

Private College
Scholars
at the
Capitol

Recognizing undergraduate
student research

Monday,
February 28,
2011





Welcome

Whether you are joining us at the State Capitol on Feb. 28 or viewing this booklet at another time, you are seeing a sampling of the wide range of sophisticated undergraduate research that occurs at the 17 nonprofit institutions that are members of the Minnesota Private College Council.

This year, the Private Scholars at the Capitol event hosts 37 students, presenting and sharing a total of 25 projects. From psychology to biology, English to chemistry, the disciplines their research covers vary greatly, as do the methodologies they have employed.

And while the students' work is impressive, it is also essential to recognize the time and effort of the faculty mentors involved in these projects. Many hours were spent in labs, offices and classrooms as undergraduates gained knowledge and confidence from these faculty members. It is this individualized attention that characterizes the commitment of our institutions to students' learning and sets them apart.

The research completed by these undergraduate students at our member institutions is important not just for their individual edification — in fact, it contributes to the health of our communities, the economy of Minnesota and the wealth of knowledge in the world. Undergraduate research also lays the foundation for students' later academic inquiry and careers; it is one of the reasons that more than half of Minnesota college students who attain a doctorate degree have earned their baccalaureate degrees at a Minnesota private college.

Thank you for joining us to celebrate the work of these students, and all of the undergraduate research conducted at Minnesota's Private Colleges.

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AUGSBURG COLLEGE
MINNEAPOLIS

Cover photo by Stephen Geffre

Table of Contents: Student Abstracts

AUGSBURG COLLEGE

- Facebook: Making the World More Connected?
Jessica Pfaffendorf **21**
- The Impact of Intertribal Transmission
on the Design Aesthetic of the Grass Dance
Michael Wilson **31**

BETHEL UNIVERSITY

- Minute Coaching: Using Evidence to
Act on Education Opportunities in
Electrocardiographic Monitoring Skills
Hannah Wichterman **30**
- The Inotropic and Chronotropic Effects
of Digoxin on Isolated Cardiac Tissue of
Alloxan-Induced Diabetic Rattus Norvegicus
Billy Sveen **27**

CARLETON COLLEGE

- Speak for Your “Self”: The Connections
between Demographics, Intuitions, and
the Philosophy of Personal Identity
Jabir Yusoff, Sarah Pinkham, Daniel Peck
and Lorenzo Najt **32**

COLLEGE OF SAINT BENEDICT AND SAINT JOHN’S UNIVERSITY

- Identifying the Characteristics of “Eating Disorder
Not Otherwise Specified” in a Community Sample
Kristina DeMuth **5**

- Rhythms: A Pathography in the
Form of Personal Essays
Abigail C. Spaniol **23**

- A New Approach to Understanding the
Early Miocene Paleoenvironment of
Rusinga Island, Kenya: Using Leaf Margin
Analysis and Digital Leaf Physiognomy
Daniel Maxbauer **17**

- Sing a New Song: Composing Music
for the 21st Century Roman Liturgy
Caleb Wenzel **29**

COLLEGE OF ST. SCHOLASTICA

- The Effects of the Mother–Daughter Relationship
on the Self-Image of First Year College Women
Anna Dontje **6**
- Mutational analysis of ARPKD aids
evaluation of mutation prediction programs
Sarah Koon **15**

CONCORDIA COLLEGE, MOORHEAD

- Containment Strategies in Network Models
Lise Holte and Ryan Wagner **13**
- From Moorhead, Minnesota to Cairo, Egypt:
Cross-Cultural Perspectives of
Community-Based Learning
Marnie Rosenheim **22**

CONCORDIA UNIVERSITY, ST. PAUL

- Monitoring Hemoglobin Levels in the Blood While Taking an Iron Supplement Alone or with a Nitric Oxide Supplement
Ellie Duffy, Krista Erickson,
Hassan Masroujeh and Taylor Sheflo **7**
- The Effects of Relaxation and Stressor Auditory and Visual Stimulants on Pulse Rates
Cassandra McMahon, Britt Bickert
and Jessica Simmons **18**

GUSTAVUS ADOLPHUS COLLEGE

- Spectroscopic Investigation of Metal Cation-Pyrazole Coordination Complexes
Garrett Stoddard and Matthew Klun **26**

MACALESTER COLLEGE

- Katharine Ordway Natural History Study Area Digital Database
Margaret Pearson **20**

SAINT MARY'S UNIVERSITY OF MINNESOTA

- Iron Oxide/Nanoparticle Arrays as Multimodal Imaging Agents
Jennifer Koezly **14**
- Just Truss Me: Geometric Recognizers
Stephanie Valentine **28**

ST. CATHERINE UNIVERSITY

- The Influence of Delivery Methods on Water Consumption in NCAA Division III Female Athletes
Megan Gosselin **9**
- Where to Carry Kids? A Comparison of Men and Women During Walking
Anna Myhre, Melvina Kpanquoi and Laura Stearns . . . **19**

