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Alumni Memorial Union

November 29, 2011

Forward Thinking Poster Session/Colloquy Presentation
Past Award Recipients

2010
The Amader Gram Breast Care Palliation Study: Phase 1
> Dr. Sheikh Iqbal Ahamed, Associate Professor, Mathematics, Statistics and Computer Science,
> Ferdaus Kawsar, Mohammad Tanviruzzaman, Md. Munirul Haque, and Mohammad
> Adibuzzaman

Speech Adaptation for Rehabilitation
> Dr. Jeffrey J. Berry, Assistant Professor, Speech Pathology and Audiology and Mary
> Bolgert

The Halo Effect of Faith Communities: An Exploratory Study on Crime and Religious Social
> **Capital**
> Dr. Noreen E. Lephardt, Adjunct Assistant Professor, Economics and Brenden Mason

Role of Mechanical Stress in LPS-Induced Damage of Periodontal Cells in Vitro
> Dr. Dawei Liu, Assistant Professor, Orthodontics and Yaroslav Yarmolyuk, DDS

2009
The Influence of Cultural Variables on Latino/a Adolescent Sexual Activity
> Dr. Lisa Edwards, Assistant Professor, Counselor Education and Counseling Psychology,
> Brittany N. Barber and Keyona Jarrett

Effects of Mechanical Vibration on Orthodontic Tooth Movement
> Dr. Dawei Liu, Assistant Professor, Orthodontics and Andrew Rummel

Pre-service Elementary Teachers' Knowledge of Relational Thinking
> Dr. Marta Magiera, Assistant Professor, Mathematics, Statistics, and Computer Science; Dr. John
> Moyer, Professor, Mathematics, Statistics, and Computer Science; Dr. Leigh van den Kieboom,
> Assistant Professor, Educational Policy and Leadership, Ashley Zenisek and Edwin O'Sullivan

2008
Role of Endurance Exercise Training in Protection of Ischemic Heart Disease
> Dr. Robert Fitts, Professor and Chair, Biological Sciences, Ms. Patricia Colloton, Research
> Associate, and Brooke Rogers

Contribution of the Frontal Lobes to "Successful Aging"
> Dr. Kristy A. Nielson, Associate Professor and Chair, Psychology, and Andrew Newsom

Novel Properties of Bean Root Nodules Harboring a Bacterial Respiratory Mutant and What These
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> Dr. Dale Noel, Professor, Biological Sciences, and Robert Stone

What's the Best Rehabilitation Prescription? Identifying Factors that Enhance Recovery of Gait
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> Dr. Sheila Schindler-Ivens, Assistant Professor, Physical Therapy, and Shannon Knoblauch

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Dr. Lisa Hanson, Associate Professor, Nursing, and Kathryn Osborne

Mold Detection using Acoustic Wave Sensors
Dr. Fabien Josse, Professor, Electrical and Computer Engineering; Dr. Susan Schneider, Associate Professor, Electrical and Computer Engineering, and Meetalee Dalal

Father Involvement in Caring for Adolescents with Diabetes: An Investigation Piloting New Techniques in Pediatric Research
Dr. Astrida Kaugars, Assistant Professor, Psychology, and Christopher J. Fitzgerald

2006

Mentoring and Collaboration: Undergraduate, Graduate and Professional Research in Literature and Law
Dr. Christine L. Krueger, Associate Professor & Director of Core Curriculum, English, and Colleen Willenbring and Kaye Wierzbicki

Role of CamKinase Alpha in Renewal and Reinstatement of Fear
Dr. Matthew J. Sanders, Assistant Professor, Psychology, and Jocelyn Miller

Imaging of the Human Brain during Pedaling
Dr. Sheila Schindler-Ivens, Assistant Professor, Physical Therapy, and Jay Mehta

2005

Cross-Cultural Development and Testing of the Risk Information Seeking and Processing (RISP) Model
Robert J. Griffin, Professor, Journalism, Franziska Borner, Jan Gutteling, Associate Professor and Ellen Ter Huurne, doctoral student, University of Twente, The Netherlands

Neurotoxicity of BMAA in Cortical Cultures
Doug C. Lobner, Associate Professor, Biomedical Sciences, and Peachy Mae T. Piana

Sexism and Rape Myth Acceptance: A System Justification Perspective
Debra L. Oswald, Assistant Professor, Psychology, and Kristine Chapleau

International Research Poster Session
Past Award Recipients

<u>2010</u>

Dr. Stephani Richards-Wilson
Assistant Dean for Recruitment and Retention
Klingler College of Arts and Sciences

Dr. M. Therese Lysaught
Associate Professor/Director of Graduate Studies
Theology

Dr. Lars Olson
Associate Professor
Biomedical Engineering

Dr. Sharon Chubbuck
Associate Professor
Educational Policy and Leadership

<u>2009</u>

Dr. Eugenia Afinoguenova
Associate Professor of Spanish
Foreign Languages an Literatures

Dr. Ruth Ann Belknap
Associate Professor
College of Nursing

Dr. Irfan Omar
Associate Professor
Theology

Dr. Toni Roucka
Assistant Professor and Predoctoral Program Director of General Dentistry
General Dental Sciences

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FORWARD THINKING POSTER PRESENTERS

PROJECT TITLE: Time, Routes, and Places of Nineteenth-Century Travelers
FACULTY NAME: Dr. Eugenia Afinoguénova, Associate Professor of Spanish,
Department of Foreign Languages and Literatures
STUDENT NAMES: Aishah Al-Fadhalah, B.A. candidate, double major in Speech Pathology and Spanish ('2013)
James Bauer, B.S. candidate, Biomedical Sciences major, Spanish for the Health Professions minor ('2013)

INTRODUCTION
Anthropologist Stephen Greenblatt recently stated that *"mobility studies should shed light on hidden as well as conspicuous movements of peoples, objects, images, texts, and ideas"* (1). Our project responds to this call by building a dynamic interactive map with a searchable database of nineteenth-century travelogues about Spain. The purpose of the GIS map is to visualize a vast amount of written historical sources collected in a searchable website compiling the testimonies of at least 100 travelers.

SIGNIFICANCE
We seek to analyze and make visible the interdependence between different travelers' interpretations of Spain by grouping them by decades, places, and associations that each place triggered. These data will be retrieved from a searchable database and visualized using computer technology. By putting the travelers' accounts on a series of dynamic maps, we will discover significant patterns in the itineraries, transportation, and interpretations of Spain in the nineteenth century. This interdisciplinary approach will allow us to arrive at a more accurate picture of Spain, as early tourists experienced it, and also to understand nineteenth-century mobility and its gender variation. We also plan to overlay these maps with the epoch road maps and with the outlines of nineteenth-century war zones. Although the initial phase of the project only deals with a limited space and time, interactive dynamic maps have potential in research and industry, ranging from urban planning to road construction to tourism business.

FORWARD THINKING/INNOVATION
Simply put, we collect, analyze, and represent the experiences of nineteenth-century travelers. But this is a new type of project because it treats travel literature in innovative ways and searches for an attractive visual alternative to analyzing texts in academic articles. Travel literature, as we understand it, is mass-produced modular type of writing. The authors of travel books were driven by market demands and by a wish to sell as much as by their desire for self-expression; more often than not they copied from one another instead of coming up with their own creative descriptions. This is why, we will claim, travelers' accounts should not be studied individually as one analyses novels, but rather in bulk. Academic research about travel literature is abundant and constantly growing, but no-one until now has attempted to approach travel literature as a form of discourse where the ideas dominating one's society at a given time play more important role than individual quest for truth. At the same time, although we visualize data, our database accounts for their constructed nature from a humanistic perspective, as "capta" resulting from and subject to interpretation (2). The work entails vast data-collection that will be 'crowdsourced' to volunteers who will be reading travel books; it will take at least two years to be completed. Relevant data will include the travelers' names (classified by gender), points of origin, dates of travel, date and place of each travelogue's first edition, purposes of travel, means of transport, itineraries, destination points in each town, and their summarized opinions about these attractions. The timeline of the database will indicate, apart from the dates of travel and of each book's first edition, the main political events in Spain and in travelers' home countries and cities.

STUDENT INVOLVEMENT
Aishah Al-Fadhalah (B.A. candidate, class of 2013) will be responsible for administering data collection: finalizing the questionnaires, sending them out to volunteers, collecting them, making sure completed questionnaires are correct, and compiling the answers in a single database. James Bauer (B.S. candidate, class of 2013) will be responsible for developing, expanding, and maintaining the project's website (www.spanishtravelers.com) and the database. Additionally, Sapna Sumanth, M.S. candidate in Computing (Department of Math, Statistics, and Computer Science) working under Dr. Praveen Madiraju's supervision, will be in charge of developing the interactive map and visualizing qualitative data. All participants will assist me with deciding about the best way of collecting, compiling, and visualizing research data.

REFERENCES
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2. Johanna Drucker, "Humanities Approaches to Graphical Display," *Digital Humanities Quarterly*, Winter 2011, Volume 5 Number 1.

Project Title: Monitoring the Menstrual Cycle as a 4th Vital Sign for Women's Health
Faculty: Richard J. Fehring, PhD, RN, FAAN (Nursing) & Sheikh Ahamed, PhD (Math/Stats/Comp Sc)
Students: David Polyak, BS; Dana Rodriguez, MSN, APRN; Mary Schneider, MSN, APRN;

INTRODUCTION

Subcommittees of both the American Pediatric Association (APA) and the American Academy of Obstetrics and Gynecology (AAOG) have recommended monitoring the menstrual cycle as a fourth vital sign for adolescents and young adults.[1]   Studies have shown a link between indicators of the menstrual cycle with cardiovascular disease, polycystic ovarian syndrome (PSOS), metabolic syndrome, gestational diabetes, anorexia, unusual uterine bleeding, and sub-fertility.[2,3] Early diagnosis of symptoms of these health problems can help identify and prevent further complications of existing problems.[4] A user friendly system to monitor the phases of the menstrual cycle, the intensity of menstrual bleeding, and menstrual cycle symptoms would be a benefit for reproductive age women and could be a valuable diagnostic tool for health professionals.

SIGNIFICANCE

In today's "fast-paced" information and technology age society, young women commonly access Web sites, smart phone applications, and online social profiles sites.[5] There currently exists many (over 20) fertility monitoring systems for smart phones or other hand held devices but none linked to online sites and professional support. A fertility application for smart phones that is linked to a professional online fertility health monitoring system administered by professional nurses with links to medical consultation is one way to meet the need for easier access to this type of service. This system could also be a valuable diagnostic tool for health professionals dealing with reproductive age women.

FORWARD THINKING INNOVATION

Researchers at Marquette University have developed an online fertility health support system and piloted the system (with >1,000 participants) and addressed over 3,000 health inquiries on over 100 topics in user forums and with private consultation.[6] Feedback from the participants of that web site and our experience guided the development of a new system. The new system is focused on the menstrual cycle and fertility health and has a simplified menstrual cycle charting system that provides an automatic warning system to alert the user when parameters of the menstrual cycles are out of the norm and indicate potential health problems. The system also has a drop down list of common menstrual cycle symptoms. A unique component of the system is a user (social) profile. Participants can share components of their profile with other participants and with the professional nurses managing the system. Another innovative aspect of the new system is a link to a user friendly smart phone type menstrual cycle monitoring system. The overall purpose of this proposed research is to pilot and evaluate this new online/smart phone app menstrual cycle monitoring system (as a diagnostics tool) among reproductive age women along the menstrual cycle continuum, i.e., from adolescents through menopause and special life circumstances in between, e.g., the post-partum breastfeeding transition.

STUDENT INVOLVEMENT

David Polyak (master student in computing) is building and piloting the charting system, web site and smart phone charging applications. Dana Rodriguez (PhD student/nursing) is studying the influence of menstrual cycle charting on the health of adolescents and Mary Schneider (PhD student/nursing) is studying the physiological and psychological variability of the menstrual cycle during the breastfeeding transition. All are involved with the design of the new Web site and charting system and analyzing and piloting the new system with 10-12 Marquette Students.

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PROJECT TITLE
Cusp Catastrophe Models for Cognitive Workload and Fatigue and Some Real-world Applications

FACULTY PI
Stephen J. Guastello, Ph.D., Department of Psychology

INTRODUCTION

Although "downsizing" in organizations is nothing new, the workload problem is likely to have increased in the recent wave of unemployment leaves the remaining workers to cover the same amount of work. Cognitive workload and fatigue both induce decrements in performance over time that need to be identified and buffered in practical situations.

SIGNIFICANCE

Research on cognitive workload and fatigue has encountered numerous entangled problems (a) it is not possible to separate the effects of work load and fatigue using conventional experimental paradigms. (b) Work load demands are often confounded with work speed demands from sources of stress that are external to the task itself. (c) Prolonged time on task can produce the performance decrements that are usually associated with fatigue, but it can also produce improvements in task performance or work capacity that would be associated with practice and automaticity [1, 2]. (d) It is sometimes possible to alleviate fatigue by switching from a low-demand task to a higher-demand task or vice-versa, but switching tasks could be mentally costly [3].

The MU Project Team is developing two mathematical models that have become useful for untangling the web of performance phenomena, one for workload dynamics, and one for fatigue (Figs. 1 and 2). Although they share mathematical structures, the control variables in each process are different and originate from different underlying dynamics or mechanisms. The research program tests the models in a variety of task situations. In so doing it will be possible to find a range of psychological variables that contribute to elasticity or resilience in the workload model, and compensatory abilities in the fatigue model. Compensatory abilities are those that are not directly related to the task, but provide an additional resource to the primary abilities. To use an analogy from physically demanding work, arm strength might be a primary ability, but leg strength would be compensatory ability that prevents the arms from becoming fatigued faster than what would occur otherwise.
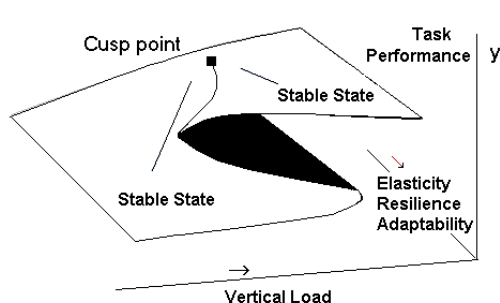
Fig. 1. Work performance as a function of elasticity and level of work load.
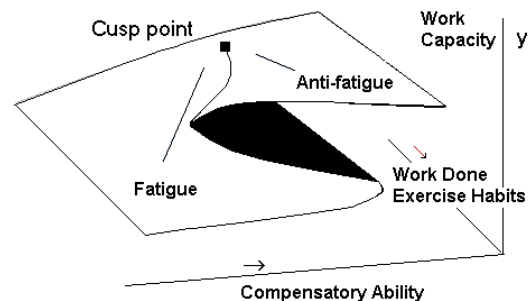
Fig. 2. Two stable states of arm strength as a function of work actually performed and compensatory strength.

FORWARD THINKING INNOVATION

The work in progress will investigate workload and fatigue dynamics and a broad range of elasticity and ability variables in realistic task scenarios. One emulates from hospital environments where the operator monitors a security cam and makes an alarm response when target images occur while doing a second mentally demanding task. The other involves financial decision making under varying conditions of load.

STUDENT INVOLVEMENT

These students are involved in the design of the experiments, creating research material and measurements, running the experimental sessions, and data analysis. Payal.Dharia, Hillary Gorin, Megan Fabisch, Natalie E. Peters, Kirsten Poston, Matthew Mallon, Paul Timm, Kelsey Weinberger.

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PROJECT TITLE: "A feminist perspective on listening to women: Birth stories of vaginal birth following previous cesarean delivery."
FACULTY NAME: Lisa Hanson, PhD, CNM FACNM, Associate Professor, Nursing.
STUDENT NAME: Elizabeth Hill-Karbowski, CNM MSN

INTRODUCTION

Vaginal birth after cesarean (VBAC) is an important option that many pregnant women desire. It can give prior cesarean mothers an opportunity to experience vaginal childbirth while reducing the rate of repeat cesarean sections. The US cesarean rate has reached 32.9% and continues to climb [1]. Numerous factors have contributed to this historic level. Exaggeration of the risks of cesarean, negative provider attitudes towards VBAC, and poor quality patient education and informed consent for VBAC all contribute to a significant reduction of the availability of this important option. The risks of VBAC, particularly those factors associated with uterine rupture, have been extensively studied and are quite small, yet present the greatest barrier to VBAC availability. The benefits of VBAC for the mother and baby include the avoidance of operative complications (infection, hemorrhage, transfusion, damage to surrounding organs, surgical injury), shorter hospital stay, faster recovery, lower hospitalization readmission rates, and overall lower rates of maternal morbidity and mortality [2,3,4]. VBAC is significantly associated with better overall maternal and neonatal outcomes than elective repeat cesarean section [5]. Further, women who undergo VBAC avoid the risks assumed by additional uterine scarring that may impact future pregnancies, fertility, and contribute to chronic pain[6]. One area of knowledge that is lacking is that of the woman's perspective. Feminism, a philosophic tradition that reflects the diversity and constant evolution of women, recognizes oppression of women, values women and their experiences, and seeks to bring about social change [7,8] . It is through this perspective that this project will be conducted seeking the narratives of women about their successful VBACs as the source of data.

