular to the B field. The second smaller diagram from Robert Good's Classical Electromagnetism shows visually what was already described mathematically and that is the the relation between the two fields.

Interaction of Laser Beams through a Medium

Let us first start this section by looking briefly at the Lambda system as seen in figure 3. There are three distinct states each with a particular population. As described before, Laser Induced Transparency comes about when the two lower states are occupied and the upper state is empty. This is also of particular importance for this study because a ratio of the entire population needs to be in the two lower states, not only to induce transparency, but also it is essential to revive the probe beam. Transparency can occur when only one of the lower states is populated, but the beam cannot be revived then.

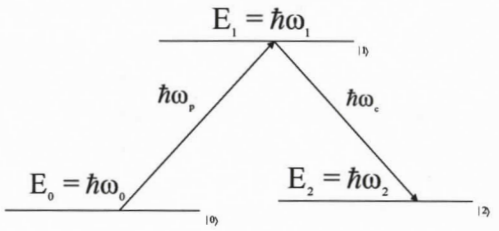


Figure 3: The Lambda system. Three different states with different populations. Ground first excited, and a hyper fine level near ground state.

Before moving one let us talk a little about the quantum mechanics that go on in the Lambda system. Quantum mechanics, simply put, is the study of how the microscopic universe works, but it is also essentially the study of waves with the importance of the information each wave can carry. In the Lambda system we see the following:

$$\begin{aligned}\Psi(t) &= C_o(t)e^{-i\omega_o t}\Phi_o \\ &+C_1(t)e^{-i\omega_1 t}\Phi_1 \\ &+C_2(t)e^{-i\omega_2 t}\Phi_2\end{aligned} \qquad (18)$$

This wave equation describes everything that is really needed in that system.

Before one delves into the interaction of the laser in the medium one needs to look at the polarization of the medium as a function of position and time. It involves calculating the mean electric dipole moment of an atom and multiplying it by the concentration, N. Therefore we get[7]:

$$\begin{aligned}P(t) &= N\langle\vec{\Psi}(z,t_r)\,|\,\hat{D}\,|\,\vec{\Psi}(z,t)\rangle \\ &= a_1^*(z,t_r)e^{i\omega_o t}a_2(z,t_r)e^{-i\omega_1 t}ND_{12} \\ &+a_3^*(z,t_r)e^{i\omega_2 t}a_2(z,t_r)e^{-i\omega_1 t}ND_{32}+c.c.\end{aligned} \qquad (19)$$

Since $\omega_p = \omega_1 - \omega_0$ and $\omega_c = \omega_1 - \omega_2$,

The positive parts of the polarizations of the two-laser frequencies are[7],

$$\begin{aligned}P^+_{\omega_p} &= ND_{12}e^{-i\omega_p t}a_1^*a_2, \\ P^+_{\omega_c} &= ND_{32}e^{-i\omega_c t}a_3^*a_2.\end{aligned} \qquad (20)$$

Knowing that following we can ascertain the amplitudes.

$$a_2(z,t_r) = -i\frac{e^{ik_p z}}{\Omega_p}\frac{\partial}{\partial t_r}\left(\frac{\Omega_c^*}{\sqrt{|\,\Omega_c\,|^2+|\,\Omega_p\,|^2}}\right) \qquad (21)$$

and

$$a_2(z,t_r) = -i\frac{e^{ik_p z}}{\Omega_c}\frac{\partial}{\partial t_r}\left(\frac{\Omega_p^*}{\sqrt{|\Omega_c|^2+|\Omega_p|^2}}\right) \tag{22}$$

Now for the amplitudes[7],

$$\begin{aligned} P_{\omega_p,0} &= iND_{12}\frac{1}{\sqrt{|\Omega_c|^2+|\Omega_p|^2}} \\ &\frac{\partial}{\partial t_r}\left(\frac{\Omega_p^*}{\sqrt{|\Omega_c|^2+|\Omega_p|^2}}\right) \\ P_{\omega_c,0} &= iND_{32}\frac{1}{\sqrt{|\Omega_c|^2+|\Omega_p|^2}} \\ &\frac{\partial}{\partial t_r}\left(\frac{\Omega_c^*}{\sqrt{|\Omega_c|^2+|\Omega_p|^2}}\right) \end{aligned} \tag{23}$$

Remembering the plane waves from an earlier section, they will now be used in seeing how waves travel in a medium where the amplitudes vary slowly. We see[7],

$$\begin{aligned} \frac{\partial E_{p,0}}{\partial z}+\frac{1}{c}\frac{\partial E_{p,0}}{\partial t} &= \frac{4\pi i\omega_p}{c}P_{\omega_p,0} \\ \frac{\partial E_{c,0}}{\partial z}+\frac{1}{c}\frac{\partial E_{c,0}}{\partial t} &= \frac{4\pi i\omega_c}{c}P_{\omega_c,0} \end{aligned} \tag{24}$$

Knowing that the half-Rabi frequencies are[7]

$$\begin{aligned} \Omega_p^* &= \frac{D_{21}E_{p,0}}{2\hbar} \\ \Omega_c^* &= \frac{D_{23}E_{c,0}}{2\hbar} \end{aligned} \tag{25}$$

Now equations 24 can be rewritten as

$$\frac{\partial \Omega_p^*}{\partial z} + \frac{1}{c}\frac{\partial \Omega_p^*}{\partial t} =$$

$$-\frac{\kappa_{12}}{\sqrt{|\Omega_c|^2 + |\Omega_p|^2}}\frac{\partial}{\partial t_r}\left(\frac{\Omega_p^*}{\sqrt{|\Omega_c|^2 + |\Omega_p|^2}}\right)$$

$$\frac{\partial \Omega_c^*}{\partial z} + \frac{1}{c}\frac{\partial \Omega_c^*}{\partial t} =$$

$$-\frac{\kappa_{32}}{\sqrt{|\Omega_c|^2 + |\Omega_p|^2}}\frac{\partial}{\partial t_r}\left(\frac{\Omega_c^*}{\sqrt{|\Omega_c|^2 + |\Omega_p|^2}}\right)$$

