10th annual undergraduate research symposium abstracts

Friday, March 14th

8:00 a.m. - 6:00 p.m.

Student Union Building

Truman State University

Division of Business and Accountancy

Is The Degree of Fashionableness Affected by Accessorization?

Jill Baldwin, Michelle Reynolds, and Talia Teer

Dr. Val Larsen, Faculty Mentor

How does *People Magazine* determine who will be the year's Best and Worst Dressed celebrities? We hypothesized that the number of accessories an individual adds to an outfit determines how fashionable the outfit will be. To determine if our hypothesis was correct, we conducted an experiment. To avoid confounds where a respondent would rate his/her opinion of the accessorization upon their degree of satisfaction with the outfit, the model was dressed in a basic black pant and basic black blouse. Five stages of accessorization were captured on photograph. In each picture, the number of different accessories added were increased. A survey which rated each picture was given to a twenty-six member statistics class. The results from the survey were analyzed and the conclusion drawn supported and contradicted the hypothesis.

Does the Acceptable Level of Saturation in a Suit Vary Across Genders and How Does this Impact an Employer's First Impression?

Thomas Bernatow, Mike Shine, and Amy Street

Dr. Val Larsen, Faculty Mentor

What someone wears during an interview plays a significant role in an employer's first impression. In our research project, we examined the differences between genders and suit saturation levels. The preliminary research focused on the rules that govern color in the work place. From this we developed a survey that was distributed to area professionals. The subjects were asked to rate the levels of professionalism, competency, and representativeness based on photographs. The research shows that there is a difference between saturation levels and acceptance in the professional world.

Strategic Advantage Through Expert Systems: Japan vs. United States

Tyrone Fernando and Kristi Doyle

Dr. Pyung Han, Faculty Mentor

Two of the most powerful countries in today's economy are Japan and the United States. These two countries have been competing for over a decade to gain a technological advantage over one another. Through this research, we will investigate the advantages of using expert systems in each countries' business sector. Expert systems, or knowledge-based systems, are the latest applications of information technology. Although expert systems were introduced in the United States before Japan, the Japanese have also begun employing expert systems to try and gain a competitive advantage. Through this study, we will determine which country has been using expert systems more effectively, to this point. In addition, we will compare companies from similar industry from each country to see where the competitive advantage lies.

The Tough Business of Money Making

Jolie Gegg*, Melissa Johnson, and Kim Link*

Dr. Jason Lin, Faculty Mentor

Violations of Securities and Exchange Commission regulations by stockbrokers, bondbrokers and publicly traded companies occur frequently in the financial world. While it is difficult to eliminate all of the violations, as investors we should be aware of the type of violations that have the potential to affect our own investments, and as future upper-level managers, we must be aware of SEC regulations and common abuses of those regulations. This presentation will focus on some common infractions of SEC regulations through recent examples. These instances of SEC violations have affected financial industry participants from companies and private investors to NASDAQ itself. The SEC, U.S. Congress, state legislatures, lobbyists, and private interest groups have all attempted to curb these violations through different methods which will be considered.

Intercultural Communication: The Nonverbal Aspect

Elaine King

Pyung Han, Faculty Mentor

As the world begins to shrink due to increased mobility, modern communication technology, and an awareness of common worldwide problems, it is becoming apparent that we can no longer ignore the impact different cultures have on our lives. This exposure to different cultures makes it imperative for us to make an effort to understand people whose communication styles may be vastly different from our own. The purposes of this study are to examine the differences of nonverbal communication between cultures and to discuss the impact of nonverbal communication on international business negotiations. It will attempt to show that since nonverbal communication and culture are closely linked, they are both learned through the social learning approach.

How do Presidents and Presidential Elections Effect the Stock Market?

Nate Landsbaum*, Craig Clark, Jeff Barnum, Brad Busch

Dr. Jason Lin, Faculty Mentor

What are investors supposed to do when election time comes around? There is significant evidence that suggests that the actions of the President of the United States as well as Presidential Elections directly influence the performance of the stock market. This research is based on a theory that there exists a chain reaction that is initiated by the President and eventually moves to Wall Street. Numerous Presidents have witnessed a significant fluctuation in the stock market both during their terms in office and their elections. There is also interesting facts on the effects that the balance of power in Washington has on the stock market. Through the years, certain combinations of political parties in Congress and in the White House have had more positive effects on the stock market than other combinations. The theory that is incorporated begins with the political ideology of an individual President, the economic policy of that President, the effects that those policies have on the business environment, the financial positions of firms, and then investor reaction.

Option's Implied Volatility as Indicator of Spot Index

Paul Lundstrom

Dr. Andrew Mun, Faculty Mentor

Market observers have recently focused on S&P 500 options as a source of volatilities in S&P 500 indices. Option's implied volatilities are often interpreted as an indicator of market uncertainty about future spot prices. In this paper, I seek to empirically investigate the impact of implied volatility of S&P 500 index options on the S&P indices. In particular, I examine the usefulness of implied volatilities as an indicator of market sentiment. Empirical tests were conducted based on the standard ordinary least square (OLS) model. Empirical evidence presented in this study indicates that the S&P 500 index's behavior mimics closely in a quarterly interval that of S&P options, as indicated by their implied volatilities. Implied volatilites create positive feedbacks through which a large portion of changes in indices are caused. There is no statistically-significant evidence of autoregressive behavior of the S&P 500 indices, at least in a quarterly interval.

International Advertising Campaigns

Michelle Thevil

Debra Cartwright, Faculty Mentor

As companies expand into global markets, international marketing strategies are increasing in importance. tine major area of concern is how to develop marketing strategies that are standardized enough to be profitable but global enough to effectively reach individual markets, Research indicates that advertising strategies can neither be completely global nor completely standardized. Marketers have struggled to find an effective equilibrium. One solution to this may be to use Hofstede's country cluster model to determine ways to adapt: advertising campaigns. Hofstede identifies flour national charactenstics and groups countries into clusters according to these characteristics. This is a conceptual study suggesting that advertisers can identify wawrs to adjust advertising campaigns by using these four characteristics. This study also suggests advertising campaigns can be fairly standardized within the country clusters.

Global Information Systems Effect On Marketing

Holly Venvertloh

Dr. Nabil Alghalith, Faculty Mentor

Global information systems have had a significant effect on marketing in foreign markets. These systems provide information on six particular external environments: competive, technological, customers, economic, political, and social, which

allow international businesses to gain a competitive advantage. The vast amounts of information provided by global information systems has also changed the focus of marketing from product-centered to customer-orientated. The Interent has additionally facilitated a restructuring of marketing's function. The Internet permits consumers to directly communicate with marketers to create products according to customer specifications. Global information systems have allowed businesses to access more information on foreign markets and to communicate with consumers in foreign markets more effectively.

Division of Fine Arts

Creating Music With Music Technology

Trisha Audrain, Matt Cole, and Bridget Munsterman

Dr. Janice Saffir, Faculty Mentor

Music technology has significantly advanced the creation, performance, and publication of music. The key to our recent progress in this area is the invention of MIDI or 'musical instrument digital interface.' This interface has enabled information to be sent between different MIDI compatible instruments, and between MIDI compatible instruments and computers. We have been using a software sequencing program (Master Tracks Pro) on a Macintosh computer to control our performances on a synthesizer. We entered the music on the keyboard at our own pace, layered sounds, auditioned different instrument combinations, and edited all parameters that we wanted to control. The product was musical compositions that would have been difficult or impossible to create in any other way. We were able to compose these works because we had access to the MIDI equipment and because we had the knowledge of how to use it.

Hurlyburly: Play as Cultural Artifact

Jason Beckfield

Dr. John B. Schmor, Faculty Mentor

This dramaturgical study explored a play's nature as a cultural artifact and analyzed one play, David Rabe's *Hurlyburly*, from both a theatrical and a sociological perspective. A play is created not only in the mind of the playwright, but also in the society in which the playwright lives. Like ideas, plays have social locations; they reflect the cultures in which they are written. Moments in *Hurlyburly* illustrate several sociological concepts, including (but not limited to) Marx's alienation and Durkheim's anomie. This interdisciplinary examination of *Hurlyburly* allowed a deeper understanding of the play itself and a more complete and modern development of abstract theoretical concepts.

Walter Gropius and the Bauhaus Design School

Sara Chabino

Dr. Julia DeLancey, Garry Gordon, and Dr. Sara Orel, Faculty Mentors

At the end of World War I Germany was in a state of economic and social disaster. Even so, many people anticipated that a brighter future would emerge from the rubble of their lives. Artists were a major group convinced that they could help create this better tomorrow. The first director of the Bauhaus design school, Walter Gropius, was one of those artists who thought he was building a new improved society. The focus of this research was to prove that Walter Gropius intended the Bauhaus to be a vehicle for socialist political ideals. Early influences on Gropius's beliefs were examined as well as the Bauhaus manifesto of 1919 in which Gropius laid out the aims and principles of the school. The curriculum Gropius designed and the faculty he appointed were also examined for socialist intent.

Making Connections Between the Arts: An Interdisciplinary Project

Matthew Cole, Matthew Groves, Christina Landers, Robert Loseman, Allen Posz, and Joseph Turner

John Bohac and Dr. Warren Gooch, Faculty Mentors

Seeking an opportunity to explore the various strong interconnections existing between artistic disciplines, six visual artists and six musical composers collaborated on a joint creative project. The project involved the pairing of one artist with one composer. A member of each pairing produced an initial art work which was interpreted by the other member of the pair in his/her artistic medium. This interpretation was then submitted to the first artist/composer, who in turn provided an interpretation of the interpretation. This cycle of interpretation and reinterpretation resulted in a total of three musical compositions and three visual art works from each pairing. Through this project, students learned to explore a means of artistic expression other than their own, and were able to make creative connections that crossed disciplinary lines. The presentation will include samples of student work, along with an overview of the project and its immediate outcomes.

Venetian Architecture in the Paintings of Paolo Veronese

John Garton

Dr. Julia DeLancey and Dr. Sara Orel, Faculty Mentors

The sixteenth-century revolution in Venetian architecture finds a painterly equivalent in the works of Pablo Veronese. The elaborate settings in Veronese's paintings

reflect the influences of contemporaries such as Jacopo Sansovino, Andrea Palladia, Michele Sanmicheli, and Sebastiano Serlio. This research compares Veronese's depiction of architecture to the writings and works of other Italian artists, architects, and patrons in an attempt to identify Veronese's sources. His use of perspective, reference to theatre, and incorporation of the classical orders serve as focal points in this study.

Auguste Rodin: The Essential Antecedent to Modern Sculpture

Amanda Gibson

Dr. Sara Orel, Dr. Julia DeLancey, and Garry Gordon

Auguste Rodin's introduction of new potentials in the art of sculpture was profoundly influential to contemporary sculptors. The liberation of the traditional figure through the presentation of the partial figure and fragmentation, the emphasis and consideration of light, shadow, volume, and space, and his experimentations with expression through modeling and surface manipulations initiated further explorations by sculptors in the twentieth century. The abstract sculpture of Constantin Brancusi and the cubist works of Jacques Lipchitz serve as examples of two diverse contemporary artists who were influenced by their predecessor. These influences are revealed through personal accounts by the artists themselves and their contemporaries, and through a study and discussion of specific works. These works present the characteristic reminiscent of Rodin, who revealed to them new potentials in sculptur, and also display the artists' further experimentation and independent expansion of the possibilities of this art form.

The Portraiture of Vincent van Gogh While In Aries and Saint-Remy

Melanie Hare

Dr. Sara Orel, Dr. Julia DeLancey, and Garry Gordon, Faculty Mentors

Though his landscapes and city scenes have become increasingly more well known, it was portraiture which truly inspired Vincent van Gogh. This interest seemed to be in direct conflict with Van Gogh's goal to create art which would serve the general public. Portraiture was a representation of a single individual while his aim was to speak to the masses. In order to resolve this contradiction, Van Gogh created a balance between the characteristics of the individual sitter and his own modifications. Through making changes in color, background, and props, Van Gogh attempted to make portraiture comprehensible to the common man.

The Vapheio Cups

Scottie Lynn Shadden

Dr. Sara Orel, Faculty Mentor

The Vapheio cups were discovered at Vapheio, near Sparta on mainland Greece, in 1888. The gold cups are excellent examples of Mycenaean metal working. They portray different scenes of catching wild bulls: one violent and one quiet. They have been dated from ca. 1500 to 1450 BC. Almost from their discovery, they have been the focus of much debate. Some scholars believe both cups are Minoan in origin, others believe they are Mycenaean, and still others believe one is Minoan and the other Mycenaean. The differences in the cups that have led to questions of origin include: the landscape, bull figures , a and human figures; the composition, finishing and manufacturing. The quieter cup draws parallels with the Toreador fresco from Knossos. The violent cup draws parallels with the Sword Pommel from Mycenae.Debate over the Vapheio cups' origins continues today. Although, all agree they are excellent examples of Aegean metal working.

(Post)Modernism: An Investigation into Vacuums and Inflatable Bunnies

Amy L. Venturella

Garry Gordon, Dr. Julia DeLancey, and Dr. Sara Orel, Faculty Mentors

While art during Modernism concerned itself with "art for art's sake," Postmodern art addresses a shift in perspective from "form" to "content," thereby accepting its unavoidable relationship to cultural discourses and social issues. This relationship manifests itself most coherently in Postmodern artists' use of appropriation (or, the borrowing of images) and identity. These two concerns have existed throughout art's history. However, since approximately 1970, art has been "appropriating appropriation" as well as developing various identities, particularly those concerned with sexuality and ethnicity. Artists' new concerns with appropriation and identity supersede the adherence to formal order and autonomy of art characteristic of Modernism and in turn mark the end of Modernism and the beginning of Postmodernism.

The Influence of Wassily Kandinsky on the Development of the Russian Avant-Garde

Lauren C. Weinhold

Dr. Sara Orel, Dr. Julia DeLancey, and Garry Gordon, Faculty Mentors

Artistic influence, especially when discussed in the context of stylistic development, is an arguably cloudy term. It leaves room for a certain amount of subjectivity and personal interpretation. Such is the case with two key figures in the Russian avantgarde: Wassily Kandinsky-artist, author, and philosopher, and Kasimir Malevich, often given credit as the innovator of Suprematism. Several scholars have argued that the geometrical forms of Malevich's Suprematism sparked a drastic stylistic change in Kandinsky's work. Kandinsky may have been inspired to some extent by his younger colleague, but evidence indicates that the opposite theory is more plausible. This research will show that Wassily Kandinsky's *Concerning the Spiritual in Art*, specifically a color chart entitled "Table 4" in that book, influenced the artistic development of Kasimir Malevich.

Division of Human Potential and Performance

Determinants of Health Promotion Behaviors In the Rural Elderly

Sandra S. Aguillon

Dr. Ranjita Misra, Faculty Mentor

With an increase in the number of elderly people, recent research is focusing on how to obtain a better quality of life at older ages. The purpose of this study was to examine the predictors of health promotion behaviors in a sample of exercising and non-exercising rural elderly using Pender's Health Promotion Model. The study population was drawn from several rural counties in Missouri and Iowa. The sample comprised of 194 subjects: 112 exercising and 70 non-exercising elderly. Information was elicited by personal interviews. A majority of the respondents were females, married and unemployed. Respondents perceived health status, self-esteem, perceived seLf-efficacy, and participation in healthpromoting behaviors like exercise, nutrition, interpersonal support, health responsibility and stress management were studied. Significant differences existed between the exercisers and non-exercisers on the health promotive behaviors. Exercisers were younger, more educated, had a higher self-esteem, higher internal locus of control, and more positive health perceptions than non-exercisers. Elderly people who exercised had higher health promotion lifestyle scores and were associated also with higher self-esteem, internal locus of control, perceived good health status, and higher income than non-exercisers.