SIGNIFICANCE

VBAC research on women's experiences and from their own perspectives is very limited. More research on women's perspectives is needed. The NIH has identified the "comparative long-term maternal and perinatal biological and psychosocial outcomes following VBAC…"as being a critical gap in the evidence [9]. The intent of this study is to listen to women's VBAC stories, comparing/contrasting them with their previous cesarean birth stories, examining them for themes, gaining new knowledge regarding the experience, and adding to the body of knowledge in an area of needed research.

FORWARD THINKING /INNOVATION

Birth story narratives are a rich source of data. There are only a few qualitative investigations of VBAC birth story studies in the published scientific literature. These studies included women from the UK, Australia, and Nigeria. However, American women who have had successful VBACs have not been studied. This study is innovative, because it will allow women to compare and contrast their own cesarean birth stories with those of their successful VBACs. This study will fill gaps in the body of literature and directions for future research for Elizabeth Hill-Karbowski, a College of Nursing Doctoral Student and practicing Certified Nurse-Midwife.

STUDENT INVOLVEMENT

Elizabeth Hill-Karbowski, CNM, MSN will take the lead on this project with the assistance of Dr. Lisa Hanson. Ms. Hill-Karbowski will recruit the research participants (n=12), develop the interview guide, and conduct the interviews. The interviews will be recorded and transcribed verbatim. Dr. Lisa Hanson and Ms. Hill-Karbowski will code the data and analyze for themes, mutually agreeing on the process. This project is Ms. Hill-Karbowski's doctoral dissertation.

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PROJECT TITLE: Predicting Cognitive Decline with fMRI and Physical Activity in Healthy Elders at Risk for Alzheimer's Disease
FACULTY NAME: Kristy A. Nielson, Ph. D., Professor of Psychology
STUDENT NAME: Alissa M. Butts, M. S., Clinical Psychology Doctoral Student

INTRODUCTION

Alzheimer's disease (AD) is a progressive neurodegenerative disorder with a distinct impairment in memory functioning and corresponding changes to brain function. Magnetic Resonance Imaging (MRI) has emerged as a noninvasive neuroimaging technique to observe changes in brain structure and function. Individuals with AD exhibit less activation (hypoactivation) in the hippocampus and poorer performance compared to healthy older adults during a functional MRI (fMRI) memory task[1]. Yet, individuals with mild cognitive impairment (MCI), which is thought to confer the greatest risk to developing AD[2] as a type of early or "prodromal" AD, exhibit greater hippocampal activation (hyperactivation) after accounting for tissue loss, than healthy controls and those with AD during a memory task on which both groups perform comparably well.[3] Importantly, cognitively intact healthy older adults who are at genetic risk for developing AD also demonstrate hyperactivation compared to those with low risk during a semantic memory fMRI task[4]. Although this trajectory may suggest that increased activation is a harbinger of future decline, we recently showed that cognitively intact at-risk elders who demonstrated greater hippocampal activation at baseline were *less* likely to demonstrate cognitive decline follow 18-months[5]. This suggests that supplemental indicators, added to fMRI activation, may be useful in correctly predicting future cognitive decline. A combination of indicators, or a biomarker, could then become the target of clinical intervention trials aimed at developing treatments to slow or prevent cognitive decline in individuals at greatest risk for developing AD.

SIGNIFICANCE

When an individual begins to show behavioral deficits, then the pathological process of AD has advanced to the point of irreversible brain damage. If, however, the onset of this disease could be delayed by 5 years, the prevalence rate will decrease by 50%, and a 10-year delay in symptom onset will virtually eliminate AD[6]. Genetics and family history, functional and structural brain characteristics and levels of physical activity have each been identified as risk factors for developing AD. A large group of cognitively healthy individuals entered a longitudinal study five years ago and will be tested at a follow-up evaluation. The purposed study will test models with varying risk factors in the ability to accurately predict cognitive decline after a five-year follow-up.

FORWARD THINKING/INNOVATION

This study will expand the literature by searching for predictive and reliable indicators of future cognitive decline. The majority of studies currently examine the individual impact of risk factors on cognitive decline, although currently no single risk factor is 100% accurate at predicting AD. It is more likely that a specific combination of risk factors such as age, education, sex, baseline physical activity levels, genetic risk, baseline hippocampal volumes and brain activity during an fMRI memory task will be more accurate at predicting future cognitive decline.

STUDENT INVOLVEMENT

Alissa Butts, M. S., will lead this project, under the supervision of Dr. Kristy Nielson. Ms. Butts will conduct neuropsychological evaluations with participants, analyze data, and interpret these data in requirements of her Ph. D. dissertation. The ultimate goal is to collaboratively use these data with Dr. Nielson to create a peer-reviewed publication.

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PROJECT TITLE: The Human Powered Nebulizer in the Treatment of Airway Diseases in El Salvador
FACULTY NAMES: Lars Olson, Ph.D. Associate Professor of Biomedical Engineering, M. Therese Lysaught, Ph.D. Associate Professor of Theology, Christopher J. Hallberg, Clinical Trial Coordinator.
STUDENT NAMES: Ellen Hawkinson, Katelynn Kramer, Brian Laning, Sarah Schmiedel, Andrew Weingart.

INTRODUCTION
Reactive airway diseases like asthma and Chronic Obstructive Pulmonary Disease (COPD) represent a major global health challenge [1,2]. Acute exacerbations of these require emergency life-saving treatment with fast acting bronchodilators like albuterol delivered directly to the airways [2]. In developing contexts, there are many issues with aerosolized delivery methods. For metered dose inhalers, the ability of the patient to correctly use them is suspect [3], and the overall cost and cost per treatment in rural areas appears to be prohibitively expensive. Using nebulizers to treat exacerbations of asthma and COPD solves those problems, but they require electricity and are often expensive themselves. In response to this, we have developed a Human Powered Nebulizer (HPN) which is low-cost and needs no electricity. It has been shown to be equivalent to an electric nebulizer in several benchtop studies and in a small clinical study of TB diagnosis in South Africa [4]. In order to deploy the HPN widely for the treatment of reactive airway diseases, we need to perform a clinical trial of the HPN to an electric nebulizer for this application.

SIGNIFICANCE
In early 2012, we will compare the HPN to an electric nebulizer (Pulmo-aide) in the treatment of mild to moderate asthma exacerbations in adults in a hospital setting in El Salvador. We will study approximately 110 subjects with Peak Expiratory Flow (PEF) measurements between 60 and 90% of normal. The subjects will be treated with 2.5 mg of albuterol solution over approximately 20 minutes where their progress will be monitored. PEF will be measured after the treatment as well. We will compare the outcomes of PEF and other indices of respiratory function between the HPN and the electric nebulizer.

FORWARD THINKING/INNOVATION
This study is critical to the advancement of the Human Powered Nebulizer Project whose goal is to provide breath and life to the world's poorest communities. It will provide the evidence the El Salvador Ministry of Health needs to adopt the deployment of the HPN in their country. We are currently obtaining IRB approval, with the Ministry of Health of El Salvador and Marquette University, to ensure the protection of human subjects in the study. This study, like the TB study in South Africa, will also lead the group to be able to pursue funding for larger scale trials of COPD, the fourth leading killer in the world, and to pursue more experimental treatments of lower respiratory infections, the leading killer in the developing world.

STUDENT INVOLVEMENT
The students are involved in the continuing development of the HPN design, benchtop testing and application of the design for the Central American community. Mr. Hallberg is also greatly involved in the design and execution of clinical trials which will be important to his continued medical training.

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nebuliser in a mobile human immunodeficiency virus testing service in South Africa. *Int J Tuberc Lung Dis*, 15(8):1077–1081, Aug 2011.

PROJECT TITLE: Surveying Parents of Deployed Military Personnel: Stress, Coping and Education about Mental Illness
FACULTY NAME: Stephen M. Saunders, Ph.D., Professor, Department of Psychology
STUDENT NAMES: Cody Carson, M.S. and Henry Boeh, M.S., Clinical Psychology Doctoral Students; Mariclare Kanaley, Jena Gomez and Erica Johnson, Psychology Majors

INTRODUCTION

Service in the United States military has far-reaching psychological effects, which have been exacerbated since the beginning of military action in Iraq (Operation New Dawn, OND) and Afghanistan (Operation Enduring Freedom, OEF). Overseas deployment places substantial stress on both those deployed and those left behind, including long-term separation from loved ones, uncertainty, fear for safety, changing responsibilities and possible financial hardship. Traumatic experiences are common in war zones and might include personal injury, performing acts injurious to others, and witnessing trauma to others. Post-traumatic stress disorder (PTSD) has long been known to be a significant and commonplace consequence of service in war zones[1]. With the advent of extremely percussive explosive munitions combined with greater rates of survival (because of improved body armor and medical interventions), non-fatal traumatic brain injury (TBI) has also become a significant post-combat consequence[2]. PTSD and TBI cause substantial suffering to the injured combatant, and they put the suffering soldier at much greater risk for suicide, which has emerged as a particular problem for OND/OEF[3]. Family members are also affected by post-combat problems, as returning veterans have higher risk for family disruption and occupational problems. Fortunately, numerous effective mental health treatments have been developed. Unfortunately, the stigma associated with mental illness and its treatment is especially acute in the military[4], preventing soldiers and family members from obtaining the help that they need.

SIGNIFICANCE

The study to be conducted will begin the process of utilizing an enormous but untapped resource to assist in the provision of mental health care of returning soldiers. There have been studies of the effects of deployment on spouses and children[5], and there are programs designed to assist the psychosocial needs of the children and spouses of deployed military personnel[6]. However, there are *no studies of parents* of deployed military personnel. This is a surprising oversight. According to DOD figures, parents are the primary support system for the 40% of unmarried military personnel that are 25 years or younger[7]. Of course, parents stay involved with both older and married military personnel as well. Parental involvement represents both *need* and *opportunity*. First, the emotional needs of parents of deployed military members are probably great. Second, parents are an untapped resource for the identification of mental health problems being experienced by returning veterans and their families. We will conduct a pilot survey of parents of military personnel to gather preliminary data on both issues. Data will be used to pursue external funding, from the DOD or other federal agencies to develop outreach programs addressing these issues.

FORWARD THINKING/INNOVATION

No studies of parents of military personnel have ever been conducted. The information collected will inaugurate a research program to design and evaluate educational and outreach efforts. These will hopefully help parents deal better with (1) the stress of having a child serve in military combat zones and (2) the psychiatric needs of their child returning from such service, including PTSD, TBI, depression, substance use, and heightened risk for suicide. Similar programs that Dr. Saunders has been involved with have been designed to address the issues of substance abuse, depression, and suicide.

STUDENT INVOLVEMENT

Students will be involved in all aspects of the study. Mr. Carson will oversee the development of the surveys, including finding measures of mental health, stress, and coping. Ms. Kanaley will implement the online surveys, and Ms. Gomez and Ms. Johnson will manage the data. Mr. Boeh will conduct the statistical analyses. All students will take part in the design and execution of analyses and production of presentations and reports.

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Abstract

Project Title: Spiritual questioning and its impact on the therapeutic alliance
Faculty Name: Stephen Saunders, Ph.D., Professor of Psychology, Director of Clinical Training
Student Name: Cody Carson, MS, Clinical Psychology Doctoral Candidate

Introduction

A large majority of Americans report believing in God or a higher power and that religion plays a significant role in their lives (Gallup & Lindsay, 1999). Additionally, a growing number of studies have found that clients would prefer to discuss spiritual and religious (S/R) concerns in psychotherapy and, notably, see it as an appropriate place to discuss these concerns (Rose, Westefeld, & Ansley, 2001). Although patients have reported that they would prefer to discuss S/R matters with their therapist, psychologists are reluctant to do so (Frazier & Hansen, 2009). Psychologists will likely be viewed as more credible and trustworthy with religious clients, leaders, and communities if they obtain training and competency in S/R diversity (Richards & Bergin, 2000). Additionally, an increased interest in the therapeutic relationship has developed in the last 30 years. This spike in interest may be due to research indicating the relative efficacy of different forms of psychotherapy (Wampold, et al., 1997). The therapeutic alliance has been proposed as a similar component among all forms of treatment. Research has consistently shown the alliance to be predictive of predictive of psychotherapy outcome (Horvath, Del Re, Flückiger, & Symonds, 2011).

Significance

While there is a substantial body of research on the alliance and the importance of discussing client's spiritual and religious beliefs has begun to be acknowledged, there has been little to no research regarding how the discussion of spirituality and religion within psychotherapy can impact the therapeutic alliance. This study aims to bridge the gap between research on spirituality and therapeutic alliance to determine if S/R querying on the part of the therapist will have a positive impact on the therapeutic alliance. Additionally, therapist and client attitudes towards discussion of spirituality and religion in psychotherapy will also be discussed.

Forward Thinking/Innovation

This study is innovated because it is the first of its kind to assess the potential impact of spiritual and religious queries by psychotherapists. While research has shown that clients would like to discuss S/R topics in psychotherapy, therapists have been reluctant to do so (Frazier & Hansen, 2009; Rose et al., 2001). This study will assess the impact of addressing this topic in psychotherapy in addition to client and therapist attitudes related to the discussion of S/R issues. The results of this research could lead to an enhanced understanding of client and therapist views of spiritual and religious questioning and more effective clinical assessments.

Student Involvement

Cody Carson, M.S. will serve as lead coordinator of this project with the support and collaboration of Dr. Stephen Saunders. Mr. Carson will develop a questionnaire that will assess therapist and client attitudes towards discussion of spirituality and religion in psychotherapy. Mr. Carson and Dr. Saunders will train graduate student clinicians to administer spiritual and religious queries to their clients. Mr. Carson with coordinate collection of questionnaires from clients and therapists at multiple points throughout the project. Mr. Carson will analyze the data and with the assistance of Dr. Saunders will come to a conclusion regarding the effect of spiritual and religious querying by psychotherapists and client and therapist attitudes towards discussion of S/R issues in psychotherapy.

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Abstract
PROJECT TITLE: Parent and Family Outcomes of PEERS: A Social Skills Intervention for Adolescents with Autism Spectrum Disorders
FACULTY NAME: Amy Vaughan Van Hecke, Ph.D., Assistant Professor, Psychology
STUDENT NAME: Jeffrey Karst, M.S., Clinical Psychology Doctoral Student

INTRODUCTION

Social difficulties represent one of the hallmark deficits of individuals with Autism Spectrum Disorders (ASD), yet research on interventions designed to assist children, adolescents, and adults in this domain is extremely limited. The Program for the Education and Enrichment of Relationship Skills (PEERS) is a manualized, social skills training intervention for adolescents with ASD. The didactic-based program consists of weekly sessions held over a 14-week period, with concurrent, separate sessions held for teens and parents. PEERS has demonstrated effectiveness in improving the relational skills of teens with ASDD as measured by self, parent, and teacher report. Furthermore, gains seen in adolescents following PEERS have been shown by research to be maintained at 6-month and 2-year follow up. Beginning in the fall of 2010, the Marquette Autism Project (MAP) began a long-term replication and extension of PEERS. A major component of this analysis will be investigation of parent and family outcomes of PEERS.

SIGNIFICANCE

Research indicates that parents and families are significantly impacted by having a child with ASD. Parents of children with ASD show increased levels of parenting stress, decreased parenting efficacy, and greater levels of mental and physical health concerns compared to parents of typically developing children and parents of children with other disabilities. While the parent-child relationship between caregivers and the affected child appears to remain intact, family discord has been shown to increase and marital satisfaction appears to decrease in these families. Parents have even been shown to be negatively affected by interventions for ASD, which can be costly, time-intensive, and emotionally demanding. These effects seen on parents and families appear to reciprocally impact affected children, and can even negate gains made in treatment. Taken together, this research suggests the importance of evaluating how treatments impact parents and families. Given that PEERS involves parents heavily throughout the interventions, it seems imperative to understand how parents are impacted. Further, it appears necessary to understand how parent changes related to PEERS intervention contribute to teen outcomes.

FORWARD THINKING/INNOVATION

This study is innovative because it is among the first investigation of any ASD intervention to assess parent and family outcomes holistically. The impact of PEERS on parents and families will be evaluated both independently and in the context of teen outcomes. Furthermore, as PEERS has gained notoriety as the first empirically supported social skills intervention for teens with ASD, it is necessary to comprehensively understand the impact of PEERS on teens, parents, and families. Thus, this study will help address questions about parents and families of teens with ASD in general, as well as shed light on how PEERS impacts caregivers and the family system. The model of treatment evaluation used in this study should serve as a new model for future investigations of any intervention for children with ASD and their families.

STUDENT INVOLVEMENT

Jeffrey Karst, M.S. will take the lead on this portion of the investigation with the support of and collaboration with Amy Vaughan Van Hecke, Ph.D. The intervention will be delivered by graduate students in the Marquette Autism Lab, including Jeffrey Karst, under the supervision of Dr. Van Hecke. Jeffrey Karst will be in charge of data entry, scoring, and analysis. In collaboration with Dr. Van Hecke, these results will be assessed with other PEERS outcomes being assessed by the Marquette Autism Lab.