(26)

The kappa's in the above equation set are $\kappa_{12} = 2\pi\omega_p \mid D_{12} \mid^2 /(\hbar c)$ and $\kappa_{32} = 2\pi\omega_c \mid D_{32} \mid^2 /(\hbar c)$. Treat the coordinates for the amplitudes for the states is z and t_r and think of Ω_p and Ω_c as being functions of z and t_r. Then equation 26 becomes[7]

$$\left(\frac{\partial \Omega_p^*}{\partial z}\right)_{t_r} =$$

$$-\frac{\kappa_{12}}{\sqrt{|\Omega_c|^2 + |\Omega_p|^2}}\frac{\partial}{\partial t_r}\left(\frac{\Omega_p^*}{\sqrt{|\Omega_c|^2 + |\Omega_p|^2}}\right)$$

$$\left(\frac{\partial \Omega_c^*}{\partial z}\right)_{t_r} =$$

$$-\frac{\kappa_{32}}{\sqrt{|\Omega_c|^2 + |\Omega_p|^2}}\frac{\partial}{\partial t_r}\left(\frac{\Omega_c^*}{\sqrt{|\Omega_c|^2 + |\Omega_p|^2}}\right) \quad (27)$$

These equations are important in describing the propagation of the two laser beams (including the adiabatic process).

The special case that involves the results of the study depends on the coupling laser being much more stronger than the probe laser ($|\Omega_P(0,t)\tau| << |\Omega_c(0,t)\tau|$). With some of the approximate methods used in this study one already knows that there will not be a significant population in the third state and that the coupling laser is not heavily affected by the resonant medium (it propagates at c). Looking at the last equation with those limits it can be rewritten as[7],

$$\left(\frac{\partial \Omega_p^*}{\partial z}\right) = -\frac{\kappa_{12}}{|\Omega_c(0,t_r)|}\frac{\partial}{\partial t_r}\left(\frac{\Omega_p^*}{|\Omega_c(0,t_r)|}\right) \tag{28}$$

Bose-Einstein Condensate

First proposed in 1924 by an Indian physicist named Satyendra Nath Bose and Albert Einstein, this new kind of matter, as their theory goes, says that atoms crowded closely together in ultra-cold temperatures would lock together to form a condensate. This Bose-Einstein condensate was not formed until 1995 when the technology caught up to the theory. Temperatures of a few billionths above absolute zero, (273.15K) where atoms have the least energy, were needed to form a condensate[3].

Lene Hau and her group performed a unique experiment at the Rowland Institute where they used this new kind of matter to slow the speed of light to 17m/s. They used sodium atoms and injected them in the vacuum chamber. At this state the atoms are moving at very fast speeds. Laser beams are then used to slow the atoms down. The beams moving at the speed of light strike the atoms and absorb the photons, which in turn slow them down. Also, the beams order their randomness so they all move in one direction. This is analogous to how a laser was formed as mentioned previously. When they are slowed down some, more lasers are added in a process that is sometimes called "optical molasses." Every time an atom collides with a photon, it gets sent back in the direction it came from, which further slows it down or cools it. Finally, the atoms are clumped together in an oval-like shape and are held in place by a magnetic field. Any atoms that are still too hot get kicked out of the

magnetic field and the cooling process is complete, a condensate has now been formed[3] (see figures 5 & 6).

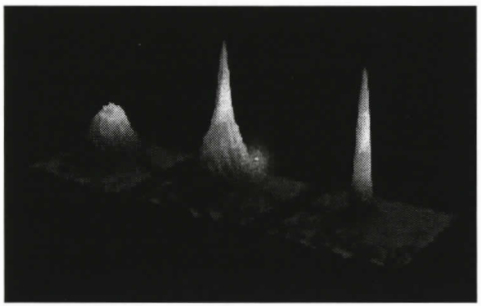
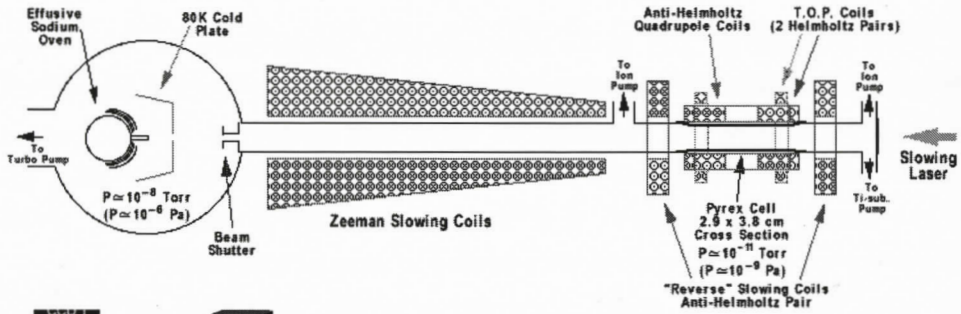


Figure 5: *This is a picture of a Bose-Einstein condensate made up of sodium atoms. This picture is from MIT's website.*



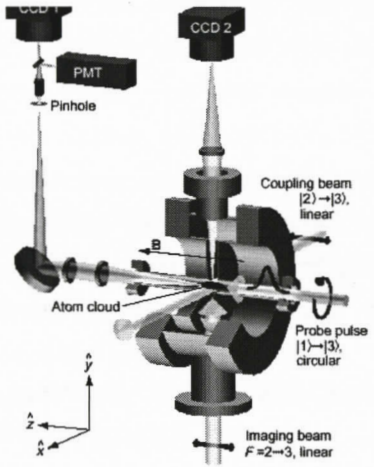


Figure 6*: The top picture is from NIST website, and it is their design for trapping and cooling atoms. On the left is the apparatus used by Lene Hau and her group. Both use helmholz coils to trap the atoms.*

Laser Induced Transparency

In an opaque cloud of atoms that make up a Bose-Einstein condensate, how is one supposed to make a laser go through it? There is a type of quantum interference called Laser Induced Transparency that will do the trick. If one manipulates the quantum states in the condensate, it can be made transparent for a narrow band of wavelengths of light.