Comparison of Stairmaster™ and Treadmill Exercise at Equivalent Ratings of Perceived Exertion

Calneet H. Balas, Lori M. Cox, and Shari Smith

Dr. James E. Heimdal and Dr. Jerry L. Mayhew, Faculty Mentor

The purpose of this study was to compare the physiologic responses for treadmill and Stairmaster™ exercise protocols at equivalent ratings of perceived exertions (RPE) of 12-13. Twelve untrained college females (age = 20.6 $\pm$ 0.5 y, %fat = 25.6 $\pm$ 2.7) performed a 15-min submaximal protocol on each device in a counterbalanced design. Following a 5-min warmup, the average ofthe 15 mins of metabolic data from a computerized metabolic cart was used for analysis. All metabolic variables were significantly higher for Stairmaster™ exercise than for treadmill exercise, except for mean arterial blood pressure (MAP). Contrary to previous findings, the present study indicates that an exercise program on a Stairmaster™ produces greater cardiovascular and metabolic benefits at the same RPE than a treadmill protocol.

The Role of Social Physique Anxiety and Other Variables in Predicting Eating Behaviors in College Students

Lori Cox

Dr. Chris Lantz and Dr. Jerry Mayhew, Faculty Mentors

Early identification of potentially harmful eating patterns is critical in the effective remediation of such behaviors. The purpose of this investigation was to examine the degree to which various factors including gender, family history, and athletic status (athlete vs non athlete) predict disordered eating behavior. In addition to these variables, social physique anxiety and percent body fat were added as potential predictor variables. The eating behaviors of student-athletes and non athlete-students were also compared. One hundred eighty undergraduate students (males = 49, females = 131) enrolled in a wellness course or a member of a varsity athletic team at a small, Midwestern university provided demographic information and completed the Eating Attitudes Test (EAT) and the Social Physique Anxiety Scale (SPAS). Stepwise multiple regression analysis indicated that social physique anxiety, gender, and body fat combined to predict 34% of disordered eating behaviors: EAT = 0.921 SPA - 1.06 %Fat + 10.95 Gender (1 = M, 2 = F) - 17.82 (R2 = .34, SE = 4.68). A one way ANOVA comparing the eating behaviors of athletes and non athletes revealed no significant difference between these groups.

Gender Differences In Eating Disorders and Cognitive Perceptual Variables Among College Students

Theresa Duffy

Dr. Ranjita Misra, Faculty Mentor

Gender differences in perceptions and satisfactions with body weight has been reported in previous studies. Many factors influence eating disorders among college students. The purpose of this study was to examine the relationship between eating disorders and cognitive perceptual variables (self-esteem, anxiety, locus of control, depression, and interference with relationships & academic performance) among college students. Subjects consisted of a random sample of 48 students with a mean age of 19.8 years. Each student completed the Harvard Eating Disorders questionnaire. Majorit,v of the sample were females, Caucasians, and had Body Mass Index between 20-25. Results indicated that 45% of females and 14.3% of males had eating problems. Thirty percent indicated episodes of binge-eating, and 4.2% took extreme measures to control their weight. Females reported lower self-esteem, anxiety, and higher depression than males. Further, a higher percent of females indicated that concern or behaviors about eating or weight control interfere with their relationships and academic work. Pearson's correlation indicated significant relationships between eating disorders and self-esteem, anxiety, locus of control, previous diagnosis of eating disorders, gender, weight control, and, interference with their relationships and academic work. The implications will be discussed.

Psychophysiological Assessment of Overtraining in Division II Collegiate Swimmers: A Season Long Investigation

Jennifer D. Frankenberg

Dr. Christopher D. Lantz and Dr. Jerry L. Mayhew, Faculty Mentors

Overtraining and burnout are common responses to prolonged, excessive training stress and occur as a result of the continual depletion of an athlete's coping resources. A particularly susceptible population are endurance athletes who engage in year-round training (e.g., swimmers, distance runners). The purpose of this research project was to examine the psychophysiological stress response patterns of collegiate swimmers during the course of an entire season. Psychophysiological measures were assessed on forty-eight members (males = 24, females = 24) of the Truman State University swim team every two weeks for the duration of the entire season. Body fat, body temperature, body weight and blood pressure were measured as physiological indicators of overtraining. The Daily Analysis of Life Demands for Athletes (DALDA) was used to measure levels of psychological reactions to imposed training demands. The DALDA is a selfreport instrument which assesses sources and symptoms of psychological stress in athletes. The results of this investigation suggest that swimmers evidenced significant increases in over

training symptoms up to four weeks prior to the national meet. This trend is rather symptomatic of swimmers as many tend to increase their training volume over the course of a season before tapering just prior to a qualifying meet.

Comparison of Softball Bat Swing Speed to Grip Strength and Forearm Cross-Sectional Area

Drew Giardina, Heather Leslie, and Leslie Raridon

Dan Zimmer, Dr. Ian Lindevald, and Dr. Jerry Mayhew, Faculty Mentors

The purpose of this study was to determine the relationship of softball bat velocity to both grip strength (GS) and forearm cross-sectional area (CSA). Eighteen female college varsity softball players had bat velocity determined by an infrared electronic timing system. Following five warm-up swings, three measurement trials were averaged to determine bat velocity. Three right and three left isometric GS measurements were taken on each subject with a hand dynamometer. Forearm CSA was determined from circumference corrected for skinfold thickness. There was no significant relationship between bat velocity and right ($r = -0.04$) or left ($r = -0.07$) grip strengths. Similarly, there was no significant relationship between bat velocity and right ($r = -0.23$) or left ($r = -0.05$) forearm cross-sectional area. These data suggest that factors other than grip strength and forearm musculature contribute to bat velocity in female players. Future research might examine relationships between bat velocity and trunk rotational strength or arm extension strength.

A Comparison of Collaborative Practice Arrangements and Prescriptive Authority for Advanced Practice Nurses in the States of Missouri, Iowa, and Kansas

Heidi Holdeman

Rebecca Payne McClanahan, Faculty Mentor

The American health care system is seen as one of the best in the world in terms of technology, equipment, and highly trained health professionals. However, many people go without necessary care because of the misuse and under-use of advanced practice nurses (APNs). As part of a larger study on health care reform in Missouri, this study focuses on the existing laws and regulations of collaborative practice and prescriptive authority for APNs in Missouri, Iowa, and Kansas. These regulations were analyzed and then compared and contrasted in order to make implications about the health care system on a larger scale. A preferred scenario has been developed which would maximize the usage of APNs in order to increase access to primary and preventative services.

Development of a Formula to Predict the Volume of the Pectoralis Major Muscle

Liz Hopkins, Roman Allen, and Javier Cargol

Dr. Fontaine Piper and Dr. Jerry Mayhew, Faculty Mentors

The purpose of this study was to produce a formula to calculate the volume of the pectoralis major muscle on male cadavers. Fourteen subjects (mean age = 75.2 y) were measured anthropometrically for structural dimensions of the pectoralis major. The known volume of the pectoralis major was determined by water displacement. A pectoralis major volume formula utilizing a thickness measurement 10 cm frorr the insertion point on humerus produced a multiple R = 0.87 (SEE = 21.8 ml). The formula is:

Pectoralis major Volume (cm^3) = 64.78 Pectoralis major Thickness (cm) + 29.97

The present study indicates that the volume of the pectoralis major can be estimated from dimensional measurements in cadavers. This formula may be useful in estimating in vivo pectoralis major volume for investigating muscle functional properties. This information might allow further refinement of the prediction of upper body strength from dimensional analysis.

Enter the Magic Kingdom: Using Computers in Speech-language Therapy

Carrie Kamp, Lisa Odorizzi, Melissa Schudel, Amy Sparks, and Jen Walz.

Dr. Paula S. Cochran, Faculty Mentor

This ongoing research and development team indudes graduate and undergraduate students in communication disorders who are interested in new technologies. Current projects which will be demonstrated during this session include an adaptation of a commercially available CD-ROM for children and an original multimedia creation for use in speech-language therapy. A magic castle theme is used in both projects. Participants will have the opportunity to explore both projects—watch out for dragons!!

Ideal Female Body Build: A Study of Gender Perception

Kristin Mathews, Holly Jones, and Trisha Okuna

Dr. Jerry Mayhew and Dr. Chris Lantz, Faculty Mentors

The purpose of this study was to evaluate gender differences in the perception of ideal female body build. Fitness class members (141 females, 75 males) were surveyed using the Visual Image Rating Scale developed at Tufts University. The scale was a computer-generated series of female body builds ranging from very skinny (rating = 1) to relatively rotund (rating = 15). All participants were asked to select the rating that corresponded to their concept of the ideal female body structure. In addition, females were asked to identify the image corresponding to their perception of their current body structure, while males were asked to select their perception of the ideal female build. Females selected a significantly smaller figure (3.62 i 1.87) than did males (4.41 + 1.90) as ideal (scale range = 1 to 15). Furthermore, females perceived their current body build (5.87 1 3.13) to be significantly higher than their perceived ideal. No males or females choose a body build greater than 11. This study found that females desire a smaller (slimmer) body build than they think they currently possess, and males feel the ideal female build is larger than the ideal perceived by females.

Validation of Equations to Predict Bench Press Strength from Anthropometric Dimensions in Male College Athletes

Kristin McGuire, Kristin McGinness, Scott Graham, and Chris Amick

John Ware and Dr. Jerry Mayhew, Faculty Mentors

The purpose ofthis study was to evaluate the validity and accuracy of selected anthropometric equations to predicted ARM bench press strength in male college athletes. Varsity athletes (25 football players, 13 wrestlers, and 18 basketball players) were measured for seven skinfolds, two muscle circumferences, and three skeletal lengths. Percent body fat and lean body mass were derived from the Jackson-Pollock generalized prediction equation. ARM bench press strength was evaluated at the conclusion of a minimum of 10 weeks of heavy resistance training. Offour equations previously developed on varied samples of males, the equation developed on a large sample of subjects with a diverse background in resistance training produced a high validity correlation (r = 0.78) and a nonsignificant difference between predicted and actual performance (t = 1.09). The remaining equations significantly overpredicted bench press by an average of 10.4 to 24.0 kg. Care should be taken in using anthropometric dimensions to estimate strength for establishing strength training programs.

The Effects of Active Recovery on Clearance Rate of Blood Lactate

Danielle D. Peterson and Carin Hunt

Dr. James Heimdal, Faculty Mentor

The purpose of this study was to determine the effect of arm vs leg active recovery on the clearance rate of blood lactate after a supramaximal anaerobic exercise. Ten female collegiate athletes performed four 45-s intermittent maximal arm + leg exercise bouts on a Schwinn Air-Dyne, with a 2min recovery between each. Following the last maximal exertion, blood lactate concentration was determined immediately, at 5 mins into active recovery, and after 20 mins of passive sitting using a YSI Sports Lactate Analyzer. Active recovery consisted of 10 mins of ergometer arm cranking or ergometer leg pedaling at 25-30% of maximal heart rate. Recovery protocols were randomly assigned and administered on separate days. Arm recovery exercise produced significantly greater ($p = 0.0007$) lactate clearance after 5 mins of exercise and after 20 mins of passive sitting ($p = 0.007$). In conclusion, it appears that active arm-cranking recovery produces greater blood lactate clearance than does leg pedaling following an all-out exercise using total-body musculature.

The Effect of Foot Position on Work and Power Output of a Maximal Power Squat

Danielle Peterson and Sandra Sumpter

Dr. Michael Bird, Faculty Mentor

Many lifters modify foot position from a laterally deviated stance to a parallel stance to emphasize different muscles and the work and power produced. This study examined the effect of stance on a 1repetition maximum (I -RM) power squat. Five female collegiate track sprinters and throwers each performed a ARM squat with the shank and foot of each leg laterally positioned 30° and with the feet parallel. One week of recovery time was allotted between each condition. Each testing day, warm-up consisted of jogging, stretching, and lifting. Rest periods between each attempt were provided. All attempts were videotaped for analysis. A Peak Performance Motion Analysis System was used for digitizing, smoothing, and calculating variables. Four participants lifted greater weight and had greater work and power in the lateral foot position. One participant lifted the same weight and had similar work and power in both conditions. A repeated measures analysis of variance, however, indicated no significant differences between the conditions.

Effects of Selected Parameters On Exercise Adherence in Cardiac Rehabilitation Patients

Sally Skelton and Stephanie Smith

Dr. Jerry L. Mayhew and Dr. Chris Lantz, Faculty Mentors

The purpose of this study was to determine the effect of age, gender, obesity, diabetes, marital status, and phase of program on exercise adherence in cardiac rehabilitation patients. Members (65 men and 55 women) of a hospital-based cardiac rehabilitation program were surveyed after a minimum of six months in the program. Exercise adherence was dichotomized into those individuals participating for less than six months and those participating for more than six months. One-way ANOVA indicated that gender was the only variable which was significantly different between the two groups, with females having greater exercise adherence than males. These results may be tentative due to the recency of the program, with fewer than 5% ofthe clients enrolled for longer than two years. In a more established program with a larger population of individuals who have participated for more than two years, the ffects of these parameters on adherence might be more discemable.

Division of Language and Literature

Orality and Textuality in *Beowulf, Le Chanson de Roland,* and the *Cantar de Mio Cid*

Erik Carlson

Dr. Adam Davis, Faculty Mentor

The transmutation of an oral traditional culture to a literate culture results in oral derived text, in which the themes, structural devices, styles, and other traits of oral literature are conserved in written form. These works straddle the gap between the heroic, oral tradition and the art/literary tradition. The intent of this endeavor is to identify the traits which mark *Beowulf; Cantar de Mio Cid, and Le Chanson de Roland* as a subclass apart from both their predecessors and their successors in the genre of epic poetry. I will investigate formulaic plot devices and thematic multiforms as well as the stylistic conventions related to the versical structure of epic poetry common to traditional oral epic and their roles in these three works to determine any common divergence which would imply a general departure from oral tradition. The juxtaposition of traditional, heroic themes (semi-pagan wrappings and all) with Christian themes brought from literate culture should also prove valuable in distinguishing these three works as the products of societies in states of profound transition with respect to their literary traditions.

Culpability and Truffaut's *Femme Fatale*

Dawn Citrin

Dr. Cole Woodcox, Faculty Mentor

The women Francois Truffaut created in his first films are any feminist's nightmare: abusive, devoid of morals, and irrational. And worse, overshadowing all their other traits is their cold, alienating beauty, an aspect which Truffaut portrays as a trap laid to enslave the men they encounter.

These first treatments are hardly sympathetic towards the *femme fatale,* a character which appears throughout Truffaut's filmography. But by his late films, the *femme fatale* has become a character to be pitied, a victim of the selfish and domineering men around her. This study traces her development in regard to her relationships with other characters, the camera angles by which she is shown, and the sound and lighting used in connection with her in the films *The 400 Blows* (1959), *Jules and Jim* (1961), *The Man Who Loved Women* (1977), and *The Woman Next Door* (1981)

Pain and Joy: Communication and Class in the films of Mike Leigh

Jason Clampet

Dr. Cole Woodcox, Faculty Mentor

Mike Leigh is one of the world's premier filmmakers and because of his distict style, he warrants a reputation of a Woody Allen or a Federico Fellini. While there are boundaries that divide classes in Leigh films, he does not use people in their respective classes as ciphers for stereotypes. In Leigh's last four feature films, *High Hopes, Life Is Sweet, Naked*, and *Secrets and Lies,* he presents four different groups of people, each consisting of individuals struggling to communicate across and overcome the barriers of class Through his characters, Leigh demonstrates that while class distinctions do exist and are virtually impossible to overcome, the failure to overcome them is due as much or even more to the inability of people to communicate properly with one another more so than class constraints placed upon them by the cultural elite. In an attempt to address Leigh's representations of class, one must examine his filmmaking process and the relationships he presents within the films themselves.

The Effects of the Overcommunicated Society

Ken Crumpler

Dr. Closepet Ramesh, Faculty Mentor

Failure of communication is becoming increasingly prevalent in modern society. The primary reason for this lies in the nature of the communication currently being attempted. Due to recent revolutions in technology, more information is available to individuals than at any other time in history. This "information overload" has created a society which is truly overcommunicated. In this paper, I will examine the sources of overcommunication, its psychological effects on the individual, and problems of cost and access.