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PROJECT TITLE: "Findings from the deployment of e-ESAS: A remote symptom monitoring system for rural breast cancer patients in Bangladesh"
PROJECT CATEGORY: Applied Research
FACULTY NAME: Sheikh Iqbal Ahamed, PhD, Associate Professor, MSCS Dept.
STUDENT NAME: Md Munirul Haque, Ferdaus Kawsar, Mohammad Adibuzzaman

SIGNIFICANCE

According to Bangladesh Bureau of Statistics cancer is the sixth leading cause of morbidity and mortality in Bangladesh. More than 22,000 new BC patients being added each year and 70% of them die due to lack of treatment though it is possible to prevent at least one-third of the cancers based on **early detection**, **availability of resources**, and **effective treatment** [1].

Many women in Bangladesh either never seek treatment or arrive at hospitals with late-stage cancer. Patients are also reluctant to visit the health centers regularly due to factors including financial, poor transport system, and physical status. Lack of patient information and scarcity of doctors complicate an already challenging situation. In this regard a mobile based Remote Symptom Monitoring System (RSMS) can play a potentially revolutionary role. Fortunately mobile phones penetrated the mass people of Bangladesh with 76.4 million users by 2011 [2]. Our field study found 43 out of 45 rural BC patients have access to cell phone.

OVERVIEW & GOALS

We have developed the first version of RSMS named e-ESAS for smart phones (Nokia X6). Patients will upload 13 necessary symptom levels through mobile phones from their home thus reducing the necessity to visit the health care centers. On the other hand doctors will be able to see graphical representation of those patient data which will help them in assessing patients' condition in a better way. We believe the overall system will be able to improve the quality of life of patients in developing countries like Bangladesh through enhanced clinic visit experience, timely intervention, and enhanced 3 way communications (patients, caregivers, and doctors).

NEXT STEPS

In order to make this project a real success we need to reach the mass poor people of the villages. For that we plan to develop a SMS based e-ESAS system for low end mobiles. The software will ask questions, collect answers, and then send the data as SMS. There will be a SMS server to receive the patients' SMS and parse the SMS to collect necessary data. We also plan to develop a forum for BC patients where they can submit voice based questions and answers. We prefer the audio version since most of the rural women do not know how to write. At the same time it will have a FAQ section with answers from experienced doctors. We believe such a platform is highly needed by the BC patients to express their closed thoughts and to increase their social interaction.

RESEARCH POTENTIAL

Our proposed system can work with not only cancer but also any disease that require long term monitoring like asthma, diabetes etc. We are in a negotiating stage for deploying similar type of projects for cancer patients in Marshfield, WI and Toronto, Canada. We are also submitting a NIH proposal for monitoring the American Indian cancer patients in South Dakota. So it is highly probable that the success of this project will generate more funds. We also plan to submit our research findings in top conferences and journals.

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PROJECT TITLE
Healthcare Privacy for the People by the People: Investigation of Practices and Attitudes to Healthcare Data
Privacy in Rural Countries

FACULTY
Sheikh Iqbal Ahamed, Ph.D.

STUDENT NAME
Farzana Rahman and Ferdaus Ahmed Kawsar

INTRODUCTION

Recent wide adoptions of information technology such as telemedicine, mobile based healthcare applications, Electronic Medical Record (EMR), and Personal Health Record (PHR) systems move traditional medical practices into the eHealth era [1]. The use of eHealth technologies allows easy access and sharing of health information among primary care physicians, specialists, patient, and caregivers. One significant impact of modern eHealth technologies is that it has the potential to transform aspects of rural health care, improving accessibility, quality and affordability. In reality, the rural healthcare system of most third world countries has changed dramatically over the past decade because of the introduction of new technologies, especially, mobile devices and intelligent infrastructure. Various smart and intelligent mobile based healthcare applications have been developed and deployed over the years in rural areas of third world countries to facilitate patients, doctors, and healthcare organizations in general [2, 3]. Nevertheless, the benefits of mobile based healthcare services are also accompanied by potential privacy issues. The unique context of the rural setting provides special challenges to realize privacy practices in eHealthcare systems. Although rural communities are widely diverse, most have the following common features: limited economic resources, shared values, reduced health status, limited availability of and accessibility to healthcare services, overlapping professional–patient relationships and care giver stress. These rural features shape common privacy practices, believes and confidentiality issues. In this poster, we present the results of a pilot study that have been conducted in rural areas of Bangladesh (It is considered as representative developing country). We also try to investigate the relations between the healthcare privacy practices of rural people with their background (such as: social, cultural, religious, gender, educational or such issues), attitudes and believes.

SIGNIFICANCE

To date, there exists a limited focus on rural healthcare privacy policies due to the scarcity of enough rural healthcare technologies, absence of investigation of rural peoples' knowledge of privacy, lack of governmental law and policy enforcement. To realize a complete set of policies for rural healthcare in developing countries, we also need to identify the key factors that mainly form and shape the practice, attitude, believes of rural people towards healthcare privacy. To the best of our knowledge, for the first time, this research work presents the study of rural healthcare privacy and identifies the key factors of privacy practices by rural people of a developing country.

FORWARD THINKING/INNOVATION

Rural communities of low income countries are unique not just because of their small population density or distance from an urban setting, but also because of the combination of their social, economic and geographical characteristics as well as their residents' cultural, religious and personal values. Most of the time, these people are more concerned about confidentiality rather than healthcare data privacy. However, in literature, none of the research has focused on identifying the contribution of these peoples' background, attitudes and believes towards healthcare privacy or eHealth data privacy. To understand these issues, we conducted an extensive survey in different rural areas of Bangladesh. We interviewed patients, doctors and people belonging to different social status. In this poster, we report the results of our conducted study and try to identify the main contributing factors of healthcare privacy practice in rural developing countries.

STUDENT INVOLVEMENT

Kawser is interviewing and surveying different groups of people in Bangladesh with questionnaire related to healthcare privacy concerns. Farzana is working on analyzing the collected data to identify the healthcare related privacy issues, attitudes and believes of rural people of Bangladesh.

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Dr. Jean Grow

Vanishing Acts: Creative Women Across the Globe

Abstract

This cross-cultural research explores the experiences of women in advertising creative departments across the globe; and is part of multi-tiered research agenda. Specifically, this applied collaborative research is an exploration of advertising creative departments and how their social and environmental structures impact female creatives. It is framed by Hofstede's dimensional model of national culture (de Mooij & Hofstede 2010; Hofstede 2001) and signaling theory (Spence 1974). Data suggests that top female creatives face challenges rooted in the "fraternity culture" or "territorio de chicos" of creative departments. Further, we know that women make up less then 20 percent of all creatives, while women make upwards of 80 percent of all consumption decisions. The data suggest that the gender-bound cultural environment within advertising creative departments may be a global phenomenon, one that may adversely affect the creative process and impact women's upward mobility.

Phase one began with an exploration of the experiences of creative women in the United States and Canada. Two papers were published from this phase of my research (*Advertising & Society Review*, Britain and *Journal of Consumer Marketing*, United States). Phase two expanded to Europe with a comparative study between the Spain and the United States. One paper is in press from this phase (*International Journal of Advertising*, Belgium). Phase two, which is still in process and like phase one will include a second country, Italy. I plan to spend winter break, 2011-12, doing intensive language studies in Italy and to begin gathering data in summer 2012. In phase three my agenda will broaden the study to add South America. I will begin with Perú, with a visit planned during winter break, 2012-13, with data collection set to begin in summer 2013. Argentina will subsequently be added as the second South American country. Clearly, a fourth phase could add Asia to the mix. Additional countries could also be added phases two and three as well. However interesting these opportunities may be, neither is a part of my near term agenda, though remain under consideration.

Finally, I have presented this work at numerous conferences and I anticipate future publications as I move deeper into phase two and subsequently add phase three. It is also of note that part of the second phase was funded by a Spanish grant, the largest awarded by the government,[1] and of which I was the only non-Spaniard. In closing, I believe this research is significant because it has the potential to demonstrate a global pattern of gender inequity within the advertising creative departments - and within an industry that has immense global cultural influence.

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[1] Spain Government, Ministry of Science & Innovation, Research Grant: (18,000 Euros), "La discriminación de género en la evaluación del trabajo creativo de las mujeres en la publicidad: ¿El sexo es un factor clave para la elección de ideas y planes de estudio/Gender discrimination when evaluating the creative work of women in advertising: Is sex a key factor for choosing ideas and curricula?" with *Universidad Autónoma de Barcelona*, Barcelona Spain, 2010-2013.

<u>The Social & Cultural Contexts of Alcohol Use and
Subsequent Sexual Involvement Among Young People</u>

Kristin Haglund PhD, College of Nursing

Project Category: Applied Research
Overview/Goals: This study is part of a research trajectory designed to develop understanding of alcohol use and subsequent sexual involvement among young people in the UK and in the US. The goal of this trajectory is to develop an intervention to reduce sexual risks for adverse consequence such as disease transmission, violence, and unwanted pregnancy among youths by addressing their alcohol use.
International Component: The international team is comprised of Dr. Kristin Haglund, Dr. Mark Hayter, University of Sheffield and Christina Harrison, Clinical Manager, Sexual Health Service, Doncaster UK. International involvement enhances the project by incorporating both emic and etic perspectives. For this study, data will be collected from youth (ages 14-16 years) in Doncaster UK.
Significance/Purpose: The purpose of this qualitative exploratory study is to discover young peoples' perceptions of how social and cultural contexts influence alcohol use and how alcohol use influences involvement in sexual behaviors among young people. Alcohol use among young people is a risk factor for engaging in risky sexual behaviors (Anderson, & Mueller, 2008; Guo et al., 2002; Levy, Sherritt, Shrier & Knight, 2009). Examples of risky sexual behaviors may include lack of condom or contraception use, coerced sexual involvement or level of involvement, multiple partners, and sexual activity in unsafe settings. Being under the influence of alcohol also places young people at risk for unwanted sexual contact, sexual assault and other forms of violence (Banister, Jakubec, Stein, 2003; Flack, & et al., 2007). These significant public health issues, alcohol use, risky sexual behaviors and the interaction of the two, have been identified as areas of concern for young people by researchers and governmental bodies in the UK and in the US (UK Department of Health, 2007; U.S. DHHS, 2000). However, there are few qualitative studies that have examined the social and cultural contexts within which alcohol use and sexual behaviors occur among young people (Banister et al., 2003; Hutton, 2004). Qualitative investigation may yield a rich description of the contextual factors that influence these behaviors which will be useful for subsequent intervention development. Understanding this phenomenon from the perspective of young people within contexts *apriori* to clinical intervention development will inform the intervention and increase the likelihood that it will meet the needs of young people and lead to actual behavior change. To engage young people in health behavior change, it is necessary to understand what their lives are like from their own perspectives (IAG, 2007).
Next Steps: Human subjects approval and formal participation agreement from the youth centers will be obtained. Group interviews will be conducted in youth centers in Doncaster by the UK researchers. Groups will be audiorecorded and transcribed. Data analysis will be completed in person in 2012.
Research Potential: This study will result in scholarly outcomes including manuscripts, presentations at professional conferences, and ongoing research relationships with international collaborators. Future projects include studies of the perspectives of young people and youth workers in the U.S. regarding alcohol use and sexual involvement.

Abstract
Marquette U. International Poster Session

Submitted by R. Marklin, Nov 1, 2011

1. *Title*: Off-Grid Electrification Project in Rural Guatemala
2. *Category*: Applied Research
3. *Faculty Names and Departments*:
    Richard Marklin, Professor, Mechanical Engineering (MEEN)
    Mark Federle, Professor and McShane Chair, Civil, Construction, and Environmental
    Engineering (CEEN)
4. *Overview and Goals of Project:*

The MU chapter of Engineers Without Borders (EWB) has been constructing an off-grid electrical system for a village (Nueva Providencia) with less than 50 homes (300 residents) in rural Guatemala for the past 4 years. Electrical power sources are solar and hydro. Solar panels have been producing power for 3 years to the village for community purposes, and recently to 11 homes. Its capacity will be doubled next year, and the number of houses with power will increase to 30. The hydro system is still under construction. The goal of the project is to provide each home with a small amount of electricity (100 watts peak) to improve the basic needs of daily living and provide opportunity for local entrepreneurs (economic development). Examples of uses of electricity are indoor lighting, computer use, cooking tasks, and public lighting for safety. The literature has shown that when rural areas receive electricity, 26% of the households increased their income, compared to only 4% of the household who increased their income without electricity (World Bank, 2008).

5. *Description of International Component and Significance/Purpose*

This project benefits rural residents in an impoverished area of Guatemala. The village, Nueval Providencia, is representative of hundreds of thousands of small, rural villages in the world that do not have access to electricity. This project will serve as a case study to learn the following:
  • The optimal design of an off-grid electricity system based on solar and hydro sources
  • Construction of the system and challenges
  • How the residents use the electricity? For example, what are their priorities of use?
  • How electricity can improve basic needs of daily living of residents?
  • How electricity can provide opportunities for local entrepreneurship and economic development

Lessons learned from this cases study may be applied to other villages with similar characteristics in South America, Asia, and Africa.

6. *Next Steps and Research Potential*

In Jan. 2012 MU EWB will send a team to Guatemala to install 9 solar panels, wire an additional 20 homes, and install some pipe for the hydro system. Subsequent trips to Guatemala will complete the hydro component.

Profs Marklin and Federle will write proposals to procure funds for the following:
  • Materials to complete project
  • Travel expenses of EWB members for future trips
  • Stipend for the professional advisors to MU EWB (Thomas Zalewski and Eugene Moe)
  • Stipend to a person who will live and work in Guatemala to monitor the project
  • Faculty release time to manage the project, analyze the data, and publish findings

7. *References*

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Circulations: Death and Opportunity in Southern Pacific Mesoamerica, 1460-1620
Project Category: Pure Research
Laura E. Matthew, History

ABSTRACT

Overview and Goals of the Project

This book-length project asks whether Spanish conquest radically altered indigenous trade and migration along the Pacific coast of southern Mesoamerica, and with what cultural impact. Geographically, it focuses on how people and goods were actually circulating rather than on colonial or postcolonial administrative boundaries. Methodologically, it incorporates recent advances in archaeology, art history, and linguistics into analysis of Spanish-language documentation from the first hundred years after contact with Europeans. Conceptually, it is less interested in explaining Europe's success at empire-building, and more interested in reconnecting Mesoamerican history across the precolonial/colonial divide.

Description of International Component and Significant Purpose

Today, the states of Oaxaca and Chiapas lie in Mexico while Guatemala and El Salvador are distinct countries. Persistent connections across national borders, however, suggest that Mixe, Zapotec, K'iche', Tzotzil, Pipil, and other indigenous groups have interacted in the region for hundreds if not thousands of years. My work tracks the adjustments of these southern Mesoamericans to the traumas of the sixteenth century -- invasion and massive epidemic disease -- in order to place them within a longer, Mesoamerican (rather than European) historical context. In particular, I ask whether new opportunities were created for some Mesoamericans out of the misfortune of others, and whether these represent significant shifts in precolonial patterns of interethnic contact.

Given that the largest waves of Latin American immigration to the United States have recently come from this area, these are not merely academic issues. In Los Angeles, Zapotecs and Mixtecs from Oaxaca compete with Guatemalan Maya as the city's fastest-growing immigrant group. While Maya from Chiapas migrate to Cancún or Mexico City, Maya and Xinca from Central America migrate to Chiapas before all three groups travel further north. "Circulations" offers a more historically and culturally grounded understanding of these immigrants' choices in the modern world.

Next Steps and Research Potential

Most of this study will be based on Spanish-language documents from the sixteenth century and early seventeenth century, safeguarded in archives in Guatemala, Chiapas, Oaxaca, Mexico City, and Spain. I have collected material in Guatemala and Oaxaca over the past two years, and this summer will focus on analyzing documents from the Santa Rosa region in Guatemala. In particular, I am interested in a rare example of colonial-era Pipil (a variation of Nahuatl, the language of both Aztec and early Spanish colonialism) from this coastal region: the "Título de Santa María Ixhuatán" from 1621, which tells the migration story of Santa María Ixhuatán's founders from their mythic origin place to the Pacific coast of Guatemala. Pictorials accompany the text, suggesting that this document represents an effort by its authors to transfer their history from older ideographic and oral traditions to alphabetic documents. This work will contribute both to *Circulations* and to a separate publication in progress with Sergio Romero (Anthropology, Vanderbilt U.)

Matthew - 1

Project Title: **INTER-RELIGIOUS HERMENEUTICS: REALIZING THE SELF THROUGH THE OTHER**

Project Category: **Applied Research**

Faculty Name and Department: **Irfan A. Omar (Theology)**

Overview and Goals of the Project:
This project seeks to further develop theoretical bases for an experiential phenomenon called "inter-religious encounter." It involves an examination of one's religious journey into one's own faith by way of an encounter with a religious other. It is based on the premise that without the "other" there is no self-knowledge. Therefore any attempt to adequately understand the self – or one's religious tradition, to put it in research terms – necessitates knowledge of the other, and/or other's religious tradition. A pertinent question here would be to discover what kind of encounter with the other would most affect the self-realization of one's own tradition. Encounter may be experienced by way of person-to-person dialogue or by way of studying the text and religious tradition of the other. This is now considered an effective hermeneutical method for interfaith dialogue. By analyzing the work of Frederiks and Ariarajah, I would argue that "interreligious hermeneutics" - which is defined as a "theory and method of interpretation and understanding across religious boundaries," - stimulate a richer experience of the self because it is both more complex and allows for a comparative view of the self. The goal of this research is to show that hermeneutics in interreligious context is fundamentally a way of interpreting encounter with the other rather than encounter with the text/s. This form of hermeneutical engagement results in a more organic form of self-understanding and leads to an overall strengthening of belief in the efficacy of faith. The encounter with the other disallows construction of differences by way of any ideological lens leading to "us" vs. "them" type of dichotomy.