ST. OLAF COLLEGE

- Comparing Student Reasoning About P-values and Statistical Significance in Three College-level Statistics Courses: A Quantitative and Qualitative Study
Quyen Duong **8**
- Binary Forms Revisited
Aaron Harcus **12**

UNIVERSITY OF ST. THOMAS

- It Takes More Than a House to Make a Housewife: A Sociocultural Feminist Analysis of the Similarities in the Roles of Women on Television, as Housewives, Housewives-in-Training and Faux-Independent Women
Lauren Marosok **16**
- Let Them Play! Why an Overemphasis on Formal Play May Have Negative Effects on Children
Carolyn Dienhart **4**

**While this listing is sorted by institution, the detailed abstracts that follow are alphabetized by the first author's last name.*

Let Them Play! Why an Overemphasis on Formal Play May Have Negative Effects on Children

STUDENT

Carolyn Dienhart

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Dr. John Tauer

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UNIVERSITY OF ST. THOMAS

Over the past several decades, participation in formal or organized play has increased significantly in athletics. This increase in formal play may be detrimental to society because by creating more structure, we may limit the lessons children learn from sports, such as problem solving and cooperation. We cannot be sure exclusively playing formally is the best way for children to develop because the degree of autonomy is far less in formal play than in informal play. Autonomy is a strong predictor of motivation, so while people believe organized sports help children's motivation through structure, our culture may be undermining motivation because of the lack of autonomy. We designed an experiment intervention to examine whether children can derive benefits from hearing about and/or participating in sports informally. The 423 children in our study were randomly assigned to one of four conditions. The children were either assigned to a control condition, were given a 10 minute talk regarding informal play every day throughout the course of the week, were allowed to play informally 10 minutes every day throughout the course of the week, or they were both given the talk and were allowed to play. We conducted a two-way analysis of variance and found a significant interaction such that children who either listened to a talk on the benefits of informal play, had the chance to play informally or did both enjoyed informal play and found it more beneficial to their lives by the end of the week compared to a control group who did not receive a talk or get to play informally. We believe our results show the benefits of informal play and we recommend that children be given more opportunities to learn about and engage in informal play to increase both their enjoyment and the value they derive from athletics.

Identifying the Characteristics of “Eating Disorder Not Otherwise Specified” in a Community Sample

STUDENT

Kristina DeMuth

FACULTY ADVISORS

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COLLEGE OF SAINT BENEDICT

The Eating Disorder Not Otherwise Specified (EDNOS) subgroup of eating disorders is composed of many heterogeneous forms of eating disorders: subthreshold anorexia, subthreshold bulimia, a combination of both anorexia and bulimia, binge-eating disorder or any problematic relationship with food, body image or behavior. EDNOS is the catch-all for those that do not meet all criteria for anorexia or bulimia and is the most commonly diagnosed eating disorder. The EDNOS diagnosis is the most problematic diagnosis because it remains the least researched disorder in terms of prevalence, severity and mortality. An online survey, available via social networking sites, is composed of several scales: the Eating Disorder Diagnostic Scale, Eating Disorder Quality of Life Scale, the Satisfaction with Life Scale, Brief Screen for Depression and the Mini-IPIP scale, as well as questions about treatment, diagnosis, insurance coverage and behavioral patterns. The survey will compare the characteristics of individuals with EDNOS to individuals with anorexia and bulimia. Data obtained will be used to determine the prevalence, severity and possible implications for helping individuals with EDNOS. It is anticipated that EDNOS will not differ among diagnoses for quality of life and psychopathology, but will have more complications obtaining insurance coverage and access to treatment.

The Effects of the Mother-Daughter Relationship on the Self-Image of First-Year College Women

STUDENT

Anna Dontje

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COLLEGE OF ST. SCHOLASTICA

This research explored the relationship between incoming first-year college women and their mothers. Orbach (2008) observed that today's adolescent females have expansive life plans and personal strengths that previous generations of women lacked. But some have insecurities of self stemming from their relationships with their mothers that may prevent them from achieving their dreams. The present study looked at the strengths and insecurities of young women and how these may be related to their relationships with their mothers. Forty-four females between 18 and 20 years old, starting college in fall 2010, completed an online survey. Findings indicated participants' self-esteem ranged from low to high. Participants who scored as more androgynous had higher self-esteem scores. Low self-esteem was related to mothers' possessive, jealous, and separation-anxiety behaviors toward daughters. Daughters most satisfied with relationships with their mothers perceived higher levels of cohesive, close-caregiving behaviors and lower levels of intrusive behaviors from their mothers.

