

**College of Arts & Sciences  
College of Business & Management  
College of Education  
College of Graduate Studies and Research**

**Present**

**NORTHEASTERN ILLINOIS  
UNIVERSITY FOURTH ANNUAL  
FACULTY RESEARCH & CREATIVE  
ACTIVITIES SYMPOSIUM**

**November 15, 2013**



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## **PRESIDENT'S MESSAGE**

The Mission of Northeastern Illinois University speaks of providing an exceptional environment for learning, teaching and scholarship as we prepare a diverse community of students for leadership and service in our regional and in a dynamic multicultural world. This conference recognizes and celebrates the scholarship—both research and creative activities—of our faculty and staff. It also models excellent scholarship for our students, and helps prepare them for their roles to come.

I want to thank everyone who has contributed to the organization of the conference, and I want especially to commend those who have shared their scholarly accomplishments.

Best wishes,  
Sharon Hahs

## **MESSAGE FROM THE SYMPOSIUM STEERING COMMITTEE**

It is our pleasure to welcome you to the NEIU Fourth Annual Faculty Research & Creative Activities Symposium. This stimulating event provides a unique opportunity to bring together colleagues from different disciplines to share their research conducted individually or through multidisciplinary and/or collaborative work. In addition, small panels will allow for substantive presentations and interdisciplinary discussion. Such a symposium furthers the principle of good teaching informed by good research. It provides an opportunity for us to become more aware of the research conducted by our colleagues, and an opportunity for lively and respectful dialog on themes presented.

I wish each of you a productive day, filled with the shared experience of exploration and dialog.

John Albazi, Chair  
Symposium Steering Committee

## **Participants**

College of Arts & Sciences  
College of Business & Management  
College of Education  
College of Graduate Studies & Research

## **Symposium Steering Committee Members**

John Albazi, College of Arts & Sciences  
Saba Ayman-Nolley for the College of Graduate Studies & Research  
Dragan Milovanovic, College of Arts & Sciences  
Cynthia Moran, Creative Activities  
Isaura Pulido, College of Education  
Rasoul Rezvanian, College of Business & Management

## **SYMPOSIUM PROGRAM**

8:00 – 8:30 AM Registration/Coffee  
Student Union, First Floor

8:30 – 8:50 AM Program Commencement  
Alumni Hall

Welcome and Introduction  
Dr. John Albazi, Symposium Coordinator

Greetings  
Dr. Sharon K. Hahs, President  
Northeastern Illinois University

This year's Symposium is sponsored by the Office of Academic Affairs and the College of Education.

**Track 1**  
**Session A**  
**Student Union (SU 003)**

**Presiding: Rasoul Rezvanian (Department of Accounting, Business Law & Finance)**

- 9:00 AM "IMPACT OF UNCERTAINTY ON HIGH FREQUENCY RESPONSE OF THE U.S. STOCK MARKETS TO THE FED'S POLICY SURPRISES" (PAGE 14), Hardik A. Marfatia\* (Department of Economic)
- 9:40 AM "USING DUALITY TO ENHANCE DECISION MAKING" (PAGE 14), Hong Chen\* (Department of Accounting, Business Law & Finance)
- 10:20 AM "BUY, BORROW OR STEAL: A MODEL OF INTERNET PIRACY" (PAGE 15), Michael Wenz\* and Shane Baker (Department of Economics)
- 11:00 AM "CROSS-BORDER STATE (AND PROVINCIAL) INTEGRATION: A COMPARISON OF BUFFALO AND DETROIT" (PAGE 16), Scott W. Hegerty\* (Department of Economics)
- 11:40 AM Lunch Break

**Track 1**  
**Session B**  
**Student Union (SU 003)**

**Presiding: Maria De La Torre (Justice Studies Department)**

- 12:30 PM "MISINTERPRETATIONS OF INTIMATE PARTNER VIOLENCE RESEARCH AND RESULTING CRITIQUES OF FEMINIST THEORY" (PAGE 17), Adam M. Messinger\* (Justice Studies Department)
- 1:10 PM "JAMES FISHKIN'S DELIBERATIVE POLLS: A VIEW FROM DELIBERATIVE DEMOCRACY" (PAGE 18), Aleksandar Jankovski\* (Department of Political Science)
- 1:50 PM "RECONCILING SOCIAL JUSTICE AND STANDARDS IN SECONDARY ENGLISH LANGUAGE ARTS CLASSROOMS: TEACHING FOR SOCIAL JUSTICE WITH (AND DESPITE) STANDARDS-BASED CURRICULUM" (PAGE 19), Alison G. Dover\* (Department of Educational Inquiry & Curriculum Studies – Secondary Education)
- 2:30 PM "MIXED: MULTIRACIAL STUDENTS NARRATIVES" (PAGE 21), Christina Gomez<sup>1</sup>, Andrew Garrod<sup>2</sup>, and Robert Kilkenny<sup>3</sup> (<sup>1</sup> Department of Sociology <sup>2</sup>Education Department, Dartmouth College; <sup>3</sup>School of Social Work, Simmons College)

**Track 2**  
**Session A**  
**Student Union (Golden Eagles, SU 103)**

**Presiding: Cynthia Moran (Department of Communication, Media & Theatre)**

- 9:00 AM "BENJAMIN BRITTEN AT 100: THE 20<sup>TH</sup> CENTURY MASTER OF BRITISH VOCAL MUSIC—AN EXPLORATION OF HIS ART SONG, OPERATIC, AND OTHER WORKS FOR THE VOICE" (PAGE 22), Robert Heitzinger\* (Music Department)
- 9:40 AM "CRIMINAL JUSTICE ISSUES SET TO COMEDY" (PAGE 23), Shelley A Bannister\* (Department of Justice Studies and Women's & Gender Studies Program)
- 10:20 AM "THE RECOLLECTION OF TEN PUBLIC SCULPTURES" (PAGE 24), Shencheng Xu\* (Art Department)
- 11:00 AM "OBSCURITY" (PAGE 24), Tim Duggan\* (Department of Educational Inquiry & Curriculum Studies – Secondary Education)
- 11:40 AM Lunch Break

**Track 2  
Session B**

**Student Union (Golden Eagles, SU 103)**

**Presiding: Cynthia Moran (Department of Communication, Media & Theatre)**

- 12:30 PM "A PERFORMANCE OF ORIGINAL SONGS AND VOCAL ARRANGEMENTS IN THE BARBERSHOP TRADITION" (PAGE 25), James A. Lucas\* (Professor Emeritus, Music Department)
- 1:10 PM "ENHANCING LEARNING AND TEACHING OF PRE-SERVICE EDUCATION STUDENTS THROUGH PLAYWRITING AND PERFORMANCE: "LOUNGING," A DRAMA WRITTEN AND DIRECTED BY CMT INSTRUCTOR AND CASEP DIRECTOR" (PAGE 26), Jim Blair\* (Department of Communication Media & Theatre)
- 1:50 PM "EMERALD LANDS" (PAGE 27), Patricio Rizzo-Vast\* (Department of World Languages & Cultures)
- 2:30 PM "UNEARTHING THE STORY: THE DRAMATURG'S ROLE IN THE DEVELOPMENT OF A REGIONAL MUSICAL" (PAGE 28), Angela Sweigart-Gallagher\* (Department of Communication, Media & Theatre)

**Track 3  
Session A**

**Student Union (SU 124)**

**Presiding: Kristen Over (English Department and the University Honors Program)**

- 9:00 AM "ILLUMINATING THE FUTURE: *MOBY-DICK*, GLOBALIZATION, AND THE COMING RESOURCE CRISIS" (PAGE 29), Ryan Poll\* (English Department)
- 9:40 AM "IMAGINING A POLITICAL ECONOMY OF FREEDOM: USING THE AFRICAN AMERICAN WORKING-CLASS LITERARY TRADITION AS A RESOURCE FOR IMAGINING A POST-MARKET POLITICAL ECONOMY" (PAGE 30), Tim Libretti\*

(English Department)