Looking at the lambda diagram, one sees three different states. The first is ground state; the next is an excited state, and finally a low energy state. timing of the probe laser to the coupling laser will determine where the population of atoms will go. If the situation occurs where all of the population is divided into the two lower states or one of the lower states, the condition known as Laser Induced Transparency occurs.

The Light Speed Reduction Experiment.[6]

Most of the experiment was already explained in the section titled "Bose-Einstein Condensate". This experiment was essentially setup to explore the possibility of manipulating the optical properties of quantum systems.

Sodium atoms were trapped and cooled to the nanokelvin scale, which forms a condensate, and then two beams enter the opaque medium. One called the coupling beam sets up an interference that allows the second beam called the probe beam to propagated through the medium (see the section titled Laser Induced Transparency). With this setup (see figure 6) the speed of light can be slowed down significantly, in this case 17m/s.

The Stopped Light Experiment.[4,5]

Electromagnetically Induced Transparency, EIT, is a type of quantum interference that allows the propagation of light through an opaque medium, a Bose-Einstein condensate. A probe laser is what propagates through the medium, while the coupling laser is used to create the interference required to allow the propagation. Creating and containing the condensate was already discussed in the section titled "Bose- Einstein Condensate". Based on the phases and frequency of the probe and coupling lasers, the coupling beam is turned off when the probe beam is still on. The coherent information that was once contained within the laser is now imprinted or

"frozen" in the medium for a limited time. When the coupling laser is turned on again the probe laser is revived. It is important to remember that the photons of light were not captured or held in place, but rather it was the information that was stored.

Purpose of Study

The purpose for studying the stopped light problem is first to understand how light interacts with matter. The original intent when working with the exotic matter called a Bose-Einstein condensate was to explore its every facet. What are the limitations of the condensate? What properties does this matter have? It was speculated that the condensate could possibly, if the correct conditions exist, slow down the speed of light. If this speculation was correct, what could the implications be? Some instantly thought of quantum computing and improved communications systems, but this is not the purpose of this study.

The explicit purpose of this study was to look at limiting cases of a particular situation. This limiting case of interest is when the coupling beam is much stronger than the probe beam. Also the environment is setup for something called the adiabatic process to work. The adiabatic process can be thought of as the time taken for the coupling beam to setup Rabi oscillations in the medium; remember the lambda system.

Method of Research

The methodology behind this study was fairly simple and straightforward. First, literature about the original experiment was found and read. Then it became important to familiarize oneself with all of the background theory with the hope of becoming comfortable with the material. Now the student can sit and begin to study the problem.

The primary tool for the theorist is the compute,r and in this case it was no different. A program was written with the explicit purpose to compute and solve a series of differential equations to relay data. This data was then imported into a plotting program where the student could visually see the results. A 3D mesh plot and a contour plot followed by a two dimensional contour plot was constructed. Those plots are explained in the sectioned titled "Data" and the plots themselves can be seen at the end of the report.

DATA

The principal case is where the coupling laser is much stronger than the probe laser. The following plots will be described in detail with all of the parameters displayed of this particular case. All of the plots come in two forms: 3D surface plot and as a 2D contour plot. The importance of the 3D plots is to give the reader more of a feeling of what is really happening. It gives someone the sense that it can be physically held onto. The contour plot gives more of an aerial perspective and one can see all of the details.

The first 6 plots represent essentially how far and how strong the probe laser is at a particular depth and time. Plots 7 through 10 express the population in |a3| (the third state) at a particular depth and time. Looking at table 1, one can see all of the parameters that were put in to create these plots.

Symbol Key:

t_d = the time delay before the coupling laser returns

$\Omega_c\tau$ = Rabi frequency of the coupling laser times the pulse length of the laser.

$\Omega_p\tau$ = Rabi frequency of the probe laser times the pulse length of the laser.

$|2\rangle\tau$ = the lifetime of state 2 times the pulse length of the laser

$K_{12}\tau$= a constant (/cm)

$K_{32}\tau$= a constant (/cm)

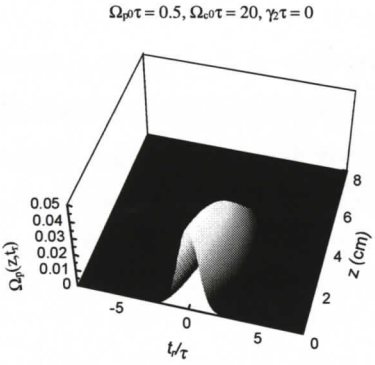
0m_c = ratio of amplitude of the recurring coupling beam compared with the initial

L (cm) = length of the vapor cell

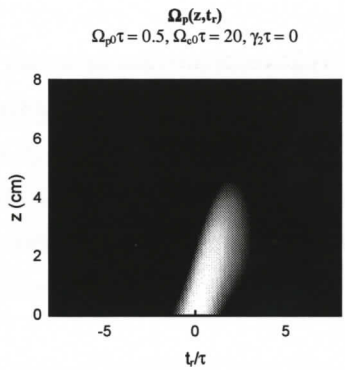
Whenever light travels through a medium it is slowed down. We represent this situation called the retarded time as $t_r = t - z/c$.

Plots 1 & 2

This case has the coupling laser delayed for a time of 12, which is out of range for the plot. This is in essence a situation where the coupling beam is turned off and never turned back on. The plots in this case show limited penetration into the medium and then the light gets absorbed.



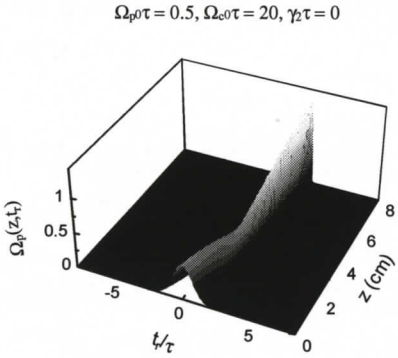
Plot 1: This 3D surface shows the probe laser entering the medium with the coupling laser and then it is turned off and doesn't return.