The Generative Morphology of Dr. Seuss

Jason Davey

Dr. Adam Davis, Faculty Mentor

Dr. Seuss has capitalized on the capacity of the English language to accept new words. This essay is a review of some 500 different morphological units that Dr. Seuss employs to create the magical and nonsensical worlds characteristic of his writing. In addition, the researcher reviewed professional literature that dealt with the processes of generative morphology, especially within the English language. Theories posed by Noam Chomsky, Morris Halle, and Joan Bybee are applied to a wide range of Dr. Seuss books. The result is a clearer understanding of how Dr. Seuss generates new words. Specifically the research shows that many of the words created by Dr. Seuss are formed from "gaps" that evict in English morphological rules.

"Our Town" Lies in New Hampshire

Suzanne Easley

Dr. Martha Bartter, Faculty Mentor

Modernism refuses to fit within the connotation of rebelling against convention, but is rather a passionate attempt to redefine the convention realistically. The seeming irony of bringing the starkly marginal existence to the forefront, coupled with the desire to depict a realistic convention, sets the stage for a Modernist perspective of Wilder's "Our Town". Not only does this play show a distinct veneer of "the perfect small town", but also reveals underpinnings of isolation and disconnectedness.

A Cry to the Goddess

Carolina Gonzalez
José F Martin, Faculty Mentor

The "feminine" tradition of western literature undermines the importance of women in an industrial society. Such is the claim of many contemporary feminist theorist. It promotes the idea of the submissive female, one whose essence encompasses such things as chaos, love, motherhood, and weakness by presenting these characteristics as innate qualities of the biological woman. According to these theorist, Gabriela Mistrals' writings illustrates the male-dominated ideology. However, analyzing one of her poems *Ballada de la Estrella* using both a mythological and a radical feminist critique one arrives to the conclusion that Mistral's poetry transcends the occidental perspective of the female as compliant. This poem can be seen as the acknowledgment of the archetypal Great Goddess, of her incarnation both in men and in women. Her poem is a cry to remind humanity of the essential role she partakes in the phenomena of life, and the survival of it.

Spike Lee's Portrayal of Women: From "Pass the Pussy" to Educated Girl Talk

Jill Goodheart
Dr. Cole Woodcox, Faculty Mentor

This paper explores evolution of the portrayal of women in director Spike Lee's films. In his first major film *She's Gotta Have It* (1986), the central character is a woman, but is merely a sex object for the men in the film. His portrayals of women have improved over time, although some critics claims there is still significant stereotyping of women. In his 1988 film *School Daze*, the women are somewhat stronger, but they still fall into stereotypes and are treated poorly by the male characters. *Do the Right Thing* (1989) is somewhat of a transition piece on the issue, and *Jungle Fever* (1991) shows more intelligent women who are more significant characters. The female characters portrayal not only includes the script itself, but how the camera focuses on them and how Lee treats their roles.

The Christianization of England and the Anglo-Saxon Oral Tradition

Leslie Graff
Dr. Adam Davis, Faculty Mentor

The preliterate society of the Anglo-Saxon used the medium of oral tradition to contain its culture, rules, and heroic exemplars. This knowledge was passed

through the storytellers and was organized in systems based on key-word coding and links between stories and concepts. The tradition changed, however, as England was slowly converted to Christianity. Christianity brought literacy which allowed the written preservation of the oral tradition but it also eliminated the need for the learned storyteller for cultural collection and maintenance. Because literacy was limited and the production of writing was costly, only a fraction of the probable tradition was recorded. What was preserved was Christianized and is not an accurate picture of the Anglo Saxon world. Ultimately, Christianization changed the Anglo-Saxon mindset and, eventually, the entire societal structure erasing the need for the oral tradition while working t,o record and maintain the songs of the Anglo-Saxon.

The Object to Character Transformation

Brenda M. Helmbrecht

Dr. Cole Woodcox, Faculty Mentor

In most films, objects play integral roles in the progression of the plot and the story. Audience members may find themselves inadvertently forming emotional attachments with objects just as they would with particular characters. Thus, the line distinguishing an object from a character becomes blurred. In the films *Citizen Kane, Bicycle Thieves* and *Heavenly Creatures*, objects cross over this line to make this object to character transformation. Both the camera and other characters in the film regard the objects of "Rosebud," the bicycle and clay figurines as actual characters capable of performing in character roles.

"Whose Text is This?": The Impossibility of Translation

Rachel E. Herring

José F. Martín, Faculty Mentor

Contrary to popular belief, a translation is never a mere conversion of a text from one language to another. My translation of Carlos Fuentes' "El que inventó la pólvora" demonstrates the impossibility of grasping the actual work. Translating, like reading, is always subject to the forces of individuality, culture, and historical context. Although the application of linguistic, stylistic, and cultural knowledge creates an illusion of the original, the translation of Carlos Fuentes' short story reveals that translation cannot produce a copy, but an image, hopelessly deformed by another language and subjectivity.

Gender Portrayals in Wim Wender's *Wings of Desire*

Lisa Kays

Dr. Cole Woodcox, Faculty Mentor

Often the artistic medium of film reflects, reinforces and/or challenges perceptions and institutions of various aspects of society. Filrn thus becomes a valuable tool in examine past and current cultural and societal trends, including perceptions of gender. Wim Wenders' film, *Wings of Desire*, provides insight into this issue, focusing largely on the dynamics of male/female relationships. In doing so, the film asserts a view of the world in which elements of both the male and female are equally crucial to a fulfilled life. This paper explores a discrepancy between the film's verbal assertions and the world and relationships the film presents. Implications of such a discrepancy are also discussed. The paper utilizes the framework of a feminist critique to explore this question, with the analysis focusing on the film's techniques and premise as well as the director's intent in making the film.

Yasujiro Ozu and Time

Sarah Lucas

Dr. Cole Woodcox, Faculty Mentor

Time is an intangible concept that greatly affects us everyday. Yasujiro Ozu uses this principle by creating a metaphor with time in his movie "Tokyo Story." He presents time as both a constant that works to solidify the story related to the viewer and the unknown variable that the characters cannot control. He is motivated to present this complex metaphor by a desire to hold true basic Japanese concepts of unity in time and space. Though this manipulation, Ozu creates a metaphor where time is equal to life and love. He then reinforces this metaphor through the use of various cinematic techniques designed to allow the viewer to appreciate both the theoretical time of the past and future as well as the real time involved in the film itself.

American Foundations Class: Correlation Papers in American Literature, Art, Music, and History

Dr. Robert Mielke, Faculty Mentor

Seven students attended the American Foundations course at Reynolda House, Wake Forest University this previous summer. The course teaches students in an interactive fashion about American History, Art, Music, and Literature. Students are asked to then take one author, composer, and artist from a ten-year time frame and correlate their work into a coherent and cohesive paper. These papers have unique perspectives on issues that arise with the works chosen, as well as insight into those works. The topics range from Dorothy Parker to Edward Hopper.

UFO Panel

Dr. Robert Mielke, Faculty Mentor

This panel will present a series of papers written as the result of several months of research into the UFO phenomenon. These papers cover the main points of interest in current UFO culture including such areas as the main dates and landmarks of UFO history, extraterrestrial crafts and reports of alien beings, and differences in cultural outlook concerning aliens. The papers approach this subject from cultural, sociological and scientific points-of-view with the goal of exploring the motivations, history and plausibility of the UFO phenomenon as it currently stands. Many of the papers are enhanced by field work which allowed contact with urologists, contactees, abductees and others involved in UFO research on a regular basis. The panel will be able to answer questions after the presentations.

Adultery in the Classical World

Heather Tylock

Dr. David Christiansen, Faculty Mentor

Twentieth century Americans often believe that ancient Greece and Rome was marked by promiscuous acts. From the erotic poems of Ovid and Sappho to the works of Juvenal and Terence, we receive a picture of drunken symposia, dancing girls, and adulterous affairs. As enticing as forbidden love might seem, in the classical world, adultery was a serious and complicated crime, punishable by such penalties as death, torture, incarceration, or exile. Though the guilty male lover was also considered a responsible party, and often held equally, if not more, responsible for the adulterous affair, the female still received the greater punishment.

Division of Math and Computer Science

A Mathematical Model of M.C. Escher's *Snakes*.

James Nolan

Dr. Todd Hammond, Faculty Mentor

M.C. Escher's artwork displays many different mathematical properties and theories. Escher had no formal training in mathematics, but developed familiar mathematical properties in his artwork. His last work, *Snakes*, has a ring design that appears to follow a hyperbolic mathematical function. By analyzing the history of Escher's work and the design of *Snakes*, a function will be formulated that represents the design of the rings in the artwork.

Observations of Garstang's Categorization

James Nolan

Dr. Sara Orel, Dr. Todd Hammond and Dr. Joe Hemmeter

John Garstang was a archaeologist in the early 1900's. Early in his career he worked at Beni Hasan in Egypt. Conflicts have now risen about the way that Garstang cataloged the pottery. At Beni Hasan, Garstang catalogued the pottery by shape but three of the categories have caused confusion because of the similarity. By using Mathematica as a statistical tool, evidence, as in the form of three-dimensional scatter plots and chi-square analysis, will be established to emphasize the similarity between the three categories. The emphasis will not only focus on the data but the usefulness of Mathematica as a tool in statistical analysis. If the analysis is correct, then the three categories will be combined to form one.

DIVISION OF SCIENCE

Assay for *Chlamydomonas* Phototaxis

John S. Alexander

Dr. David Howard, Faculty Mentor

Chlamydomonas reinhardtii is a unicellular green alga that responds to light via a rhodopsin containing eyespot. This response is named phototaxis, and can be either positive (the cell moves toward the light) or negative (away from the light). *Chlamydomonas* phototaxes by altering the activity of its two flagella relative to one another.

Many methods have been developed to measure phototaxis. The most quantitative of these assays include microscopic imaging of the phototactic response of individual cells. Unfortunately, published microscopic assays typically utilize computers and laser light, making them intricate and costly. We developed an alternative assay method that is inexpensive, yet efficient. Our method utilizes light delivered via fiber optics to the edge of a slide. Cells and their phototactic response are imaged using dark-field microscopy. The response is recorded with a CCD camera and VCR. The specifics of this assay and selected results from its use will be presented.

Preparation of Thin Film Deposition System for Experimental Use

Adrienne Anderson

Dr. Maria Di Stefano, Faculty Mentor

Thin films are important not only for their many practical applications, but also for the scientific insight provided by the study of their properties. For this reason, the physics department at Truman State University has acquired a vacuum deposition system which will allow us to manufacture thin films of different compositions, thicknesses, and shapes, and investigate their properties. The researcher conducted an evaluation of the vacuum system to determine its practical limitations. Preparation of the apparatus for operation also included: improvement of the water cooling system, installation of a liquid nitrogen transfer system to help achieve better vacuum, and construction of a substrate platform, platform locator, and substrate mask. After calibration, the thin film deposition system will be used to develop Al-Te superconducting granular thin films so that their conduction properties can be studied.

Efficient Genetic Algorithms as Methods for Supervised Learning in Artificial Neural Networks

Adrienne J. Anderson

Dr. Tane Ray, Faculty Mentor

Research in artificial neural networks has been on the rise in recent years, primarily because of their ability to solve problems that were previously intractable. Interest in neural networks was prompted by their usefulness as an approach to artificial intelligence, but the field has expanded to include problems in various disciplines, such as computer science, engineering, biology, and the modeling of statistical problems in physics.

One of the main hurdles in neural network research is finding efficient learning algorithrns. The objective of my research was to find a suitable algorithm to optimize the time taken for the network to converge on a solution. My presentation will focus on two different learning algorithms, backpropagation and the genetic algorithm, and their comparative efficiency. The superior speed of convergence of the genetic algorithm will be discussed, as well as its advantages as a method for supervised learning.

Jewels (Joules) of Time

Anne Beshears* and J. Andrew Upchurch

Dr. Peter Rolnick, Faculty Mentor

The Twin Paradox is a hypothetical situation by which a traveling twin, going very fast, returns home to discover that he is much younger than his twin who stayed at home. In essence, the traveling twin has moved forward in time. It has been proven in previous projects that the amount gain in time is related to the percentage of the trip spent accelerating and decelerating. In this presentation, we will compare the energy required for the trip to the gain in time, for fixed proper length and time for the trip.

Using Inexpensive Gamma-Ray Spectrometry for Experimental Verification of Special Relativity

James L. Bopp

Dr. Kenneth Hahn, Faculty Mentor

The gamma-ray spectrometer is a valuable instrument for a modern physics laboratory. It is used to study numerous phenomena including Compton scattering, annihilation radiation, absorption crosssections, and gamma-gamma angular distri-

bution. Modern scintillation spectrometry systems employ a NaI(TI) crystal, photomultiplier tube (PMT), and a multichannel analyzer. These instruments usually cost between $3,000 - $5,000. We have designed an easy-to-build and easy-to-use spectrometry system that only costs $925. The spectrometry system uses a single-channel analyzer ($35) as opposed to the more expensive multichannel analyzer ($1,500 - $3,000). The collected spectra suggest a performance comparable to manufactured systems. The spectrometer is currently being used at Truman to investigate the relativistic nature of recoil electrons created during the Compton scattering process. A survey of the system's design and operating performance, as well as a discussion of the relativistic Compton scattering experiment will be presented.

Body Condition Score and Backfat Measurement in Cattle

Lisa Brokaw

Dr. Glenn Wehner, Faculty Mentor

Cow body condition scoring can play a key role in efficient beef production. In body condition scoring, cows are grouped on a scale of one to nine according to visually perceived fat, with one being extremely thin and nine being overfat. Body condition scores of five to seven are ideal. Fat over the ribs, backbone, tailhead, and below the vulva is used to determine body condition score. In this project, the relationship between the amount of backfat on a cow and her body condition score will be studied. Evaluating, sorting, and feeding cows to optimize body condition score can improve reproductive performance. Cows need to cycle and breed within 90 days after calving in order to have a calf every year. Thin cows that have lower body condition scores take longer to repair their reproductive tracts after calving and do not cycle as quickly as moderate or fleshy condition cows. Cow condition at calving is also important. Cows with condition scores of five or six have more vigorous calves and have more colostrum than cows with condition scores of three or four. Conversely, fat cows are not economical to feed and may have increased calving dystocia.

Effects Of MGBG On Mitochondrial Respiration and ATP Levels In Digitonin-Permeabilized PC 12 Cells

Sara E. Brokaw

Dr. Cynthia L. Cooper, Faculty Mentor

PC12 cells, derived form rat tumor of the adrenal medulla, provide an *in vitro* system for the study of chemotherapeutic and pharmacological agents on nerve cell functions. Inhibition of energy metabolism and DNA replication are two targets of polyamine inhibitors such as methylglyoxal *bis*(guanylhydrazone) (MGBG) and α-difluoromethylornithine (DFMO). DFMO effectively blocks the cell division cycle, while MGBG inhibits cell growth by blocking polyamine synthesis and

mitochondrial function. Together, the drugs reduced cellular spermine by 73%, inhibited growth completely, and increased cellular ATP levels. A method to use digitoninpermeabilized PC12 cells to measure mitochondrial respiration was optimized to facilitate dose response studies with MGBG. The optimized procedure employs the mitochondrial assay buffer (15 mM Tris-HCI, pH 7.4, 8.9 mM $MgCl_2$, I mM EGTA, 15 mM KH_2PO_4, 250 mM mannitol) to permeabilize cells with 20 ,μM digitonin and respiration was initiated with 24 pM succinate. Changes in dissolved oxygen was measured with a Clark oxygen electrode. The MGBG dose response studies showed that drug treatment caused an increase in oxygen consumption by mitochondria in digitonin-permeabilized cells. The findings suggest that the enhancement of mitochondrial respiration by MGBG could account for the previously observed increases in cellular ATP and regulated exocytosis. Funding was provided by the Council for Undergraduate Research (SEB), Truman State University (CLC), and National Institutes of Health (CLC).