Description of International Component and Significance/Purpose:
I am primarily looking at models of inter-religious hermeneutics developed by the Asian theologian Wesley Ariarajah within the context of his study of Christian and Hindu communities which seek to live as authentic Christians and Hindus and yet live inter-religiously. For my research, I would be visiting a community of such Hindus and Christians in Delhi, India, in order to understand the dynamics of such an encounter first hand. This will allow me to develop teaching resources for my MU theology courses that deal with inter-religious engagement and world religions.

Next Steps and Research Potential:
If my proposal is accepted, I will return with a variety of teaching resources (interviews, pictures, video footage, etc) which will be helpful in my classes. I will also use these resources, as well as notes and other findings to produce a longer research paper in an attempt to further develop theoretical and analytical precepts of the phenomena of inter-religious hermeneutics.

References:
Ariarajah, S Wesley. "Intercultural hermeneutics -- a promise for the future?" *Exchange*34, no. 2 (January 1, 2005): 89-101.
Frederiks, Martha. "Hermeneutics from an Inter-Religious Perspective?" *Exchange* 34, 2 (2005): 102-110.

Abstract for 2011 International Research Poster Session and International Research Awards Grant

Project title: "Fascism and Race: Historical Origins and Contemporary Legacies"

Applicant: Peter Staudenmaier, Assistant Professor, Department of History

Category: Pure Research

The regimes of Fascist Italy and Nazi Germany stand as notorious examples of racial ideology in practice. Both Mussolini and Hitler made images of race supremacy central to their rule, with disastrous human consequences. While the Race Laws implemented in Fascist Italy in 1938 have been overshadowed by the subsequent Nazi genocide, both regimes cultivated a fascist ideal of racial superiority which took different forms in Italian and German contexts. As infamous as these historical cases are, they have received surprisingly little empirical study and comparative analysis.

My proposal attempts to fill this gap in the scholarship on Nazism and Fascism, as part of the broader scholarship on the history of racial thought. In the initial step of a long-term research program, I would like to use the opportunity of an International Research Award to undertake a preliminary assessment of the relevant archival sources in Germany and Italy. If selected for the award, I will use the funds for travel to the German Federal Archives in Berlin and the Central State Archives in Rome in May and June 2012. I have worked extensively in both archives before and have assembled a provisional catalogue of pertinent files and documents.

Archival research is a time-consuming part of historical scholarship, and the initial survey of available materials is a crucially important phase in a longer process. If the full project develops as currently envisioned, it will provide a significantly new perspective on the evolution of racial policy in Fascist Italy and Nazi Germany while relating this history directly to the much larger task of understanding Western conceptions of race more generally. Despite the wealth of existing scholarship on Nazism in particular, this subject has been largely neglected; historians and other scholars have yet to produce an empirically based comparative study of racial theory and racial practice in Fascist Italy and Nazi Germany.

My project views fascist approaches to race not as anomalies or divergences from the usual path of Western cultural development, but as part of a continuum of prevalent racial beliefs, past and present, in popular culture as well as scientific and political contexts. The research thus carries implications for fields far beyond the boundaries of modern European history. It engages with ongoing disputes across a range of disciplines attempting to come to terms with a particularly difficult and provocative racial legacy, a part of our collective past which continues to generate controversy and concern and stimulate inquiry.

I expect the next steps after this initial phase to lead toward an eventual book-length study. This project marks a significant new departure for my own research as a historian, and is also directly relevant to my teaching. I have previously taught courses on the history of racial thought, and am currently working with several colleagues in the History department to design an ongoing course here at Marquette on the history and contemporary significance of race. Thank you very much for your consideration.

Project Title: *Measurement equivalence across English and Malay cognitive indices*
Project Category: *Applied research*
Faculty/Researcher Names: *Indrani Thiruselvam, MA and James Hoelzle, PhD*
Department: *Psychology*

Abstract

Intelligence testing is a crucial aspect of psychological assessment worldwide. Typically, in determining a psychoeducational diagnosis, a comprehensive assessment is conducted that includes formal evaluation of broad intellectual skills (e.g., working memory, nonverbal ability) with standardized measures. Given that psychological assessment often results in resource allocation (e.g., financial compensation), disability accommodation, and impacts educational or occupational opportunities, it is imperative that measures used during assessment are reliable, applicable, and valid. The risk in utilizing instruments with poor validity is that resources and opportunities may be inappropriately distributed.

In Malaysia, significant decisions regarding special education eligibility and access to giftedness programs are made based upon results of psychological assessments, the core of which are often intelligence tests. The validity and cross-cultural applicability of these tests are questionable at best, given that they are mostly obtained from the United States or United Kingdom, loosely translated into Malay, and scored exclusively based on Western norms. This is problematic because it is unclear that measurement equivalency exists across cultures (i.e., the same raw test score may reflect different attributes). Therefore, it is crucial to rigorously develop, standardize, evaluate, and norm translated versions of Western tests.

The proposed project is a pilot study to develop and evaluate a Malay translated measure of intelligence (predominantly nonverbal aspects). Standardized instructions and test stimuli from the Wechsler Adult Intelligence Scale and Wechsler Memory Scale will be investigated. These instruments were selected because of their documented validity and utility across clinical settings. Subtests of the following cognitive indices will be translated into Malay, and back-translated into English to ensure accurate translation: Perceptual Reasoning (Block Design, Matrix Reasoning, and Visual Puzzles subtests), Working Memory (Digit Span, Arithmetic, and Letter-Number Sequencing subtests), and Processing Speed (Symbol Search, Coding, and Cancellation subtests). Additionally, the Spatial Span subtest will be investigated.

To evaluate the invariance of English and Malay subtests versions, each will be administered to fifty bilingual Malaysians (whose dominant language is either English or Malay), recruited for this study, through word-of-mouth, and through the Malaysian student associations of local Universities. Analyses of variance (ANOVA) will be used to determine if language of instruction and language dominance of participants affect performance on these nonverbal measures of intelligence.

This pilot study is an important preliminary step in establishing standardized and locally normed cognitive ability tests for Malaysians. Results would be meaningful in developing additional translated measures and set the stage for a larger scale normative study in Malaysia. Encouragingly, potential collaborators have been identified at the National University of Malaysia and HELP University College, who have expressed interest in assisting to evaluate the cross-cultural measurement invariance and recognize the significance of this research.

The initiation of this project raises important questions about the validity of current testing practices in Malaysia, and is likely to be an important "first step" towards research aimed at improving diagnostic decisions based on psychological assessments. It will also contribute to the scarce literature available on the relatively young field of psychology in Malaysia.

Project Title: Revisiting Cultural Imperialism: Cultural Resistance and Resilience amid Imported TV Programs

Project Category: Pure Research

Researcher Name: Chioma Ugochukwu, Ph.D.

Overview and Goals of the Project: What are the effects of American-produced entertainment programs on the knowledge, beliefs, attitudes, behaviors, and values of television viewers? Some research studies suggest that these programs gradually erode the traditional values of indigenous cultures. Others argue that foreign audiences are not passive dupes of the American ideology, and that these audiences are quite capable of negotiating the messages in American-produced media programs. The present study employs a content analysis of programs available on Nigerian TV, as well as a post-test only, control group experimental design to attempt to resolve these conflicting findings. This, the researcher does, by focusing on the effects of American-produced programs on Nigerian youth.

Description of International Component and Significance/Purpose: The effects of foreign programming on people's values seem to be the most contentious aspect of findings from international research on cross-border TV effects. After 9/11, there was renewed debate on how much America's "soft power," seen in the country's ability to export cultural products all over the world, fuels the excuse for the kind of moral outrage among some terrorist groups. In academic circles, proponents of cultural imperialism argue that there is an onslaught of foreign TV programs in Third World countries, and that such programs lead to negative effects or a homogenization/Americanization of cultures. Goonasekara (1987) wrote that in "the face of this media invasion, the indigenous cultures of the Third World disintegrate consistently and without resistance." Findings from the present study should add to the debate and help to determine if there is indeed reason to believe that exposure to foreign TV content (especially American content) equals disintegration of Third World countries' cultural values. Another significant aspect of this study is that, unlike many other studies in this area, the researcher employs an experimental design, which establishes causation rather than a qualitative approach or a survey, which can only establish correlation.

Next Steps and Research Potential: This research is a follow-up to the experimental study carried out by this researcher in 2002. The original study investigated the effects of American-produced programs, using the cultural imperialism theory as a framework. The subject pool consisted of 482 high school students from Nigeria, who are representatives of the three major ethnic/religious groups in the country. Participants in the experimental condition were exposed to American TV programs, while participants in the control group were exposed to Nigerian programs only. The results showed that exposure to American TV programs affected the participants' knowledge, but their behaviors, beliefs, values and attitudes, remained unaffected. The proposed study will use the same design to replicate the original study. This is to determine if things have changed in terms of TV programs offered in Nigeria a decade later, and to determine if Nigerian audiences are still immune to some of the assumed cultural effects of foreign TV programming.

References:

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A Diagnostic System for Monitoring the Menstrual Cycle as a Vital Sign for Women's Health

FACULTY
Sheikh Iqbal Ahamed, Ph.D., Richard Fehring, Ph.D.

STUDENT NAME
David Polyak

INTRODUCTION

Menstrual cycle monitoring is known to be an important indicator of women's health. In fact, "menstruation is a unique indicator of a women's overall emotional and physical health", and it provides a unique view into the general health and well being of women [1]. Not only is menstrual cycle monitoring an effective monitor of general health but abnormalities within the menses and symptom management throughout the menstrual cycle can be used as a catalyst to disease recognition, mitigation and preventive care [2]. However, unlike the primary vital signs that are monitored using diagnostic tools (e.g., electrocardiography or counting for heart rate, counting for respiratory rate, thermometer for temperature, and sphygmomanometer for blood pressure), there exists no such diagnostic tool to monitor the menstrual cycle as a vital sign for women's health.

SIGNIFICANCE

If a diagnostic tool capable of monitoring the menstrual cycle existed it would be revolutionary to the field of women's health. In today's ever changing, technology-packed world, technology continues to provide us easier access to websites and mobile applications. This provides an interesting and unique foundation for a diagnostic system for women's health that integrates seamlessly into the everyday busy lives of women. This system will incorporate an online and smartphone application. Together these components work together to provide an anytime, anywhere diagnostic tool that alerts users of potential problems that is currently unavailable.

FORWARD THINKING/INNOVATION

This system will incorporate two components to provide users anytime, anywhere access to the system using any web browser or a mobile application designed for the Apple iPhone and Google Android devices. These components allow users the ability to create and modify their menstrual cycle charts anywhere they have access to a personal computer or mobile device with the installed application and Internet connection. User charts consist of cells that allow users to record fertility parameters (e.g., Clearblue Fertility Monitor, second luteinizing hormone, cervical mucus, and temperature) and other information (e.g., bleeding patterns, intercourse, and symptom notes) for each day of their menstrual cycle. Modifications to any of the fertility parameters for any day will dynamically adjust the user's calculated period of fertility, known as the fertile window, and tailor alerts to help users based on their motivation for using the system. System motivations include: monitoring fertility health, avoiding pregnancy, and achieving pregnancy. This unique alert system not only assists women with their motivation but also provides the interface for communication between the diagnostic system and users designed to alert and warn users and health professionals of potential health problems. The last unique component of this system is the ability to interact with other system users and health professionals using the unique social networking component. Together the online and mobile components empower users, ultimately providing them resources to monitor and understand their menstrual cycle along with giving them the power to proactively discuss issues with their physicians.

STUDENT INVOLVEMENT

David Polyak is working on the system framework, design, implementation, and evaluating its performance.

REFERENCES

[1] http://www.projectvitalsign.org/menstrual-cycle-is-a-vital-sign/
[2] http://pediatrics.aappublications.org/content/118/5/2245.full

PROJECT TITLE
Accurate Estimation of Future Health Risk: **Building a Model to Estimate Future Health Risk from Activity Data from Cell Phones**

FACULTY
Sheikh Iqbal Ahamed, Ph.D.

STUDENT NAME
Ferdaus Ahmed Kawsar, Weiqiang Wang, and Casey J. O'Brien

INTRODUCTION
Insurance premiums are determined by actuaries employed by insurance companies. While determining premiums, the cost of advertising, cost of services rendered by health care practitioners, administration of the insurance program and profit margin are considered. Actuaries also determine the exposure to risk by considering different factors like medical history, neighborhood, and habits like tobacco or alcohol use. They try to collect as many risk factors as possible before setting the premiums. One problem with current risk assessment is that it does not incorporate the healthy habits of individuals.

The recent widespread use of cell phones and their continued growth, both in the developed and the developing world, provides a unique opportunity for human activity data collection. There is a good number of works where researchers used accelerometers to recognize different human activities. Most of those works, however, were not suitable for day-to-day use as they were wired. Recently work is going on to identify human activities using cell phones with on-board accelerometers. Some activities have been identified with good accuracy [1, 2]. Still there are opportunities for improvement in identifying these activities. Our strategy requires building two components. The first component is building a cell phone based real-time activity recognition system. The second component is building a model that incorporates this log of daily activities and calculates the future health risk. For example, some people maintain a healthier lifestyle than others by exercising regularly, which in turn reduces their risk for some diseases like heart disease for example. Capturing physical activities using cell phones can help us to incorporate a new parameter in calculating future health risk.

SIGNIFICANCE
Health care is currently an important issue as it concerns people, governments, the economy and politics. A system that incorporates more information is certainly of interest to policy makers. Of course, predicting health risk from activity behavior will require long term monitoring.

FORWARD THINKING/INNOVATION
Insurance companies use different parameters to calculate future health risk. While healthy habits are an important fact in determining health risk, they have not been considered in actuarial models so far. The recent growth of smart phone technology is making many things possible, which were previously unrealistic due to computational expense. A cell phone based activity recognition system may help us to include a new significant parameter for heath. In a time, when health care expense is a burning issue, such a system may change the way we think about health insurance. We are currently working on building a cell phone based activity recognition system. In this poster, we report the architecture of the final system.

STUDENT INVOLVEMENT
Kawsar is building a cell phone based activity recognition system, and Weiqiang is studying existing risk calculation models used by different insurance companies. They both will modify the current models and so that the modified model incorporates activity data of clients.

REFERENCES
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[2] Khan, M.,Ahamed, S. I., Rahman, M., and Smith., R. O. A feature extraction method for realtime human activity recognition on cell phones. In Proceedings of isQoLT. 2011.

PROJECT TITLE

Multimodal Ubiquitous Affect Detection for Social Network

FACULTY

Sheikh Iqbal Ahamed, Ph.D.

STUDENT NAME

Mohammad Adibuzzaman, Ferdaus Ahmed Kawsar, Md. Munirul Haque, Md Osman Gani, Nicholas Steinhafel

INTRODUCTION

The world has experienced the power of social media by the recent Jasmine revolution in the Arab world. Yet social media is still in its nascent stage with respect to its applications. In the next few years it will reshape the way we interact with computers and do business. At the same time, in the new research area Affective Computing, researchers are working on multi-modal affect recognition using facial expression, speech data, gestures, body movements and other aspects of human emotion expression. So far there has been significant research in unimodal affect detection, but very few systems have been developed for multimodal affect recognition. No system has been considered for real time affect detection in social network and the impact of such systems on social dynamics has not been analyzed. In this paper, we propose our novel idea to integrate these two powerful areas: social media and affective computing by automatically detecting human affective state from facial image and energy expenditure due to body movement using Naïve Bayes Classifier from mobile devices. Depending upon the affective state, the power of social network could be used for location and affect based advertisement, market research as well as for social support.

SIGNIFICANCE

The novel idea of using facial expression and total energy for affect detection in the social network domain is unique. It will help users sharing emotion in that domain and also introduces new idea about affect sensitive advertisement.

FORWARD THINKING/INNOVATION

Research in multimodal affect detection has been done in laboratory environment so far. But there is significant difference between acted emotion and real emotion. Our goal is to make the affect detection system available to real environment. Making affect detection algorithm available to ubiquitous devices will enhance us to build a database of affective data of real environment. Automatic affect detection and (automatic) social sharing of emotion will add a new dimension on the existing interaction paradigm in the social network. This will enhance the social network users with a new capability for social interaction which may change or influence the way people interact with each other. There have been different theories in social psychology about interaction between people affected by technology. There remains significant research scope for the new dimension of automatic affect detection and sharing it in social network domain from the perspective of social science. At the same time, it will reshape the advertisement industry by showing advertisement depending on the affective state. The study of the change of consumer behavior on affect based advertisement is a major challenge. The contribution of this paper includes the integration of affect detection from facial expression using eigenface algorithm and using it from the web. We also used the eigenface and eigenlips to improve the accuracy. Although physical activity might be a good indication of the affective state, no research has been done combining these two powerful indicators for automatic affect detection. The novel idea of using facial expression and total energy for affect detection in the social network domain is unique. Also there is no significant proof that multimodality increases the accuracy of the system. Sometimes the system may have redundant data and thus lower the performance. The result of the research will lead to the algorithms and data that is related to the information about the emotional cue. Additionally, it will help users share emotion in social network domain and also will introduce new idea about affect sensitive advertisement.