Monitoring Hemoglobin Levels in the Blood While Taking an Iron Supplement Alone or with a Nitric Oxide Supplement

STUDENTS

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**CONCORDIA UNIVERSITY,
ST. PAUL**

The purpose of this experiment was to determine the effects of an iron supplement on hemoglobin levels in the blood. Nitric oxide was also tested in conjunction with the iron supplement to see if it affected the rate at which the hemoglobin levels change. Nitroglycerine releases nitric oxide (NO), which is an important messenger molecule involved in many physiological and pathological pathways in the human body. NO dilates the blood vessels and allows more blood to flow to the heart. If the blood flow is increased, then hemoglobin levels should increase more quickly. The hemoglobin level in five human subjects was tested every five days over a 20-day period. We observed that subjects taking an iron supplement along with the NO supplement displayed higher hemoglobin levels than subjects taking the iron supplement alone.

Comparing Student Reasoning About P-values and Statistical Significance in Three College-level Statistics Courses: A Quantitative and Qualitative Study

STUDENT

Quyen Duong

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Dr. Sharon Lane-Getaz

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ST. OLAF COLLEGE

This quasi-experiment compares student learning outcomes from three college statistics courses to investigate whether greater randomization test content explains gains in conceptual understanding of inference, adjusting for prior knowledge and mathematical ability. Furthermore, the study extends and documents psychometric properties of the RPASS scale. The RPASS is used to measure gains in student inferential understanding from pre-test to post-test. RPASS modifications for this study include rewording, reordering, adding a new item and adding explanation fields to selected items. One of the two introductory courses examined has limited randomization content. The second introductory course emphasizes randomization, simulation, and P-values throughout. The third is a second statistics course that reviews randomization tests at the beginning. Quantitative and qualitative results are reported and directions for future research are discussed.

The Influence of Delivery Methods on Water Consumption in NCAA Division III Female Athletes

STUDENT

Megan Gosselin

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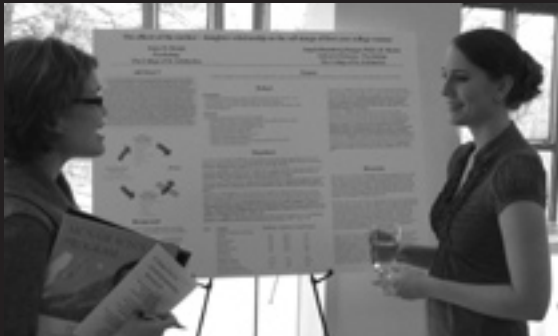
Department of Exercise
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ST. CATHERINE UNIVERSITY

A greater than 2% loss of body weight during activity can lead to decreased aerobic ability, decreased mental performance, muscle cramps and fatigue due to the decrease in blood volume. Staying hydrated during training is essential to athletes' performance. The purpose of this study was to determine if water delivery method influenced intake of water among female athletes. Water consumption in female athletes ($n=34$) from various sports was observed. The conditions of self-served water from a standard 3L jug, individual water bottles and labeled individual bottles were applied randomly. A 2x3 factorial ANOVA with repeated measures was used to analyze the data. A significant interaction was found for sport by water distribution ($p<0.05$). Volleyball players drank significantly more water (743.53 ± 72.84 mL) from the jug than the soccer players (283.53 ± 72.83 mL). No significant differences were found among sports for labeled individual bottles and non-labeled individual bottles. Finally, soccer players drank significantly less from the jug than the labeled and unlabeled water bottle conditions. For volleyball, there were no significant differences among the volume of water drank across the three conditions. Based on the present study, water consumption among female collegiate athletes was influenced by sport played and delivery method of water.