Development of a Rapid Assay Technique for Detecting Urinary Pteridine Levels for Monitoring Cancer

Tim Busenhart

Dr. Yinfa Ma, Faculty Mentor

Urinalysis is fast becoming a new technique to monitor cancer levels. Pteridine levels, excreted in urine by healthy individuals, have been found to be elevated in urine samples for patients with cancer, sexually transmitted diseases, and AIDS. A technique to detect these pteridine levels include using High Performance Liquid Chromatography with fluorescence detection, but this process is very slow.

My research involved developing a rapid-assay technique to detect urinary pteridine levels in cancer patients. An instrument, incorporating capillary electrophoresis and fluorescence detection, was developed to measure pteridine standards, and mixtures of pteridines in urine samples. Standards were separated using different buffer systems. Concentrations of 10^{-5} M to 10^{-7} M were measured.

Genomic DNA Analysis using HPLC

Jill Butler

Dr. Dana Delaware, Faculty Mentor

The physical property of genomic deoxyribonucleic acid (DNA) is of measurable use to the biochemist. Genomic deoxyribonucleic acid is the base component of the DNA expressed in terms of the cytosine and guanosine content. This is referred to as the percent G+C or the mole fraction of G+C (χ_{gc}) The old method for determining χ_{gc} involved the melting temperature of the DNA as it is trans-

formed from double strand DNA to single strand DNA. The sample was placed in a spectrometer. A plot of the absorbance (at 260nm) versus incubation temperature is prepared and the melting point of the DNA at the midpoint of the hyperchromic shift is read. The χ_{gc} can be determined from this if the salt concentration is known. However, the Truman State University Biochemistry class will determine χ_{gc} via HPLC analysis of the nucleotides. Samples of Genomic DNA isolated from calf thymus, *Clostridium perfringens* and *Micrococcus lysodeikticus* will be used to determine χ_{gc} from the peak area of the HPLC.

The Synthesis and Characterization of Bis(N-methylbenzohydroxamato-*O,O*')copper (II) Salts

Jill Butler

Dr. Pam New, University of Central Oklahoma, Faculty Mentor

The synthesis of a series of bis(N-methylbenzohydroxamato-*O,O*')copper(II)salts were continued in part for their study as potential alpha-nucleophiles in substitution reactions. An alphanucleophile is one which has an unusually high degree of reactivity, for reasons not completely understood. The reaction of copper (II) nitrate trihydride with 3,5-dinitro-N-methylbenzohydroxamic acid produces green crystals of bis(3,5-dinitro-N-methylbenzohydroxamato-*O,O*') copper (II). This compound was characterized by elemental analysis, 1R, and X-ray diffraction techniques. The synthesis and structure of this compound will be presented and future evaluation for nucleophilic activity will be described.

Phosphorylation of Amino Acids in *Chlamydomonas* dynein

Héloïse Chenelot

Dr. David Howard, Faculty Mentor.

Chlamydomonas is a unicellular green alga that swims by using two anterior flagella that are homologous in composition and function to mammalian cilia and flagella. As in all eukaryotic flagella, the beating of *Chlamydomonas* flagella is generated by the microtubule-based motor protein dynein. The direct regulation of dynein activity may regulate the beating frequency and beat waveform of the flagella, which in turn would control the overall flagellar motility. Previous work indicated that the forcegenerating activity of dynein is controlled by the phosphorylation/dephosphorylation of dynein.

The purpose of the current study was to determine which amino acids—of the three potentially used—are the substrates for phosphorylation in dynein of *Chlamydomonas*. The kinase enzyme involved in this phosphorylation is thought to be a structural component of the *Chlamydomonas* flagella. Recent results suggest

that the radial spoke structures in flagella inhibit or override the activity of the kinase. In order to maximize kinase activity and therefore the amount of phosphorylation in dynein, we used the radial spoke-deficient mutant *pf 14*.

Dynein from *Chlamydomonas* flagella was isolated through salt-extraction and sucrose density gradient centrifugation. Dynein proteins were Western blotted, and anti-phosphoepitope antibodies were used to distinguish the types of amino acids phosphorylated.

The Competitive Relationship Between the Perennial *Cardaria draba* and the Annual *Lepidium virginicum*

Maria Conley

Dr. Steven Carroll, Faculty Mentor

Life history theory predicts that perennials, having a higher investment in vegetative rather than reproductive structures, should be superior to annuals in their ability to compete for resources. To determine if this competitive relationship was affected by a delay in seedling emergence, the perennial *Cardaria draba* and the annual *Lepidium virginicum* were planted alone and together in 4 inch pots, and in delayed and simultaneous plantings. Relative competitive ability was assessed by measuring the root and shoot dry masses of the focal plants. For both planting times and treatments, the perennial had higher root and shoot biomass. The annual displayed a higher root:shoot mass ratio than the perennial in the delayed planting, as well as a dramatically decreased shoot mass. These results indicate that the perennial is a superior competitor.

Pollen Morphology and Development in Water Starworts (Callitrichaceae)

Ranessa L. Cooper

Dr. Jeffrey M. Osborn, Faculty Mentor

Callitrichaceae is a family of flowering plants, commonly known as water starworts, that includes the single genus *Callitriche. Callitriche* consists of 50 terrestrial, amphibious, and obligately submersed species, and it is the only genus in the plant kingdom with cooccurring aerial, water surface, and subsurface pollination systems. Pollen morphology of only a few species have been critically examined, and pollen development is poorly understood in *Callitriche* as no published studies have addressed the topic. The research focused on 12 species of *Callitriche,* including representatives of all growth forms. Pollen morphology and development are described using light and electron microscopy. New data confirm the lack of an exine in mature pollen of obligately submersed taxa, and, by contrast, the presence of a distinct exine in pollen of both terrestrial and amphibious taxa. Pollen wall

development is examined and compared between the exineless, underwater-flowering species and the exine-bearing, aerial-flowering taxa. In addition to the palynological stages documented, several anther characters are examined.

Understanding Botanical Structure Through Illustration: An Interdisciplinary Approach

Bradford L. Day

Dr. Jeffrey M. Osborn, Faculty Mentor

Biological illustration integrates scientific observation and artistic ability. Illustrations are used in both textbooks and the primary literature as an important medium of research communication. A well-drawn illustration can reveal the smallest intricacies about a specimen. This study involved the use of different illustration types to document several botanical specimens. Illustrations were created using pen and ink, utilizing a form of shading known as stippling. The first set of drawings focused on the growth stages and floral morphology of the rapid-cycling plant *Brassica rapa* The next illustration type depicted the three-dimensional structure of several gymnosperm pollen grains. Based on observations with scanning electron microscopy, coupled with the use three dimensional models and techniques in shading and perspective, drawings of pollen from five extant and four extinct species were rendered. These illustrations provide detailed information about overall shape, aperture type, and surface ornamentation. The different forms of illustration present a variety of challenges, but are invaluable learning tools; the ability to couple a picture with a concept enhances the opportunity for full comprehension.

Spectroscopic Studies of $Co(acac)_3$ in a Room-Temperature Molten Salt

Molly Delanty* and Michael Wyzlic

Dr. Michael F. Ortwerth, Faculty Mentor

The chemistry of chemical compounds in liquid state systems is well documented in the literature. Solvent-solute interactions in these environments are extensively categorized. The area of materials science is also shedding light on interactions between solvent and solutes in solid state systems. However, little is known about solute-solvent relationships in media having both liquid state and solid state characteristics, such as molten salts. In fact, minimal data for transition metal complex solutes in molten salt solvents is available. Research results in this study have determined spectroscopically the interactions of a $Co(acac)_3$ transition metal solute in the room temperature l-methyl-3-ethyl-imidazolium / aluminum trichloride molten salt. Specific experiments have addressed the affect of varying the concentration of solute and the composition of the molten salt on solvent-solute interactions.

One World Government, Under Laughlin, with Liberty and Justice for Some: Exploring the Link Between Eugenics and the Internationalist Movement of the 1920s

Jerritt Farrar

Dr. Philip Wilson, Faculty Mentor

In this paper, a different side of Harry Laughlin, one of America's foremost proponents of eugenic sterilization, is explored. Laughlin, known for his work to control reproduction and immigration policies during the period of 1910-1940, was also interested in world peace. Here, his detailed plan for world government is examine using his own personal correspondence and unpublished manuscript material on the subject. My research emphasizes his amalgamation of eugenics, immigration, and world peace into one unified plan. It also tracks his ties to the internationalist movement of the 1920s and his connection to influential men of the major peace societies of the day. The paper also demonstrates that Laughlin may not have been the only internationalist interested in furthering eugenics through the implementation of a world government.

Self-Assembled Monolayers of N-alkylthiols on Ag Nanoparticles

Jordan A. Freie and Brian D. Reiss

Dr. Griff Freeman, Faculty Mentor

Derivatized Ag particles have been synthesized in which a nanometer-scale Ag nucleus is formed with the simultaneous attachment of self-assembled 1-dodecanethiol or l-octadecylthiol monolayers. The preparation proceeds via a phase-transfer catalyzed, two-phase (water/toluene) redox reaction analogous to the procedure used to form similar Au-based nanoparticles. Ag-thiol nanoparticles are air-stable, isolable solids that are soluble in nonpolar solvents and readily characterizable. NMR and IR spectra will be presented to support the attachment of the thiol monolayers and TEM images will demonstrate average particle size.

DNA Fingerprint Analysis of the Southern Flying Squirrel, *Glaucomys volans*

Christy Geiger* and Kenna Johnson

Dr. Susan Crowson and Dr. Scott Ellis, Faculty Mentors

Dr. Scott Ellis and his student researchers have been observing the Southern flying squirrel in nest boxes in Adair county, in order to better understand their ecology and mating behavior. In addition to the field work, we are carrying out a genetic analysis on related squirrels to determine paternity of squirrel siblings. We are trying to perfect a DNA fingerprinting protocol using isolated kidney and small intestine tissues from siblings to address the Southern flying squirrel's mating behavior. This research will provide a better understanding of this species enabling intelligent decisions to be made concerning its habitat.

Conception of Ionically Bonded Composite NLO Films and Preliminary Research Results

Cory A. Geise

Dr. Dana Delaware and Dr. Steven Keller, (University of Missouri), Faculty Mentors

Materials displaying nonlinear optical (NLO) responses are integral to the development of optical communications technology for light signal modulation, circuit switching, and wave guidance. Though many materials display the desired properties, polymers offer the most dynamic potential for strong and stable responses required for practical application. Typically, NLO polymers are subjected to an electropoling process to orient the dipoles of the response-generating entities in one direction. Thermal randomization gradually reorders this arrangement and degrades response. Dr. Steven Keller at the University of Missouri - Columbia proposes to achieve the necessary alignment of molecules via an electrostatic differential across the pertinent polymeric sidechains and its incorporation into an ionically bonded composite film. The hypothetical composite films consist of charged polymeric, organic, and inorganic layers each with their respective functions. Only the polymeric component displays the NLO response and it is this aspect of the proposed project that we have concentrated on in the recent nine months and for which preliminary data is now available. Among the results are the acquisition of a viable polyelectrolyte and data from subsequent construction of simple polymeric films.

Farmers' Age, Growth and Productivity Relationships: The Case of Northeast Missouri Farmers

Chris Gibson* and Emily Dombek

Dr. Paul W. Armah, Faculty Mentor

The objective of the study is to determine the impact of age on the productivity and growth of NEMO farmers. Randomly selected NEMO farmers were divided into 6 age groups: under 25, 25 to 34, 35 to 44, 45 to 54, 55 to 64, and over 65 years. An age productivity and equity growth functions were generated. These models were used to examine how age affects productivity and growth of NEMO farmers. While the productivity results indicate that NEMO farmer's efficiency generally increases at about 5.4 percent per age group and then decreases at the same rate with age, the relationship 5 with the growth model results indicates that higher leverage appears quite attractive to NEMO farmers as a means of potential growth. However, efficient and less leveraged NEMO farm age-groups with less debt overhang have the ability to take on additional debt to finance new investments and increase their growth potential.

Applications of the Skyrme Model to the Quantum Hall Effect

Darren Glosemeyer

Dr. Peter Rolnick, Faculty Mentor

Since the mid-1970's physicists have studied the Quantum Hall Effect which is exhibited by a two-dimensional electron gas subjected to a perpendicular magnetic field. In recent years, the Skyrme model from nuclear physics has been used to describe this quantum effect in solid state physics. In this talk, the fundamentals of the Quantum Hall Effect and the Skyrme model will be discussed with an emphasis on applying the Skyrme model to the Fractional Quantum Hall Effect as a subject for future study.

Investigations of Solutions of the Classical Skyrme Model Which Do Not Have Radial Symmetry

Gerald J. Good

Dr. Peter Rolnick, Faculty Mentor

The Skyrme model is a classical field theory proposed in the 1960's which models nucleons as solitons in a pion field. In the last decade, work has been done which shows that the Skyrme model can be used as an approximation to QCD in the low- and medium-energy limit—quantities such as nucleon mass can be calculat-

ed, whereas at low energies, QCD is not useful because that energy realm is non-perturbative.

So far, radial symmetry has been assumed in nearly every study of the Skyrme model. Multiplebaryon systems are usually modeled by bringing together solutions of the radially symmetric model (hedgehog) and allowing them to relax numerically. We have been trying another approach, where we use arrangements of sources which do not have radial symmetry. Using numerical techniques and a Macintosh computer, we have found the profile function which solves the model for one of these symmetries. In my presentation, I will focus on how we can show that these configurations are stable and what physical systems they may represent.

Separation and Detection of Free and Bound Metal Ions Using Capillary Electrophoresis Coupled with Direct Current Plasma

Jason A. Gruenhagen

Dr. Yinfa Ma and Dr. David McCurdy, Faculty Mentors

Cu^{2+}, Fe^{3+}, Zn^{2+}, and other metal ions are vital to many of the human body's biochemical processes. However, these ions also can become toxic to the body when there concentrations are too high. Many techniques have been developed for the analysis of free ions in blood samples, but none of these are able to analyze free and protein bound ions. We have developed a technique in which this metal-ion speciation is possible using capillary electrophoresis interfaced with direct current plasma. Thus far, we have successfully developed an interface between the two instruments and are in the process of testing standard samples. Soon we hope to proceed further with testing of serum samples.

Non-Random Mating in a Population of Soldier Beetles, *Chauliognathus pennsyvanicus:* Evidence from Field Observations and Mate Choice Experiments

Daniel Hemmann, Joanna Tucker, and Shelly Russell

Patrick Ross, Faculty Mentor

The existence of non-random mating within a population can indicate the presence of sexual selection operating on that population. In our study, we looked for evidence of differential mating success in soldier beetles, *Chauliognathus pennsylvanicus,* by comparing the phenotypic traits of non-mating and mating individuals. We analyzed for differences in body size, weight, and body symmetry. In many species, reproductive fitness is often associated with a high degree of symmetry. To further elucidate the mechanism responsible for nonrandom mating in this population, a series of mate choice experiments were conducted. Male beetles preferred

previously mated females to unmated females. In contrast, female beetles were shown to mate at random with respect to the previous mating experience of males. Size, weight, and body symmetry measurements were taken from all individuals in order to determine the presence of any phenotypic correlates with mating success.