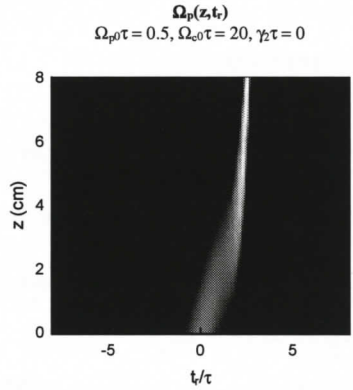
Plot 2: This 2D contour shows an aerial view of what took place in the 3D surface.The lighter regions represent higher elevations.

Plots 3 & 4

This case has the coupling laser delayed for only a time of 3, which is now in the range of the plot. Now where the first two plots ended, this one continues. When the coupling beam returns, it partially blends back into the original source, but it can be seen that the probe laser returns.



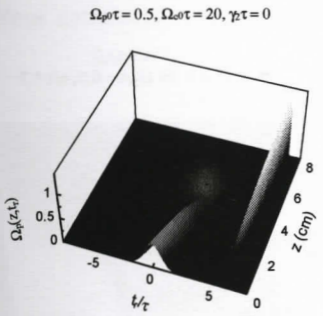
Plot 3: This 3D surface shows the probe laser entering the medium with the coupling laser and then it is turned off only to be brought back 3 time units later. Probe laser is revived.



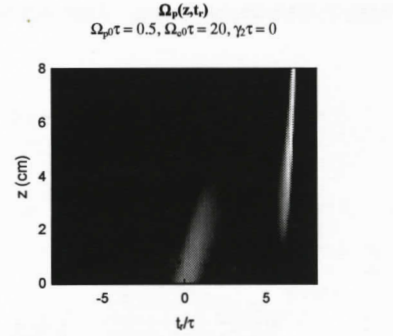
Plot 4: This 2D contour shows an aerial view of what took place in the 3D surface. The lighter regions represent higher elevations.

Plots 5 & 6

This case has the coupling laser delayed for only a time of 7, which is at the edge of the range of what can be plotted. This is the best case to see that the probe beam returns once the coupling beam is brought back. There is now spacing between the original penetration and then an obvious gap where the coupling beam is off and then back on.



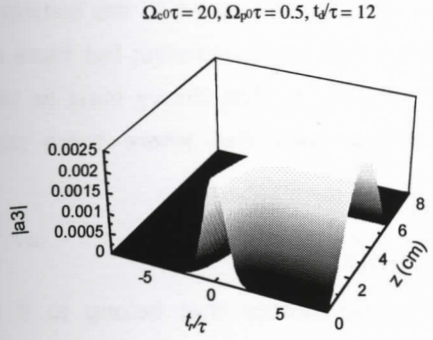
Plot 5: This 3D surface show the probe laser entering the medium with coupling laser and then it is turned off only to return 7 time units later. The probe laser is fully revived.



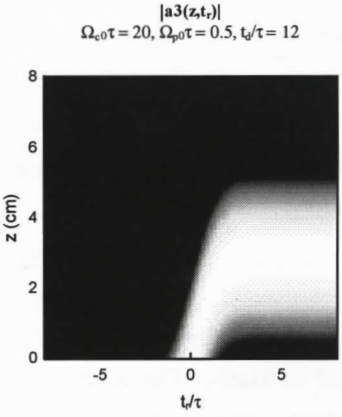
Plot 6: This 2D contour shows an aerial view of what took place in the 3D surface. The probe laser is revived at 7 time units later. The lighter regions represent higher elevations.

Plots 7 & 8

These two plots show the |a3| when the coupling beam has returned after 12 units of time. After the coupling beam is cut off, the population of |a3| is held constant. The 3D plot shows a full surface of what is happening, while the contour plots gives an aerial view of the same thing. The lighter color represents a higher elevation.



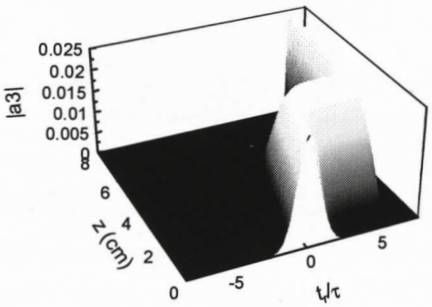
Plot 7: This is a 3D surface representing a situation where the coupling beam doesn't return and the population of |a3| remain constant.



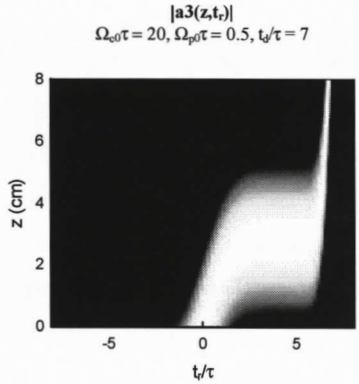
Plot 8: This is a 2D contour plot of plot 7 showing an aerial view.

Plots 9 & 10

These two plots show |a3| when the coupling beam has returned after 7 units of time. After the coupling beam is cut off, the population of |a3| is held constant until the coupling beam returns. Then the population is not constant and is excited again. The 3D plot shows a full surface of what is happening, while the contour plots gives an aerial view of the same thing. The lighter color represents a higher elevation.



Plot 9: This 3D plot shows what happens to |a3| at a time unit of 7 when the coupling beam returns.



Plot 10: This is a 2D contour plot representation of plot 9. The lighter colors represent higher elevations

Overall these ten plots were the expected outcome based on the theory. Simply put, the times that the coupling beam returned the approximate model had the probe beam revived, and when the probe beam was not revived was when the coupling beam wasn't returned. Generally, the purpose of this study was completed, but there is some more that needs to be done at a more careful approach. The theory must be tested to all extremes to see when and where it breaks down and where there might be limitations.

Conclusions

The study of stopped light and the consequences that belong to it can be difficult to study. The limited time partitioned to this study does not allow the author to feel wholly comfortable with material as desired.

In genera,l the quantum phenomenon expressed by the original experiment can be misleading and have been reported incorrectly at times and therefore can be difficult to explain. The information about how it works can be easily lost through oversimplification, but sometimes it becomes necessary in order to see the whole picture.