STUDENT INVOLVEMENT

Mohammad Adibuzzaman is working on the design of the system and the machine learning algorithms including defining the scope of the project. Md Munirul is working on the facial expression detection and Ferdaus Kawsar is helping on Physical Activity interpretation. Md Osmani and Nicholas are working on the development of the system.

REFERENCES

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[2] B. Rime, B. Mesquita, P. Philipot, "Long lasting cognitive and social consequences of emotion: Social sharing and Rumination," *European Review of Social Psychology*, 1992.

PROJECT TITLE
Scent of a Place: Navigation using Social Knowledge
FACULTY
Sheikh Iqbal Ahamed, Ph.D.

STUDENTS
Rizwana Rizia, Mohammad Tanviruzzaman

INTRODUCTION

With the rapid increasing use of smartphones, location based services are now one of the standard feature on these devices. Many location based services already exist in the market. A smartphone can detect user location with the help of GPS, Wi-Fi or cell-tower triangulation and using that location information LBSs can provide location specific information. The current LBS applications send user location and query to some central LBS server where the actual location specific data are preserved. These servers require maintenance to provide real time context aware data. Our observation says that people who share space-time context may have overlapping needs and the set of places explored by the people of a particular locality during their day-to-day life may be regarded as a rich source of location-based information. With this observation and the smart phone's ability to communicate with other smart phones, we show in this work that a pure p2p based location based service model that will not use any central LBS server can be developed. In this system people will share their location specific information with others via smartphones.

SIGNIFICANCE

The project proposes a new pure p2p based LBS application for smartphones where instead of asking to server people will be able to ask other people around through their smartphones. The basic idea behind the project is to use the already explored knowledge of local people to serve location specific information. The system will be pure p2p based and will be using the common knowledge of the local people to serve reliable and latest LBS with user opinion. Currently in the system each user plays the role of service provider and service requester at the same time. As a service provider the user will be able to save and update information about places he visits in his day to day life. As a service requester the user will be able to connect to other smartphones around him to get location specific information. The next level of work will involve navigating people towards most popular places. The idea is to spread the scent of a popular place from user's smart phone to other smart phones around and so is the name 'Scent of a Place'. As the smart phone will detect the scent of any place from multiple smart phones around it will follow the scent to find the location. We observe that near a particular place the scent will be thicker and away from that place it will become lighter.

INNOVATION

No current LBS application uses the idea of using local people's common knowledge as service providing database. Also there is no pure p2p based LBS system. We have implemented the application on iPod Touch 4.0. The application connects with the nearby peers using Bluetooth or Wi-Fi (using Bonjour protocol) and determines location from Wi-Fi access points with an accuracy of roughly 10 meters [1]. We implemented the Rabin fingerprint based Bloom filter library [2] in Objective C to use in our application.

STUDENT INVOLVEMENT

Rizwana has implemented the prototype on iPod Touch 4.0 and she has collected data over one month of the places she visited using the prototype application. From that data Tanvir showed that the proposed incentive mechanism works to fight against free-riders. Tanvir and Rizwana has conducted a survey among 100 Marquette Students. Based on the survey result Tanvir has verified the initial assumption that people sharing space-time context have overlapping needs and almost all the places of a particular locality are already explored by the people living there.

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[1]http://developer.apple.com/library/ios/#documentation/CoreLocation/Reference/CoreLocationConstantsRef/Reference/reference.html
[2] http://jaspell.sourceforge.net

PROJECT TITLE

TAGS: Towards Abnormality in Gait using Smartphone

FACULTY

Sheikh Iqbal Ahamed, Ph.D.

STUDENT NAME

A.K.M. Jahangir Majumder, Ebel Jr. William, Md. Osman Gani, and Ferdaus Kawsar

INTRODUCTION

With the elderly population rising in America from 31 million in 1990 to a projected 70 million by 2030 according to the US Census Bureau, technologies for cheaply and easily monitoring the health of the elderly are becoming increasingly important. Falls causing gait problem are the main fact of admission and extended period of stay in a hospital. It is the sixth cause of death for people over the age of 65, the second for people between 65 and 75, and the first for people over 75 [1]. Human gait analysis can provide a cheap, noninvasive method to monitor elderly people and assess the risk of falling. Today, the three main branches of gait analysis differ in the method in which the data is collected: vision based, floor-sensor based, and inertia based. Most advances in gait analysis technology have come through the first two, but these methods require bulky, expensive equipment and have associated logistical difficulties that limit practicality. Modern Smartphone have become a viable alternative to these expensive methods given their advanced motion-sensing capabilities, processing power, and relatively low cost. Hence, a Smartphone based system will detect gait abnormality.

SIGNIFICANCE

This system would alert the elderly people and warn them by analyzing gait abnormality. This would create awareness and thus avoiding possible fall. The system will remotely communicate the information to the doctor or caregivers to omit the possibility of an accident before it actually happens.

FORWARD THINKING/INNOVATION

The proposed Smartphone sensor based gait analysis approach is innovative and state of the art because it provides a number of beneficial features together that current gait analysis approaches do not. The proposed design will be robust and reliable but, unlike current approaches, it does not require the wearing of sensors and does not require an infrastructure. Because this approach is implemented on a Smartphone, it also gains the benefits of mobility and direct internet connectivity while being relatively inexpensive and non-invasive [2]. This design exhibits the following novelty and contributions: i) Apply EEG signal analysis methods to motion sensor. ii) Establish a paradigm shift sensor-based health assessment technology as a practical way of monitoring the health of the elderly. iii) Infer the risk of falling, based on analysis of physical behavior iv) Create an essential, user-friendly health analysis tool out of a device that is already present worldwide. By virtue of the fact that the proposed gait analysis technique is implemented on a Smartphone, it is inexpensive, mobile, and non-invasive. Because of these flexible, convenient features, our gait-abnormality technology can be applied to a wide range of areas such as using general ambient sensor information to infer physical human behavior, diagnosing causes of gait abnormality, and trends relating physical human behavior to human health. The research outcome will disseminate this paradigm shift in health risk diagnostics to the next generation so that they can develop new ideas and solutions for monitoring the disabled and elderly in a practical, non-obtrusive way. We used the accelerometer and gyroscopes motion sensors available in the current mobile phones for collecting gait data. The accelerometer and gyroscopes are now ubiquitous due to their inclusion in most mid-range and high-end smart phones. Our preliminary investigation in calculating robust, tilt-invariant features has found the Hjorth mobility and complexity as well as the energy integral of the data to be effective in classifying normal gait from simulated abnormal gait in a single subject. Based on a random sample of total collected data, an algorithm was able to classify the data correctly into different distinct classes, two distinct, simulated gait abnormalities along with normal gait, with 99.8% accuracy using calculated features with tenfold cross-validation.

STUDENT INVOLVEMENT

A.K.M. Jahangir Majumder is working on design issues of the proposed framework. Ebel Jr., William, Md. Osman Gani, Wang Weiqiang will help in developing the entire system and evaluate its performance.

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[2]http://developer.apple.com/library/ios/#documentation/EventHandling/Conceptual/EventHandlingiPhoneOS/MotionEvents/MotionEvents.html#//apple_ref/doc/uid/TP40009541-CH4-SW1

PROJECT TITLE
Towards Assessing Accessibility Using a Smartphone
FACULTY
Sheikh Iqbal Ahamed, Ph.D.

STUDENTS
Mohammad Tanviruzzaman, Rizwana Rizia

INTRODUCTION

Over 50 million Americans have some kind of physical, sensory, cognitive, or mental disability [1]. The **A**mericans With **D**isabilities **A**ct (ADA) of 1990 sets the minimum requirements (minimum door width, staircase slope, etc.) for state and local government facilities, public accommodations, and commercial facilities to be readily accessible to and usable by individuals with disabilities with a view to eliminate architectural barriers for these people [2]. The **A**mericans With **D**isabilities **A**ct - **C**ompliance **A**ssessment **T**oolkit (ADACAT) is a screening tool-kit, which allows individuals without advanced training to assess the architectural barriers of the built environment, e.g., door width, sound/light level in a room, etc. [3]

In this work we propose to show that a smartphone equipped with accelerometer, gyroscope, microphone, and a digital camera can adequately (having acceptable accuracy) serve as a measuring tape, sound-level meter, slope meter, light-level meter, and font's height-to-width ration measurement component. This application will enable one to assess the accessibility of a facility using only his smartphone.

SIGNIFICANCE

At present, all the measuring instruments of ADACAT's Measurement Kit are accommodated in a 30" x 8" x 4" bag that weighs about 4 lbs, and it costs about $650 [3]. Whereas a smartphone, e.g., an iPhone 4.0, weighs only 4.8 ounces and has dimensions 4.5" x 2.31" x 0.37". Obviously, a smartphone software capable of performing most of the measurements required by the ADA with acceptable accuracy, can make the Measurement Kit cheaper (since many people already possess smartphones) and more portable; this is the principal motivation behind our work.

A database containing accessibility ratings of various parts of all the buildings can assist the people with disabilities to live independently. For example, with such a database in place, a person with disabilities can inquire about a building before actually going there or he may find some facility, e.g., a nearby restaurant, which has good accessibility scores. In order to populate such a database, the participation (may be voluntary) of a great number of individuals is needed. The goal is very unrealistic with the present Measurement Kit of the ADACAT, which is too cumbersome and costly.

On the other hand, if a person with disabilities feels that part of a building does not comply with the ADA standards, he can perform the measurements using his smartphone with much more ease than using the various instruments of the Measurement Kit of the ADACAT; and if needed he can then report his findings to the appropriate authority.

INNOVATION

In order to measure length/height we use 6-position static test followed by a Discrete-time Kalman Filter on the phone's accelerometer data. To measure slope we utilize the phone's gyroscope data. From the audio data collected through the phone's microphone we perform **F**ast **F**ourier **T**ransform followed by an "A-weighting filter" to measure the ambient sound level. Our algorithms perform better (more accurate) than the existing iPhone applications for various measurement tasks.

STUDENT INVOLVEMENT

We have already developed a prototype application for iPod Touch 4.0. Tanvir is currently working out the Extended Kalman Filter approach to further increase the accuracy of the length/height measurement. He is also working on the algorithms for the remaining components of ADACAT's measurement toolkit such as, light-level meter and font's height-to-width ratio measurement. Rizwana is implementing the full software on iPodTouch 4.0 and collecting data to perform evaluation of the software.

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[2] http://www.ada.gov/
[3] http://ada-cat.misericordia.edu/

PROJECT TITLE
Towards Fall Prevention Using Human Activity Genome on Smartphones

FACULTY
Sheikh Iqbal Ahamed, Ph.D.

STUDENTS
Md Osman Gani

INTRODUCTION

Senior Citizen or elderly people are the fastest growing segment of the population in the world. According to the US Census Bureau the elderly population will rise in America from 31 million in 1990 to a projected 70 million by 2030. Falls are most frequent cause of injury among elderly people and more common than strokes. 30% of the elderly persons among 70 years and older fall at least once a year and 10% suffer a serious fall injury often lead to a fast decline in health or death [1]. At present, use of technologies to save life through preventing fall is becoming important. Thus gait analysis approaches, which are basically based on various sensors, are being used to detect the fall after it has actually occurred. Thus, it reduces the risk of serious injury and death by falling. These approaches require fixed, expensive infrastructure and there is lack of mobility. Nowadays' Smartphone's are equipped with various sensors such as accelerometer, gyroscope, magnetometer, and proximity sensor. People are using Smartphone every day and everywhere. It offers good computational power, motion-sensing capabilities and at the same time it is relatively low cost. Our research aims to design a Smartphone-based real-time fall prevention system which will lower the frequency of fall by identifying the problems that lead to falls by notifying user instantly.

SIGNIFICANCE

Lack of elderly-care-centers and expectations of elderly people to live in their own house increases the number of high risk population living alone at home. Thus living alone at home increases the risk of falling. Falls cause over 90% of broken hips. In the United States, 16% of all Emergency Department visits and almost 7 percent of all hospitalization are for fall-related injuries. As a result fear, anxiety and depression are getting increased. Efficient fall prevention system that can alert the subject before a fall actually occur have a great impact on improving life quality, security, reducing risk of serious injury and death. Such system based on Smartphone will be cost effective and at the same time will provide mobility to the user.

INNOVATION

In previous years there have been lot of research conducted to detect fall of a subject and there are only few works done in preventing fall. Existing methods have some disadvantages like lack of mobility, requiring subject to wear sensors, needs additional infrastructure, and they are expensive. Our goal is to design a fall prevention system that will have following features: 1) Anytime, anywhere (i.e. Mobility), 2) No wearing, 3) No additional infrastructure, 4) Preserve privacy, 5) Cost effective, 6) Robust, 7) Reliable and 8) Cellular and Internet connectivity. In order to do that we are proposing a holistic approach where observing a subject's daily activities, he or she will be notified about the risk of fall. Basic human activities are walking, running, standing, sitting and lying. Fall may occur during any of these activities. Our target is to identify the parameters which cause the abrupt changes in activity that leads to a fall. Hagerstrand was the first to propose that human activities are influenced not only by location, but also by time [2], which he called "time geography". Time elements constrain the activities possible as much as location. Based on our research we have found six parameters that constrain human activity. These are a) Time, b) Location, c) Age, d) Weather e) Environmental hazards and f) Profession. Using Smartphone we will be able to detect the time, location and weather easily. We will research to find out all the parameters that can influence human activity thus creating a vector of attributes. To be precise, calculating distance between the standard parameterized vector and current vector will be used to determine different kind of activities and also the risk factor of occurring fall.

STUDENT INVOLVEMENT

Md Osman is doing the analysis to find out the parameters that influence the human activity. He is going to design the system using Smartphone.

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Building Quantum Computer from Molecules and Lasers

Dmytro Shyshlov and Dr. Dmitri Babikov, Department of Chemistry

(*Applied research*)

Quantum computers are hypothetical machines that would give astronomical speed-up for a variety of computational problems. Applications of quantum computers would vary from database search and cryptography to modeling very complicated physical, chemical and biological processes. Many scientists around the world are searching for quantum objects (*e.g.*, photons, electrons, atoms, *etc*.) suitable for implementing the quantum computer. In this computational and theoretical project we study how to employ molecules for encoding information and how to use shaped picosecond laser pulses for controlling state-to-state transitions in molecules, in order to process this information fast and achieve quantum computation [1].

The molecule studied is thiophosgene, $CSCl_2$. We focus on 28 vibrational states within the ground electronic state in the energy range 8000-8500 cm^{-1}. This is our quantum memory register. The state-to-state transitions are induced indirectly through excitation of a gateway state within the excited electronic state by an UV/VIS laser. This is our quantum processor. We use optimal control theory and numerical propagation of laser-driven vibrational wavepackets to optimize shapes of laser pulses. The goal of this study is to find a way to implement quantum gates with high fidelity. In our numerical experiments we are able to optimize laser pulses for 1-qubit gates (NOT and Hadamard transform) and for 2-qubit gates (controlled NOT) with fidelity exceeding 0.999. In order to make the problem computationally manageable, parallelization using MPI and OpenMP is employed [2].

The results of our theoretical work will help experimentalists (Prof. Martin Gruebele at the University of Illinois, our collaborator on the NSF funded project) to create small quantum register in the laboratory [3].

Some of the most prominent researches working on this problem will gather for a workshop in Barcelona, Spain: "Architecture & Design of Molecule Logic Gates and Atom Circuits", Jan. 12-13, 2012. It is very important for us to take part in such an event during the build-up phase of the project, in order to present our results and learn about the state-of-the-art in the field.

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PROJECT TITLE: "Investigation of stress relaxation in esthetic composite orthodontic archwires"
FACULTY NAME: David Berzins, PhD, Associate Professor, Dental Biomaterials
STUDENT NAME: Jake Spendlove, DDS, Orthodontic Resident

INTRODUCTION

Fiber reinforced composite materials have been discussed in the dental literature since the early 1960's.[1] They have had a variety of dental applications such as provisional bridges, retainers, space maintainers, orthodontic wires[2], endodontic posts and cores, fixed partial dentures, periodontal and orthodontic splints, and for trauma stabilization.[3] In recent years there has been a high demand for esthetic materials in the field of dentistry. Traditionally brackets as well as archwires have been manufactured from metal alloys such as stainless steel, cobalt-chromium or nickel-titanium.[1] In order to improve the esthetics of orthodontic appliances, several esthetic materials such as ceramics and polycarbonates have been used as an alternative to metal brackets.[1] The use of esthetic orthodontic archwires is the next step to enhance the esthetics of tooth colored brackets. Fiber reinforced composites have been used orthodontically as anchorage units[5] and are now being developed for use as orthodontic archwires.[1]

SIGNIFICANCE

Orthodontics is the dental specialty involved in the management of growth, maintenance and correction of the dento-facial complex as well as the movement of teeth into a functional, stable & esthetic position. A large majority of patients seeking orthodontic therapy are more concerned with the tooth esthetics[4] than function or stability. As the amount of adults seeking orthodontic treatment has increased, so too has the demand for more esthetic orthodontic appliances.[1] Esthetic ceramic and polycarbonate brackets are already in use clinically, the use of a fiber reinforced composite archwire, rather than a metal archwire, would further increase the esthetics of the orthodontic appliance. In addition to the esthetic concerns, fiber reinforced composite archwires would eliminate the allergenic potential of a nickel containing appliance.