Comparative Peridium and Spore Morphology in Bird's Nest Fungi (Nidulariaceae) and Its Relation to Spore Dispersal Mechanisms

Betty Jo Jeffers

Dr. Jeffrey M. Osborn, Faculty Mentor

Nidulariaceae, or bird's nest fungi, contain their basidiospores in lenticular-shaped peridioles. The peridioles are contained within a peridium, or fruiting body, that ranges in shape among the five genera. Little is known about the influential role of peridium structure in the mechanisms of spore dispersal. In the present study, two species of Nidulariaceae were examined using combined light microscopy and scanning electron microscopy. *Cyathus stercoreus* has a rigid, vase-like peridium, whereas that of *Nidularia pulvinata* is more fragile and globose. This investigation focused on the ultrastructural differences between the two species regarding the morphology of mature peridia and peridioles, the initiation of peridiole development, and the presence or absence of both modified clamp connections and a funicular cord, which functions in spore dispersal. This study also documented morphological correlations between these structural features and the different methods of spore dispersal in the two species. In addition, this is the first study to examine a special case of twinning in *N. pulvinata.*

DNA Fingerprint Analysis of Southern Flying Squirrels, *Glaucomys volans*

Kenna Johnson* and Christy Geiger

Dr. Susan Crowson and Dr. Scott Ellis, Faculty Mentors

Since 1987, field work has been done in Adair County, MO, to determine the mating system of the southern flying squirrel. This work has consisted of observing individual flying squirrels repeatedly in nest boxes dunng mating season. Recently, laboratory work has been undertaken to perfect DNA fingerprinting techniques for determination of relationships of individuals observed in nest boxes. Squirrel brain and heart tissues from three juvenile siblings are currently being studied to provide information about paternity. This information, once obtained, will be valuable for making decisions about our impact on the habitats of flying squirrels.

Harry Laughlin's Crusade to Eradicate the Feebleminded: Eugenics and Sterilization in Early 20th-Century America

Joshua P. Kesterson

Dr. Philip K. Wilson, Faculty Mentor

In 1883, Francis Galton introduced the term eugenics to describe "the science which deals with all the influences that improve the inborn qualities of the race. . . [and] develop them to the utmost advantage." The mission of this new science included the eradication of the "feebleminded," or those identified with a mental age less than twelve. At a time when the increase in such individuals was deemed to be "the greatest problem that confronts our Nation," Harry H. Laughlin rose to prominence by advocating the sterilization of the "feebleminded." By 1931, thirty-one states had passed compulsory sterilization laws and, by 1935, 30,000 mandatory sterilizations had been performed in the United States, both due in large part to the unflagging effort of Laughlin. These radical movements stemmed from 1) the eugenicists' misinterpretation of Mendelian genetics as to how "feebleminded-ness" was passed on from parent to offspring, 2) the labeling of the mentally retarded as inferior, and 3) the reprehensible condition of institutional care.

Nonlinear Oscillations of Floating Buoys

Paul Koski

Dr. Ian M. Lindevald, Faculty Mentor

The equation of motion of a buoy oscillating in a fluid was analyzed. The solution for a buoy of cylindrical cross section is exactly analogous to the well known mass and spring system. The buoy oscillates sinusoidally about an equilibrium position with a natural frequency that depends on the density of the buoy's constituent material, the density of the fluid, and the buoy's length. However, when the buoy's cross sectional area is nonuniform, the corresponding equation of motion is non-linear. Numerical approximation methods (Runge-Kutta) were used to study the motion of non-uniform buoys in a number of specific cases including the conical buoy. The non-uniform buoy proves to be a convenient model for the general study of non-linear dynamics in physics.

Anther and Pollen Development in the American Lotus (*Nelumbo lutea*)

Sarah S. Kreunen

Dr. Jeffrey M. Osborn, Faculty Mentor

Nelumbonaceae is a small family of aquatic flowering plants, comprised of two species, *Nelumbo nuciferfl*, the Indian or sacred lotus and *N. lutea*, the American lotus or water chinquapin. *Nelumbo* and members of related waterlily families are believed to occupy a phylogenetically important position at the base of angiosperms. The developmental sequence of pollen grains and anthers provide evolutionarily significant characters in phylogenetic studies. However, little has been known about these events in *Nelumbo.* The focus of this presentation will be these ontogenetic events which have now been morphologically documented in *N. lutea* utilizing scanning electron microscopy, transmission electron microscopy, and light microscopy. The developmental stages that have been documented include. microspore mother cells, tetrads, free spores, and mature grains. The present study is the first to employ electron microscopy in the study of anther and pollen development in *Nelumbo.* Moreover, only three studies have examined pollen development in related waterlilies.

Genetically Manipulating the Population: The Common Goal of Margaret Sanger and Harry Laughlin

Gretchen Krueger

Dr. Philip Wilson, Faculty Mentor

In the 1920s, the eugenics and birth control movements fought to limit the number of births in the United States to improve the human stock. Eugenicists compiled human pedigrees in order to identify the "unfit" in society. They proposed the segregation of these persons to prevent them from reproducing. Eugenicist Harry Laughlin offered another solution, mandatory eugenical sterilization, and developed a model state sterilization law. Margaret Sanger, leader of the birth control movement, also sought to limit the number of births to the "unfit." However, she criticized eugenicists for not advocating voluntary birth control as a practical tool for limiting family size.

Although Laughlin and Sanger passionately promoted different ideas, for over a decade they directly influenced each other's eugenics work. This presentation discusses how Sanger and Laughlin' s writings show their two movements merging for a short time and then dividing again as the events in Nazi Germany became visible to the American people.

Sperm Development in *Drosophila melanogaster:* A Comparative Study

Gretchen Krueger

Dr. Janna McLean, Faculty Mentor

Segregation Distorter (SD) is a meiotic drive system found in *Drosophila melanogaster.* Male flies heterozygous for an *SD* second chromosome generally produce at least 95-99% *SD* bearing sperm instead of the 50% expected. By electron microscopy this has been attributed to abnormal chromatin condensation and histone protein transformation in the *SD* flies. *SD* has been observed to primarily affect the condensation of chromatin in about half of the spermatid nuclei during the individualization and coiling stages of spermiogenesis. This project uses light microscopy to observe variations between the spermatogenesis of normal flies and several *SD* strains. The sperm nuclei were stained with Hoechst 33258 and histone recognizing antibodies to screen for possible abnormalities. Qualitative differences in the nuclei among the various strains have been observed and categorized, yet no specific patterns can be identified to distinguish *SD* from *SD+* testes. Funded by NSF/REU grant #BIR-9424233 and the BARS stipend.

Identification of Suppressor Genes in *Segregation Distortion (SD)* Males of the Species *Drosophila melanogaster* through P Element Mutagenesis

Thomas M. Lancaster

Dr. Janna McLean, Faculty Mentor

The purpose of this research project was to determine if there are any other genes that are involved in the failure of chromatin condensation in heterozygous SD male flies. This was done by crossing a transposable element (PlacZ[w+]) with a transposon *(delta* 2-3;*Sb)* into a normally sterile male fly thereby causing a mutant to become fertile. I obtained approximately 275 potential mutants and I am presently establishing a stock for each. These mutant flies represent possible insertional mutations that may be directly related to the reversion from sterility to fertility. The next phase of this research project is to remove the P element from its locus by simply crossing in the same transposon which was used before, and then testing to see if the fly becomes sterile. If so, the P element probably originally inserted into a region that normally contributes to chromatin condensation.

Visualizing the Human Form: Art and Anatomy in Enlightenment England

Erin M. Loos

Dr. Philip K. Wilson, Faculty Mentor

The dualism of art and science in eighteenth century England was reflected in the anatomical illustrations of the time. This relationship, revolutionary for contemporary medical thought, resulted from the intellectual and aesthetic partnership formed between anatomists and artists. Although artistic and medical anatomy both convey knowledge of the inner workings of the human body, their visual motives are diverse. Medical anatomy divides the human body into its mechanical components while artistic anatomy attempts to conceptually visualize the whole based upon its parts.

My research has focused on the artistic influences placed on Enlightenment period anatomical illustration For this presentation, I will evaluate whether the artist's brush or the anatomist's scalpel played a greater role in the study of anatomy during this time

Genetic Diversity in the Resurrection Fern *(Pleopeltis polypodioides)* in the Southeastern United States

Andrew Lutz

Dr. Elisabeth A. Hooper, Faculty Mentor

The evolutionary potential of a species is deterrnined, in part, by the levels of genetic variability within populations and the distribution of that variation among populations. Surveys of allozyme diversity in plants have correlated population genetic structure with various life history features and/or ecological parameters. However, nearly all studies have focused on terrestrial plants. Epiphytes (plants growing on plants) are an important group with an unique set of life history features; yet, little is known about their genetic structure. This study reports on genetic diversity within *Pleopeltis polypodioides*, a common epiphyte in the southeastern United States. Eleven populations from throughout its range were sampled for electrophoretically detectable variation at 11 loci using starch gel electrophoresis. Standard genetic parameters (e.g., allelic diversity and heterozygosity) were calculated for each population. The results indicate that *P. polypodioides* maintains high levels of intra-populational genetic variation, but the levels are lower than conspecific populations from more tropical areas.

Direct Determination of Copper and Lead in Coal Using Electrothermal Vaporization - Direct Current Plasma - AES

A. R. Mahon and S. C. Ringwald

Dr. David L. McCurdy, Faculty Mentor

The development of electrothermal vaporization (ETV) for sample introduction into a direct current plasma (DCP) atomic emission spectrometer has allowed the direct introduction of coal slurries for trace element determinations. Initial determinations of copper and lead in bituminous and subbituminous coal slurries using aqueous standard calibration resulted in recoveries between 150-170%. These results, likely due to differences in transport efficiency between slurry samples and standards, were corrected using standard additions, improving Cu and Pb recoveries to 97-107%. To further simplify the calibration, a palladium/ magnesium matrix modifier and air ashing ETV program step were employed. With this approach, calibration by standard additions was unnecessary and recoveries were comparable to the standard additions results for both copper and lead in the coal slurries, but using only simple, direct calibration with aqueous standards.

Experiment on *Daphnia maqna*

Megan Malcolm

Dr. Nancy Sanders, Faculty Mentor

One goal of the introduction biology classes at Truman State University is to introduce students to how scientists go about doing their work. A clear understanding of how to observe living things, form hypotheses based on these observations, test these hypotheses, and accurately report the results is important for science students to understand and appreciate. In this study, a team of researchers worked together to design a laboratory exercise that is open ended and investigative in nature. We utilized the microcrustacean *Daphnia maqna* as a research animal. My project specifically focuses on the effects of different pH levels on tne heart rate and swimming behaviors of the animal.

Exploring the Scientific Method with *Daphnia magna*

Sarah McNeely

Dr. Nancy Sanders, Faculty Mentor

Our research group goal was to develop an investigative hands-on laboratory experiment for introductory biology classes the illustrate the significance of the scientific method. We chose *Daphnia,* more commonly known as the water flea, as

our biological system of interest because a culture is relatively inexpensive to start and maintain First, we tested the practicality of using live animals in an introductory biology course. After some modification, we found that *Daphnia* are indeed practical to maintain, observe, and manipulate In addition the *Daphnia* project provides another medium of study for both introductory college-level students and elementary school students. Based on my educational training and upcoming career as an elementary educator, I used our research group experiences to modify the *Daphnia* experiment such that it can be incorporated in an elementary school science unit.

Aerodynamic Features of Saccate Pollen: Evolutionary Implications for Wind-Pollinated Plants

Ryan T. McWilliams

Dr. Jeffrey M. Osborn and Dr. Ian M. Lindevald, Faculty Mentors

Pollen of wind-pollinated plants may exhibit a variety of shapes, sizes, and surface features. Saccate pollen grains consist of a main body that contains the reproductive cells and up to three laterally positioned, air-filled sacs. These sacs add little weight to the grain, but considerable surface area to catch the wind. Using light and electron microscopy, I have examined the saccate pollen of three conifers and documented the overall, main body, & sac sizes, surface ornamentation, wall thickness & infrastructure, sac infrastructure, overall mass, and wall mass. Some of these structural features have been incorporated into a *Mathematica* model that uses numerical methods (Runge-Kutta) to calculate flight duration and distance for theoretical wind-dispersed pollen grains given the height of dispersal, wind speed, and wind direction. By conducting comparable studies of the aerodynamic features of pollen grains, we hope to evaluate the adaptive significance of saccate pollen regarding the reproductive biology of both extant and extinct windpollinated plants.

Analysis of SDS and NaOH on the Bio-Rad Protein Assay

David Meyer and Heather Morgan

Dr. Cynthia Cooper, Faculty Mentor

The purpose of our study was to determine the upper limits of concentration of two reagents sodium dodecylsulfate (SDS) and sodium hydroxide (NaOH) in a protein assay. We plan to extract nucleotides and catecholamines from PC 12 cells treated with certain cancer drugs using trichloroacetic acid and determine the amount of protein produced by the cells. The Bio-Rad method for protein measurement is a simpler and easier technique compared to other widely used procedures such as the Lowry method. The microassay procedure allowed us to measure 0-25 micrograms of protein. Each sample received an appropriate volume of SDS, NaOH, or both, followed by Barnsted Nanopure water and 200 microliters of

Bio-Rad Dye reagent to total a volume of two milliliters. After mixing, each of the samples was measured for absorbance using a spectrophotometer. The results were plotted and analyzed to determine the effects of the various reagents on the standard curve of the Bio-Rad protein assay. The results of the study were that SDS up to 0.0001% and NaOH up to 0. IN did not interfere with the Bio-Rad assay.

A New Method for the Determination of Zinc in Serum using HPCE

Aaron Cassely and Sheila Meyer*

Dr. Yinfa Ma, Faculty Mentor

Zinc has undeniable importance in the human body, from its involvement in cell differentiation and replication to it's interaction with hormones. Zinc deficiency has been shown to influence keratogenesis, growth retardation, and adverse effects on reproduction. Because zinc plays such an important role in human growth and development, methods to accurately measure zinc in small amounts of blood serum are needed. Currently, spectrophotometric analysis is used to determine zinc quantities in samples. However, interferences from copper and iron, plus a large sample size, limit the quantification reliability. These problems can be solved by high performance capillary electrophoresis (HPCE). This promising technique utilizes a small sample size (10 μL for a single analysis) and eliminates interferences from other metals through separation. HPCE is limited by only one factor: metals do not absorb much light. Since zinc does not absorb light a complexing reagent, such as 4-(2-pyridylazo)resorcinol, is complexed with zinc to fulfill the absorption capabilities. With this technique the zinc level in serum can be easily detected and quantified.

Gravimetric Analysis of Nickel Using Microwave Digestion

Rachel A. Morgan

Dr. Griff Freeman, Faculty Mentor

Microwave ovens may be used to speed up many reactions and procedures that are normally carried out using traditional heat sources, such as hot plates, Bunsen burners, or heating mantles. The quantitative analysis of nickel, present in nickel oxide standards, is routinely carried out using standard digestion procedures on a hot plate. In the standard procedure the sample is placed in a beaker with HC1 and HNO_3 and heated for up to three hours or to completion of digestion. We have digested the same sample with microwave techniques using the same acids in a closed Teflon container in less than thirty minutes. In addition, the microwave is used to dry glass crucibles necessary for the analysis in about five minutes rather

than up to one and a half hours in a conventional oven. Overall, microwave techniques will shorten the amount of time spent on a procedure and introduce new sample preparation techniques into our laboratories.

The Bell-Kochen-Specker Theorem in Four and Eight Dimensions

Jonathan Morris

Dr. Eduardo Velasco, Faculty Mentor

Bell's Theorem, and its less well known analogue, the Kochen-Specker Theorem, have captured the imaginations of physicists and philosophers alike since their introduction in the mid-sixties. Each places constraints upon the types of hidden variable theorems which are possible within the framework of Quantum Mechanics. Recent extensions of these theorems have been offered in four and eight dimensions. I study some of the implications of these four and eight dimensional proofs, and explain the types of hidden variable theorems which are allowed in light of these new theorems.

Effect of Smoothing on Significance of Activation Foci in fMR Images

Ellen J. O'Connell

Dr. Terrence S. Early, University of Texas Medical Branch at Galveston, Faculty Mentor

Functional magnetic resonance (fMR) imaging is a technique that can be done with a conventional MR magnet to measure increases in local brain activity due to sensory, motor or cognitive stimuli. An increase in brain activity is noted by an increase in regional cerebral blood flow, resulting in a concurrent overcompensation in oxygenated hemoglobin. Oxygenated hemoglobin is more diamagnetic than the deoxygenated form, thus producing a more intense MR signal. The signal-to-noise ratio in an fMR image using conventional pulse sequences is typically low, resulting in false negative error. The degree of spatial filtering of the fMR image is crucial in reducing this error. We have reconstructed fMR activation images and processed them using spatial filters of various sizes. In this presentation, activation is shown to be seen best with a filter of a given size, as opposed to other filters or no filtering. Use of this technique should enhance the utility of fMRI for use with conventional, widely available MR magenets as a research and clinical tool.