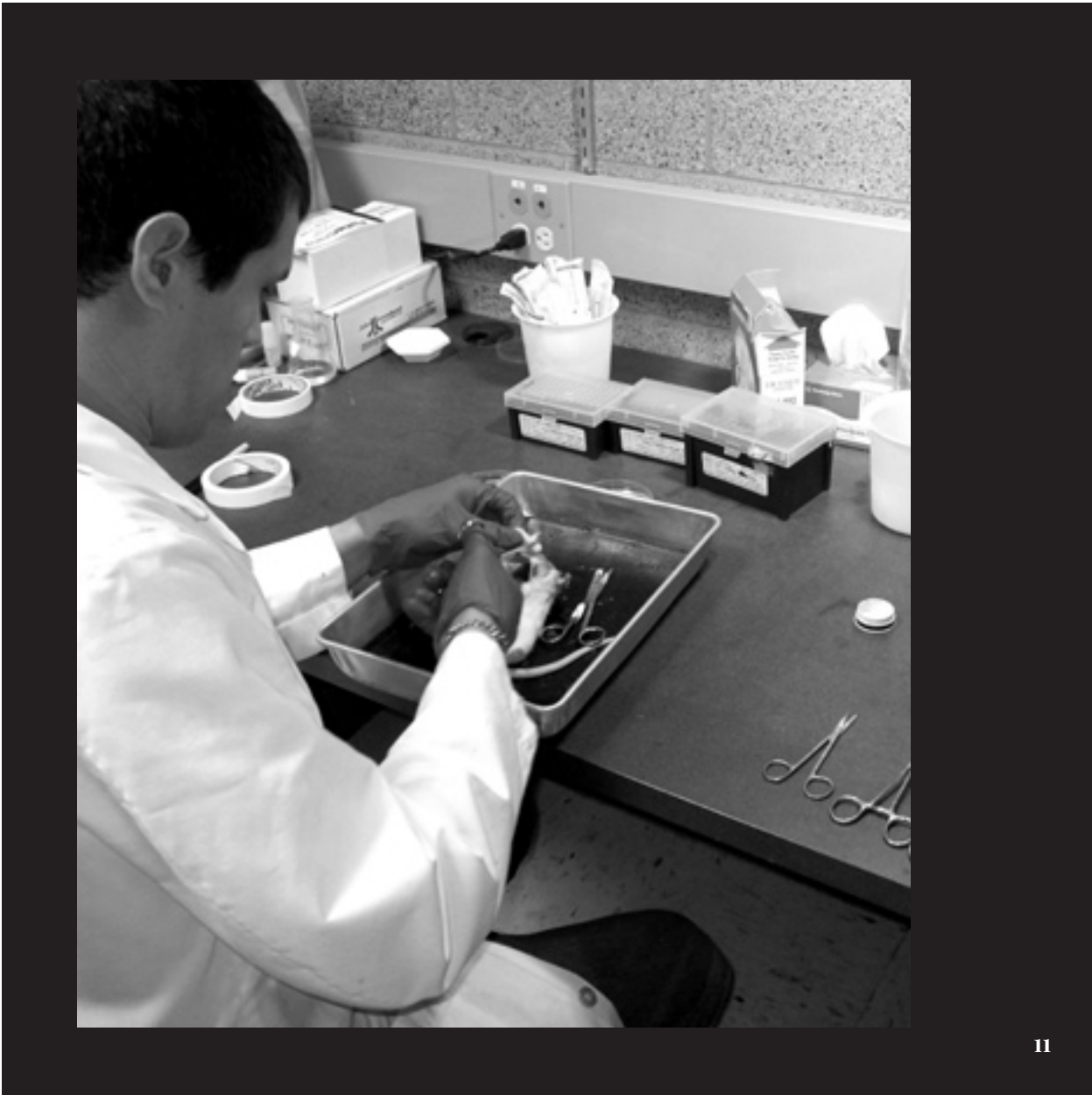


Egyptian college students (on the left) participate in service learning with youth, which **MARNIE ROSENHEIM** (Concordia College) discusses in her research project.



Above: **ANNA DONTJE** (College of St. Scholastica) presents her research at a poster session. Right: **MARGARET PEARSON** (Macalester College) conducts research from a canoe at the Katharine Ordway Natural History Study Area in Inver Grove Heights. Opposite: **BILLY SVEEN** (Bethel University) dissects a rat to isolate the heart for his research..





Binary Forms Revisited

STUDENT

Aaron Marcus

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ST. OLAF COLLEGE

The binary form is an ubiquitous term in the *formenlied* (“study of musical form”) tradition, yet there has been no extensive research into the basis of its existence as a cross-genre convention. This study reexamines theories of binary form in order to understand how composers of the 18th century approached the fulfillment and frustration of binary form conventions. In order to test old theories and develop new ones, this study examines the melodic/motivic content, key areas, harmonic and cadential structure, and context of various two-reprise forms as they appear and function within minuet-trio, theme-and-variations, middle sections of rondo forms and other larger forms. In so doing, we have found three common digressional types, the pseudo presentation phrase, quasi-tight-knit theme group and quasi-tight-knit theme group with retransition. In addition, we have outlined three contextual backgrounds that are significant determinants in form-theoretical construction, historiographic ideologies, delimitation of material (composers included, timespans, etc.) and the pragmatic function of the theory. The paper is divided into three sections. The first section gives a general introduction to the issues that have affected the neglect of binary form studies and gives a general outline. The second section deals with theories of form and the final section begins to develop a theory of binary form from the 912 musical samples analyzed.

Containment Strategies in Network Models

STUDENTS

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**CONCORDIA COLLEGE,
MOORHEAD**

What is the best way to allocate resources in order to fight a forest fire? How should vaccines be distributed to limit the spread of a virus? Which areas need the most protection during a flood, and what is the most efficient way to distribute sandbags and other supplies to hold back the water? In situations like these, we are interested in defense strategies to contain the spread of something that is undesirable. In this project, we researched containment strategies in networks. A network is a collection of nodes and lines, where the lines represent relationships between the nodes. For example, a network could model the grid of streets in a city, a computer network or a social network where individuals are connected through relationships. We improved existing network models and developed new models and containment techniques. Since these network models apply to a variety of situations, our results have the potential to help solve many important problems in optimal ways. In our poster presentation, we will highlight applications that are interesting and accessible for a wide audience, including an application where we studied the containment of the flooding of the Red River in Moorhead near the Concordia College campus.