FORWARD THINKING/INNOVATION

This study will examine the stress relaxation properties of BioMers esthetic orthodontic archwires. Maintenance of force levels is important for orthodontic wires and since the esthetic wires are polymer-based, they may be more susceptible to force decay compared to their metal counterparts. Force decay/stress relaxation will be monitored utilizing a 3 point bend test by measuring the amount of force necessary to maintain a given deflection over time.

STUDENT INVOLVEMENT

Jake Spendlove, DDS will work in collaboration with David Berzins, PhD to design and implement the research protocols, as well as analyze the data gathered and complete the write up. This research project will serve as the thesis for Dr Spendlove's Master's degree.

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Project Title: Blending as a general purpose time series forecasting tool
Faculty Name: Ronald Brown, Phd, Associate Professor, Electrical & Computer Engineering
George Corliss, Phd, Professor, Electrical & Computer Engineering
Student Name: Tian Gao, Electrical & Computer Engineering graduate student
Curtis Stochl, Coe College, Iowa

Introduction

With the increasing demand for gas, it becomes more and more important for the local distribution companies (LDCs) to get a accurate forecast of the consumption of the gas used by their customers every day. Accurate forecasting cannot only save money, but also contribute to saving energy and protecting the environment. GasHour as an hourly gas consumption forecasting tool, can produce forecasts up to 106 hours ahead. These forecasts use no ensembling, and mainly rely on multi-horizon forecasting and auto-regressive terms for accuracy. GasHour has a very good performance. However, things can be done to improve its performance.

Problem Statement

Our problem is one of optimization. Our main goal is maximize the accuracy of our forecasts. This means we wish to minimize whatever error metric we chose. We will do this by incorporating forecasts from multiple models at multiple times into one optimized model.

Method

Good forecasts are generated through good inputs and good models. Usually, we use quantitative data as inputs for forecasting. Any environmental data and any number of different models which forecast the same time horizons can be used as inputs. Moreover, forecasts from models over multiple time horizons can also be treated as forecasts. At the same time, models play an important role. Here, we are going to use two models, a multi-horizon regression model and a daily profile model. In a multi-horizon forecast, a new model is created to forecast each time horizon in the forecasting span. Such multiple models usually are more accurate than evaluating a single horizon forecast at multiple horizons. The daily profile model is a new model which collects data in the past and generates a mean profile for each day. Besides the inputs and models which are necessary for accurate forecasting, the methods to combine these inputs together are also vital to the final result. In previous work, equal averaging has been preferred. However, in our new method, we use a neural network to combine multiple forecasts at multiple time horizons to form a consensus forecast for each time horizon.

DETERMINING THE EXTREME COLD WEATHER EVENT (DESIGN DAY) CONDITIONS

Hermine Akouemo, Anisha D'Silva, Dr. Ronald H. Brown, and Dr. George F. Corliss
Department of Electrical and Computer Engineering, Marquette University

INTRODUCTION

Low cost and reliable natural gas deliveries are important for both Local Distribution Companies (LDC) and their customers. Therefore, forecasting the extreme cold weather events is important. Knowing the probability of occurrence of an unusually cold day is a tool to improve the forecast of the gas consumption for those types of events.

Purpose: The goal of the design day conditions method is to help in the consistent forecasting of severe winter or extreme cold event gas demand that happen every 1-in-N years.

METHOD

An accurate forecast of natural gas consumption is a very important tool for LDC's because it helps them make cost savings. These costs include penalties from ordering too much gas or for not ordering gas in advance. It also includes costs due to gas shortage which is the most critical event an LDC need to deal with. The main objective of the Gasday is to address those customers' issues by providing them an accurate as possible natural gas forecasting.

The method for determining 1-in-N temperature conditions uses statistical methods. A probability distribution function is fit on an actual data set using a kernel density statistical method. The kernel density method is a nonparametric method (does not use a predefined model and only uses actual data set) which has been found to perform very well in this case. An algorithm is developed that reliably determines the probability of having the unusual coldest day that will happen in a data set of N years.

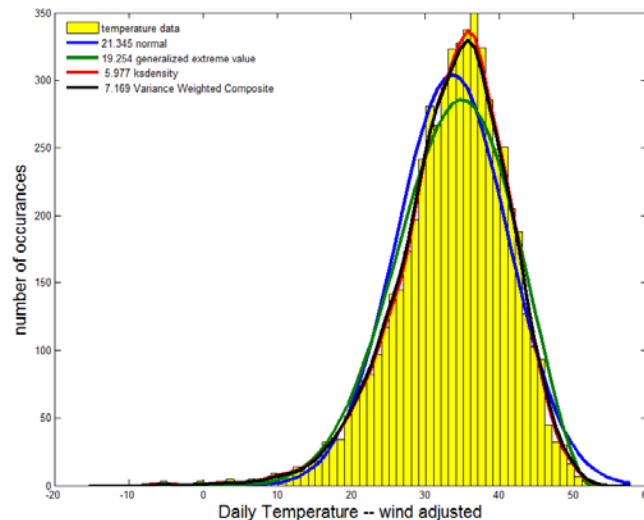Figure 1: Albuquerque coldest 91 days * 64 years Temperature with Distributions

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PROJECT TITLE: Hosting a Concurrent ActionScript Virtual Machine
on an Emerging Many-Core Architecture
FACULTY NAME: Dennis Brylow, Ph.D., Assistant Professor, MSCS
STUDENT NAME: Michael Ziwisky, M.S. Student, EECE

INTRODUCTION

Cloud resources are being leveraged more and more to achieve performance gains that previously came from now-stagnant advancements in the speed of individual processing cores. In order to take advantage of this new paradigm, Adobe researchers are building concurrency constructs into the Tamarin ActionScript Virtual Machine. We propose the use of the flexible, reliable environment of Xipx, a port of the Embedded Xinu operating system to the Intel Single-Chip Cloud Computer (SCC), for development of the computation-location-transparent concurrency extensions of the Tamarin virtual machine.

SIGNIFICANCE

Gordon Moore's famous law can be stated as: "The number of electrical components that can be inexpensively fabricated on a chip doubles every two years" [1]. For decades, this exponential progress enabled dramatic performance gains in computing largely due to accelerating clock speeds. The accuracy of Moore's Law continues to this day, but the way in which it manifests performance gains has evolved. Rather than boosting clock speeds, the new hardware trend is to take advantage of denser components by implementing many separate processing cores on a single chip. A multi-core processor with n individual cores, each able to execute instructions in parallel, can potentially increase performance n-fold. Modern consumer-grade multi-core CPUs feature between two and about six or ten cores. The next generation of processors will be many-core, with dozens or even hundreds of processing cores on a single chip [2, 3, 4]. However, all of these computing resources are useless if a programmer doesn't take advantage of them, and writing scalable parallel programs is difficult. It is therefore of great importance to provide programmers with tools that alleviate some of the burden of parallel programming. The Tamarin concurrency extensions will do just this.

FORWARD THINKING/INNOVATION

Tamarin with concurrency extensions will provide application programmers with an interface that allows the creation of independent "ActionScript worker threads" which can communicate with each other via message passing. Worker threads may all take turns running on a single processing core, or they may be physically distributed across many cores for parallel execution. In either case, the source code will be the same. This degree of transparency will allow the virtual machine, rather than the programmer, to decide how to best take advantage of the the computing resources available at runtime. Efficient development and testing of the concurrency extensions will be facilitated by the reliable, light-weight environment of the Xipx operating system running on top of the 48-core Intel SCC. Working with an on-die network of cores is much more consistent and controlled than working with a traditional cluster of networked computers. It also will provide insights into how to take advantage of future generations of many-core architectures.

STUDENT INVOLVEMENT

This project is the focus of Michael Ziwisky's masters thesis. Michael has already completed the foundational work of creating Xipx, a port of Xinu to the SCC. In addition, he has extended Xipx with virtual memory and new message-passing constructs. The student's next steps involve adding protection and thread migration capabilities and adapting the kernel as needed to be able to host the Tamarin virtual machine.

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PROJECT TITLE: Network Emulation Using Embedded Router Devices
FACULTY NAME: Dennis Brylow, Ph.D., Assistant Professor, MSCS
STUDENT NAME: Kyle Persohn, Research Assistant, MSCS & EECE

INTRODUCTION

Over the last several decades, the Internet has evolved from a simple inter-linked collection of text documents forming the World Wide Web to a massive, media-rich center for serving all sorts of content. In addition to web pages and electronic mail, the Internet connects users to online music, television, film, and telephony services. Many of these services rely on complex time-sensitive interactions between servers providing and clients receiving the content. As data traverses the Internet, it may become disrupted for various reasons; consequently, quality of service may suffer [1]. As a result, there is an ever-present demand for new techniques that ensure reliable delivery of emerging content types.

SIGNIFICANCE

Data is transmitted over the Internet in small chunks called packets. As each sequence of packets travels to its destination, elements may be lost, delayed, duplicated, corrupted, and reordered. The end-user commonly experiences these effects as artifacts, for example, a garbled video frame or skipped audio segment. As the Internet continues to carry new types of information, developers create additional protocols to efficiently and reliably transport data in the presence of adverse conditions. Implementation and testing of these protocols hinges upon the ability to deterministically or stochastically emulate the behavior of realistic networks in a controlled environment. We propose a network emulator with a unique balance of features and usability suitable for aiding the creation of next-generation Internet technology.

FORWARD THINKING/INNOVATION

Current network emulation software is notorious for steep learning curves and complicated deployment procedures [2]. Our proposal reduces the complexity by providing a simple baseline of features common to most testing scenarios that the user configures from an intuitive interface. Other approaches use complex hooks into the Linux kernel to process network packets for emulation [3]. Our innovative approach leverages the lightweight Embedded Xinu operating system, which allows for packet manipulation at line-speed. Furthermore, we simplify deployment and promote accessibility by providing firmware images for low-cost commodity embedded networking appliances readily available to the community. We anticipate this tool will greatly improve the development process of future network protocols.

STUDENT INVOLVEMENT

Kyle Persohn will spearhead this project under the supervision of Dr. Dennis Brylow. Mr. Persohn will start by expanding the existing framework established by Brylow and Thurow [4]. Project extensions will focus on the usability concerns that set this work apart from other offerings. Kyle Persohn is an experienced researcher in the networking and embedded systems fields with immediate access to resources supporting these developments. The network emulator will directly impact ongoing student-driven research in the Systems Laboratory at Marquette University.

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ABSTRACT

PROJECT TITLE: "Economic Factors Contributing to Natural Gas Demand Forecast Model"
STUDENT NAME: Catherine Twetten, Graduate Student, Master of Science in Applied Economics
FACULTY NAMES: David Clark, PhD, Professor, Economics
Farrokh Nourzad, PhD, Professor, Economics
Ronald H. Brown, PhD, Professor, Electrical and Computer Engineering
George F. Corliss, PhD, Professor, Electrical and Computer Engineering

INTRODUCTION

Natural gas has become an important source of clean energy and is expected to be the primary fuel source by 2030. Large capital investments are being made throughout the industry, from methods of increasing output to innovations for more efficient distribution. The cost of natural gas can be a barrier to its adoption and use, and gas providers must find ways to keep their costs low. Given the cost structure of the agreements between utilities and pipeline companies, one important way that gas utilities achieve this cost-minimization is by having accurate forecasts of their future gas demand. To this end, we will contrast the ex-post forecast performance of two models of monthly regional demand for natural gas.

SIGNIFICANCE

The two models will forecast time horizons up to five years using both physical and physical-economic variables. The first model contains weather-related factors such as heating and cooling degree days and wind velocity combined with measures of lagged energy demand and trend. The physical-economic model adds to these variables a set of economic factors such as the market price of natural gas, local unemployment rates, and home vacancy rates. We have applied both models to data from one major metropolitan area and intend to expand the study to include several states, using publicly available data. Thus far, the ex-post forecasts show that the two sets of variables complement one another. The physical-economic model forecasts the future demand for natural gas better than the physical or economic models alone. We will expand the model and create forecasts for several states with different geography, weather, and economic conditions. The final model that we develop will help companies predict their future natural gas needs as well as contribute to the existing literature on forecasting models and methods.

FORWARD THINKING/INNOVATION

This project involves extensive collaboration between two groups of forecasters from different colleges. Initial interdisciplinary research has already indicated that the combined forecasting model is more powerful than either group's model alone. We will write a paper using publicly available state data that expands the forecasts to include many states, thereby refining the model while providing more support for it.

STUDENT INVOLVEMENT

Catherine Twetten, a graduate student in the Department of Economics, will work in conjunction with and as a liaison between both groups of forecasters. As part of her graduate studies she will be exposed to two different forecasting methods, learning each with the possibility of writing her master's thesis on this topic. The scholarly paper forthcoming from this research will be presented by Ms. Twetten at the Midwest Economic Association's 2012 conference, to which we have already applied.

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ABSTRACT

PROJECT TITLE: The Relationship of Nurse Attributes and Selected Organizational Characteristics to Labor Support Attitudes and Behaviors: A Mixed Methods Approach
FACULTY NAME: Lisa Hanson, PhD, CNM, FACNM, Associate Professor, Nursing
STUDENT NAME: Ann Aschenbrenner, MSN, RN, Nursing Doctoral Student

INTRODUCTION

Positive outcomes from continuous labor support include fewer cesarean deliveries[1,2,3], less use of pain medication[1] including but not limited to epidural analgesia[2], fewer newborns with signs of asphyxia[1,3] and increased satisfaction with the labor experience[1]. Research findings suggest that support is more beneficial when it is provided by someone who is not a member of the hospital staff, including Registered Nurses (RNs)[4]. It is important to investigate and to try to understand why professional labor support provided by RNs does not have equal or better benefits than that provided by non-nurses. RNs' characteristics, attitudes and labor support behaviors[5], and the characteristics of the hospital organization may all influence the bedside care provided to patients. Yet, little is known about how contemporary hospital realities impact nurses' ability to provide labor support. The purpose of this exploratory, descriptive study is to describe professional labor support in a threefold manner; 1) To evaluate intrapartum nurses' attitudes and behaviors; 2) To identify factors that impact their attitudes and behaviors and including inter-relationships; and 3) To compare findings between nurses at three Midwest hospitals. Intrapartum nurses employed at three different hospitals will complete the Labor Support Questionnaire[5] to evaluate their attitudes and behaviors regarding labor support. The participants will also complete a demographics and organizational questionnaire and 30 will be invited to participate in follow-up focus groups.

SIGNIFICANCE

Intrapartum nurses care for women at a vulnerable time in their lives. Labor support can lead to a variety of improved outcomes for women and their newborns and is an important part of the role of labor and delivery nurses. With most women delivering their babies in a hospital setting, there is an enormous opportunity for nurses to make a positive impact. Research findings suggest that nurse characteristics and the characteristics of their employing hospital may have an impact on nurses' labor support attitudes and behaviors, but have not been investigated. This study of intrapartum nurses who work at three hospitals will help create a more accurate description of factors that impact professional labor support.

FORWARD THINKING/INNOVATION

This is the dissertation research of Ann Aschenbrenner and was derived from an interest in understanding nurses' motivation and action to care for patients. Nursing is a caring profession, but understanding what makes nurses care is at the heart of this study. Ann taught maternity nursing at Columbia College of Nursing and has worked in obstetric nursing. This study brings together her interests in a manner that will help create the starting point of a very important program of research. Ultimately, the findings of this study will inform the direction of her future research in labor support.

STUDENT INVOLVEMENT

Ann Aschenbrenner, MSN, RN, will lead this project with the support and collaboration of Dr. Lisa Hanson. Ms Aschenbrenner will meet with the manager and nurses of each study unit to gain entrance and encourage participation. She will post the questionnaire on an online survey provider, develop focus group questions, lead 3, 2-3 hour focus group meetings that will be recorded, transcribed and analyzed. Ann Aschenbrenner will consult with a statistician and Dr. Hanson to analyze the questionnaire results and evaluate descriptive statistics of the sample. She will work with Dr. Hanson to code and evaluate focus group transcripts.

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PROJECT TITLE: "The Structural and Material Basis for Bone Fracture in Osteogenesis Imperfecta
FACULTY NAMES: Gerald Harris, PhD, PE, Professor, Biomedical Engineering
Carolyne Albert, PhD, Postdoctoral Fellow, Biomedical Engineering
STUDENT NAME: John Jameson, BS, Biomedical Engineering Doctoral Student

INTRODUCTION

Osteogenesis imperfecta (OI) is a genetic bone fragility syndrome affecting collagen synthesis and assembly, ultimately leading to an impaired collagen network and irregular mineralization.[1] Understanding the mechanical deficiencies of OI bone requires quantitative analysis of both its structural and material properties. Many studies have focused on histology[2] and bone mineral density[3] (BMD) testing to characterize OI bone quality and quantity, respectively. However, due to the scarcity of human bone specimens available for testing and the lack of appropriate testing methods, few studies have investigated the material properties and three-dimensional (3-D) structure of OI bone. To resolve these issues, recent research has focused on the development and application of small-scale materials characterization techniques. Many of these methods have been useful for analyzing animal models of OI such as the *oim* mouse.