Mineral Fluxes from Non-estrus to Estrus in Beef Cows

Libby Ottiger* and Philip Briscoe
Dr. Glenn Wehner, Faculty Mentor

Previous research utilizing an OVATEC integrated probe for estrus detection in beef cattle had indicated a shift in ions leading to an increase in resistance and capacitance of cervical mucus in cows entering estrus. This study was to determine Ca, P,. Zn, Cu. Na and Mn ion levels in the vaginal mucus of nonestrus and estrus cows. The common levels for these ions varies a great deal. The ion with the highest rate of intestinal absorption in nonestrus cows was Ca, followed by Na, and then P. The Zn, Cu and Mn levels were much lower. Cows of varying parity were used in this experiment. Vaginal mucus and blood serum samples were taken from these nonestrus cows and estrus was then induced by PGF2α. Blood and mucus samples were taken again as each exhibited estrus behavior. Ion concentrations-were-then determined by atomic absorption and the nonestrus and estrus readings compared. With this information we hoped to learn which feed concentrations best alter ion levels and provide the highest rates of fertility.

Selection of Host Fungal Stromata by a Mycophagous Fly

Rachel Pawlitz
Dr. Thomas Bultman, Faculty Mentor

Endophytic fungi interact with *Phorbia* female flies in a mutualism that appears to be analagous to angiosperm "pollinating parasite" systems. Female flies act as vectors for fungal spores as they lay eggs on the fungi which grow within and on grass stems. To understand selective pressures on choice of fungi by female flies in what appears to be a highly co-evolved system, I marked fungi of two species of *Epichloe* in southern England and recorded the number of eggs on each of them, and the following characteristics: fungal length, diameter, height from ground, local density of fungi and grass stems, and number of grass stems and fungi in each clump. I followed development of eggs to their fate of successful pupation or death. Preferences varied among sites and species, and fungal characteristics preferred by the female fly showed no correlation with larval survivorship, leading me to speculate that characteristics I did not measure may have had more influence on survivorship.

Daphnia, An Experimenter's Friend

Jennifer Payne

Dr. Nancy Sanders, Faculty Mentor

Life comes in many shapes and sizes, but in the classroom and laboratory, we as students and scientists have more limited access to principles and organisms we can study. In the pursuit to overcome this dilemma, our research group chose to observe the lifecycles, physiology, and behavior of the microcrustacean *Daphnia magna*. Many variables, such as food availability, environmental pH level, and temperature were tested to develop a laboratory exercise that is investigatory and is designed to challenge students in an introductory level biology class. My research tested the effects of food availability on a *Daphnia.* My experiments consisted of varying the amounts and types of food given to the *Daphnia* on a daily basis, and seeing how they react to these changes. The results, thus far, suggest that *Daphnia* grow, reproduce, and develop well, but with different manifestations in food amount and type, a variance of change occurs.

Computer Modeling of Laser Systems

Mark Pecaut

Dr. David Chyba, Faculty Mentor

We have taken a semi-classical approach to the analysis of a ring laser system with a saturable absorber. The system consists of an amplifying medium, an absorption medium, and mirrors that form a ring laser. Our model assumes two level atoms, both in the absorption media and the amplifying media. Steady state solutions have been obtained using the Maxwell-Bloch equations, and several approximations. Using these same techniques, we have turned our attention to the dynamic solutions, in particular, looking at the square of the electric field versus the operating frequency of the laser. Numerical solutions using Mathematica© have been obtained. We examined time-evolution behavior for different excitation parameter values, obtaining graphical solutions. The time-dependent solutions corroborate the existence of stable and unstable steady-state solutions, show the existence of periodic oscillating solutions, and strongly suggest the occurrence of non-periodic oscillations. These results suggest several avenues for further exploration of the model.

The Construction of a Laser Diode System

Mark Pecaut

Dr. Maria Di Stefano, Faculty Mentor

Dye lasers, despite their bulk and expense, have been the traditional sources for tunable laser light. Diode lasers, like the ones used in CD players and supermarket checkouts, have been rapidly replacing dye lasers because they are small and inexpensive. In atomic physics, diode lasers are well suited as tunable light sources for spectroscopy experiments. The output wavelength of a diode laser can be controlled by controlling the temperature of the laser and the current through the laser. By changing these parameters, we can tune the wavelength of the laser to a specific energy transition in an atom. Rather than using a commercially available unit, we have elected to construct a current and temperature controller. A description of the system and the laser head to be used with it, as well as the obstacles encountered during the project, will be described in this presentation.

The "Fine Structure" of a Damped, Driven Harmonic Oscillator

Mark J. Pecaut and Jennifer A. Wilcox

Dr. Kenneth Hahn, Faculty Mentor

There are detailed characteristics of the common damped, driven harmonic oscillator not mentioned in classical mechanics texts. Although a completely solvable problem in Newtonian physics, real systems depend on the history of the force. We have conducted a thorough investigation of this 'fine structure' by building several linear harmonic oscillators with which we can easily control frequency, amplitude, and damping. Each consists of a neodymium magnet attached to a spring which is driven by an alternating magnetic field. Generally, we sweep each oscillator through resonance and study the response, obtaining very repeatable results. Phenomena we have studied include: (1) dependence of resonant frequency and resonant amplitude on sweep rate, (2) dependence of resonant frequency on the position of the magnet, and (3) dependencies on temperature and pressure. We will present the results of these studies as well as mathematical models we have developed to explain these 'fine structure' charactenstics.

The Use of Cemetery Records to Investigate Historical Trends in Male and Female Survivorship Curves in Adair County

Tysen Petre

Patrick Ross, Faculty Mentor

Age-specific survivorship curves can be constructed from a variety of data sources to describe the demographic structure of a population. We used data from local cemeteries to characterize trends in survivorship in Adair County over the past two centuries. Survivorship curves were constructed for each decade between the year 1800 and the present, based upon all of the recorded births within that decade. Males and female survivorship data was analyzed separately. As expected, our analyses showed improvements in survivorship and life expectancy for both sexes over this time period. In addition, we found sex differences in survivorship which also showed strong shifts over time. The association of these trends in survivorship with medical and societal changes will be discussed as well as the limitations of this approach to the collection of demographic data.

Self Assembly and Electrochemistry of 1,1'-Bridged-2,2'-Dipyridium Amphiphiles

Janette Powers

Dr. Dean A. Van Galen, Faculty Mentor

The self assembly of 4-nonadecyl-4'-methyl-1,1'-x methylene2,2'dipyridium ions (where x = di, tri, or tetra) were studied at a glassy carbon electrode by cyclic voltammetry. The limiting surface coverage of these ions on the electrode in $KCl0_4$ was determined to be 1.73×10^{-10}, 1.63×10^{-10} and 1.75×10^{-10} mol/cm^2 for the di, tri, and tetra ions respectively. Molecular modeling of these ions yielded similar values, suggesting that the dipyridium rings are roughly parallel to the electrode surface. Utilizing 4-nonadecyl-4'-methyl-1,1'dimethylene2,2'-dipyridium as an immobilized catalyst on the electrode surface, the reduction of artemisinin (an antimalaria drug) and ethyl-3benzoylacrylate (an industrially important olefin) were electrocatalyzed at a potential less negative than the direct reduction for these compounds.

Exploration of the Mechanism of Synthesis of Alkanethiol Coated Ag Nanoparticles

Brian Reiss

Dr. Griff Freeman, Faculty Mentor

Nanoscale particles have been prepared in which a Ag core is coated with either 1-dodecanethiol or 1-octadecanethiol. These particles have been prepared using a two-phase procedure analogous to that previously used to prepare Au -based particles from Tetrachloroaurate ($AuCl_4^-$). The mechanism proposed for Au-based nanoparticles should not work for the Ag^+ used in these experiments because the phase transfer reagent, tetraoctylammonium bromide. is also positivelv charged. Several mechanisms have been proposed for the Ag particle synthesis, including the formation of complexes between the organic solvent and Ag^+. The thiols used in these experiments can also complex with the Ag^+, and both types of complexes would make the Ag^+ soluble in the organic phase. Ag^+ also forms divalent halides, AgX_2, in the presence of excess halides. These ions could be transferred to the organic layer in the same wa,v as the $AuCl_4$-. Atomic spectroscopy has been employed to determine which of these mechanisms, or series of mechanisms, is responsible for particle synthesis.

P-element Mutation and mRNA Analysis of Sterile *Drosophila melanogaster*

Walter Roensch

Dr. Janna McLean, Faculty Mentor

The SD region of *Drosophila melanogaster* has been an area of great interest to many geneticists recently. One gene in the SD region called RNA1, codes for a protein that is necessary for embryo development. Earlier in my research I created more mutations of this sequence. I am attempting to look for expression of this gene in: testes, male carcass, ovaries, and female carcass.

"Ready for the Grave Nationally:" Harry Laughlin and the House Committee on Immigration and Naturalization, 1920-1928

Michael Roth

Dr. Philip Wilson, Faculty Mentor

Immigration has a long and divisive history in America. During the 1920's efforts were taken by many to limit the influx of immigrants from Southern and Eastern Europe, and eventually a number of bills were passed which changed the immigra-

tion policy of the U. S. government. Instrumental in these changes was Harry Laughlin, Expert Witness for the U. S. House Committee on Immigration . Laughlin, a graduate of Northeast Missouri State University, served as head of the Eugenics Record Office and utilized the "science" of eugenics in his testimony before Congress. Some of his ideas eventually became law and remain in force today.

Solution-Based Electrocatalyzed Reduction of Artemisinin Using D3B

Garrett Slaton

Dr. Dean A. Van Galen, Faculty Mentor

A study of the electrocatalyzed reduction of the anti-malarial drug, artemisinin, was conducted. A discussion of electrocataiysis, artemisinin's importance and redox behavior, and the role of 4, 4'-dimethyl-1 ,1'-trimethylene-2,2'-dipyridinium (D3B) as an electrocatalyst will be presented. Applications of artemisinin's electrocatalyzed reduction to possible electrochemical detectors will be discussed as well as possible mechanisms for the D3B-catalyzed reduction.

Mitochondrial Oxygen Consumption In Cold Acclimated Animals

Kathy K. Smock

Dr. Michael G. Tannenbaum, Faculty Mentor

Previous research has shown that mitochondrial oxygen consumption (MOC) decreases over time in animals acclimated to cold ambient temperatures. However, these studies have all been performed on small animals that hibernate. Furthermore, these studies have measure MOC after many months of acclimation to cold temperatures. In contrast to these experiments, our research has focused on MOC during the first twenty days of cold exposure. We measured MOC in *Peromyscus leucopus*, an animal which enters a shallow form of hibernation known as daily torpor, *Microtus orchrogaster*, a wild animal which does not enter hibernation or torpor, and white laboratory mice, a domestic animal which also does not enter hibernation or torpor. In addition to measuring MOC, we measured food consumption to better determine the increased energy costs an animal demonstrates in cold temperatures. Our results suggest that acclimation to cold temperatures may be occurring within twenty days of cold exposure in contrast to many months as previously thought.

Comparison of Bovine Body Weight Obtained Through a Variety of Methods

Tracy A. Snider

Dr. Glenn R. Wehner, Faculty Mentor

Seedstock producers report calf birth weights back to registries so sires can be categorized by calving difficulty, calving ease direct, and birth weight to weaning weight gain. This data is utilized in the National Sire Evaluation by breed associations to calculate expected progeny differences (EPD). Producers use EPD's to decide which genetics they will add to their herd. This requires the data to be accurate. If mechanical scales are not available, several other devices can be utilized to estimate birth weight and weaning weight. In this study four different devices were compared in deriving weights: mechanical scale, cattle girth tape, horse girth tape and a hoof tape. In finding the weaning weight, the hoof tape was not used as it was not practical; therefore the scale, cattle girth tape and horse girth tape were used. Calves nursed dams and were supplemented with free choice ration, hay and grass. They had access to clean, fresh water at all times and were weaned between five and seven months of age. 27 Gelbvieh calves were measured for birth weights and again for weaning weights. Correlations bet veen devices and regression equations were fitted to correct tape measurements to actual scale weight.

X-ray Crystallographic Studies of Naphthoquinone Anti-fungal Agents

Mindy M. Steiniger

Dr. Anne E. Moody, Faculty Mentor

X-ray crystallographic studies were performed on 2-hydroxy-1,4naphthoquinone (I) and 2-methoxy- 1 ,4-naphthoquinone (2) for comparison with the previously studied di(2-hydroxy-1,4-naphthoquinyl)-3-methane (3). These naphthoquinones are known antifungal agents isolated from various species of *Impatiens*. Compound (1) was crystallized from methanol. Single crystal x-ray studies reveal a planar molecule with the hydrogen of the hydroxyl group in the plane of the aromatic structure. This hydrogen also participates in hydrogen bonding with the carbonyl oxygen in the 4 position of a different molecule. The unit cell shows the molecules stacking atop one another in parallel. The X-ray crystal structure of 2-methoxy- 1 ,4-napthoquinone (3) formed upon slow crystalization from acetonitrile and showed dimerization of these molecules via a photochemical 2 + 2 cycloaddition.

Regulation of Calcium Dependent Flagellar Dominance by a Protein Phosphatase in *Chlamydomonas*

Michael E. Watson, Jr.

Dr. David Howard, Faculty Mentor

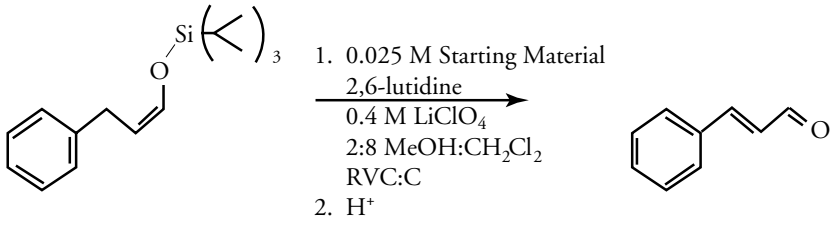
In the green alga *Chlamydomonas reinhardtii*, Ca^{2+} functions as the intracellular signal regulating flagellar dominance. Previous studies have shown that both a protein kinase and phosphatase are involved in the regulation of dynein-driven flagellar motility. We hypothesized that the phosphorylation state of dynein modulates the effects of Ca^{2+} in determining flagellar dominance. To investigate this hypothesis, positively and negatively phototactic cells were demembranated, incubated with the phosphatase inhibitors okadaic acid or calyculin-A, and reactivated with ATP over a range of Ca^{2+} concentrations. Flagellar dominance was determined by microscopic observation. Results from these experiments suggest that flagellar dominance does not seem to be affected by phosphatase inhibition. Therefore, the ability to coordinate phototaxis through flagellar dominance may involve another mechanism by which calcium influences axoneme activity.

The Formation of α,β-Unsaturated Carbonyl Compounds by Using Anodic Organic Electrochemistry.

Michael Zahra

Dr. Dallas G. New, Faculty Mentor, University of Central Oklahoma

The utility of forming a,,8-unsaturated carbonyl compounds by oxidative organic electrochemistry was studied. There are many chemical methods already known for this transformation, but they use toxic metals, high temperatures, or costly reagents. In order to avoid these conditions, we began to explore the generality of this process using oxidative organic electrochemistry. The scope and limitations of these reactions will be presented.