Iron Oxide/Nanoparticle Arrays as Multimodal Imaging Agents

STUDENT

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FACULTY ADVISOR

Dr. Paul Nienaber

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**SAINT MARY'S UNIVERSITY
OF MINNESOTA**

Magnetic Iron Oxide Nanoparticles (MIONs) are extensively used as contrast agents for in vivo MRI. Unfortunately, the low sensitivity (millimolar range) of MIONs and the low resolution (millimeter) of MRI limits the application of this class of imaging agents. Gold nanoparticles, on the other hand, are used extensively in cellular imaging techniques, taking advantage of their plasmonic properties. Dark field spectroscopy, for instance, enables single molecule detection at the nanometer range. It would therefore be beneficial to synergistically couple the in vivo imaging capabilities of MIONs with the sensitivity and resolution offered by gold nanoparticles in a system that would remain biocompatible with low cellular toxicity. The synthesis of a ligand enabling dual functionalization of gold and iron oxide nanoparticles and its application in the self-assembly of multimodal and multimetallic nanoparticle arrays will be presented. The properties of the arrays and their efficacy as plasmonic and MRI contrast agents will be discussed. This work was a summer undergraduate research experience conducted with Dr. Valerie Pierre of the chemistry department at the University of Minnesota.

Mutational Analysis of ARPKD Aids Evaluation of Mutation Prediction Programs

STUDENT

Sarah Koon

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MAYO CLINIC

ARPKD is a common infantile nephropathy occurring in ~1:20,000 live births and characterized by enlarged kidneys and congenital hepatic fibrosis. Severity of ARPKD varies greatly from neonatal death to survival into adulthood and is caused by mutations in the gene PKHD1 (~470kb; 67 exons) located at 6p12. Approximately 40% of mutations are truncating and 60% missense, which are associated with neonatal survival. PKHD1 encodes the protein fibrocystin (474kD; 4,074 aa). For this project, 24 patients with an ARPKD-like phenotype were screened using Sanger sequencing. PKHD1's 66 coding exons were amplified using PCR and fully sequenced. Analysis of the resulting chromatograms identified the following variants: 50 intronic, 26 missense, 18 synonymous, and one truncating. One typical intronic mutation was predicted to affect splicing. Missense variants were difficult to assign as pathogenic or polymorphic because many neutral changes are found in PKHD1/fibrocystin. Hence, manual scoring and an ARPKD database were used to predict the likely pathogenicity of detected changes. Evaluation showed 11 missense mutations to be highly likely pathogenic, 12 to be likely pathogenic, 11 to be indeterminate and seven to be likely neutral. Overall, 12 patients were found to have two likely pathogenic mutations and one mutation was confirmed in another seven patients. For families with just one detected mutation, the second mutation may have been missed or misassigned. For the five patients where no mutations were found, ARPKD is likely a misdiagnosis. Overall, these studies have helped characterize this group of patients and provided information on the most useful scoring programs.

It Takes More Than a House to Make a Housewife: A Sociocultural Feminist Analysis of the Similarities in the Roles of Women on Television, as Housewives, Housewives-in-Training and Faux-Independent Women

STUDENT

Lauren Marosok

FACULTY ADVISOR

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UNIVERSITY OF ST. THOMAS

Since its inception, television has been widely regarded as a non-influential entertainment medium. However, careful analysis of its programs and advertisements reveal that it is not just an unimportant piece of furniture. Rather, it is a powerful communication tool that has an underestimated effect on shaping our society. This research explores the representations of women on television, and specifically began as an observation of the differences between female characters from the East Coast and the West Coast. It was hypothesized that there would be important differences in the women on these shows, based on their region. However, the findings brought to light numerous similarities that were far more socially significant. By analyzing eight popular television shows, there were several prominent themes that evidenced similarities between the characters. These themes are age, physical appearance, substance use, lifestyle, education and employment and relationships. They show how the female characters from each television show can fit among one of three titles of male-dependent women: housewives, housewives-in-training and faux-independent women. The similarities and social effect of these female television characters are discussed.

A New Approach to Understanding the Early Miocene Paleoenvironment of Rusinga Island, Kenya: Using Leaf Margin Analysis and Digital Leaf Physiognomy

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Department of Biology

SAINT JOHN'S UNIVERSITY

Nearly 100 years of field work has established Rusinga Island, Kenya as one of the most important Early Miocene (23-16 Ma) primate sites in Africa. In order to fully understand the patterns of primate and early hominid evolution, it is critical to understand the paleoenvironments in which early primates lived. In spite of the amount of paleoanthropological work conducted on Rusinga Island, there has been limited focus on paleoenvironmental studies and there has yet to be a study considering fossil leaves as potential paleoenvironmental indicators. Variations in physiognomy of woody dicot leaves are well understood to correlate with temperature and rainfall globally and can be used in the study of paleoclimates. A total of 91 fossil leaves were collected from a leaf layer within the Grit Bed Member of the Hiwegi Formation at Kaswanga Point on Rusinga Island. This study applies leaf margin analysis and digital leaf physiognomy to the flora in order to obtain climate estimates for mean annual temperature (MAT) and mean annual precipitation (MAP). Results suggest that the Early Miocene climate on Rusinga Island supported MATs near or above 30°C with a MAP of 1-1.5 meters, which denotes a tropical, seasonal forest or tropical woodland paleoenvironment.