This study will be an ongoing process untill the author can accomplish something more definitive, as the author needs to have the material feel like second nature before satisfaction is achieved.

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ECONOMIC RECONCILIATION FOR THE POOR AND THE RICH IN GLOBAL SYSTEMS

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ABSTRACT

Social and economic disparities between the rich and the poor countries are persistent. Poverty-eradication and income distribution are major parts of the United Nations' global agenda. This study presents discussions of these complex issues incorporated with the influence of globalization. The purpose of this study is to encourage readers to think actively and critically about the issues influencing world conditions. The methodology used is qualitative analysis. The procedure involves analyzing relevant information from a variety of sources including literature in political economics, articles and official documentation. Result: Findings may show that there has been substantial improvement in economic conditions in poor countries as a result of emerging technology and more open global economic policies. More rigorous international cooperation is significant in improving stability in the world systems. Continuing technology revolution provides an opportunity for global economics and social development, while at the same time facilitates serious challenges and problems including: economic crises, violence and crimes, social insecurities and inequalities, and environmental degradation.

INTRODUCTION

Global inequality is one of many challenges the world is facing today. People have become more globally oriented, and most believe that globalization has brought the world's society closer together. This is a piece of the central question studied here: is it true that world societies are closely connected or, instead, have become further apart from each other? In analyzing this issue, I have divided the content of this study into four sections.

In the first section, I will talk about three periods of the globalization process in a brief and general description. In the second section, the discussion will focus on the impacts of globalization on societies in this post-modern era. In the third part, I will focus more on the issue of inequality among global societies. The last part will expand the discussion around the implications of globalizing society and its socioeconomic and environmental impacts. The conclusion will reemphasize all points of the study.

Three Periods of the Globalization Process

First, what is globalization? "Globalization is a world - wide process of increased technological, trade, financial and information flows that penetrate countries and affect domestic society" (Hughes, 2000, p.431). Globalization in this era is characterized by a more complex human and environmental condition. Since the industrial revolution around 200 years ago, the world economy has begun to change from its traditional home-economy into a manufacturing and market-economy on a large scale. This change was gradual until the end of cold war in the late 20th century.

Then, the process of globalization became more transparent and increased its speed and its scope. For example, the most notable characteristic of the era of globalization after the 19th century was the formation of a number of international corporations and organizations in defining and reaching common goals among countries in areas such as economics, politics, military, human rights and social value systems. These include the establishment of the United Nations organization, GATT, and The Bretton Woods Agreement. In addition, international economics activities also started taking their toll in trade, capital investment, and money market transactions. Table 1 shows world's industrial production annual growth rate during the period of 1710 - 1996.

Table1: World Industrial Production during the period of 1710-1996

Year	Index Value (1913 = 100)	Average Annual Growth Rate During Period
1710	0.6	
1790	1.8	1.4
1840	7.4	2.9
1913	100.0	3.6
1938	182.7	2.4
1973	1,116.0	5.3
1980	1,321.5	2.4
1990	1,636.0	2.2
1996	1,859.5	2.2
1710-1996		**2.9**

Source*: Hughes, Barry. 2000, Continuity and Change in World Politics; United Nations Statistical Yearbook 1983/1984; United Nations, Monthly Bulletin of Statistics, March 1998, 250.*

Globalization in the Post - Modern Era

Globalization in this present era has distinguishing characteristics. Highly revolutionized information and communication technology has influenced humanity in multidimensional aspects in an unprecedented way. Advancement in all fields of sciences and technology has dramatically and rapidly changed our lives.

One of the consequences of this rapid world integration is that our world has become smaller in terms of social interactions, exchange of ideas, and information and transportation systems. For example, the internet, cellular phones, fax machines, satellite systems, digital and computer technology are some of the factors and devices that have connected the world community closer than ever (Hughes 2000:17-18). The reason is that all of the tools mentioned above facilitate instantaneous flows of communication and other social interactions between individuals around the world twenty-four hours a day. Decades ago, such opportunity was not even seen on the horizon. For example, when the computer and the internet were first invented in the1930s, only government, academic institutions and military personnel had access to them, and their capability and purpose were very limited compared to now. In this era, (particularly for the rich countries), the computer and the internet have been seen as

another "necessity" for every household. They are widely available with relatively low cost.

Nonetheless, there are parts of globalization which are challenging and quite problematic to global community and stability for the short run as well as for the long run. These problems and challenges will influence the conditions of the world environment and community in the future. What are these challenges and problems?

Global Inequality

UN secretary general, Kofi Annan, in 1999's world summit, stated, "approximately 50% of the world's 6 billion people struggle to survive with less than $2 per day" (UN world summit 1999). This statement does show an obvious economic problem in terms of income distribution. However, the true realities of global inequality are much more complex than what that simple, yet, profound statement says. Further, the seriousness of the problems has not been well taken into consideration by the majority of society in international community, other than the UN and a few others. Consequently, few people are aware of the urgency and the need for a more immediate response to the global social problems relative to the serious nature of the threats we might face in the present and future if these problems remain unattended adequately and properly.

Due to innovative scientific ideas and human intelligence, technology that we see today has made human lives so much more advanced and improved in all aspects. Almost to any problem there is a ready solution; for example, genetic engineering produced a seedless orange, artificial insemination provides genetic improvements in breeding, and space exploration has led to countless useful everyday products. Were this not the case, scientific experts would spend a lot of time in conducting research and experiments to develop some kind of alternative solution. Usually, they would not stop until they finally find ideas that work in solving the problems.

Nevertheless, it is obvious that social and economic inequality seems like one of major social problems that no expert in the world has ever succeeded in solving. Hundreds of theories have been written about it. However, there has been little implementation that really aimed at equalizing the imbalances. After 200 years of being debated and studied, the gap is only getting wider. For example, "during the end of the

19th century, the ratio of the average income of the richest countries to that of the poorest was 9 to 1, and today is around 60 to1"(Birdsall, 1998 p19). Furthermore, this study suggested that "the portion of the world's population living in poor countries grew 250%, while in rich countries the population increased only by 50% since 1950"(Birdsall, 19).