- 10:20 AM “HATE LANGUAGE IN THE 1972 GENOCIDE IN BURUNDI: DEHUMANIZATION AND THE BLAME GAME” (PAGE 31), Jeanine Ntahirageza\* (TESL and African & African American Studies Program)
- 11:00 AM “CAFFÈ EX MACHINA: ESPRESSO. ALSO INCLUDED MACCHIATO, CAPPUCCINO. FOR DESSERT I ADD ÉCLAIR” (PAGE 32), J. Peter Maher\* (Professor Emeritus, Linguistics Department)
- 11:40 AM Lunch Break

**Track 3  
Session B  
Student Union (SU 124)  
Presiding: Saba Aymn-Nolley (Department of Psychology)**

- 12:30 PM “INNOVATION FOR SURVIVAL IN THE 21<sup>st</sup> CENTURY CLASSROOM” (PAGE 32), Erick Howenstine\* (Department of Geography & Environmental Studies)
- 1:10 PM “COMPUTER ACTIVITIES AND JUST-IN-TIME TEACHING IN UNIVERSITY PHYSICS I” (PAGE 33), Max Hansen, Bryan Loeding, and Paulo Acioli\* (Physics Department)
- 1:50 PM “DIGITAL ART AND ANIMATION BASED ON RECURSIVELY DEFINED TILING PATTERNS INCLUDING A NOVEL PATTERN UTILIZING THE GOLDEN MEAN” (PAGE 34), Paul Lempke\* (MFA Electronic Visualization, Art Department)
- 2:30 PM “ASSESSING COMPUTATIONAL THINKING” (PAGE 35), Roxana Hadad\* and Kimberly Lawless (Math, Science, and Technology, Chicago Teachers' Center)

**Track 4  
Session A  
Student Union (SU 214)  
Presiding: David Rutschman (College of Arts and Sciences)**

- 9:00 AM “AMYTROPHIC LATERAL SCLEROSIS IN *C. elegans*: UNDERSTANDING HOW TDP-43 AFFECTS MOTOR NEURON FUNCTION” (PAGE 36), Cindy Voisine\*, Emily Rendleman, Quan Nguyen, Giovanni Monterroso, Zelene Figueroa, Deelegant Robinson, and Kevin Mathews (Department of Biology)
- 9:40 AM “DISCOVERY OF NOVEL PLANT-BASED ANTI-VIRAL COMPOUNDS” (PAGE 37), Emily Rumschlag Booms\*<sup>1</sup> and Lijun Rong<sup>2</sup> (<sup>1</sup>Department of Biology; <sup>2</sup>Department of Microbiology and Immunology, University of Illinois, College of Medicine)
- 10:20 AM “DIFFERENTIAL ROLE OF TYPE TWO SECRETION EFFECTORS OF LEGIONELLA PNEUMOPHILA IN AMOEBAL INFECTION” (PAGE 38), Paloma



Vargas\*<sup>1,2</sup>, Nicholas Cianciotto<sup>2</sup> (<sup>1</sup>Student Center for Science Engagement;  
<sup>2</sup>Department of Microbiology and Immunology, Northwestern University)

11:00 AM “BEYOND FREQUENCY AND DENSITY-DEPENDENCE: AN EXPERIMENTAL DEMONSTRATION OF THE IMPORTANCE OF NON-LINEAR TRANSMISSION DYNAMICS IN A HOST-MACROPARASITE SYSTEM” (PAGE 39), Sarah A. Orlofske\*<sup>1</sup>, Samuel M. Flaxman<sup>2</sup>, Brett A. Melbourne<sup>2</sup>, Maxwell B. Joseph<sup>2</sup>, Pieter T.J. Johnson<sup>2</sup>  
(<sup>1</sup>Department of Biology; <sup>2</sup>Department of Ecology & Evolutionary Biology, University of Colorado-Boulder)

11:40 AM Lunch Break

**Track 4**  
**Session B**  
**Student Union (SU 214)**  
**Presiding: Jennifer Slate (Department of Biology)**

12:30 PM “RED-LIGHT PHOTORECEPTORS IN MYXOBACTERIA: IMPLICATIONS FOR LIGHT-DRIVEN MULTICELLULAR ASSEMBLIES” (PAGE 40), Dorina Bizhga, Kevin Gallagher and Emina A. Stojković\* (Department of Biology)

1:10 PM “DOMAIN STRUCTURE OF A UNIQUE BACTERIAL RED LIGHT PHOTORECEPTOR AS REVEALED BY ATOMIC FORCE MICROSCOPY” (PAGE 41), Blaire A. Sorenson<sup>1</sup>, Daniel J. Westcott<sup>2</sup>, Alexandra C. Sakols<sup>1</sup>, Perry Anderson<sup>2</sup>, Emina A. Stojković<sup>2</sup>, Stefan Tsonchev<sup>1</sup>, and Kenneth T. Nicholson\*<sup>1</sup>  
(<sup>1</sup>Department of Chemistry; <sup>2</sup>Department of Biology)

1:50 PM “FROM ECOLOGY AND COGNITIVE PSYCHOLOGY TO POTASSIUM CHANNELS AND NEURAL NETWORKS: UNDERSTANDING HOW PRAYING MANTISES RECOGNIZE PREY” (PAGE 42), Frederick R. Prete\* (Department of Biology)

2:30 PM “THE ROLE OF DOPAMINE IN THE MODULATION OF SIGNALS AT THE PHOTORECEPTOR-BIPOLAR CELL SYNAPSE IN THE ADULT ZEBRAFISH RETINA” (PAGE 43), Shannon Saszik\* (Department of Psychology)

**Track 5**  
**Session A**  
**Student Union (SU 215)**  
**Presiding: Isaura Pulido (Department of Educational Inquiry & Curriculum Studies)**

9:00 AM “THE FUNCTION OF REPETITION IN DISCOURSE COMMUNITY INITIATION: A CASE STUDY OF PEER TUTORING IN A WAC WRITING CENTER” (PAGE 44), Rachel L. Holtz\* (Center for Academic Writing)

9:40 AM “JUST BELOW THE SURFACE: LINGUISTIC IDEOLOGIES IN THE URBAN CLASSROOM” (PAGE 45), Jill Hallett\* (Department of Linguistics)

- 10:20 AM “WINNING TEACHERS, WOEFUL TEACHERS: HOW TO TELL THE DIFFERENCE” (PAGE 46), Terry Stirling\*<sup>1</sup>, April Nauman<sup>2</sup> and Arlene Borthwick<sup>3</sup> (<sup>1</sup>Department of Educational Leadership & Development; <sup>2</sup>Department of Literacy Education; <sup>3</sup>Technology in Education, National Louis University)
- 11:00 AM “THE RESPECTED SCHOOL LEADER” (PAGE 48), Howard J. Bultinck\* and Lynn H. Bush\* (Department of Educational Leadership & Development)
- 11:40 AM Lunch Break

**Track 5  
Session B  
Student Union (SU 215)  
Presiding: Alberto Lopez (College of Education)**

- 12:30 PM “EFFECTS OF SCIENCE INQUIRY PRACTICES ON DIVERSE 7TH GRADE STUDENTS' SCIENCE ACHIEVEMENT AND ATTITUDES” (PAGE 49), Hanna Kim\* and Samuel Aguirre\* (Department of Teacher Education)
- 1:10 PM “MEASURING TEST PERFORMANCE IN DEVELOPMENTAL MATHEMATICS: INCREASED EXPOSURE TO A TESTING ENVIRONMENT LEADS TO GREATER PASS RATES” (PAGE 50), Ivan Temesvari\* (Department of Mathematics)
- 1:50 PM “A TIME FOR EVERYTHING: ASSESSING LEARNING EFFECTIVENESS AND STUDENT EXPERIENCE IN AN ENVIRONMENTAL INTERPRETATION SERVICE-LEARNING SETTING” (PAGE 51), Melinda S. Merrick\* (Department of Geography & Environmental Studies)
- 2:30 PM “EXAMINING A NEW TEACHER PREPARATION PROGRAM'S EFFECT ON PRESERVICE TEACHERS' VIEWS OF NATURE OF SCIENCE” (PAGE 52), Huseyin Colak\*<sup>1</sup> and Alex Carstensen<sup>2</sup>, (<sup>1</sup>Department of Educational Inquiry & Curriculum Studies – Secondary Education/Science; <sup>2</sup>Department of Curriculum and Instruction, University of Illinois at Chicago)

**Track 6  
Session A  
Student Union (SU 216)  
Presiding: Chandana Meegoda (Department of Chemistry)**

- 9:00 AM “MOLECULAR DYNAMICS INVESTIGATION OF THE ALKANE/WATER: THE EFFECT OF ALKYL CHAIN LENGTH AND IONIC SPECIES ON INTERFACIAL PROPERTIES COMPARED TO THE AIR/WATER INTERFACE” (PAGE 53), Oneka T. Cummings\*<sup>1</sup> and Collin D. Wick<sup>2</sup> (<sup>1</sup>Center for Science Engagement; <sup>2</sup>Department of Chemistry)
- 9:40 AM “STRUCTURAL ANALYSIS OF BACTERIOPHYTOCHROMES ON GRAPHITE AND MICA USING SCANNING PROBE MICROSCOPY” (PAGE 54), Justin Thomas<sup>1</sup>, Blaire Sorenson<sup>1</sup>, Brian Lampert<sup>1</sup>, Daniel Westcott<sup>2</sup>, Alexandra C. Sakols<sup>1</sup>, Emina A.