The Effects of Relaxation and Stressor Auditory and Visual Stimulants on Pulse Rates

STUDENTS

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Britt Bickert and
Jessica Simmons

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Dr. Shellie Kieke

Department of Science

**CONCORDIA UNIVERSITY,
ST. PAUL**

Pulse is the rate at which one's heart beats and is measured in beats per minute (bpm). The purpose of this experiment was to test the hypothesis that pulse rate will decrease during a relaxation period and increase after a stressful period. Relaxation and stressful periods were conducted using visual and auditory stimulants. A baseline pulse rate for human subjects was measured before the experimental period as well as afterward. Pulse rates were then measured during the relaxation period and again during the stressor stimulant. We were interested in answering the following questions: 1) What effects (if any) do relaxing auditory and visual periods have on pulse rate? 2) What happens to pulse rate when subjected to a stressful auditory or visual stimulant? 3) How long does it take for an increased or decreased pulse rate to return to normal after subjected to a stimulant? After using hypothesis testing to analyze the data from 25 subjects, we concluded that there was no significant difference when comparing resting pulse to stimulant period pulse. For future experiments, we plan to test a larger number of subjects and to lengthen the rest and stimulant time periods.

Where to Carry Kids? A Comparison of Men and Women During Walking

STUDENTS

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Melvina Kpanquoi
and Laura Stearns

FACULTY ADVISOR

Dr. Marcie Myers

Department of Biology

ST. CATHERINE UNIVERSITY

Determining the energetic costs and behavioral consequences of child-carrying is critical to our understanding of the evolution of early humans. Evolutionarily, if a woman could save energy, she would have more energy for breast-feeding or future reproduction. This study examined how child-carrying affects the metabolic cost and optimal speed of walking, both free-walking and walking on a treadmill, as a function of sex and task in six females and six males. We calculated the walking speed and metabolic costs of walking for three loading conditions and four walking speed directives. Preliminary analysis showed that speed category ($p < .0001$), sex ($p = 0.08$), and the interaction of sex and speed ($p < .0001$) affected free-walking speed, but not loading condition. For all loading conditions, females walked faster than males at all but the fastest speed category. At the two fastest speed categories, free-walking speed was slower for hip than for shoulder carrying. Although the carrying task was a larger burden for the females, females consistently chose faster walking speeds than males. Additional analyses will examine the metabolic cost of walking across speeds for each condition and the optimal speed of walking as a function of carrying position, sex and treadmill versus free-walking.

Katharine Ordway Natural History Study Area Digital Database

STUDENT

Margaret Pearson

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Dr. Jerald Dosch

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MACALESTER COLLEGE

The Katharine Ordway Natural History Study Area is an approximately 280-acre field station owned by Macalester College and located in Inver Grove Heights, Minn. In the fall of 2009, 12 students took on the task of creating a digital database for this site. Throughout the semester, students collected primary and secondary data to create a suite of maps and GIS data layers for Ordway. Continuing the project in the summer of 2010, a team of student researchers worked alongside faculty advisors to study vegetation and continue GIS work at the site. This began with the installation of a 20-meter-by-20-meter research grid based on UTM coordinates. This grid will allow research to be easily continued into the future and integrated into our digital database. It will also provide a framework for tracking ecological changes over time. Once we established the grid, we chose 10 20-meter-by-20-meter cells for in-depth research of a nonnative herbaceous species, garlic mustard (*Alliaria petiolata*), with the goal of understanding why garlic mustard grows in some parts of the forest and not others. As we collected garlic mustard data, GIS users integrated the data into our GIS database. Once all field data was collected, we used GIS to find other environmental factors, such as elevation and slope, which may influence where garlic mustard grows. To conclude our summer work we made a series of maps for the primary and secondary data to aid in the analysis, interpretation and presentation of research results.

Facebook: Making the World More Connected?

STUDENT

Jessica Pfaffendorf

FACULTY ADVISOR

Dr. James Vela-McConnell

Department of Sociology

AUGSBURG COLLEGE

This study examines the link between Facebook use and the strength of social bonds. Previous studies offer highly polarized results, which has led to a virtual “good internet” versus “bad internet” debate. Through interviewing and focus groups, this study examines the ways in which certain dimensions of Facebook use affect the strength of social bonds offline. Results yield a typology that classifies different types of Facebook users and how their use influences the stability of interpersonal relationships. Conclusions show that Facebook has the potential to both strengthen and diminish the strength of social bonds outside of the website.