SIGNIFICANCE

The recent interest in measuring changes to bone microstructure and mechanical properties in OI has lead to the emergence of computational models to assess fracture risk in patients. Indeed, our group has generated a preliminary finite element (FE) model that enables calculation and visualization of the stress distribution on bone during gait.[4] The purpose of this study is to improve model inputs and clinical relevance through the integration of more accurate, 3-D structural and material properties.

FORWARD THINKING/INNOVATION

Current efforts to assess fracture risk in persons with OI do not address the role of toughness, a key mechanical property governing fracture resistance. This study represents the first attempt at characterizing toughness and toughening mechanisms in both human OI and *oim* bone. A combination of imaging (synchrotron radiation micro-computed tomography and scanning electron microscopy) and mechanical testing (notched beam bending and micro-hardness indentation) techniques will be used to assess bone structure and measure crack propagation in OI bone. This work will provide new insight on the science behind bone fragility in OI, ultimately leading to the development of a fracture theory for human and *oim* bone. The results will also improve the accuracy of current FE models, enabling the development of improved clinical interventions for OI patients.

STUDENT INVOLVEMENT

John Jameson will lead all aspects of this study as a major component of his dissertation. He will adapt methods he has previously developed for bone mechanical testing and imaging.[5] He will also participate as a co-author on any publications stemming from the results.

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Project Title: Legal and Extra-Legal Factors Impacting Domestic Violence Injunctions in Milwaukee
Faculty Names: Dr. Heather Hlavka and Dr. Sameena Mulla, Assistant Professors of Social and Cultural Sciences
Student Names: Ms. Kate Hanson and Ms. Chelsea Pierski, Social and Cultural Sciences

Introduction

Domestic and intimate partner violence is a pervasive phenomenon in the U.S. The Department of Justice cites a 25% victimization rate among women alone (U.S. Department of Justice, 2006). In 2005, 389,100 women and 78,180 men were victimized by an intimate partner, accounting for 9% of all violent crime nationally (Catalano, 2005). In 2008, there were nearly 30,000 domestic abuse incidents reported to law enforcement and the District Attorney in Wisconsin. As a result, domestic violence demands a large share of judicial and police resources. In an effort to streamline victims' access to resources and offer immediate protection, Milwaukee Court System has dedicated a single civil courtroom to hearing all requests for domestic violence and harassment injunctions; the court hears over 5000 injunction cases each year. Injunctions (or protective orders) give victims immediate legal recourse to abate the violence against them, expel the abuser from a shared household, and call for the abusive respondent's immediate arrest if in violation of the court's order. Little is known about how these civil cases are disposed, and what factors impact injunction hearing outcomes.

Significance

While the public generally perceives law and the judiciary to be impartial, social science research continues to demonstrate that courts are not the unbiased arbiters the public imagines (Mueller et al, 2009; Wan, 2000). Few studies have examined issues of judicial discretion as they pertain to domestic violence, and none have examined Milwaukee, WI specifically. Our project speaks to enduring issues of unequal access to local system systems of justice for those affected by intimate partner violence by using an observation instrument that includes quantitative and qualitative variables to investigate the impact of demographic and case characteristics on case outcomes.

Forward Thinking/Innovation

We employ an integrated experiential learning module in our research methods course as our primary mode of data collection (Callaghan, 2005). Students have collected over 1000 case observations. Small sub-sets of the data have been used for teaching purposes, but research assistants are needed to systematically analyze the entire data set. Our study addresses the question of equal access to justice by grouping case variables into two categories: legal and extra-legal. Legal factors include case characteristics determined to meet evidentiary standards for granting injunctions. This includes the victim's complaint, the potential for lethal outcomes as indicated by use of guns or strangulation, evidence such as photographs, voicemail or text messages, threats conveyed via social networking sites, and eye-witness testimony. Extra-legal factors include characteristics that are independent of legal standards, including the gender and race of the victim and respondent, presiding Court Commissioner, victim's use of language interpreters, and presence of a victim's advocate during the proceeding. Identifying the factors with the greatest impact on case outcome is vital for insuring that the court is unbiased and even-handed in meting out justice.

Student Involvement

Ms. Hanson and Ms. Pierski will work with the faculty collaborators to prepare data for statistical analysis, and to consult with faculty during the analysis phase. Using SPSS software, faculty will teach the students to perform bivariate and multiple regression analysis to determine the relationship between variables and injunction hearing outcomes. Both students will serve as co-authors on research articles that will be prepared for submission to peer-reviewed journals. Preparing the existing data set for statistical analysis will also allow future cohorts of students in the research methods course the opportunity to work with a large and original data set and establish ongoing undergraduate research opportunities to better prepare students to prepare students who aspire to go to graduate school. In addition, students will present their findings to the Milwaukee Commission on Sexual Assault and Domestic Violence in hopes of contributing to updating policy on domestic violence hearings.

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PROJECT TITLE: "The Effect of Protein Pellicle on Surface Antimicrobial Activity"
FACULTY NAME: Stephen Hou, CLS; Donghwa Lee, Andrew Dentino, MUSoD
STUDENT NAME: Kim Rybicki (SoD), Jose Sierra (SoD), Madeline Anfang (SoD), Chris Tamsen (former CLS)

INTRODUCTION

While studying the phosphate-containing denture materials to prevent microbial colonization, we found peptide antimicrobials were not as effective as non-peptide antimicrobials captured through protein pellicle. Since then, we have focused our effort in creating an effective antimicrobial shield with various protein pellicle precursors which can function on a range of surfaces. This shield for acrylic surfaces is made of cetylpyridinium chloride (CPC) and freshly mixed clarified human saliva. We have also shown the effectiveness of a commercially available salivary substitute as an effective carrier of CPC. In this project, we propose to optimize the formula to create an economical solution. We also propose to develop a spray-on device for easy application. This formula offers the advantage of killing bacteria upon contact, before biofilm formation. We envision its diverse applications in dentistry, medicine and infection control as a surface disinfectant. With funding for additional basic science experiments and randomized controlled trials, we hope to apply the knowledge to the prevention of denture-associated stomatitis, secondary caries around resin-based restorations, as well as biofilm mediated infections on catheters.

SIGNIFICANCE

Biofilm formation on dentures [1] has been associated with oral and systemic diseases, particularly in the dependent elderly population [2]. Routine oral care, including regular denture hygiene, is able to reduce pneumonia in the institutionalized elderly [3]. We are proposing here, as an effective preventive measure, to treat the denture surface using CPC and commercially available pellicle precursors. This optimized formula should have potential to be an effective surface disinfectant for dental materials (acrylic, silicone, titanium) and non-oral indications, e.g., catheters and environmental surfaces (ex. door-knob) to combat hospital-acquired infections.

FORWARD THINKING/INNOVATION

There are several unique features in this proposal. CPC is an effective antiseptic with long term safe and successful use in many oral health care products [4]. It is listed by the FDA as a "generally recognized as safe" (GRAS) compound which makes it an ideal active agent to study with high commercialization potential. We will also run some *in-vitro* experiments using other compounds such as chlorhexidine, triclosan and polyvinylpyrrolidone for comparative purposes. This CPC:protein pellicle appears to kill a range of microbes upon contact, a promising approach [1]. Secondly, we propose to develop a spray-on delivery system to simplify the application. Thirdly, we will establish a small-scale *in-vivo* model using modified dental bleaching trays with inset denture base disks to characterize the short-term effects of a CPC:Protein pellicle shield on developing bacteria populations.

STUDENT INVOLVEMENT

Due to its collaborative nature, our students will work on assays to study oral microbes. In addition, they will make dental disks and perform impressions for customized bleaching trays.

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PROJECT TITLE: "Mandibular incisor angulation changes in relation to crowding or spacing - from mixed to permanent dentitions."
FACULTY NAME: Russel Kittleson, DDS MS, Adjunct Professor, Orthodontics
STUDENT NAME: Nicholas Valeri, DDS (1st year Orthodontic Resident)

INTRODUCTION

Crowded or spaced dentitions in the youth patient continue to pose challenges for orthodontic practitioners. There are numerous dental and skeletal factors that can lead to a space excess or deficiency in a developing child; however, there is limited evidence on the relationship between mandibular incisor angulation and the degree of crowding or spacing from the mixed to permanent dentitions. The aim of this study is to gather information from several growth studies of children patients that were not treated with orthodontics. The severity of crowding or spacing of mandibular teeth and the angulation of the mandibular incisors relative to the mandibular plane will be recorded at two separate time points: ages 10 and 12. Subjects will be broken up into four groups for analysis: severe crowding (4.0mm or more), moderate crowding (0.0 to 4.0mm), no arch length discrepancy, and spacing (0.0 to 4.0mm). Clinically significant conclusions about arch length discrepancy and mandibular incisor angulations will be noted and analyzed.

SIGNIFICANCE

Measurements at the ages of 10 and 12 years are significant in that they represent the transition from mixed to permanent dentitions respectively. Any relationships between incisor angulation and severity of crowding or spacing will provide further information on the dynamics of the mandibular arch throughout growth. Mandibular crowding or spacing in relation to incisor angulation is an important topic to explore in orthodontics as it has a profound impact on prognosis, treatment planning, and retention.

FORWARD THINKING/ INNOVATION

This study is innovative because it utilizes previously published large scale growth studies as its primary source for data collection. Previous studies had small sample sizes and analyzed a limited amount of variables[1]; therefore, more definitive conclusions will be able to be made from a larger source of data.

STUDENT INVOLVEMENT

Nicholas Valeri, DDS (1st year orthodontic resident) will participate in this project by gathering data from published growth analyses and by taking measurements on dental casts and lateral cephalometric radiographs from two separate time points: age 10 (mixed dentition) and age 12 (permanent dentition). He will collect and analyze the data and write a research paper.

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PROJECT TITLE: "How Much Reduction in Orthodontic Treatment Time Is Considered Significant?"

FACULTY NAME: Dawei Liu, DDS MS PhD, Assistant Professor, MUSOD
STUDENT NAME: Manika Patwari, Department of Orthodontics, MUSOD

INTRODUCTION

Orthodontic treatment brings about better occlusion, improved function and esthetic facial appearance. However, one of the big challenges in clinical orthodontics is the longer (2-3 years) treatment time, which is unfortunately associated with the side effects such as root resorption[1], enamel decalcification (white spot lesions), compromised periodontal tissues and poor oral hygiene. Searching for solutions to shorten the total treatment time by moving teeth faster thus becomes a critical task for orthodontists. Among all the possible therapeutic means to help shorten orthodontic treatment time, mechanical vibration has been proposed in recent years. It has been shown to be able to help move teeth faster during orthodontic treatment in animal models[2,3] and clinical studies (unpublished), although its biological mechanisms are still under investigation[4].

SIGNIFICANCE

So far there is no definite consensus on how much reduction in treatment duration is considered significant and we plan to conduct a survey study to collect and analyze the opinions regarding relevant reduction in orthodontic treatment time. Our target population will be the practicing orthodontists and residents in orthodontic programs across the United States. The keystone of the study will be a questionnaire which will be instrumental in gaining feedback. The outcome of this study will construct the "time saving" concepts with regard to orthodontic treatment among various groups of people, which will ultimately help apply dental vibration to shorten treatment time in orthodontic patients.

FORWARD THINKING / INNOVATION

To the best of our knowledge, our study is the first on this topic. A well designed survey study will allow us to get feedback from different groups of people as to answer the question "how much time saving is considered significant in orthodontic treatment" specifically pertaining to the use of dental vibrators.

STUDENT INVOLVEMENT

The resident, Manika Patwari will be engaged in formulating the questionnaire which will be a critical tool in the survey study. She will be seeking guidance from her advisors, and also from experienced academicians at Marquette University School of Dentistry to ensure that the survey study conducted is of high value and quality.

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PROJECT TITLE: "Marginal Ridge Thickness (MRT) of Maxillary Incisors In Completed Orthodontic Patients"
FACULTY NAME: Dawei Liu, DDS MS PhD, Assistant Professor, Dentistry
STUDENT NAME: Syrah Quraishi, DDS (1ˢᵗ year Orthodontic Resident)

INTRODUCTION

This project is a continuation of our previous project in attempt to determine the MRTs of maxillary incisors in orthodontic patients and its possible correlation with Bolton anterior ratio Index. In our previous study, 120 pretreatment dental casts of orthodontic patients were screened out of 500 casts. For each cast, the mesial-distal widths of the upper and lower teeth were measured to calculate Bolton anterior ratio index. To determine the MRTs of the maxillary incisors, the labial-palatal thickness at the incisal 1/3 level of the mesial and distal marginal ridges as well as that of the center of the crown were measured. The marginal ridge thicknesses were determined by subtracting the thickness at the center of the crown from that of the mesial and distal marginal ridges. As found, the MRTs and Bolton anterior ratio index are significantly correlated (r=0.652, p=0.000). The MRT discrepancies exist in 23-32% (>1SD), 4-6% (>2SD) and 2% (>3SD) of the 120 orthodontic patients. The #1 aim of this study is to further analyze how the MRTs were managed in the same 120 cases during orthodontic treatment. The #2 aim is to see that if the cases are finished with ideal overbite and overejet, how the MRTs were managed. The patient population and methods will be the same as used previously. Statistical analysis (paired t-test) will be performed to determine if there is a difference between pre-treatment and post-treatment MRTs, with a significance level being set at 0.05.

SIGNIFICANCE

The MRT and Bolton anterior ratio index are significantly correlated (r=0.652, P=0.000), and MRT discrepancies exist in 23-32% (>1SD), 4-6% (>2SD) and 2% (>3SD) of the 120 orthodontic patients. To further study the clinical relevance of the MRTs to the ideal finishing of orthodontic patients, in this study we will measure the MRTs after orthodontic treatment for each of the 120 patients. This study when finished will shed light on the importance of and how to clinically manage the MRTs to achieve ideal incisal relationship (overbite and overjet).

FORWARD THINKING

To the best of our knowledge, there is no literature that looked at the impact of the MRTs on achieving ideal overjet and overbite.

STUDENT INVOLVEMENT

Syrah Quraishi (1ˢᵗ year Orthodontics Resident) will participate in this project. She will completely be involved in designing and implementing experiments, analyzing data and writing research paper.

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PROJECT TITLE: "Linguistic bias in preschool language assessment: Evaluating the nonword repetition task"
FACULTY NAMES: Steven Long, Ph.D., CCC-SLP, Associate Professor, Speech Pathology and Audiology
Maura Moyle, Ph.D., CCC-SLP, Assistant Professor, Speech Pathology and Audiology
STUDENT NAME: Melissa Boone, B.A., Graduate Student, Speech Pathology and Audiology

INTRODUCTION

Children from minority backgrounds have been historically overrepresented in special education[1] and are receiving speech and language therapy at a disproportionate rate[4]. Communication sciences and disorders research has long demonstrated the impact of linguistic variation on the results of standardized language assessment as one of the causes of this complex issue[4]. Consequently it is essential that speech and language pathologists design assessment protocols that will accurately distinguish dialectal difference, a manifestation of linguistic variation, from communication disorder. Recently, nonword repetition has been promoted as a less-biased alternative to traditional standardized language assessments. The purpose of the proposed study is to examine nonword repetition performance in preschool age children who speak two English dialects, Mainstream American English and African American English. The specific aims of the research project are to: 1) determine if English dialect affects preschool children's overall accuracy on the nonword repetition task and 2) examine whether preschool age African American English-speaking are children more likely to demonstrate omission and substitution phonological patterns associated with African American English than Mainstream American English-speaking children on this task.

SIGNIFICANCE

Standardized measures of language learning ability have traditionally depended a great deal on language knowledge and cultural experience. This biased approach has resulted in the over-identification of minority children whose experiences differ from the majority population as language impaired. In order to combat this trend, a series of "processing-dependent" measures have been designed to tap into the mental operations required to efficiently manipulate linguistic units unlike the aforementioned "knowledge-dependent" measures. Tasks such as nonword repetition seek to accomplish this by equating prior knowledge of stimuli, making the task completely novel to all participants[2]. The nonword repetition task, which requires the repetition of nonexistent words such as "cheenoitowb", has consistently differentiated between typically developing and language-impaired children and thus gained increasing consideration for clinical use[3]. It has also been characterized in the literature as an efficient and culturally less-biased assessment of children's language ability. Despite this, the potential influences of English dialect on nonword repetition performance have received little attention. The proposed study will provide additional evidence for theoretical models of nonword repetition performance interpretation and evaluate the nonword repetition task as a less-biased assessment of language ability. This will make a valuable contribution to the field, given the strong interest in nonword repetition as a clinical marker of language impairment, and as a potentially less-biased language assessment.