In the next sections of this study, I will further discuss the implications of this globalizing world and the global social imbalances in broader detail. However, first, I would like to lay out brief economic categories of the entire global societies as a relevant background to the subsequent analysis in this study.

Three Categories of World Macro economy

Currently, the UN's record shows that there are approximately 174 countries in the world. The economics divisions among all the societies in the global system covers those 174 countries. For the purpose of this study, the world economy is grouped into three categories: the richest 20%, the middle 60% and the poorest 20%.

The richest 20% is the economies belonging to highly industrialized nations or highly developed countries. These nations are mainly in North America, Western Europe, but also include Japan and Australia. The middle 60% consists of developing economies, mainly in Southeast Asia, Latin America and Russia, while the poorest 20%, which are also called *economies-in transition* (less developed economies), are those of Africa, especially Sub Saharan countries and CIS (Commonwealth of Independent States) (3).

The inequality between the poor (the second and the third categories) and the rich (the first category) is still persistent even in this modern globalization era. Most of the poverty is found in developing countries and in the poorest regions. Some scholars believe that "globalization only makes the rich get richer and the poor get poorer." How has globalization contributed to global inequality? In answering this question, first, I would like to discuss the issues of economic inequality and global opportunity. However, before I do so, let me just briefly mention some factors that are usually used in measuring the economic performance of a nation. This is relevant as a base to better understand some of the terms used in the following discussion.

Factors in Measuring Macroeconomic Performance

GDP, inflation, the unemployment rate, Foreign Direct Investment, Purchasing Power Parity (PPP), international interest rates and the volume of exports-imports usually measure the macroeconomic conditions of a nation.

GDP (Gross Domestic Product) is defined as "the market value of the final goods and services produced in the economy within some time period, usually one quarter or one year"(Collinge & Ayers, 1996, p 579). Inflation, on the other hand, is considered good at a low level, which indicates stability in the prices of the goods and services in the nation's total economy. The same is true for the unemployment rate. A good economy usually has a full employment, which means, " a situation in which all members of the labor force that desire employment are working"(Edgman, at al, 1998 p.456).

Foreign Direct Investment (FDI) is also a significant economic indicator. It is defined as "Interstate capital flows through which a firm in one country acquires, creates, or expands a subsidiary in another country" (Hughes, 2000, p. 430). The flows of FDIs from the rich countries into the poor countries usually will substantially influence the economic development for those poorer countries. Lack of capital investment and technological factor markets are some of the major disadvantages of poor nations' economies that hinder their growth.

Purchasing Power Parity (PPP) is another factor used in measuring the economic development of a nation. It is the calculation of GDP and other economic variables that values goods and services at equivalent prices across countries (Hughes, p. 439).

Exports and imports are the outflows and inflows of goods among countries. Usually, exports are valued at transaction value, including the cost of transportation and insurance to bring the goods to the frontier or border of the exporting country. Imports are also valued at transaction value plus the cost of transportation and insurance to the territory of the importing country. Table 2 illustrates some of the inequality for global opportunities based on 1997's share.

Table 2: Inequality Between Countries for Global Opportunities based on 1997's share

Global opportunity	Richest 20%	Middle 60%	Poorest 20%
World GDP	86%	13%	1%
Export	82%	17%	1%
Foreign Direct Investment	68%	31%	1%
Internet user	93.3%	6.5%	0.2%

Source*: United Nation Human Development Report 1999*

The above table yields the following conclusion: The fifth of the world's people living in the highest income countries had 86% of world GDP, while the fifth poorest countries had only 1%. The middle three-fifths had 13%. As forestated, GDP is one of the determining factors in measuring macroeconomic performance of a nation. High GDP means economic growth and the overall economy is good. The simplest way to understand the above figure, therefore, is like this: for every eighty-six pieces of bread for the richest countries in a day, there is only one piece of bread for the poorest countries. This also means that the rich countries' wealth is eighty-six times that of the poorest and thirteen times the income of those in the middle. And the same illustration (interpretation) can be made for the rest of the data in the table with the rest of variables.

The distribution of the global wealth needs to be more balanced, not just for the sake of fairness but, more importantly, for the sake of stability in the entire "global village". How do economic disparities influence global stability? To answer this question, one must fully understand the entire concept of and the force of globalization. For this reason, let me continue to discuss the other challenges and problems we are facing as a result of highly integrating world systems. These problems are, among others: financial volatility and economic insecurity, job and income insecurity, health insecurity, cultural insecurity, personal insecurity, political and community insecurity, and environmental degradation. In the next subheadings, I will further explain these insecurities, one by one in a broader sense, by providing some examples and their interconnections with technology and globalization.

Financial Volatility and Economic Insecurity

One of the most painful and highly unprecedented economic events was that of Asia's financial crises during 1997 - 1998. It first started in Thailand. Then, quickly (almost overnight), it spread to its neighboring countries, Indonesia, Malaysia, Korea, Singapore, Philippines and even Japan. Soon after, it threatened Russia, Brazil and the rest of Latin America.

Prior to the financial crises, Asian countries were in a fairly stable economic condition. In fact, for several years before the crises, they had had the most impressive economic growth with average per capita growth of 5% compared to the rest of the nations.

Net capital flows to Indonesia, Korea, Malaysia, Philippines and Thailand was high for most of the 1990s. It reached $ 93 billion in 1996. But, as the crises rapidly and aggressively hit market after market, the economics successes were soon history. During the first week of this economic turmoil, the outflow of capital from the regions amounted to $ 12 billion, which is about 11% of the pre-crises GDPs of these nations. The shortest and simplest explanation to this tragedy is a global financial market failure. And the consequences are not just economic devastation, but also social and political disruptions that were sudden, hurtful, and sorrowful to the entire populations of these nations, particularly in Indonesia

The social impacts of this economic disaster have cost thousands of innocent lives. How did it happen? The shock of losing hundreds of thousands of jobs overnight, the sudden and sharp inflation, the sudden drop in the real wages (40% - 60%), combined led to an unprecedented social upheaval that swept across Indonesia. People, therefore, were panicking and scared. It promoted anger, frustration, riots, demonstrations and violence, which were spreading like wild fire across the country. As a result, thousands of people died due to random violent attacks, not to mention the damages to private property and hundreds of major facilities and infrastructures that were totally destroyed or burned down. For at least two years, this country was "a dead place," totally disoriented, chaotic and officially declared an unsafe place to visit by international governments. (See US Embassy's WebPages for Indonesia).