From Moorhead, Minnesota to Cairo, Egypt: Cross-Cultural Perspectives of Community-Based Learning

STUDENT

Marnie Rosenheim

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Department of Psychology

**CONCORDIA COLLEGE,
MOORHEAD**

Community-based learning (CBL) integrates community service with classroom learning to help students develop personal and academic skills and a sense of civic responsibility. The objective of this type of learning is for students to critically reflect on their service experiences and gain more concrete connections between these and the abstract theories of their coursework. The current literature describes numerous benefits of CBL; however there is a lack of quantitative data and most studies are conducted on western samples. This study analyzed survey data collected from students at a college in northern Egypt and from students at a comparable Midwestern college in the USA. The effects were measured using a self-report questionnaire and Likert Scale to determine interest, satisfaction and future intentions. Open-ended questions determined CBL rewards and challenges. Results showed significant impacts in both cultures including: academics, critical thinking/communication/inter-personal skills, local/global citizenship, and intra-personal development. Differences were found between the two groups of students regarding perceived benefits and challenges. These results aid in understanding how community-based learning experiences can be optimized in unique cultural settings. The current study is attempting to fill the lack of cross-cultural research by quantitatively assessing the impact of engagement in community-based learning across cultures.

Rhythms: A Pathography in the Form of Personal Essays

STUDENT

Abigail C. Spaniol

FACULTY ADVISOR

Dr. Ozzie Mayers

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COLLEGE OF SAINT BENEDICT

According to the *Oxford English Dictionary*, a pathography is “the study of the life of an individual or the history of a community with regard to the influence of a particular disease or disorder.” My project is a pathography based on the illness and recovery of my father in 2009 from a still unidentified life-threatening disease. I am writing a collection of personal essays that trace key moments and aspects of my father’s illness from beginning to end. Within my essays, I explore the power of medicine, the human body, prayer and community. Through my writing, I hope to inspire readers to insert their own experiences into my essays so that my project will create discussion about some of life’s most difficult questions. I hope my essays produce thought-provoking questions concerning science and religion and look forward to the challenges I will face when writing about the roles both play in the lives of critically ill patients.





Clockwise from above: **JENNIFER KOEZLY** (Saint Mary's University) works in the lab. **HANNAH WICHTERMAN** (Bethel University) demonstrates correct electrode patch placement on an RN who is posing as a patient. **QUYEN DUONG** (St. Olaf College) with faculty mentor Dr. Sharon Lane-Getaz. Opposite page: **DANIEL MAXBAUER** (Saint John's University) completes field work on Rusinga Island, Kenya with the help of a few local children.

Spectroscopic Investigation of Metal Cation-Pyrazole Coordination Complexes

STUDENTS

Garrett Stoddard
and Matthew Klun

FACULTY ADVISOR

Dr. Stephen Miller

Department of Chemistry

GUSTAVUS ADOLPHUS COLLEGE

A series of aqueous first row transition metal ion-pyrazole complexes were made and characterized. UV-Vis spectra were collected for each complex at varying metal:ligand ratios to determine the ratio at which the ligand sphere of the metal is saturated. Fluorescence and concentration dependent UV-Vis spectra were then collected for the coordinatively saturated aqueous complexes. Infrared spectra were collected for the complex-chloride salts for comparison to the bare ligand. Finally, computational methods were used to examine the metal-ligand bond for the copper (II) complex. Our results indicate that 1) the ligand binds to the metal in a monodentate, sigma fashion through the non-hydrogenated N atom of the ligand; 2) the number of ligand molecules in the coordination sphere varies with the identity of the metal cation, as expected; and 3) comparison of the ligated and non-ligated spectra spectra should (with further analysis) provide insight into the bonding interactions and geometries observed.

The Inotropic and Chronotropic Effects of Digoxin on Isolated Cardiac Tissue of Alloxan-Induced Diabetic *Rattus Norvegicus*

STUDENT

Billy Sveen

FACULTY ADVISOR

Dr. Jonathan Van Berkom

Department of Biology

BETHEL UNIVERSITY

Digoxin is a drug used in congestive heart failure to stabilize rate and increase force of heart contractions by altering intracellular ion concentrations. The ion imbalance caused by uncontrolled diabetes could potentially oppose the action of digoxin. Therefore, higher doses of digoxin may be required to reach a therapeutic effect. Using rats (*R. norvegicus*) as a model, 18 hearts were isolated in tissue baths containing solutions with ion concentrations mimicking uncontrolled diabetes or normal physiologic conditions. The rate and force of heart contraction from alloxan-induced diabetic rats and healthy rats were monitored while treated with a series of digoxin concentrations from 1×10^{-11} M to 3×10^{-7} M. Percent change from the baseline was calculated for each concentration in both heart rate and force of contraction. The mean values from this study indicate concentrations above 3×10^{-10} M decreases digoxin's effect on contraction force by approximately one-half in uncontrolled diabetes. However, the separation between the healthy and diabetic groups was not statistically significant due to large variation between individuals and small sample size. There was no discernable difference between mean values for the heart rate-altering effect of digoxin.