Lattice Gas Simulations of Two-dimensional Flow

Aleksey Zimin

Dr. Eduardo Velasco, Faculty Mentor

In my research I am using the Frisch-Hasslacher-Pomeau lattice gas models to study the flow of incompressible fluid in two dimensions. The simulations are performed using cellular automaton collision rules that preserve number of particles and linear momentum. The particles move from node to node on a two - dimensional hexagonal lattice that also preserves the rotational symmetry of the fluid. The model has been shown to obey the Navier - Stokes equation in the limit of large lattice size and low velocities. The main objective of this research is to create a computer model to simulate the flow of an incompressible fluid in the arbitrary geometries in two dimensions, and further to extend this model to three dimensions.

Division of Social Science

Causes of Party Fractionalization in Newly Developing Democracies

C. Michael Arnold

Dr. John Ishiyama, Faculty Mentor

The study of the number of parties, or party fractionalization, is important because it represents the degree of available representation via parties in a given system. Party fractionalization, has been explained in the past through such things as type of election law, district magnitude, ethnicity, and other variables. Recently previous regime type and type of democratic transition have utilized to explain fractionalization in the newly emerging democracies. It is the purpose of this paper to incorporate some of the past variables as well as previous regime type and type of transition, and apply it to the democracies that have emerged since the Third Wave of democratization. Also, this paper identifies which variables influence the newly emerging democracies greater than the Western democracies.

A Study of the Link Between Odor, Memory, and Emotion

Daniel Baack

Dr. Mark Hatala, Faculty Mentor

How do odor, emotion, and memory interact? In a preliminary study, the names of odors were paired with either emotional words or concrete nouns. The odor names were then freely recalled, and each odor smelled at encoding was chosen from a pair of odors, a recognition task. Results suggest that the connection between emotion and odor results in a robust memory that is resistant to decay.

The Ethical Implications of Fetal Tissue Research and Transplantation

Kelly Barbour

Dr. David Gruber, Faculty Mentor

Being diagnosed with Alzheimer's or Parkinson's may no longer be a death sentence for many individuals. New advances in research on fetal tissue are offering exciting possibilities of future treatments and cures to a variety of degenerative brain, diseases, diabetes mellitus, and some blood disorders. The thesis examines fetal tissue research and the resulting societal and ethical implications about the notions of personhood, rights, status, and value of life. The paper also addresses how the research will affect women, fetal life, individuals suffering from diseases, and society in general. Fetal tissue research should be seen as ethical and should continue to have governmental support. However, a number of restrictions must be put in place in order to prevent devaluation of women, fetuses, and human life. As technology continues to expand, we must lock at the ethical implications that certain advances may lead to despite the potential and desired benefits.

The Manifest and Latent Functions of Fraternity Hazing and Ethnic Cleansing: A Comparative Analysis

Chris Barreca

Dr. Keith Doubt, Faculty Mentor

Social theorist Robert K. Merton defines the manifest function of social action to be the explicit and overt reasoning behind a given act. The latent function refers to the covert or hidden reasoning behind a given act. Using Merton's theories on the manifest and latent functions of social action, there is a parallel between the latent functions of fraternity hazing and ethnic cleansing. The latent functions of both acts are to form group solidarity, whether fraternal or national, based upon

collective guilt and shame. There is a direct correlation between the severity of the hazing/atrocities and the need for rationalization. The greater the rationalization, the more extreme the devotion to the said fraternity/nation.

The Effect of Diaphragmatic Training on Respiratory Homeostasis

Shawn Bergman, Linda Gannon, Bobbi Hopkins*, and Brian Yochim*

Dr. Fred Shaffer and Dr. Jerry Mayhew, Faculty Mentors

This study examined whether diaphragmatic training decreases respiratory homeostasis. Twenty undergraduates were assessed on minute volume, respiration rate, tidal volume, and $\%ECO_2$ using a metabolic cart during resting and treadmill conditions. Next, they were assigned to a diaphragmatic training (two weekly 60-minute group sessions) or control condition, and re-assessed two weeks after training. Planned comparisons revealed that neither diaphragmatic ($F(1,9) = .89$, $p = .37$) nor control group ($F(1,9) = .40$, $p = .557$) treadmill minute volume decreased across this study. Diaphragmatic training did not reduce respiratory homeostasis since ventilation continued to increase with workload.

Breathing Effort Disrupts Diaphragmatic Breathing

Shawn Bergman, Bobbi Hopkins, Jason Squires*, and Denise Irwin*

Dr. Fred Shaffer, Faculty Mentor

This study tested Peper and Holt's thesis that diaphragmatic breathing should be effortless. We compared the effects of low and high effort diaphragmatic breathing on respiration. Thirty undergraduates were taught diaphragmatic breathing and randomly assigned to either: low effort, rest, high effort, or high effort, rest, low effort. Each condition lasted three minutes. A one-tailed -test showed that high effort decreased $ETCO_2$ 11% ($t(29) = 5.65$, $p < .0001$) and increased $ETCO_2$ variability 72% ($t(29) = 3.72$, $p < .0004$) instead of raising and stabilizing $ETCO_2$. These findings confirmed the importance of effortlessness and monitoring $ETCO_2$ during diaphragmatic training.

Does lnhalation-to-Exhalation Ratio Affect Diaphragmatic Training Outcome?

Shawn Bergman, Jennifer Wheelehon, Staci Johnson*, and Brian Yochim*

Dr. Fred Shaffer and Dr. Jerry Mayhew, Faculty Mentors

This study examined whether inhalation-to-exhalation ratio affects diaphragmatic training outcome. Thirty undergraduates were assessed on minute volume, respiration rate, and tidal volume while resting using a metabolic cart. Next, they were assigned to 1:1 ratio training, 1:2 ratio training, or a control condition, and reassessed two weeks after training. A Student-Newman-Keuls test revealed that the 1:1 ratio group increased $\%ECO_2$ and tidal volume, and decreased respiration rate more than the control group. The 1:2 ratio group only improved on $\%ECO_2$. Since the two diaphragmatic groups achieved equivalent changes on all measures, we found weak support for favoring 1:1 ratio training.

Indicators of Diaphragmatic Breathing Effort

Shawn Bergman, Kayla White, Jennifer Carter*, and Juanita Myles*

Dr. Fred Shaffer, Faculty Mentor

This study evaluated five indicators of breathing effort during low and high breathing effort instructions. Twenty-eight undergraduates were taught diaphragmatic breathing and randomly assigned to either: low effort, rest, high effort, or high effort, rest, low effort. Each condition lasted three minutes. A onetailed t-test showed that accessory muscle sEMG increased 53% from low to high effort, frontages sEMG increased 25%, skin conductance level increased 17%, and heart rate increased 3%. Blood volume pulse did not change. That data suggest that while accessory sEMG was the most sensitive indicator, monitoring all four significant measures may better detect breathing effort.

Gender Differences in Perceived Guilt

Melinda Braband*, Hope Wallis and Christy Wilson

Dr. Michele Breault, faculty mentor

The hypothesis of this study is that female offenders are held less accountable for their actions and will receive lesser punishments than male offenders. Also, male victims will receive more blame than female victims. Fifty male and fifty female students from Truman State University read domestic abuse senarios. In one senario the male physically attacked the female and in the other senario the female attacked the male. Relationships between gender, provocation, fault, and personal-

ity were examined. Results agreed with our hypothesis that female offenders would receive lesser punishments than male offenders. The study also revealed that male offenders were considered to have more aggressive personalities and to be more at fault than female offenders. Male victims were also perceived to have provoked the violence and to deserve the violence more than female victims.

The *Republic, Brave New World* and a Modern Look at Eugenics

Amy M. DeBaets

Dr. Keith Doubt, Faculty Mentor

This paper presents a look at Plato's *The Republic* and Huxley's *Brave New World* . It examines each author's perspective on the topic of Eugenics and contrasts them. The paper then focuses on the modern debate over eugenics and those issues which affect the debate in terms of the technological advances since Huxley and Plato wrote. Finally, the paper evaluates these new issues and puts them in the light of the arguments of Plato and Huxley.

Schizophrenia: A Double-Voiced Discourse

Heather Droste

Dr. Keith Doubt, Faculty Mentor

In this paper that I researched with Dr. Doubt, we view people with schizophrenia as heroes without denying either the affliction, suffering, or uniqueness of people with schizophrenia. We ask what can be learned about dialogue and what Mikhail Bakhtin calls "an authentic life for the word" from the double-voiced discourse of people with schizophrenia. We critique what it means for the medical and social sciences to neglect the dialogical action of people with schizophrenia. What can people with schizophrenia teach us about who and what we are in dialogue with one another? What are the ways in which people with schizophrenia preserve self-consciousness in their use of language with others? How do people with schizophrenia hope for the possibility of community?

Media's Use of Economic Indicators

Angie Green
Dr. David Gillette, Faculty Mentor

American newspapers use economic indicators as tools to report on the economy. Indicators, such as unemployment rates and housing starts, can help to explain the state of the overall economy, to predict growth and market trends, or simply to quantify economic changes.

The challenge for media is to report economic indicators within a context that explains their significance, linkages to economic change, and ability to predict those changes. Informal observations of newspapers suggest that journalists present economic indicators with little explanation of how they are derived or why they are significant in their reflectionss of, and effects on, the overall economy.

This study quantifies informal observations by examining indicator coverage in three ,oublisations: *The Walt Street Journal, USA Today*, and *New York Times*. The importance placed on each indicator as determined by its physical placement with-in the pithlicatxon is assigned a numeric value The coverage is then identified as Predictive, Explantory, or Statistical Analysis of the economy. The coverage of indicators by the three newspapers is then compared and contrasted.

Creation of a Needs Assessment Questionnaire

Aaron Hannah*, Danielle Smith*, Gwen Farrow*, Jennifer Curtner, Debbie Drenth, and Scott Castro
Dr. Teresa Heckert, Faculty Mentor

The purpose of this study was to create a more reliable measure of basic social needs. The current measure, the Manifest Needs Questionnaire (MNQ), is a twen-tyitem measure that assesses the needs for achievement (nAch), affiliation (nAff), autonomy (nAut), and dominance (nDom). Prior research has shown there are problems with the internal consistency and test-retest reliability of the scales. In this study, 467 undergraduates, enrolled in undergraduate psychology courses par-ticipated. A 60-item survey instrument was created, consisting of the 20 MNQ items and 40 new items. Factor analysis was used to identify the best 20 items. Internal consistency estimates were higher for this new scale than for the original MNQ.

Relations Between Personality and Roommate Conflict

Aaron Hannah, Mike Mueller, Shauna Masters, Matt Jones, Shari Bibbs, and Shawn Bergman

Dr. Teresa Heckert, Faculty Mentor

The purpose of this research was to examine potential correlates of conflict between roommates, focusing on the relation between personality and conflict. Participants were recruited from psychology courses at Truman State University and a total of 104 roommate pairs participated. Of the 208 individuals, 172 identified themselves as female and 187 were Caucasian. The participants filled out the following questionnaires: background information, frequency of conflicts, nature of conflicts, morningness/eveningness scale, liking scale, needs assessment questionnaire, and the NE0 personality measure. From these questionnaires, we discovered that frequency of conflict was related to the number of different types of conflict (r=.56) and to how well an individual liked his/her roommate(r= .54). Frequency of conflict was related with openness (r=.15) and the need for dominance (r=.14). Additionally, openness was related to liking (r=-.21), dominance was related to morningness (r=.20), and morningness was related to liking (r=.18). Further analyses will be run to explore the relationship between personality matches and conflict.

Relationships Between Family Structure, Parental Attachment, and Gender Role Stereotyping

Kimberly Kerlin, Rebekah Oehring, and Lisa Roberts

Dr. David Conner, Faculty Mentor

In this study, the Inventory of Parent and Peer Attachment (Armsden, 1987), the Sex Role Trait Inventory (Street, 1996), and a demographic survey were used to assess the correlational relationship between three variables: family structure, the role of adult attachment, and the development of gender role stereotyping. Previous research has shown family structure (Russell, 1991) and adult attachment to parents (Haigler, 1995) to have an influence on the development of gender identity and gender roles. Currently, experimenters are recruiting students from Truman State University to respond to these three surveys and we anticipate approximately 200 participants. Preliminary data analysis will be discussed.

Effects of Gender Stereotypes on the Rating of Mental Disorder Severity

Matthew Kliethermes

Dr. Terry Palmer, Faculty Mentor

Studies the effects of gender stereotypes on the rating of mental disorder severity. Subjects were 20 male and 20 female undergraduate students from Truman State University. Ten male and ten female Ss read a passage describing a male schizophrenic. Ten male and ten female Ss read a passage describing a female schizophrenic. Subjects were asked to rate the severity of the disorder for each. These ratings were compared based on the gender of the character and the gender of the individual subject to determine if gender stereotypes affect the rating of mental disorder severity. A Two-Way ANOVA was run with an alpha level of .05. Significant results were found for neither subject gender or character gender. This suggests that gender stereotypes do not influence the rating of mental disorder severity.

Problems of the Welfare Reform Bill

Ian Lange

Dr. Mustafa Sawani, Faculty Mentor

The Welfare Reform Bill states that people currently on welfare in the U.S. will receive no government assistance after being on welfare for two years. This bill which units the time and extent of welfare assistance to American poor, will have a great impact on the U.S. economy. First, the U.S. economy cannot produce jobs for the people currently on welfare. Second, the people on welfare will have problems finding a job because they are of low-skill. Furthermore many studies have shown that our economy has a bias against lowskilled workers and jobs suitable for them. Based on these two points, the economic consequences of this bill are a higher unemployment rate, a decrease in confidence in the economy, and an increase in the amount of people who will be forced to beg on the streets for food.

The Effects of Prosecutor Characteristics on Assessment of Reward, Competence and Likability

Julie Lindstrom and Susan Vehige

Dr. Judi Misale, Faculty Mentor

Male and female participants in this completely crossed, between-subjects experiment read scenarios describing either an experienced female or male prosecuting attomey's behavior in a capital case. The prosecutor in the scenario employed

either an assertive or non-assertive strategy during the first-degree murder trial of either a female or a male defendant. Assertive behaviors included interrupting the witnesses and objecting to questions and motions presented by the defense, Participants subsequently estimated the salary of' the prosecutor, and assessed the effectiveness of the strategy used, the likelihood the prosecutor would win the case, their personal liking for the protagonist and their desire lo be represented by this attorney. Results showed both female and male participants estimated a higher salary for the male prosecutor, and all were more accepting of the assertive prosecution style than the passive style. Participant gender qualified perceptions of success and liking.

The Pluses and Minuses of Grades: Playing the Game at Truman State University

Jay Lins

Dr. Robert Graber, Faculty Mentor

As the history of industrialization and technological development have exemplified, human beings constantly seek the most efficient means available to accomplish a given task. Students are no exception to this rule. In their pursuit of quality grades they often do the least work possible to attain the desired level of achievement—they "play the game." This study explores the attitudes and reported practices of Truman State University students regarding the use of grades in general, the current grading system, "playing the game," and what effect a change to a letter system using pluses and minuses might produce. Additionally, the study attempted to find correlations between 15 different variables addressing practices and opinions about grades. This was accomplished through a survey of 97 students from three different classes within the Social Sciences. Results reveal that most students indeed admit to "playing the game," and would support a change to a grading system with pluses and minuses.

Quesnay with a Twist

Adam McKinnie

Charles Murray, Faculty Mentor

Francois Quesnay was the head of the Physiocratic school of economic thought in 18th century France. Quesnay and his followers maintained that taxes should be paid by the class that ultimately produces value, as taxes assessed anywhere else would ultimately be shifted there. He demonstrated this belief in the *Tableau Economique*, his model for the circular flow of income of pre-Revolutionary France. His analysis portrayed artisans and skilled craftsmen as being "sterile" since they did not produce any value. However, my reinterpretation of his model reveals that the true sterile class of France was the landowners and the aristocrats.

Comparison of Voter Turnouts in the 20th Century

Tom Moody and Michele Chandler
Dr. Donna Cooper Graves, Faculty Mentor

Voter turnout for presidential elections in the 20th century has fluctuated from election to election, generally decreasing as we move towards the 21st century. Despite the fact that voting is the cornerstone of democracy, many Americans do not exercise their right to vote. This investigation will examine voter turnouts for all presidential elections in the 20th century. Certain elections will be classified as having occurred during periods of national crisis such as wars, depression, and social unrest. The voter turnouts for crisis years will then be compared with voter turnouts during periods of national quietude. In order to demonstrate these comparisons and provide social context for the results, various mediums will be utilized. The mediums will include charts, graphs, photographs and documentary film footage.