FORWARD THINKING/INNOVATION

No studies have yet investigated the comparative nonword repetition performance of Mainstream American English- and African American English- speaking children with otherwise matched backgrounds. In addition to percent phonemes correct, the following analyses will be conducted: consonant and vowel error types per nonword, anticipation and perseveration errors, binary feature distance of consonant and vowel errors, errors by position, errors unique to particular groups, and differences in rate with which certain errors occur. The methodology for these analyses, developed by Dr. Steven Long, involves the recoding and sorting of the nonword repetition task transcription data using a combination of word processing and custom software developed for this line of investigation.

STUDENT INVOLVEMENT

Melissa Boone, B.A., will recruit participants and administer the study protocol. This includes a language sample, hearing screening, nonverbal IQ measure, measure of vocabulary knowledge, and the nonword repetition task. She will then transcribe and score nonword repetition recordings. She will also take primary responsibility for preparing a manuscript for publication under the mentorship of Dr. Long and Dr. Moyle.

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PROJECT TITLE: Decision Making in Implicit Memory Processes of Healthy Elders at High Versus Low Risk for Alzheimer's Disease
FACULTY NAME: Kristy A. Nielson, Ph.D., Professor of Psychology
STUDENT NAME: Christina M. Figueroa, B.S., Clinical Psychology Doctoral Student

INTRODUCTION

Decision-making is impaired in Parkinson's disease (PD), especially when trial and error learning, a form of implicit memory, is required. This is caused by the loss of dopamine in the basal ganglia (BG), which is needed when the medial prefrontal cortex (mPFC) exerts behavioral control during decision conflict via the subthalamic nucleus (STN, part of BG) to override automatic responses in favor of considered choices[1]. Electroencephalography (EEG) is frequently used to evaluate the role of the mPFC in regulating decision-making during conflict[2]. Notably, there are known similarities between PD and Alzheimer's disease (AD), including increased rates of dementia in PD compared to controls, and increased rates of the motor symptoms typically associated with PD in AD patients relative to controls[6]. Although the hallmark of AD is memory impairment, the focus in that literature is on episodic memory, or memory for one's life events. However, other types of memory, including implicit memory (e.g., procedural and skill learning) and semantic memory (e.g., knowledge or facts) are also affected by AD[3,4]. For example, we have shown that semantic memory distinguishes healthy low AD-risk from healthy high AD-risk elders (via inheritance of the apolipoprotein-E epsilon-4 allele) when measured using functional magnetic resonance neuroimaging[5]. Yet, implicit memory has been much less studied in AD. The complementary symptom profiles of PD and AD are indicative of comparable neurological dysfunction, suggesting that an understanding of implicit memory in healthy elders at risk for AD could be beneficial toward the early diagnosis and intervention of AD.

SIGNIFICANCE

By investigating the decision-making processes of healthy elders at differential risk for developing AD using EEG, we may be able to speak more definitively about cognitive decline in areas of the brain associated with implicit memory. We hypothesize that AD patients will perform similarly to PD patients in their decision making processes which would suggest that the cortico–basal ganglia network (i.e., mPFC to STN) is disrupted in both disorders. This knowledge could lead not only to a greater understanding of overlapping neurological dysfunction but also to a better understanding of the risk factors and interventions for the two most prevalent neurodegenerative diseases.

FORWARD THINKING/INNOVATION

Much of the existing research investigating cognitive ability prior to the development of AD has focused on deficits in explicit memory function. While these findings have detailed the aspects of cognition most affected by AD, early predictors of AD, effective prior to measurable cognitive decline, are needed because that is the time most valuable to initiate interventions. Little is known about the role of implicit memory in predicting AD before symptom onset, but work in PD suggests it could be very fruitful. The proposed research will address both the value of studying implicit memory in asymptomatic elders at high and low risk of AD, and the neural mechanisms underlying the effects. It therefore has high potential for making applied and theoretical impact on the field.

STUDENT INVOLVEMENT

Christina Figueroa, B.S., will lead this project, under the supervision of Dr. Kristy Nielson. Ms. Figueroa will recruit participants, test participants, analyze the data, and interpret them with Dr. Nielson. Data will be published under the direction of Dr. Nielson. The project will hopefully lead to Ms. Figueroa's master's thesis and dissertation work, as well as future extramural grant application (including a pre-doctoral NRSA application by Ms. Figueroa).

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PROJECT TITLE: *Effects of Age and Memory Decline on Response to Errors in a Task of Inhibition*
FACULTY NAME: Kristy A. Nielson, Ph.D., Professor of Psychology
STUDENT NAME: Kathleen Hazlett, Clinical Psychology Doctoral Student

INTRODUCTION

Memory ability significantly declines over the course of "normal" aging[1]. Cognitive inhibition, which is the ability to attend to, select, and reject stimuli depending on task conditions, is a critical component of memory and most other cognitive tasks that also declines significantly with age[2]. Indeed, some have proposed that aging-related declines in inhibition are the cause for declines in memory functioning[3], yet there is very little research directly evaluating aging, memory and inhibition. Recent studies have used event-related potentials (ERP, a technique using electroencephalography (EEG)), as well as functional magnetic resonance imaging (fMRI) techniques to identify differences in neural responses to the various conditions of inhibition tasks (i.e., "go," "no-go," and "stop")[4,5]. In addition, errors of inhibition, which are now being studied as a measure of general performance monitoring ability, have also been a particular focus of research. Such studies show that depressed individuals exhibit slowed responses to inhibition errors relative to healthy controls[6], indicating poorer performance monitoring. However, this has not been studied in older adults or in relation to memory functioning. Research in this area could be extremely valuable in understanding age-related inhibition and memory decline, as well as toward developing interventions aimed at enhancing the ability of older adults to monitor their performance and respond effectively to cognitive demands.

SIGNIFICANCE

While fMRI has revealed much about inhibition and memory, an older but recently enhanced neuroimaging technique, ERP, offers an option that is far less expensive, safe for use with all potential participants, and better suited to detect when in time different portions of the brain network are active, versus fMRI, which is best at localization of brain responses. The proposed study will use ERP to evaluate cognitive inhibition and memory in young adults and older adults—some of whom are experiencing memory difficulties—using the same tasks that we have previously used in these populations in published fMRI studies. The use of ERPs in the proposed study will allow for better temporal evaluation of response to errors as well as comparison with fMRI data, a trend that is growing in the current literature[5,7]. Additionally, evaluation of response to errors in the proposed population may reveal interactions not before evaluated between memory and inhibition performance, which would helpful in evaluating the importance of inhibition to memory, as well as the timing and optimal methods of intervention.

FORWARD THINKING/INNOVATION

To our knowledge, ERP/EEG has not been used to examine the interaction of age, memory, and inhibition, and additional research evaluating neural activation during inhibitory errors is still greatly needed. If ERP can detect age differences similarly to what fMRI detects, it could much more readily allow for a time-sensitive evaluation of the ways in which individuals process and respond to inhibition errors. ERP may also reveal important differences in the timing of brain responses that fMRI is less able to detect, that are more important for understanding and intervening in aging. Finally, comparisons of adults of varying ages as well as older adults with and without memory decline will enhance our understanding of the role of inhibitory control and error monitoring in memory. This project will provide the preliminary data we need for a federal grant application in 2012-2013.

STUDENT INVOLVEMENT

Kathleen Hazlett will take the lead on this project, under the supervision of Dr. Kristy Nielson. Ms. Hazlett will recruit and test participants, analyze the data, and interpret and publish the data with Dr. Nielson.

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PROJECT TITLE: Posttreatment Changes Following Orthodontic Treatment of Class I Malocclusions with the Use of Square Arch Form Wires
FACULTY NAME: Spencer Pope, DDS MS, Associate Professor, Orthodontics
STUDENT NAME: Michael Payne, DDS (1st year Orthodontic Resident)

INTRODUCTION: Stability and retention of treatment results is a primary objective in clinical orthodontics. Despite being well aligned during treatment, instability of the orthodontic treatment results often causes changes in tooth position. posttreatment changes can be expected to occur but there is a lack of evidence to provide explanation for these changes.[1] The changes of dental and skeletal dimensions following orthodontic treatment appears to be a combination of relapse and age-related changes in the dentition. Typically, long-term posttreatment changes include a reduction in the mandibular width and arch length and an increase in the irregularity of the lower incisors.[1] A commonly held view is that in order to ensure stability of the orthodontic treatment result, the original arch form should be maintained. This however is not always possible and the arch form may need to be intentionally modified in order to alleviate crowding and accommodate the opposing arch. It is believed that expansion in the mandibular arch is not stable and any increases in intercanine width will relapse. When arch form is altered, the maxillary intercanine width tends to remain stable but expansion of the mandibular intercanine width is not and only 8% of the expansion will be sustained after retention.[2,3] The purpose of this study is 1) to examine the dental and skeletal posttreatment changes of a group of Class I malocclusion cases successfully treated with a square arch form, including intercanine width, intermolar width, incisor irregularity, AP position of incisors, incisor inclination, arch length, mandibular plane angle, overjet, overbite, and midline discrepancy 2) to compare the posttreatment changes to those found in other studies, and 3) to evaluate any associations between relapse and other posttreatment changes.

SIGNIFICANCE: There is no evidence outlining the changes in Class I malocclusion cases treated to a square arch form. The information gathered from this study will shed light on possible associations between relapse and other posttreatment changes. This will also provide evidence about the stability of orthodontic treatment when arch form is altered during treatment.

FORWARD THINKING/ INNOVATION: The results of this study will quantify the posttreatment changes associated with treating Class I malocclusion patients to a square arch form. This will likely modify treatment decisions and retention protocol when using a square arch form.

STUDENT INVOLVEMENT: Michael Payne (1st year orthodontic resident) will participate in this project by taking measurements on digital dental casts and cephalometric radiographs from 3 time points; pretreatment, end of active treatment, and posttreatment. He will determine the measurements to be recorded, analyze the data, and write a research paper.

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PROJECT TITLE: Development of a Suicide Risk Assessment Protocol
in a General Hospital Emergency Department
FACULTY NAME: Stephen M. Saunders, Ph.D., Professor, Department of Psychology
STUDENT NAME: Megan L. Petrik, M.S., Clinical Psychology Doctoral Student, Department of Psychology

INTRODUCTION

Approximately 34,500 suicide deaths occur in the U.S. annually, which translates into one death every 15 minutes[1]. In addition, 8.3 million American adults seriously thought about suicide in the last year[1]. By definition, people with mental health crises need immediate care, but most are not able to obtain urgent psychiatric treatment because of organizational issues with the delivery of mental health services. Instead, most treatment of suicide crises occurs at general hospital emergency departments (ED)[2]. Numerous patients who utilize EDs for medical concerns also have an increased risk for suicide[3]. In evidence of this, many people who eventually commit suicide seek ED services within the month prior to their death[4]. As a result, EDs are a critical site for identifying patients at risk for suicide. However, assessing suicide risk in EDs is a complicated task for many reasons, such as high patient volume and a lack of psychiatric training among ED physicians and nurses[5].

SIGNIFICANCE

Failure to identify a patient at risk of suicide is associated with significant consequences for both patients and ED staff. Patients that present to the ED for self-inflicted injuries utilize ED services more frequently and have increased suicide mortality rates[3,5]. ED providers experience occupational burnout as a result of such recidivism and overcrowding, and they may also face malpractice lawsuits if they fail to identify an individual who subsequently commits suicide after discharge from the hospital[3,5]. Many suicide deaths are preceded by recent ED visits for self-inflicted injury, but mental health referrals for the ED patients who disclose suicidal ideation occur infrequently[3]. Empirical research on how to best evaluate suicidality in EDs is negligible[5], and the proposed study aims to develop a feasible and effective protocol to assess suicide risk in the ED setting.

FORWARD THINKING/INNOVATION

Currently, there are no psychometrically sound measures or empirically informed protocols available for assessing suicide risk in general hospital EDs for adults. There has been a recent call for improving suicide risk assessment practices in EDs[3,5]. This would be the first study to empirically investigate the best practices to assess suicide risk in a general hospital ED with adults. Such a protocol would provide ED personnel with immediate feedback on the patient's suicide risk, which is a critical component in appropriate allocation of mental health resources. This project will hopefully lead to an extramural grant application to examine the impact of identification of suicide risk in EDs on subsequent utilization of mental health services and on recovery from suicidal crises.

STUDENT INVOLVEMENT

This project will be Megan Petrik's doctoral dissertation, who will thus act as the lead investigator in collaboration with Dr. Stephen Saunders' mentorship and support. Ms. Petrik will interview ED clinical providers at Froedtert Memorial Lutheran Hospital (FMLH) to determine best practices suicide risk assessment in the ED setting. With data gathered from the interviews, a clinical suicide risk assessment protocol will be developed. Next, Ms. Petrik will conduct a pilot study evaluating the feasibility of implementing the protocol with patients seeking emergency medical treatment at FMLH's ED. Ms. Petrik has established good relationships with faculty members on FMLH/Medical College of Wisconsin's (MCW) Department of Emergency Medicine and MCW's Injury Research Center's Suicide Interest Research group, and has access to ED providers and patients through partnership with this group. Ms. Petrik will analyze, interpret, and publish the data. Dr. Saunders serves as her dissertation director.

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PROJECT TITLE: Dimension Reduction and Noise Biasing for Particle Filters of Nonlinear Dynamical Systems
FACULTY NAME: Dr. Elaine Spiller, Assistant Professor, MSCS Dept.
STUDENT NAME: Adam Mallen, Computational Sciences Doctoral Student

INTRODUCTION

The nonlinear models often used by geophysical scientists—to study weather, climate, ocean flows, etc.—can present challenging mathematical problems. One such challenge arises in how to assimilate data gathered about a system into the mathematical model used to describe that system. Data assimilation is the science of using noisy empirical data—which at best provides a limited description of a physical process—to improve imperfect model-based estimations of that physical process. Frequently, we can only observe a select number of the characteristics of a process due to inherent limitations of the measuring device. However, often knowledge of the state of unobservable characteristics or the state of the system between observation times is important. Particle filters (PFs) are a common data assimilation technique used for nonlinear models [1]. They use a large number of sample states (particles) which evolve through state space over time according to the model's dynamics and provide a probability density of the state of the system for each moment in time. The densities are updated according to the likelihood of yielding the observable measurements of the system at observation times.

SIGNIFICANCE

Because PFs use a large number of random samples as a discrete approximation to the probability densities of the state variables, the PF is able to capture non-Gaussian densities and the effects of nonlinear dynamics on these densities. However, PFs become computationally unwieldy as the state space dimension increases because a very large cloud of particles is necessary for a reasonable sampling [1]. To assimilate data into large ocean and atmosphere models scientists often require a filtering technique which can handle nonlinear dynamics but also handle the large state space dimension created by finite difference and spectral methods of solving Partial Differential Equations. By reducing the dimension or size of the problem, PFs become computationally tractable on these high dimensional models.

FORWARD THINKING/INNOVATION

This project will involve studying different techniques for effectively reducing the dimension of the space which the PF can sample and still capture the important nonlinear dynamics of the system. Currently techniques exist which project the problem down to a subspace of the original state space and only perform the filtering on the unstable directions of the dynamics [2]. The purpose of this research is to investigate the use of biased stochastic forcing (system noise) on the particles in order to "push" the sampling towards the unstable directions without actually projecting the entire problem down to a subspace of the original problem.

STUDENT INVOLVEMENT

Adam Mallen will be responsible for this research project. He will be supported by his dissertation advisor Dr. Elaine Spiller. The results of this research project will be included in his dissertation on filtering nonlinear geophysical models.

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PROJECT TITLE: "The effect of concurrent texting on the kinematics of walking and obstacle clearance"
FACULTY NAME: Andrew Starsky MPT, PhD, Clinical Assistant Professor, Physical Therapy
STUDENT NAME: Tyler Vander Zanden, SPT, Physical Therapy Student

INTRODUCTION

Tripping over an obstacle is a very common cause of falls in all age groups. When a person has their attention divided between walking and another task, such as texting, the risk of falling may increase. This concept of "dual-tasking" is seen more frequently in the college aged population who frequently walk while texting (or text while walking). It has been casually observed that students who walk while texting appear to pay less attention to their environment, resulting in more frequent stumbles and falls.

SIGNIFICANCE

Research has shown that adults have difficulty maintaining normal walking kinematics (joint angles) over an obstacle while performing another simple concurrent task, such as mental math[1]. The kinematics of walking over an obstacle have been examined without the dual-task paradigm, and show that increased angles of the hip and knee are evident[2]. These kinematics have not been examined when another task such as texting is added. Pilot data show that when subjects walk while texting over the obstacle, they move more slowly, exhibit less loading response at the knee, and exhibit increased hip flexion while clearing the obstacle. The goal of this study is to examine the joint kinematics, gait speed, and motor coordination of college age students as they navigate a curb height obstacle while texting.

FORWARD THINKING/INNOVATION

This project is innovative as it will use a 14 camera motion analysis system to examine joint motion during a common task of texting while walking over an obstacle. These complex data will be evaluated to find a meaningful implication. The results of this study may yield some suggestions to increase safety while texting/walking.

STUDENT INVOLVEMENT

Mr. Vander Zanden will perform the testing of subjects in this study. Subjects will have 16 reflective markers placed on their legs and EMG electrodes placed on their leg muscles. Subjects will complete three trials of 4 different conditions (walking, walking/texting, walking over obstacle, walking/texting over obstacle). Dr. Starsky will assist with the data analysis and dissemination.

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Keywords