Stojković<sup>2</sup>, Kenneth T. Nicholson, Stefan Tsonchev\*<sup>1</sup>  
(<sup>1</sup>Department of Chemistry; <sup>2</sup>Department of Biology)

- 10:20 AM “MODELING METAL-BASE INTERACTIONS OF NUCLEOBASES” (PAGE 55), Paulo Acioli and Sudha Srinivas\* (Department of Physics)
- 11:00 AM “ARSENOPLATINS – ANTICANCER AGENTS DESIGNED AS A COMBINATION OF PLATINUM AND ARSENIC DRUGS” (PAGE 56), Denana U. Miodragović\*<sup>1,2</sup>, Irawati Kandela<sup>2</sup>, Andrew Mazar<sup>2</sup>, and Thomas V. O’Halloran<sup>2</sup>  
(<sup>1</sup>Department of Chemistry; <sup>2</sup> Department of Chemistry, Northwestern University)
- 11:40 AM Lunch Break

**Track 6**  
**Session B**  
**Student Union (SU 216)**

**Presiding: Nanette Potee (Department of Communication, Media & Theatre)**

- 12:30 PM “EXQUISITE UTERI, WUP CONCIERGE DESK: LIFE AND DEATH AND TEXAS & DREAM PALACE: RATED F(EMINIST) F(ANTASY) F(ARCE): THE WORK OF THE WANDERING UTERUS PROJECT” (PAGE 57), Angela Sweigart-Gallagher\*<sup>1</sup> and Vicky Pettersen Lantz<sup>2</sup> (<sup>1</sup>Department of Communication, Media & Theatre; <sup>2</sup>Sam Houston State University)
- 1:10 PM “FOLKTALES LIVE! CHAMBER THEATRE ADAPTATIONS FOR YOUNG AUDIENCE” (Page 58), Ann Hartdegen\* (Department of Communication, Media & Theatre)
- 1:50 PM “TURNING A CRITICAL LENS ON MY PEDAGOGICAL ADVENTURES: TEACHING COMMUNICATION AT AN URBAN HISPANIC-SERVING HIGHER EDUCATION INSTITUTION IN THE MIDWESTERN UNITED STATES” (PAGE 59), Wilfredo Alvarez\* (Department of Communication, Media & Theatre)

**Track 7**  
**Session A**  
**Student Union (SU 217)**

**Presiding: Marcelo Sztainberg (Department of Computer Science)**

- 9:00 AM “IMPORTANCE, METHODOLOGY AND APPROACH TO SOFTWARE HISTORY” (PAGE 60), Kim W. Tracy\* (University Technology Services)
- 9:40 AM “DISCOVERING THE INTERNET TOPOLOGY WITH SIMPLE EXPERIMENTAL TOOLS” (PAGE 61), Graciela Perera\*<sup>1</sup> and Aleisa Driver<sup>2</sup> (<sup>1</sup>Department of Computer Science; <sup>2</sup>Department of Computer Science and Information Systems, Youngstown State University)
- 10:20 AM “TOO NEUROTIC, NOT TOO FRIENDLY: STRUCTURED PERSONALITY CLASSIFICATION ON TEXTUAL DATA” (PAGE 62), Francisco Iacobelli\*<sup>1</sup> and Aron Culotta (<sup>1</sup>Department of Computer Science Department; <sup>2</sup>Department of Computer

Science, Illinois Institute of Technology)

11:40 AM Lunch Break

**Track 7**  
**Session B**  
**Student Union (SU 217)**  
**Presiding: Lidia Filus (Department of Mathematics)**

12:30 PM "MATHEMATICAL MODELING OF NEGLECTED TROPICAL DISEASES IN DEVELOPING COUNTRIES" (PAGE 63), Anuj Mubayi\* (Department of Mathematics)

1:10 PM "RELATIVISTIC BROWNIAN MOTION IN A CURVED SPACE-TIME" (PAGE 64), Paul O'Hara\*, (Department of Mathematics & Lamberto Rondoni Dip. Scienze Matematiche, Politecnico di Torino)

1:50 PM "HOW TO FACTOR A POLYNOMIAL" (PAGE 64), Zhonggang (Zeke) Zeng\* (Department of Mathematics)

2:30 PM "IN SELF-CONTRADICTION, MACH'S GEOCENTRISM LEADS TO ABSOLUTE SPACE" (PAGE 65), Herbert I. Hartman (Harper College (ret.) and Charles Nissim-Sabat\* (Professor Emeritus, Physics Department)

**Track 8**  
**Session A**  
**Student Union (SU 218)**  
**Presiding: Erick Howenstine (Department of Geography and Environmental Studies)**

9:00 AM "CIRCADIAN RHYTHMS IN *HIERODULA PATELLIFERA* (INSECTA: MANTODEA)", Aaron E. Schirmer\* (PAGE 66), Frederick R. Prete, Edgar S. Mantes, Wil Bogue, and Andrew F. Urdiales (Department of Biology)

9:40 AM "THE ROLE OF FUNGI IN BIOREMEDIATION OF CONTAMINATED WATER" (PAGE 67), Pamela Geddes\* and Andrea Erber (Department of Biology)

10:20 AM "RUNNING REDD: BROKERING TRANSNATIONAL EFFORTS TO REDUCE DEFORESTATION" (PAGE 68), Caleb Gallemore\* (Department of Geography & Environmental Studies)

11:00 AM "DEVELOPING A DIGITAL DATABASE FOR ARCHAEOBOTANICAL RESEARCH IN MESOAMERICA" (PAGE 69), Jon B. Hageman<sup>\*1</sup>, David J. Goldstein<sup>2</sup> and Kelsey O. Nordine<sup>3</sup> (<sup>1</sup>Department of Anthropology; <sup>2</sup>National Park Service, U.S. Virgin Islands; <sup>3</sup>Washington University in St. Louis)

11:40 AM Lunch Break

**Track 8**  
**Session B**  
**Student Union (SU 218)**  
**Presiding: Jade Stanley (Department of Social Work)**

- 12:30 PM "KIN AND KILOMETERS: A QUALITATIVE STUDY OF LONG-DISTANCE RELATIONSHIPS FROM THE PERSPECTIVE OF TRANSGENERATIONAL THEORY" (PAGE 70), Laura Tejada\* (Department of Counselor Education)
- 1:10 PM "COMPONENTS OF CREATING MICROENTERPRISE DEVELOPMENT PROGRAMS" (PAGE 71), Marius Dancea\* (Department of Social Work)
- 1:50 PM "PROMOTING, CAPTURING, SHARING, AND MANAGING THE VALUABLE KNOWLEDGE OF EMPLOYEES IN THE WORKPLACE" (PAGE 72), Shirley J. Caruso\* (Department of Educational Leadership & Development)
- 2:30 PM "ADDRESSING HOMOPHOBIA IN SOCIAL WORK EDUCATION" (PAGE 73), Milka Ramirez\* (Department of Social Work)

## **ABSTRACTS OF PRESENTATIONS**

### **NEIU FOURTH ANNUAL FACULTY RESEARCH & CREATIVE ACTIVITIES SYMPOSIUM**

**NOVEMBER 15, 2013**

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Northeastern Illinois University  
Chicago, IL 60625

## **IMPACT OF UNCERTAINTY ON HIGH FREQUENCY RESPONSE OF THE U.S. STOCK MARKETS TO THE FED'S POLICY SURPRISES**

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This paper examines the impact of uncertainty on estimated response of stock returns to U.S. monetary policy surprise. This is motivated by the Lucas island model which suggests an inverse relationship between the effectiveness of a policy and the level of uncertainty in the economy. Using high frequency daily data from the Federal funds futures market, we first estimate the response of S&P 500 stock returns to monetary policy surprises within the Time Varying Parameter (TVP) model. We then analyze the relationship of these time varying estimates with the benchmark VIX index and alternative measures of uncertainty. Evidence suggests a significant negative relationship between the level of uncertainty and the time varying response of S&P 500 stock returns to unanticipated changes in the interest rate. Thus, at higher levels of uncertainty the impact of monetary policy shocks on stock markets is lower. The results are robust to different measures of uncertainty.