Two important lessons from Asia's economic crises of 1997 - 1998 are these: first, impacts on humanity are severe, and likely to persist for a long time, even after

economic recovery is taking place; second, the total bankruptcies of these countries made other national budgets suffer as well, especially health and educational budgets. This is a setback, and will further delay economic development. A review of financial crises in 80 countries over the past few decades shows that real wages take an average of three years to return to pre-crisis levels. Further, it also suggests that employment growth does not regain for several years after the crisis.

Job and Income Insecurity

How does globalization influence job and income insecurity? Global economic trends for both poor and rich countries are corporate and economic restructuring, dismantling the institutions of social protections, acquisitions and mergers (horizontal and vertical). These popular economic activities have influenced greater insecurity in jobs and, therefore, in income. The scenario is like this: as a result of global trade and global competition, countries, businesses and employers have been pressured to adopt more flexible economic policies and labor arrangements. Mergers and acquisitions, and other types of corporate restructurings risk massive employment layoffs. In fact, the US was recently facing dramatic employment layoffs due to reasons similar to those factors listed above. Other examples include, "workers without contracts, or with a less secure employment contracts make up 30% of the total employment in Chile, and 39% percent in Columbia." This employment problem is found almost in every country nowadays. Geoffrey Garrett, a professor at Yale University, suggested, "the most important immediate effect of globalization is to increase social dislocations and economic insecurity, as the distribution of incomes and jobs across firms and industries becomes increasingly unstable" (Garrett, 1998, p.7). He further said that as a result of this, people have to spend more time and money in an effort to make their future more secure.

Health Insecurity

HIV/AIDS is an epidemic disease in African countries. More than thirty-three million people were living with this disease/virus in 1998. This figure shows an additional six million new infections in that year alone. Growing transcontinental travels and migrations between countries help spread the virus. A new study showed that this

virus now is rapidly spreading in rural India, Eastern Europe and CIS countries. The data also showed that 95% of the 16,000 people infected each day are living in the less-developed countries, notably in Sub-Saharan African Countries. For example, "in Zimbabwe, 26 % of the adult population is infected; in Botswana, the rate is 25 %"(Brown; Halweil, 2000:23). In South Africa, with a population of 43 million people, the rate is 22 %. Other countries that have infection rates greater than 10 % are: Namibia (20%), Swaziland (18%), Malawi (15%), Mozambique (14%), Rwanda (13%), Kenya (12 %) and Central African Republic Cote d'Ivoire with rate of 10%. (See table 3). So far, the study showed that HIV infection rates in industrial countries is 1% of their adult population (Brown; Halweil: 43).

Table 3. Countries where HIV infection Rate Among Adults is Greater than Ten Percent

Country	Population (millions)	Share of adult population infected (percent)
Zimbabwe	11.7	26
Bostwana	1.5	25
South Africa	43.3	22
Namibia	1.6	20
Zambia	8.5	19
Awaziland	0.9	18
Malawi	10.1	15
Mozambique	18.3	14
Rwanda	5.9	13
Kenya	28.4	12
Central African Republic Code d'Ivore	14.3	10

Source*: UNAIDS & Global issues 00/01*

What are the social consequences of the HIV/AIDs? Among others, first, it shortens life expectancy. "In Bosnia, for example, life expectancy has fallen from 61 to 44 from 1990 to 1999." Furthermore, life expectancy is projected to drop to 39 years by 2010 (Brown; Halweil: 43). Second, HIV also decreases fertility because some women that were infected since infancy will likely die before reaching their reproductive ages. Meanwhile, for those that are infected and able to conceive, there is a high risk of spontaneous abortion. For the rest that are able to continue to carry on the pregnancy

cycle and give birth, an estimated 30 % of their infants are infected already, and another 20 % will likely be infected during their second year of age. In addition, this disease has resulted in growing numbers of orphan children. Also, the epidemic damages other social infrastructure of those nations with economic effects that ultimately increase the poverty level, illiteracy and malnutrition (Brown: Halweil 43).

Cultural Insecurity

Today's flow of culture is also unbalanced. The flow is heavily weighted in one direction: from rich countries to the poor. Notably, the single largest export industry for the United States is not aircraft or automobiles. Instead it is the entertainment industry. Hollywood films grossed more than $ 30 billion in 1997. Again, the expansion of powerful global media networks and satellite communications technology bring Hollywood to remote villages around the globe.

Personal Insecurity

Deregulated capital markets, advances in information and communication, and cheaper and faster transport make flows easier and more effective, not just for ideas and knowledge but also for illegal activities. For example, many illegal transactions, done through the internet as well, include markets on illicit drugs, weapons, prostitutions and other underground economic activities. All of these activities are often undetectable. Illegal weapons trades equip street crimes. The internet is also used as a network in managing the markets and transaction activities on women as well. Quite often, no one can really detect it because of the use of certain codes and other secrecy strategy.

In 1995 illegal drugs traded was estimated at 8% of world trade, which means that this underground economy was larger than motor vehicle trade, during that time. The IMF estimates that 2-5% of global GDP hides the traces of crimes in split seconds, with the click of a mouse on computer.

The growing influence of organized crime is estimated at $ 1.5 trillion a year. This is quite competitive with multinational corporations in terms of economic size.