The Effects of Stereotyped Occupations and Gender on Estimates of Wage and Competence

Jamie Morgan and Sara Hill
Dr. Judi Misale, Faculty Mentor

Male and female participants in this between-subjects experiment read scenarios describing the work activities and personal characteristics of either a nurse specialist (a female sex-typed occupation) or a systems analyst (a male sex-typed occupation), jobs with equivalent real-world market value. Both scenarios contained the same number of words and an equal number of characteristics and activities. Further, participants read the person employed in the position was either a female or a male, or they received no gender information. Participants subsequently estimated both fair and actual annual incomes for the described position, their likelihood of accepting this job, their expected salary in such a contingency, and how competent they felt they would be in that position. Results indicated participants devalued the female sex-typed occupation, but were more likely to accept and felt more confident about that position. Participants' gender further qualified these findings.

Gracchan Initiatives and Their Effect upon the Equites

Christopher J. Palo

Dr. David Christiansen and Dr. Martha Edwards, Faculty Mentors

Tiberius and Caius Gracchus, wanted to correct the vast problem of unemployment in the Roman world due to severe economic conditions, caused by both war and increases in territory. Theywished to pass legislation which would make it easier for members of the lowest classes to own land, which would allow them to serve in the Roman army, since ownership of land was a prerequisite and allow them to not to rely on the welfare of the state. However, the Gracchi were met with serious opposition from the wealthiest class who felt that they were being wronged. Hence, to secure the passage of their agrarian laws, the Gracchi were compelled to give power to the *equites*, which was the wealthy merchant class of Rome. The power that the Gracchi gave to the *equites* while they served as tribunes of the people was vast and unprecedented and would allow the *equites* to remain a class of power even into the Empire. After the Gracchi were both assassinated, the *equites* came out as the political and economic winners, yet the wealthiest class, who had the most to lose, and the poorest class, who had the most to gain, both returned to their status quo.

Maximizing Milošević: Rational Choice and the Yugoslav Crisis

Ann Price

Dr. Keith Doubt, Faculty Mentor

In the context of social anomies like the recent war in Bosnia, rational choice theory offers critical, but limited, insight into the actions of the parties involved. The consequences of the maximizing actions of nationalist leaders such as Serbia's Milošević and Croatia's Tudjman are reduced to theoretical tactics, diminishing entirely their deadly effects. Moreover, the utility being maximized by such individuals is not clearly known. Social theorists must attempt to infer from behavior what the motivating factor, or utility being maximized, is for any given action. As diplomats such as Warren Zimmerman, the last United States Ambassador to Yugoslavia, struggle to understand the repurcussions of their policies, reflecting on the principle of self-interested choices that undergirds rational choice theory may show them why they were not effective at stopping the violence—why their individually rational actions did not add up to a rational or desireable outcome.

Are Female Faculty Treated Differently by Students than Male Faculty?

Rebecca Schnarre*, Amy Gulinson*, Kayla White, Linda Gannon, and Sandra Schneider*

Dr. Teresa Heckert, Faculty Mentor

This study focuses on the possibility of differential treatment by students toward faculty based on faculty's gender. an area where little research has been done Of the 305 survevs distributed to instructors at Tnumatl State University 204 were returned. Of the panicipants, 39% were females. 90% were Caucasians and 75% had completed a Doctoral degree. We found that, of professors holding a Doctoral degree, females were more likely than males to repon being called Mr./ Mrs /Ms. Males reported students showing more inappropriate sexual behaviors such as sexist remarks. unwanted sexual attention and sexual propositions, than females. Females reported more inappropriate non-sexual behavior. such as belligerence. verbal harassment and physical Ihrcatst than males A greater proportion of females than males reported feeling they were treated differentially due to their gender (50%, vs. 20%,). Additional analyses. mn to detenlline if differential treatment was more related lo other demographic characteristics. will also be discussed.

Analysis of Search Behavior in a Performance Appraisal Situation

Danielle Smith*, Gwen Farrow*, Aaron Hannah*, Debbie Drenth, Scott Castro, and Jennifer Curtner

Dr. Teresa Heckert, Facutly Mentor

The purpose of this study was to evaluate the applicability of a consumer psychology approach for studying choice behavior to a performance appraisal situation and to examine the information accessed using this approach. Twenty undergraduate psychology majors who had successfully completed an industrial psychology course participated in this study. There are three basic steps involved in the decision process: present an evaluation problem, provide an information environment which contains the necessary information, and allow the problem solvers to access as much information as desired, in any order, and as often as desired. Participants rated the performance of two hypothetical employees. For each worker, 46 pieces of information were available from a total of ten sources. On average, 46.1% of the available information was accessed. Overall, the highest percentage of information was obtained for the customer source (92.5%) and the least for the second and third coworker sources (31.1%). The majority of participants examined information on all ten sources. Problems encountered in adapting this methodology will be discussed.

An Experimental Comparison of African-Americans' and Caucasians' Racist and Sexist Beliefs

Henrietta A.Vaughn

Dr. Judi Misale, Faculty Mentor

This study investigated differences in the sensitivity of various qroup to racism and sexism as measured by their endorsement of racist and sexist beliefs and practices and it assessed the relationship between racism and sexism in terms of the forms thee each currently take. Tn a completely crossed design African-American and Caucasian males females completed a scale assessing either modern racist or modern sexist attitudes. The hypothesis of enhanced sensitiviev as a function of membership in a targeted growls received support. African-Americans demonstrated less racist beliefs than Caucasians. but within each ethnic group neither differed as a function of gender. Male African Americans and female African-Americans displayed equal sensitivity to sexist issues, and both of these groups were reliably less sexist in their responses than Caucasians, although Caucasian females exhibited significantly less sexist attitudes than Caucasian males. Results also suggest parallels between target groups on the issues which illici discrimination.

Career Expectations of Freshmen and Seniors

Hope Wallis

Dr. Teresa Heckert, Faculty Mentor

This study compared the career expectations of college freshmen and seniors. Subjects, consisting of 124 freshmen and 101 seniors, were recruited from undergraduate psychology courses. The sample consisted of 157 females, 70 males, and 31 different majors. Subjects completed a survey about their expectations of the utility of their education in obtaining a desired and satisfying job and expectations about their salaw as well as descriptive information such as year in school and highest expected degree. Our results showed that freshmen expected to earn a higher degree, make more money, and were more likely to agree with the statements expect to work in a job related to my degree," than seniors. Freshmen expected an average salary of $25-29,999 in their first job following graduation while seniors only expected $20-24,999. Females were more likely to expect a lower salary in their first job than males. All the above results were significant. Given these results, it appears likely that some expectations do change from a student's freshmen to senior year. It appears that they may become less idealistic.

The Effects of Political Culture and Parties on Environmental Policy

Jacy F. Whitaker

Dr. Marijke Breuning, Faculty Mentor

There have been many recent articles on the rise of environmentalism. This surge of environmental interest has been attributed to an increase in Postmaterialistic values in society. This paper will analyze the hypothesis that the more Postmaterial a country is, the more likely it is to have strict environmental policy. The focus will be not only on how Postmaterial a country is, but will also include variables such as the percent of seats controlled by emerging Green parties, and the public's support for the environmental movement. The tendency among scholars has been to analyze Postmaterialism as a dependent variable, therefore, leaving out possible effects of this value on society. This paper will analyze the effect of Postmaterialism as an independent variable, along with the other aforementioned independent variables, on emissions regulations.

Reasoning Styles and Undergraduate Education

Keri Wingo, Caroline Hernandez and Shirley Arteaga

Dr John Ishiyama, Faculty Mentor

A considerable amount of research has been conducted in the past several years which has focused on the process of human reasoning when making political decisions. Sylvan, Ostrom and Gannon (1994) have provided a three part taxonomy which identifies different styles of reasoning, namely *case-based, explanation-based* and *model based*. This project extends the framework initially developed by Sylvan et. al.(l994) to the study of students at Truman State University. Three hypotheses constitute the core elements of this study: 1) we posit that reasoning styles will vary across class, with underclassmen more apt to rely on case-based reasoning as opposed to upperclassmen; 2) we hypothesize that reasoning styles will vary across major field of study among underclassmen, but differences across majors will decline as students enter their final two years of undergraduate study; 3) we expect differences to exist between different groups, particularly across gender and cultural group.

Phi Alpha Theta History Symposium

The Fall of Ngo Dinh Diem: The Role of United States Foreign Policy Makers in the Coup of November 1, 1963

Sean M. Carney

Dr. Thomas Zoumaras, Faculty Mentor

During the Cold War, the United States main goal was to stop the spread of communism around the w orld. In South Vietnam the United States supported Ngo Dinh Diem, a Catholic, non-communist leader hoping he could thwart the rapidly spreading communist movement led by Ho Chi Minh. The American government gave Diem money, military hardware, and sent numerous advisors to help in the war against the communists. During the Kennedy administration, it appeared that the war was not going well and Kennedy and his advisors began to distance themselves from Diem and his government. The indecision and disagreement among Kennedy's policy making team encouraged the coup which resulted in the murder of Diem and the violent overthrow of his government. The evolution of this policy towards the Government of Vietnam is analyzed in this presentation.

Argula von Grumbach and Her Use of the Doctrine of the Priesthood of All Believers as a Justification for Her Public Discussions of Religion

Angela Ellis

Dr. R. V. Schnucker, Faculty Mentor

Argula von Grumbach, Protestantism's first published female writer, suffered a multitude of disappointments in her personal life and in the more public realm, endured open hostility and criticism, often in quite personal terms, for her active role as a Lutheran apologist. She apparently took to heart Martin Luther's teachings on the priesthood of all believers and, therefore, say it as her Christian duty to spread the word of God. By actively defending her faith, however, she was contradicting the teachings of Lutheranism, which, like most other religious faiths at the time, presented a domestic, submissive existence as the preferable path in life for a woman. Nevertheless, von Grumbach used the Lutheran doctrine to defend herself and her actions.

The Evolution of the Argentine Right, 1900- 1946

Matthew J. Goyer
Dr. Thomas Zoumaras

In 1945, the United States government issued the document *Consultation Among the American Republics with Respect to the Argentine Situation*. Known as the *Blue Book*, it attempted to label Juan Perón and the rest of the Argentine government fascist. In doing so, the U.S. government ignored multiple factors unique to Argentina that led to the rise of a nationalistic Right, and eventually the rise of Juan Peron. After examining the rise of the Right in Argentina during the period 1900- 1946, it becomes clear that what evolved can not be labeled fascist in terms of the European model. The idea of social justice advocated by the Argentine Right, known as *justialismo*, is central to refuting the argument that Argentina was a fascist country. The unique combination of the nationalistic doctrine found in fascist philosophies and socialistic ideals of justice implemented by Peron is best defined as Peronism, not fascism.

The Many Faces of Lincoln

Jeffrey Lee Hartnett
Dr. Mark Hanley, Faculty Mentor

After the war, chattel slavery would no longer be allowed to exist in America. The country was taking its first fledgling steps toward fulfilling its lofty foundations. While these observations are generally not points of contention, the process by which the slaves were freed by Abraham Lincoln is so not easily resolved. It is the goal of this paper to document the varying stances that Lincoln took toward the issue, and to note his dominance over the decision to ultimately free the slaves. Upon the outbreak of the Civil War, Lincoln was committed to exhausting every possible solution, short of outright freedom for the slaves, in order to restore the Union. Realizing the futility of his policies, Lincoln had to take drastic action in order to save the Union. Therefore, the gift of freedom was a means to an end, not an end in and of itself.

Consolidating the Revolution in the North: Republican Response to the New York City Draft Riots of 1863

Ben Jewell

Dr. Mark Hanley, Faculty Mentor

On March 3, 1863 Abraham Lincoln signed the National Enrollment Act into law creating the nation's first federally executed draft. Resistance to the draft was widespread, but in New York City the draft met opposition that could only be characterized as a second rebellion. For nearly five days the city was left in a state of insurrection while city officials, federal and state military officials, and New York City's newspapers all scrambled to quell the rioting. Republicans and Democrats were divided about how to respond to the crisis, but ultimately the appeals made by Republican newspapers and of ficials to enforce the draft and civil order were heeded. During those hot days in July of '63 New York City became a microcosm of the entire war; not in terms ol North versus South, but rather federal supremacy versus states' rights.

Words and Worlds, the European Synthesis of the New World in Cartography

Warren Kasper

Dr. Robert Cummings, Faculty Mentor

Columbus' s voyage in 1492 was the beginning of a period of rapid exploration. One of the most visible consequences of all this exploration was what it did to geographic knowledge as represented on maps. Explorers tended to interpret discoveries in light of their view of geography. The views of explorers were synthesized into maps by cartographers. The works of these cartographers display a variety of interpretations regarding the presence or absence of a northern continent, the number and placement of islands in the Caribbean, and the naming of territories, both continents and islands At the end of this period of change, a definite idea of geography developed This idea of geography would be the impetus for the later journeys of discovery, such as that of Ferdinand Magellan.

Southern Romanticism: Tying Popular Literature to Cultural Ideals in the Old South

Jennifer J. Orey
Dr. Mark Hanley, Faculty Mentor

Although the American Romantic movement was characterized by predominantly Northern writers, many of the ideals they presented were actually more in accord with the values held by those considered "Southern" during the nineteenth century. This interdisciplinary paper examines the characteristics and similarities between the Southern ideal and the Romantic literary movement by comparing specific major Romantic works with the poetry in volume one of the journal *Southern Literary Messenger*. These characteristics not only influenced Southern philosophy, but also seem to have been internalized into their values and vision of their culture. Also shown will be how these characteristics were uniquely adapted to the Southern cultural identity.

British Economic Policy in the Gold Coast, 1884-1914

T. Kyle Plackemeier
Dr. John Ramsbottom, Faculty Mentor

What was British policy in the Gold Coast Colony between the years 1884-1914? How did this policy change and what were the causes of these changes? Scholars have postulated that economics, competition with rival European colonial powers, and the interaction with the native population fueled change. Such theories oversimplify the issue. By examining official dispatches between the Gold Coast administration and London, Parliamentary debates, and contemporary newspaper reports, this paper intends to illustrate that the three aforementioned causes all affected British colonial policy, although in different degrees and at different times.

The Accomplishments of Timbuktu, a Legendary City of Sixteenth Century Africa

Ryan Christopher Totten
Dr. Taj Hargey, Faculty Mentor

Timbuktu was an important ancient city in Africa and contained an advanced culture that prized learning and scholarly research. The people living in Timbuktu valued social and intellectial development in society, so they created a university for learning and prioritized the family above all other relationships. Timbuktu was also a major trading center and destination for people from Europe and Asia. Timbuktu was a representative of Africa's excellence in the 16th century and peo-

ple from all over the world wanted to visit the "mysterious city" in Africa's interior. This research will discuss the accomplishments of Timbuktu in the areas of the family, education, and creative expression and how they might still be influencing Africa and Western civilizations in current times. The people succeeded in their endeavours because Islam was a major factor in Timbuktu and the people used that religion and its holy book, the Koran, to discipline themselves in order to create the advanced society in Timbuktu, resulting in a legend that is known throughout the world.

Greed and Goodwill: Portuguese Intervention on the Gold Coast of Africa

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It would be difficult to name another continent which contains more historical fascination and diversity than Africa. This is an area which saw empires created and peoples destroyed with relatively little outside knowledge. A myriad of factors and influences surround an ancient and often painful record of events gone by. The culture existing now remains as a blend of native traditions and foreign interjection of ideals and beliefs. Portuguese intervention in the Gold Coast region serves as a prime example of an intermingling and somewhat symbiotic relationship. Trade, the introduction of new materials, and slavery acted as the vehicles for this often rocky connection between two very different societies.

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