Keywords: Fed Funds Futures Market, Monetary Policy, Stock Returns, Time-Varying Parameter Model, VIX, Uncertainty

## **USING DUALITY TO ENHANCE DECISION MAKING**

Hong Chen  
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Most decision makers know what they focus: either opportunities or risks, disruption or going concern; process or input and output; bear market or bull market; gains or losses. However, for experienced investors who have gone through many bear and bull life cycles, they usually take the duality into consideration. They will look at both opportunities and risks; disruption and continuity; process as well as input and output; gains and losses. Most of these financial investors will take advantage of the duality; for example, most of these experienced investors are keenly aware of the extreme bear market and the extreme bull market. At these two extremes, they are ready to invest for the renewing new bear or bull cycle. A typical example is the investment of Apple Computer when they were really down and invited Steve Jobs to come back. That was the extreme bear condition. But in a chaotic complex market environment or in day to day managerial decisions, seldom people bring the duality to enhance their decision making. For example, when they see an opportunity, they seldom bring the risks into consideration. Thus, in fraud triangle, when a perpetrator is

under a financial pressure, they become very sensitive to the opportunities so that they can use the new resources to release their pressure. However, if they also bring in the risks involve they will counter they rationality back to the reality. With the reality in mind, they will find a way to control the risk. Sadly, these perpetrators just sink in to the false reality: their own rationality, which eventually make them ruin.

In news we often see the decision makers of the disrupted enterprises stepped into a slipper slop by their own rationality rather than reality. If they see the process of making money, they forget to check the slowly invisible accumulated structural output effect. If they see the structural output effect, they forget the process will continue to drive the output structure in to its own destruction.

These dualities can be abstracted into two formal parts: visible and invisible. Together with the types of the structure functions, the decision makers can model their own decision into what structure they like to become. Moreover, through the model, the decision makers can modularize the decision to reduce it into the fractal process – repeatedly reapply a set of simple rules to each juncture point. Thus, a very complex problem is being virtualized into a simple set of step-wise redirection rules.

In this presentation, I will show examples of duality in decision making. Then I will show how a very complex issue can be modularized and virtualized. By doing so, critical junctures in the complex problem can be repeatedly reapplied a simple set of rules to find out the reality and thus their control measure can be put in place to optimize decision value.

## **BUY, BORROW OR STEAL: A MODEL OF INTERNET PIRACY**

Michael Wenz\* and Shane Baker  
Department of Economics  
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With the ongoing expansion of the Internet, decreasing computer hardware and bandwidth costs, and users' heightened computer skills, more and more intellectual property is becoming available for distribution across the Internet. This has many obvious benefits for both consumers and producers of content, but poses many challenges for producers.

Piracy, where consumers consume intellectual property without paying for the right to do so, has the immediate effect of reducing producer welfare and increasing consumer welfare in the short run. However, there are a number of downstream effects that make the effect on overall welfare difficult to evaluate (Handke 2010). First, piracy increases enforcement costs, which is a socially unproductive use of resources. Second, piracy counterbalances the monopoly power of content rights-holders, which may increase total economic surplus. Third, piracy dulls the incentives of content producers to produce new content and may

reduce the supply of intellectual property below the socially optimal level. Fourth, piracy may actually promote the interests of producers through network effects or the sale of complementary products, such as when a consumer gains unauthorized access to a song for free, but then decides to purchase an album or concert tickets based on the experience. As time and technology have evolved, it has become more and more difficult for producers to protect their intellectual property, and these issues continue to deepen with increased technological development.

In this paper, we build a purely theoretical two-sector model designed to examine the decision to participate in the formal (legal) sector versus the informal (pirate) sector in the market for music downloads on the consumer side. Much existing work in this area focuses on producers and the decision to supply content (e.g., Varian 2005, Posner 2006), but very little has focused on the decision of consumers about whether to pay or pirate. Our work follows Rauch (1991), who examines the decision to participate in formal or informal labor markets, combined with Banerjee (2013) writing in the field of intellectual property.

In the model, consumers are presumed to maximize utility subject to prices and transactions costs in each market. Utility depends on their enjoyment of the media and non-pecuniary costs of breaking the law. Prices and transactions costs depend on market supply in the formal market, enforcement costs, technology costs and capital investment costs in the informal market. Our model shows that non-pecuniary costs and benefits are likely to influence the decision to pirate, and we conclude with a suggestion for empirically estimating these effects.

## **CROSS-BORDER STATE (AND PROVINCIAL) INTEGRATION: A COMPARISON OF BUFFALO AND DETROIT**

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Department of Economics  
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Facing a combination of domestic and global macroeconomic factors, American manufacturing has undergone major transformations in recent decades. While much of this change has occurred at the firm level, this is also true for major manufacturing cities as they adjust. This study examines the confluence of economic integration and economic decline for two U.S. border cities, Buffalo, N.Y. and Detroit. In particular, while both have experienced decreasing employment during the 2000s, particularly after the 2008 financial crisis, they continue to serve as manufacturing exporters. This study asks the question, “How closely are these cities’ economic fortunes tied to their respective states and to the U.S., and are their economies more closely connected to Canada and the province of Ontario?”

While such studies as Phillips and Cañas (*Annals of Regional Science*, 2008) examine U.S.



cities that border Mexico, and Hegerty (*Eastern European Economics*, 2010) look at international regional integration, far fewer studies examine the relative integration between U.S. border cities and Canada. This study uses monthly data (January 2001 to September 2012) on employment for Buffalo-Niagara Falls and Detroit-Warren-Livonia. The cyclical components of these deseasonalized series are then extracted using the Hodrick-Prescott filter. Employment cycles for each city are then paired with similar cycles created for the U.S., Canada, Ontario, and New York or Michigan, as well as U.S. and Canadian industrial production, allowing for twelve separate analyses.

For each pair of time series, cross-correlation coefficients are calculated to capture the “synchronization” of the employment cycles. A contemporaneous correlation captures statistical associations between employment in the U.S. city and in the other economic region during the same month. We also capture associations between Buffalo or Detroit’s employment at one point in time and a partner’s employment at up to six months in the past or future. If two cycles are synchronized, the contemporaneous correlation should be higher than the others. Otherwise, one region might lead, with the other following its economic trends. We aim to find which province, state, or country Buffalo and Detroit are most synchronized with, and whether the two cities differ in their economic performance.

We find that, while it is contemporaneously correlated with all four employment cycles, Buffalo exhibits the highest correlation coefficient (0.805) with New York and the second-highest (0.746) with Ontario. Local factors, therefore, dominate over national ones. Detroit is highly synchronized with Michigan (0.961 at zero lags) and Canada (0.907), and lags Ontario’s and U.S. employment by one month. We conclude that the fortunes of Michigan are more closely tied to its major metropolis than would be expected of New York’s second-largest city, but that international forces help drive the automobile industry as well.

## **MISINTERPRETATIONS OF INTIMATE PARTNER VIOLENCE RESEARCH AND RESULTING CRITIQUES OF FEMINIST THEORY**

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*Significance of the Project:* Feminist intimate partner violence (IPV) theory contends that, owing to hegemonic masculinity norms within the context of a patriarchal society, IPV is particularly likely to be perpetrated by men against women. However, recent nationally-representative surveys indicate that men and women are equally likely to engage in physical IPV in opposite-sex relationships, and research also suggests that male-male and female-female intimate relationships are at a greater risk than male-female dyads of experiencing IPV. In identifying the apparent disconnect between these findings and

feminist IPV theory, several notable IPV scholars and “men’s rights” groups have critiqued feminist IPV theory as inaccurate, ideologically biased, and incorrectly used to justify gearing IPV public policy predominantly towards addressing male-to-female IPV. In reviewing common misinterpretations of feminist IPV theory, so-called “mutual battering” data, and sexual minority IPV research, this presentation highlights both the misguided nature of these critiques as well as their dangerous potential for derailing needed IPV-intervention funding streams.