Just Truss Me: Geometric Recognizers

STUDENT

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Department of
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**SAINT MARY'S UNIVERSITY
OF MINNESOTA**

In their first semester, mechanical and civil engineering students learn the mechanics of trusses, one of the most fundamental concepts of engineering. From houses and bridges to skyscrapers and playground equipment, trusses are the support systems of everything around us, so a clear understanding of them is imperative to success. Professors want to assign homework problems involving hand-drawn truss diagrams, but the grading of such diagrams requires extensive time commitment. Especially in large classrooms, this amount of time is difficult to attain. To combat this problem, we introduce Mekanix, a sketch recognition system that can recognize, correct and provide feedback on a student's hand-drawn truss diagram in real-time. We use geometric constraints to recognize the diagram's components from the primitive shapes (i.e. line, circle, triangle, etc.) they comprise. In order to make our recognizers robust enough for classroom use, we allow for several configurations, variations, and drawing styles for each shape. Designed to enhance learning, Mekanix is an unobtrusive and helpful tool that benefits the professor and teaching assistant as much as the student.

Sing a New Song: Composing Music for the 21st Century Roman Liturgy

STUDENT

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SAINT JOHN'S UNIVERSITY

The goal of this project is twofold: To explore the theological understanding of music within the Roman Liturgy and to create a catalog of music appropriate for use within the Roman Liturgy. Since the liturgical reformation of the Second Vatican Council, music written for the Roman Liturgy has varied. The United States Conference of Catholic Bishops emphasizes the composition of music designed to engage the congregation in active participation and reflect the liturgical action. These principles are used as the foundation for the works composed for this project. Each work is designed in its formal structure, genre, instrumentation and textual consideration to reflect the liturgy and its theological context while addressing the unique pastoral needs of the city, suburban and rural parishes, using these works in the liturgical context of their own community.

Minute Coaching: Using Evidence to Act on Education Opportunities in Electrocardiographic Monitoring Skills

STUDENT

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Hospitalized patients depend on nurses' knowledge and skills. We conducted baseline audits of all inpatients at our hospital receiving continuous ECG monitoring (n=72) in order to check for accuracy of electrode placement. We then coached nurses and assistants using an interactive poster consisting of a diagram of a chest with anatomical markings, as well as Velcro electrodes that could be attached and detached to practice correct electrode placement. All coaching was individual or small group on patient units during time when staff were responsible for patient care; thus length varied, never lasting more than 10 minutes. Quick reference guides and case studies were offered. Follow-up audits (n=77) assessed effect of minute coaching. Significant improvement in accuracy was demonstrated after three weeks of interactive minute coaching.

The Impact of Intertribal Transmission on the Design Aesthetic of the Grass Dance

STUDENT

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The Powwow is a valued cultural element of today's Native American communities. In its modern form, the Powwow has evolved from the Omaha Grass Dance, which has its own distinct history and aesthetic. The dance was practiced and transmitted throughout the eastern and Great Plains regions of North America. Anthropological, historical and photographic sources along with oral histories provide understanding regarding the evolution of this dance. This research examines how intertribal transmission impacts the Omaha Grass Dance and its accompanying material components. The focus is on clarifying the tribal contributions influencing the development of movements, traditions and ceremonial dress as a social dance and regalia. In the course of research three distinct time periods have been identified — pre-transmission roots as a Dhegihan ceremony, the effects of Plains contact and development of contemporary dance form. Research shows that the transmission and development of the Omaha Grass Dance can be seen in the motifs produced during these periods reflecting intertribal movements and intertribal relationships. Concurrent movements, such as the ghost dance and peyotism, serve to revive and stimulate the Omaha Grass Dance and contribute to ongoing practice and the aesthetic. By focusing on intertribal transmission rather than American and European influences, the indigenous forces that shaped the dance are better recognized and understood.

Speak for Your “Self”: The Connections Between Demographics, Intuitions, and the Philosophy of Personal Identity

STUDENTS

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Philosophers of personal identity — the field of philosophy that looks at what it takes for you to be you and to survive over time — often derive their theories from their own intuitive responses to hypothetical situations they call thought experiments. It is not clear, however, that these philosophers’ intuitions are universal. We sought to find out if the general population’s intuitive responses to some of these thought experiments would differ from those of philosophers, and if so, how exactly they varied according several demographic factors like age, race, level of education and religiosity. We created a survey containing several thought experiments and conducted it both online and in person in various locations in Minnesota: Northfield, Faribault and Minneapolis. Broadly, we found that young, white, educated and non-religious participants tended to have intuitions differing from the rest of the population. Although our study had some possible limitations that we acknowledge, our results could imply that philosophers of personal identity would have to account for favoring their intuitions — and by extension, their personal backgrounds — over those of others.



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This event would not have been possible but for the efforts of many people from the contributing colleges and universities who worked tirelessly to review abstracts, produce posters and encourage our student authors.

We thank them all.

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