Environmental Insecurity

Many worlds populations today are unaware of the silent chronic environmental cancer that threatens the stability of our world as a result of cumulative human activities. Aggressive businesses and economic expansion, which directly and rapidly depletes our natural resources, is affecting the stability and the health of our globe. The growing exports markets for fish, shrimp, lumber and other natural commodities means depleting stocks, less biodiversity and fewer green forests. As one author said, "contemporary methods of resource utilization often creates problems that transcend national boundaries" (Turbark, 2000: 61). Although the environmental impacts of humans' daily activities are not clearly seen in the short run or in the present; nonetheless, this does not mean that they are not there. The Greenhouse effect, for example, resulted from the increase of carbon dioxide (CO_2) in the atmosphere from fossil fuels produced by automobiles, manufacturing machines and some other chemical compounds such as CFCs, and methane. The gradual effects of this air pollution include a change in global temperature and subsequent rise in global oceans. The atmospheric level of CO_2 is estimated to double by the middle of the 21^{st} century. Finally, the environmental problems that the world is facing today, among others, are: "air pollution, acid rain, global warming, ozone depletion, tropical deforestation, water pollution and nuclear waste accumulation" (Glantz, 2000:65). All of these hurt the planet in various ways.

Political and Community Insecurity

World statistics showed that out of 61 major armed conflicts fought between 1989 and 1998, only three of those were between states. The rest were fought within the states. In other words, the majority of the conflicts were civil conflicts. This is another trend in this globalization era. These conflicts were blurring political and business interests. During the post cold war era, military companies and mercenary armies began offering training to governments and corporations.

Globalization with Two Directions

Highly revolutionized information and communication technologies are driving world integration but polarizing the world into the connected and the isolated. In other

words, globalization divided us into two factions. The first faction is a group of societies that are closely connected to each other more than ever. The second faction is for another group of societies that are further isolated from the world.

With the cost of communication plummeting and innovative tools easier and simpler to use, people around the world have burst into instant conversation daily using internet, mobile phones and fax-machines. Statistics showed that the internet is the fastest - growing communication tool ever. During 1998 alone, it had more than 140 million users. And this number is expected to pass 700 million by the end of 2001. This trend can foster great advantages in health and education.

Therefore, global technological breakthroughs offer great potential for human development and for eradicating poverty. But we must be willing to use technology properly. Still, it is also fundamental to understand the hindrances and barriers on the implementation.

Barriers for Technology and Information Sharing

Despite the potential for growth and development through the use of internet, there are significant barriers in the process. Some of the barriers are as listed by UN for human development report:

- **Geography divides**
  In 1998, Thailand had more cellular phones than Africa. South Asia, which is home to 23% of world's populations, had less than 1% of Internet users.
- **Education is the ticket to the network high-societies**
  Globally, 30% of users had at least one university degree.
- **Income buys access**
  While the average American would pay just one month's wage to purchase a computer, the average Bangladeshi would have to spend more than eight years income.
- **Men and youth - dominate**
  Women made up only 17% of the internet users in Japan and only 7% in China. Most users in China and the United Kingdom are under 30.
- **English - talks**

English prevails in almost 80% of all websites. Yet, the ratio of people who speak English is less than 1 in 10 people worldwide.

The above exclusivity factors parallel the data we have mentioned in the previous sections of this study. Those with income, education and, literally, connections have cheap and instantaneous access to the information and communication systems. The rest are left with uncertain, slow and costly access. When people in these two worlds live and compete side by side, the advantage of being connected will overpower the marginal and impoverished, cutting off their voices and concerns from the global conversation.

Sustainable Development Management for Global Community

Global convergence is not only necessary, but it is more of an emergency call. Perhaps, that is what the inventions and all of the sophisticated technologies and sciences are for. Humans have been equipped with sufficient knowledge, wisdom, ideas and power to overcome the problems on this planet. What the world is currently lacking is a greater sense of social unity and solidarity in perspectives. The diversity of humanity in terms of cultures, political systems, languages, nationalities, demographical sovereignties and many other differential attributes, should not be hindrances in achieving common goals to preserve global stability and prosperity for all.

The affluent nations hold the key and a significant role for distributing the flow of knowledge, technology, capital investments and information to help enhance the socio-economic condition of the less fortunate countries.

What are those things that can be done to pave the road into convergence? First, economic equality and stability for all should be on top priority. Next, the spread of education and information to the poor by facilitating greater access is desirable. In addition, there is a need for a more active promotion on human rights and civil liberty.

Strong Economies and Societies in Global Community

One of the most fundamental strategies in preserving stability is economic development. The more equalized distribution of information technology throughout countries will promote productivity and growth. The new global economic policies that strengthen multilateral trade and investment will broaden free competition. "The rules-

based systems combined with well-designed domestic institutions and policies provide the best framework for releasing the promise of new economy and supporting poverty reduction and sustainable development."(OECD annual report 2001).

Trades policies, governance policies and environmental policies should be designed based on international agreement without interfering with political or national sovereignty of each nation. And those policies can and should be seen complementary to each other. For this reason, there is a need for a general guideline as a benchmark for multinational cooperation in the area of trade, export and markets competition aimed at the promotion of democracy and development. In addition, progress toward eradicating extreme poverty involves investing in early education, commitment to a more liberalized markets competition and a more equalized sharing of technologies and information.

Conclusion

Globalization, therefore, provides us with great opportunities for human advancement in a more equalized manner. Increased trade, foreign investment, technology, communication and information sharing can fuel economic growth and social advancement for all. Global markets, global technology, global ideas and global solidarity can enhance peoples' lives everywhere. The key is to understand and to realize what is going on in the global community: the good parts and the challenging parts; and, more important, to realize that the good parts that the world has today as far as technological capabilities and scientific innovations are concerned, combined with a higher sense of solidarity and cooperation, are sufficient in their scopes to overcome most of the challenges and problems that we are facing today. Stronger implementation with full consciousness of common goals is achievable and can be used to assist the lives of those less fortunate societies and keep the planet and its humanity in sustainable and continuous development, with strong stability and prosperity for all.

Endnotes

1. Bretton Woods System is the monetary and trade systems created after the WWII. Two pillars of the systems are the International Monetary Fund (IMF) and the World Bank.

2. Economic and social disparities have been found as a societal problem since the industrial revolution 200 years ago.
3. CIS country members are: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

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