*Research Objectives:* This presentation examines the rhetoric of scholars and men’s rights groups that contend feminist IPV theory is inaccurate owing to two recent developments in the research literature: prevalence data on same-sex IPV as well as opposite-sex “mutual battering” physical IPV. Both of these empirical literatures are reviewed to determine the accuracy of such rhetoric and the implications for feminist IPV theory.

*Methodology:* Methodology for this project entailed conducting a review of the literatures on feminist IPV theory and its criticisms, IPV directionality, and IPV involving sexual minorities (SM-IPV).

*Summary of Findings:* Debate over the veracity of feminist IPV theory stems in large part from misunderstandings regarding the intended scope of feminist IPV theory (designed to explain opposite-sex IPV, not SM-IPV, although underlying elements of feminist IPV theory are still applicable to SM-IPV) and the IPV directionality literature (a clearer picture emerges when contextualizing “mutual battering” physical IPV research with violence motivations data as well as when looking at non-physical forms of IPV). Many critics of feminist IPV theory call for shifts in funding patterns away from male-to-female IPV intervention and towards a gender-neutral approach. While encouraging needed fresh perspectives in developing interventions for male IPV victimization and female IPV perpetration, the literature suggests that dramatic shifts in funding may be unfounded and potentially dangerous.

## **JAMES FISHKIN’S DELIBERATIVE POLLS: A VIEW FROM DELIBERATIVE DEMOCRACY**

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A large body of literature notes Americans’ rather low reservoir of factual knowledge about politics. This means that citizens’ preferences, as expressed in their votes, may be different from what their preferences – and consequently their votes – would have been if they were

only better informed. James Fishkin and his colleagues address this problem by way of deliberative polls. They design an approach – the deliberative poll – that yields a better informed electorate such that the citizens’ expressed preferences *are* informed preferences. In so doing, Fishkin et al. operationalize the theory of deliberative democracy. I critically assess the extent to which Fishkin et al. successfully do so. Viewed *from* the theory of deliberative democracy, I find Fishkin’s operationalization wanting on *three* fronts. *One*, it is not altogether clear to what extent factual knowledge determines and explains citizens’ preferences. I posit that social constructions – that is, the various ways in which citizens have come to understand the social world and intersubjectively share their understandings – does most of the work in determining and explaining citizens’ preferences. To buttress my case, I invite the audience to consider three hypothetical situations that call into question the importance of factual knowledge as the determinant of citizens’ preferences. *Two*, in the deliberative polls, Fishkin and his colleagues introduce two highly problematic procedures. (i) Fishkin et al. send briefing document to the participants *prior* to the participants’ deliberations. And (ii) the participants in the poll have the opportunity to question “experts” in the field that is the subject-matter of the given deliberative poll. This is problematic on at least two fronts: (a) I posit that the participation of experts creates hierarchy in the deliberative polls. This is precisely what the most important theorists of deliberative democracy – Arendt, Habermas, Dryzek, et al. – argue should *not* be introduced in citizens’ deliberations. The deliberative arena ought to – theoretically, at least – be an arena free of any hierarchy. And (b) the introduction of briefing documents and experts is *also* problematic on the social-scientific front. If the deliberative poll were designed to measure the extent of factual knowledge gained – and, crucially, to measure whether the gain of factual knowledge leads to change in preferences – then we cannot be sure whether any gain of knowledge is owing to the briefing documents, the questioning of experts, deliberation with one’s fellow citizens, or some combination of the three. Finally *three*, and concentrating on Fishkin’s polls on national security, I note that the “experts” whom the participants quizzed represented only one way of theorizing security. This violates the *inclusiveness* tenet of deliberative democracy. Namely, the exclusion of additional ways of theorizing security forecloses the deliberative space thereby rendering citizens’ deliberations well-nigh meaningless.

**RECONCILING SOCIAL JUSTICE AND STANDARDS IN SECONDARY ENGLISH  
LANGUAGE ARTS CLASSROOMS: TEACHING FOR SOCIAL JUSTICE WITH (AND  
DESPITE) STANDARDS-BASED CURRICULUM**

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The purpose of this presentation is to examine how teachers promote social justice and equity despite current emphases on standardization and accountability. After presenting a

conceptual model of teaching for social justice, I use examples from participants' curriculum to illustrate how they implemented their social justice visions while meeting local, state, and national mandates. This presentation concludes with recommendations for increasing pre- and in-service teachers' readiness to teach for social justice in increasingly standardized contexts.

The data presented in this paper draws from a multi-state constructivist grounded theory analysis examining how 24 secondary English Language Arts (ELA) teachers conceptualize and implement teaching for social justice. Participants defined "teaching for social justice" in their own words, submitted curriculum for analysis, and described their strategies for teaching for social justice in standards-based environments. I used constant-comparative and open-coding protocols to identify central themes in participants' descriptions of teaching for social justice, and lesson plan analysis protocols to examine trends in participants' curriculum.

I found that secondary ELA teachers define teaching for social justice as having three primary dimensions: curriculum, pedagogy, and social action. In describing their curriculum, teachers highlighted: a) curriculum related to students' personal and cultural identities, b) explicit instruction on oppression, prejudice and inequity, and c) the integration of ELA standards and social justice topics. Pedagogically, teachers attempted to: a) create a supportive classroom climate that embraces multiple perspectives, b) emphasize critical thinking and inquiry, and c) promote students' academic, civic, and personal growth. Finally, teachers noted their: a) sense of themselves as social activists, b) intent to raise students' awareness of inequity and injustice, and c) intent to promote students' social action.

In addition to their social justice emphases, submitted lesson plans addressed a wide range of British, American, and "World Literature," including fiction, nonfiction, poetry, and multimedia texts; engaged students in an array of formal and informal writing assignments, including research papers, persuasive essays, formal compositions, and creative writing; and required students to publish, orally present, and develop multimedia products demonstrating their learning. Moreover, although data was gathered before the widespread implementation of the Common Core Standards, collectively, the 24 lessons submitted addressed each of the College and Career Anchor Standards for Reading, Writing, Speaking and Listening and Language in grades 6-12, NCTE standards, and research on "best practices" in the English Language Arts. [A complete analysis of how teachers addressed—and extended—these standards is included in the full presentation.]

## MIXED: MULTIRACIAL STUDENTS NARRATIVES

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The multiracial movement of the 1980s and 1990s prompted a restructuring of American racial classifications. Beginning with the 2000 U.S. Census, respondents who previously were only allowed to mark one racial category were allowed for the first time to check multiple categories; however, a multiracial category was never added. The ability to “mark one or more”—radically changed the way race was perceived in the United States. People’s responses could now reflect their diverse racial backgrounds and perceptions of race itself.

This presentation will highlight themes examined in our forthcoming book, *Mixed: Multiracial Students Tell Their Life Stories* (Cornell University Press, December 2013). Each chapter in this book reveals a story of how race is lived within the context of being multiracial. Unlike individuals who understand themselves as having one racial identity, these students have lived the complexity of their identity from a very young age. They understand how their mixed racial identity impacts their lives, how the race of their parents and family affects their childhood development, and how others’ understanding of them shapes their relationships. For these young adults, negotiating their identity is an everyday occurrence, one that often causes stress, and at times one that offers them the privilege of seeing their environment from a different perspective.

The students who contributed to this volume negotiate their race in various situations—they often present one identity one day and another the next. Checking one or more boxes fails to capture the realities experienced by mixed-race individuals. Surveys provide a demographic portrait, but they do not portray life experiences. These essays, written in the voices of multiracial students, explore the concerns these young people confront with their families and friends in their everyday lives, and as they enter adulthood. They push the boundaries within their communities and therefore open spaces that offer new possibilities.

We hope this collection of narratives moves beyond a narrow black-white binary of multiracial identity and instead elucidates the wide variety of multiracial experiences that includes the influences of culture, class, gender, space, sexual orientation, nations and regions. A multiracial identity has taken hold, and forecasters expect that it will be an ongoing trend. These stories paint a portrait of the concerns and experiences inherent in this new identity. As they look toward the future, these students, too, wonder what this identity will bring. Will we continue to allow people to

choose more than one category, or will we again force individuals into a singular racial identity?

**BENJAMIN BRITTEN AT 100: THE 20<sup>TH</sup> CENTURY MASTER OF BRITISH VOCAL MUSIC—AN EXPLORATION OF HIS ART SONG, OPERATIC, AND OTHER WORKS FOR THE VOICE**

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The musical community is currently celebrating the 100<sup>th</sup> anniversary of Benjamin Britten's birth (1913-1976). Through the innovative use of melody, harmony, rhythm, texture, and sensitive text setting, his vocal music changed the course of British music, but specifically song forms, and reverberated through international music circles.

This presentation will use printed musical examples, spoken texts, audio recordings, and YouTube videos, to explore the scope and depth of Britten's vocal music. It will demonstrate how, in his folksong arrangements and the realizations of Purcell songs, his harmonic treatments gave new depth to traditional melodies and texts. These arrangements also gave Purcell's 300-year-old songs a contemporary sound. (In Purcell's time, the bass line was not written out; instead, it was listed by numbers, which represented intervals, chords, and non-chord tones in relation to a bass note. When the bass line is performed or written, the performer interprets these numbers and creates an imaginative bass line. This process is called realization.)

Britten was widely read, and as a result, his music reflects the use of high-quality texts by early authors such as John Donne (1572-1631), William Shakespeare (1564-1616) and William Blake (1757-1827), to contemporary poets Thomas Hardy (1840-1928), Edith Sitwell, (1887-1964), and W.H. Auden (1907-1973).

As time allows, musical examples will be drawn from his folksong and Purcell settings; "The Holy Sonnets of John Donne", a song cycle for tenor and piano; "Songs and Proverbs of William Blake, written for baritone and piano; the "War Requiem", an oratorio written for soprano, tenor, and baritone soloists, full and chamber orchestra, and full and children's chorus; and from "Peter Grimes" his first operatic success.

Britten's contemporaries Edward Elgar, Ralph Vaughan Williams, William Walton, and Michael Tippett are also recognized as great British composers, but none have the scope and depth to match Britten, who overshadowed them and was widely recognized as the greatest English composer since Purcell (1659-1695), the previous master of British music. The range of Britten's vocal music is staggering. He wrote over 20 choral works, 13 operas, a single oratorio, and about 20 song cycles (many written for his partner, the tenor Peter Pears). His operatic and choral works often included difficult vocal lines for children. He also

wrote 8 books of folksong arrangements, as well as the many realizations of songs by Henry Purcell mentioned earlier.

Although Britten also wrote a large body of instrumental works, his vocal music encapsulates the whole of his compositional style. Being a singer, this author has chosen to focus solely on that which he knows and loves best.

## **CRIMINAL JUSTICE ISSUES SET TO COMEDY**

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**Medium and description:** This project presents in the form of a play, as a series of somewhat comical courtroom sketches that allow for audience participation. The four sketches each include a judge, a prosecutor, a defense attorney, and a defendant. In several, there will be witnesses who testify; in one, the defense attorney has a brief monologue. The author will play the role of narrator, and will break the fourth wall by interacting directly with the audience. The other roles will be played by actors with whom the author has worked previously, including two NEIU community members. The text for the sketches was developed by the author based on actual cases from her years as a criminal defense lawyer and prisoner civil rights lawyer in Cook County. While the project takes the form of several trials within a play, there is no need for a theater or courtroom for its production. Within the narrator's discussion with the audience, the setting will be described sufficiently for the audience to imagine the grandeur of the courtroom.

**Intended artistic message:** Through these farcical sketches, the audience members will learn about inequality and injustice in the United States criminal justice system, utilizing a close look at four specific examples from the author's experience with the Cook County criminal justice system. The narrator will encourage the audience members to render verdicts in the individual trial sketches. There will be an opportunity for audience members to discuss their impressions of the system with one another, as well as with the actors. The goal is to educate using comedy instead of lecture as the method of conveying information. The purpose of the project is to serve as a means of describing to non-lawyer audiences what happens in criminal courtrooms and how reality differs from what is depicted on television crime dramas such as CSI and other one-hour shows produced for general entertainment. This heightened awareness of the criminal justice system, ideally, can help inform potential jurors and voters about the need for change to the system as it currently exists. As the courtroom sketch examples reveal, much needs to be done to provide justice to those arrested and processed through the criminal justice system.

## **THE RECOLLECTION OF TEN PUBLIC SCULPTURES**

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My presentation is about the ten outdoor public sculptures I've made in the past 10 years. These ten public sculptures are "*Happy Family*" 2004; "*Gourd Man*" 2005; "*Catch Up*" 2006; "*Row Your Boat*" 2007; "*Our City*" 2008; "*A Song of Joy*" 2009; "*Free as A Cicada*" 2010; "*Dream Seeker*" 2011; "*Fly*" 2012; and "*Clouds*" 2013; Each of these sculptures were designed for a specific environment in the Chicago area and each has its own story. I do not deny that traditional training remains important to my artwork. I am developing a language of forms that I use in various combinations to create visual stories. These forms are the key components of my sculptural installations.

My creative activities are directly linked to my life experience. The world I live in, my responses to it, and any insights I gain are all sources of inspiration. Right after I moved into Chicago in 2003, I immediately fell in love with this city. This large northern industrial town reminds me very much of my hometown Shenyang in China. Chicago is the origin of the modern skyscrapers, in addition to outdoor public sculptures. I really want to create a group of public sculptures expressing my love and impression of this great city. My combined urge to create and my love of nature helped bring into focus my central idea for which I use traditional techniques to address contemporary issues. These ten public sculptures combine human forms with other organic forms to express the relationship between man and nature. There is a connection between the ten sculptures, yet each sculpture is developed differently. The sculpture itself and the processes in which I took to create them influenced both my personal vision in art and my life as well.

The presentation includes the ideas for my designs, materials, working processes, and the installation processes of these ten sculptures. My artwork considers the differences between East and West as well as the differences between traditional and contemporary art. I believe that each of my public sculptures will help us to see more connections between the natural world and ourselves. Hopefully, it will give us a greater appreciation for each other.

## **OBSCURITY**

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I am currently completing a creative work that has been years in the making. This collection of original songs in the American folk tradition, titled "Obscurity," will be my sixth studio



recording, and is scheduled for release in February of 2014. By the time of the symposium on November 15, the music will be completely recorded and will only await final mixing, mastering, artwork, and reproduction. Half of the songs were recorded in August 7-11, 2013 in Sonora, California, and the other half October 27-30, 2013 in Minneapolis. The album includes 10 original compositions and features me on vocals and guitar. My fellow musicians on the project play a variety of instruments, from mandolin and piano to synthesizer and electric guitar, while also adding backing vocals.

The majority of my symposium presentation will be a live performance, but I will also play a couple of selections from the recording with my commentary on production decisions and artistic choices related to the lyrics and the musical structures.

While I have been a musician for nearly 40 years, my academic background is in English literature, creative writing, and secondary education. I believe it is important for teachers to be active in their fields while continuing to hone their pedagogical skills. As such, writing teachers should write, and this recording is the latest (and perhaps best) manifestation of my creative writing. I have been influenced in my songwriting by artists I admire, such as Bob Dylan, Neil Young, John Prine, Gillian Welch, Robert Earl Keen, and Lucinda Williams, but as my body of work has developed, I have realized that I am attempting to create a distinct style, perhaps a “Great Plains folk” sound, something that is underdeveloped in American music. While other regions have their own well-defined genres, such as Appalachian bluegrass and Texas swing, my songs celebrate and critique places like South Dakota and Nebraska, where I grew up and spent a good portion of my adult life. I studied poetry with Nebraska poet and former U.S. Poet Laureate Ted Kooser, and his influence is evident in my lyrics. Similarly to Kooser, I spend the majority of my compositional effort revising, simplifying, and working to eliminate superfluous expressions. Every word in every line should communicate and further the impact of the piece. While my sound is grounded in a sense of place, I believe it contains an appeal beyond what would be considered “regional” music. The collection itself is an eclectic mix of tunes placed in an order that considers the listener experience as the prime criterion.

## **A PERFORMANCE OF ORIGINAL SONGS AND VOCAL ARRANGEMENTS IN THE BARBERSHOP TRADITION**

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The project will be a performance of songs in the barbershop harmony tradition. The songs are written and/or arranged by Dr. Lucas within that tradition. The songs will be performed by the Flashback Quartet, a quartet consisting of Dr. Lucas, Albert Thompson, James Jenz,

and Jo Mortland. Flashback performs regularly at local retirement homes, and other events. The quartet will perform songs arranged for the quartet by Dr. Lucas, and songs composed by Dr. Lucas and arranged by Jay Giallombardo. Mr. Giallombardo is the director of Northbrook's New Tradition chorus, one of the most acclaimed a cappella choruses in the world.

#### Description of Exemplar Arrangements and Original Songs:

The songs and arrangements are all intended to be sung by four voices, without accompaniment. They are within the barbershop tradition, which is defined by Wikipedia as "a cappella, or unaccompanied vocal music, characterized by consonant four-part chords for every melody note in a predominantly homophonic texture."

The songs, in their order of performance, are:

#### Vocal Arrangements and Parodies by Dr. Lucas:

Lida Rose/Sweet and Low: words and music by Meridith Wilson (from *The Music Man*)

Blackbird Medley: combines "Bye Bye Blackbird" (words by Mort Dixon and music by Ray Henderson) and Blackbird (music and lyrics by Paul McCartney)

I'm Gonna Sit Right Down and Write Myself a Letter: music by Fred E. Ahlert and lyrics by Joe Young, with new lyrics by Dr. Lucas

#### Original Songs by Dr. Lucas and Arranged by Jay Giallombardo:

More Than You Need To Know

Rachel Was Here

Glue

### **ENHANCING LEARNING AND TEACHING OF PRE-SERVICE EDUCATION STUDENTS THROUGH PLAYWRITING AND PERFORMANCE: "LOUNGING," A DRAMA WRITTEN AND DIRECTED BY CMT INSTRUCTOR AND CASEP DIRECTOR**

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The play *Lounging* is a dark comedy set in a teacher's lounge of a Chicago inner-city high school. This drama—in two acts or scenes—depicts a day in the lives of a group of teachers, and a principal, who enter, exit, and inhabit this refuge. The action and dialogue escalate as the players interact and attempt to somehow confront the dangers and frustrations they face on a daily basis. Not restricted to a specific racial or ethnic group, any committed acting ensemble (including NEIU students and faculty) will discover that this activity will enhance their communication, critical thinking, and collaborative skills. In

addition, internalizing this process is an excellent teaching tool for prospective teachers. The above playwright has successfully implemented these concepts in elementary, high school, and college classrooms with students and teachers.

My Introduction to Theater section only enrolls first year students who intend to become teachers. Playwriting and performance are excellent tools for pre-service teacher training as a strategy to enhance student learning. By internalizing this tool; my students should be able to impart this knowledge in their own classrooms. Most importantly, the writing and directing of this drama has enhanced my teaching skills and supports my philosophy: "If we teach it we should do it."

Writing, developing, directing, and presenting this drama helps me to focus on a text from multiple perspectives, a concept I encourage my students to internalize. For these reasons, their final Introduction to Theater project consists of small groups of students collaborating on the writing of an original script connected to one of the plays we've studied. They memorize the script, and employing costumes and props present their drama to their peers in Northeastern's Stage Center Theater. Each scene is videotaped, and every student receives a copy of his or her performance and that of their classmates.

Instructing my students how to employ dramatic strategies in a classroom environment to enhance student learning is critical for their success when they become teachers. In addition, my pre-service students have successfully employed these strategies while observing and assisting public school classroom teachers.

## **EMERALD LANDS**

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This presentation focuses on my latest poetry collection in English titled: "Emerald Lands." A series of short poems that I am in the process of publishing, the work deals with the intersection of dreams, creativity, and reality. This collection is part of a long process of writing poetry that began with the 1981 publication of a bilingual (Spanish-English) collection entitled "Desde el océano – From the Ocean." Since then, I have published four other collections: "Jardín en Playa Unión," which deals with childhood and memory. Then I published "Ananda naranja" a poetry collection about spirituality. Recently, I published two more works: "Luz vital" in Spanish and "Ser Libre" in English in 2012. These five collections focus on microcosmic connections in the world "through the lens of romantic Zen Buddhism and magical realism" as Max Stern has written in [studiomosaic.com](http://studiomosaic.com).

The presentation will consist of a poetry reading, using PowerPoint to project a series of collages and paintings that I created. The images belong to a collection of gouache paintings entitled "Dreamwater" whose theme is the intersection of desires and dreams with

reality. The other images I would like to display belong to a collection of collages entitled “Ser Libre.” In these collages we see the transmutation of consciousness and the subconscious into art. I will use both collections of paintings and collages as a background to illustrate the new poems I will be reading to the public. The presentation will last about twenty minutes without exceeding half an hour, allowing ten minutes for comments, questions and answers.

The intended audience of the presentation is the general public, students, professors and other members of the university community. The purpose of the project is to display the relevance of creativity and work to manifest dreams that turn into realities. Personal education intertwines with the education of others. The teacher is also a student and a source of personal inspiration for himself/herself and for others. Focusing on the importance of self-knowledge, self-expression, and compassion the presentation is a path towards full awareness in harmony with all forms of life beyond any separation and borders. The poetry emphasizes, as I wrote elsewhere: “We are little birds in this awesome universe. Art is the gate to the unknown. Every instant is a blessing.” Focusing on literature and visual art, that express dreams and the manifestation of dreams into reality, the project invites the audience to remain in a creative path respecting nature and all sentient beings.

## **UNEARTHING THE STORY: THE DRAMATURG’S ROLE IN THE DEVELOPMENT OF A REGIONAL MUSICAL**

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Dramaturgs serve important functions within a theatre company, and yet most audience members have never heard of a dramaturg, and many people working in theatre have never worked closely with one. Dramaturgs do everything from serving as an internal researcher and resource for directors, designers, and actors to preparing contextual material that can be shared with audience members via lobby displays, study guides, and program notes. Their role, while less visible than that of the performers or even the artistic team is particularly important when a theatre company chooses to work on a new play and/or with a new playwright. In this context, dramaturgs can profoundly shape a play’s final text, as well as the production as a whole.

From 2010-2013 I served as the dramaturg for Endstation Theatre Company’s production of *Unearthed: An Appalachian Musical*. Over the course of three years I worked closely with the director, playwright, and composer, serving as a liaison between the individual artists we commissioned to develop the piece and the company and providing feedback that helped shape the development of the piece as a whole. The work was unique in the sense that it

was commissioned for by an existing company and with the strengths of particular actors mind. It was also somewhat unique in the sense that it was commissioned for a particular audience—in this case an audience in rural Virginia. In early conversations, the piece was designed to be a bluegrass inspired opera, but over time the piece shifted from a regional inspired folk opera, to a musical that would meld opera, bluegrass and folk music, with musical theatre in order to tell a story inspired by regional folk stories and history.

This presentation will focus on my role as dramaturg for Endstation Theatre Company's production of *Unearthed: An Appalachian Musical*. It details the process of dramaturging a new musical from initial idea to final performance, as well as presents the challenges and possibilities of developing new work for a particular company and audience. My presentation features images and video from the 2013 performance and details the changes made to the script over the course of the play's three-year development period.

<http://sbc.edu/news/endstation-theatre-company/endstation-premieres-unearthed-appalachian-musical/>

<http://www.broadwayworld.com/norfolk/article/Endstation-Theatre-to-Present-UNEARTHED-World-Premiere-726-28-20130725>

### **“ILLUMINATING THE FUTURE: *MOBY-DICK*, GLOBALIZATION, AND THE COMING RESOURCE CRISIS”**

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For all the ways in which *Moby-Dick* is studied—as a novel about the possibilities of democracy, about the limitations of accepted knowledge forms, about the dangers of totalitarianism, about the ideals of the United States—what is frequently forgotten is that Melville's magnum opus is an energy novel that was published during an energy crisis. In the first half of the nineteenth century, the New England whaling industry was a global enterprise that was central to the United States becoming a global empire. The whale industry procured vast quantities of sperm whale oil for the purposes of artificially illumination. Put differently, the sperm whale is materially central to the Enlightenment. However, by the 1850s, the context in which *Moby-Dick* was published, the industry was in crisis due to overfishing and the subsequent plummeting of sperm whale populations. This paper historicizes *Moby-Dick* as a transitional text on the precipice of what may be called “oil capitalism.” More than ever, I contend, we need to recognize and read *Moby-Dick* as a historically-situated energy novel, one that philosophically and politically meditates on the globalization of natural resources and the globalization of labor. Recognized as an energy

novel, Melville's "mighty book" becomes a "mighty" critique of global capitalism—an economic system that ideologically forecloses the ability to cognitively map the present and an economic system that forecloses a sense of futurity.

**IMAGINING A POLITICAL ECONOMY OF FREEDOM: USING THE AFRICAN  
AMERICAN WORKING-CLASS LITERARY TRADITION AS A RESOURCE FOR  
IMAGINING A POST-MARKET POLITICAL ECONOMY**

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In this talk, I will argue and explore the necessity of both interrogating and also re-imagining key concepts such as "freedom" and "equality" which have historically animated our political discourse and ideals and which we like to believe characterize our civil society. I will suggest that our current and most conventional understandings of "freedom" and "equality" are already couched in the terms and values of a market economy and class society, which I argue are forms of political economic organization that inherently and structurally militate against freedom and equality. The challenge for us in trying to achieve a society that practices freedom and equality is to develop a discourse and an imagination that think outside of a market economy and class-stratified society.

In my research, I suggest that we can find resources for this re-imagination of freedom and equality from outside the terms of a market economy by looking back to the moment of Reconstruction in U.S. history when newly emancipated African Americans were expectantly imagining freedom and equality as alternatives to systems of labor exploitation and class hierarchy. In particular, I will look to African American literature, such as the works of Toni Morrison and Charles Chesnutt, which return to and process this historical moment. In returning to Reconstruction, Morrison's representation pinpoints this episode as the moment when a particular language and conception of equality and freedom were inaugurated at the expense of other possible imaginations and implementations of them. Like Morrison, who returns to Reconstruction to recover a lost moment of possibility, Chesnutt, writing freshly on its cusp and still processing the transition and engaged with it, similarly challenges the separation of political conceptions of freedom and equality from economic ones by insistently rooting his fictional discussions and representation of freedom and equality in terms of political economy, recognizing that the obstacle to African Americans achieving equality was the resistance of the dominant culture and class to re-imagining and transforming the property relationships informing class society as a whole. Chesnutt's fiction engages in a re-imagination of property relationships, which, given that during slavery African Americans were considered property, entails a re-imagination of human and social relationships as well—a complete re-organization of the socio-economic

system. This re-imagination, as I will argue below, involves, in the tradition of the slave narrative in which both Morrison and Chesnutt are writing, an end to labor exploitation and, by extension I will argue, an end to the class system.

## HATE LANGUAGE IN THE 1972 GENOCIDE IN BURUNDI: DEHUMANIZATION AND THE BLAME GAME

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***Wars are not fought for territory, but for words.  
Man's deadliest weapon is language. He is susceptible to  
being hypnotized by slogans as he is to infectious diseases.  
And where there is an epidemic, the group mind takes over.***

***Arthur Koestler 1978***

Most poignant studies of genocide analyze Hitler's Holocaust, Armenian Genocide, former Yugoslavia (Bosnia), Cambodia, and Rwanda. Yet, in Burundi, within three months, from May to July 1972, Tutsi government-led forces and other collaborating Tutsi carried out a hideous slaughter of anywhere from 200,000 to 300,000 Hutu (Lemarchand 2009:406). These included ministers, professionals, members of the army, students, businessmen, teachers, priests, medical staff, etc.). Astoundingly, very few studies qualify these killings as genocide. To further exacerbate the incognito situation, as Barnabe Ndarishikanye (1998:146) points out, for fear of retaliation and because Burundian society knows how to hide its pain (secrecy and indirectness are the norm), the population continued to live as if nothing happened. Meanwhile, those in power qualified the end of the war as a victory against the enemy of the nation and forbid anyone to allude to it. Despite the imposed silence and obfuscation, hate language was loud and clear. This paper depicts inciting state-sanctioned hate metaphors that served to dehumanize and blame Hutu during the 1972 genocide. Numerous culturally and semantically connotative lexical items such as *igihere* 'bedbug', *inyankaburundi/abansi b'Uburundi*, 'Burundi enemies', *abicanyi* 'the killers/murderers', *inkozi z'ikibi* 'evil doers', *umumenja/umuyahudi/umuyuda* (from Judas) 'traitor', *mayimayi* 'water-like', *ikiza/événement de 72* 'epidemic of 1972' to refer to the genocide, were used to portray members of the Hutu ethnic group. Such words were abundant during and after the genocide. Dehumanizing and blaming in nature, this kind of language gave the Tutsi army and militia a reason to kill. In addition, this study shows that not only did this kind of language accelerate the killings, but also it also deeply wounded the survivors who, notwithstanding, were silenced. Using an ethnopragmatics framework (Goddard 2006), this paper analyzes the cultural practice in which hate language metaphors

were used to create a social identity that ultimately provided a rationale for the 1972 genocide in Burundi. The goal of this paper is threefold. First it directly aims to pinpoint the nature of the 1972 killings of Hutu in Burundi through the prevalent hate language. Second, it contributes to a number of other studies on genocide language ([www.genocidepreventionnow.org](http://www.genocidepreventionnow.org)) whose primary purpose is genocide prevention. Finally, this study indirectly constitutes a contribution to the healing process so direly needed in Burundi.

In observance of the centenary of Italy's gift to the world, Espresso, I propose to give an entertaining PowerPoint multi-media presentation on

***CAFFÈ EX MACHINA: ESPRESSO.  
ALSO INCLUDED MACCHIATO, CAPPUCCINO,  
FOR DESSERT I ADD ÉCLAIR...***

J. Peter Maher  
Linguistics, Professor Emeritus

This will be of interest to linguists, anthropologists, historians, art historians,, historians and other coffee drinkers.

**INNOVATION FOR SURVIVAL IN THE 21<sup>st</sup> CENTURY CLASSROOM**

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Big changes are likely to affect NEIU in the coming decade; some of these are local, some are regional, some national and some global. One factor affecting declining enrollments is the dramatic change in the underlying demographics. By comparing NEIU student age-gender breakdown to that of our immediate surroundings we find an alarming trend which suggests the current decline in enrollments will not rebound but will stabilize in the next few years, and then remain at the lower level. Population pyramids will give a view into the near future and a partial explanation of why enrollments in nearly every institution of higher education in the area have fallen.

But bigger changes still may be on the horizon; higher education itself may be facing a restructuring on the order of what has swept through publishing, news, film, and the music industries. It is driven by the sharp rise in the cost of a college education, by advances in technology, and the quick bold action by some universities which now provide free classes, MOOCS: massive open online courses. This research will document some of these



changes and explore ways in which Northeastern might survive them, and even thrive in the face of these potential threats, as new opportunities are presented, and some are particular to a commuter university like NEIU. These include online courses, hybrid courses, “flipped” classrooms, and more.

One novel idea which will be discussed is really only possible at a commuter institution in a dynamic region. It has the potential to incorporate many of the elements which are considered most valuable for a modern college education: civic engagement and community involvement, applied learning, problem-based study or the “inverted curriculum,” interdisciplinary work and more. At the same time it could significantly elevate NEIU’s visibility, attract more students through many new channels of recruitment, extend NEIU’s geographic reach and even bring national attention by modeling an exciting new 21<sup>st</sup> Century pedagogy. It promises to increase both retention and enrollment, support businesses, save carbon, and have a positive impact on urban development. It could also save money or even become a revenue builder through grants and contributions. And Northeastern – as a commuter campus – is uniquely positioned to implement this model.

Another innovation, somewhat more immediate, will be shared: early results from one of the first “flipped classrooms” at NEIU. In the flipped classroom, podcasted lectures are watched before class, leaving class time for more valuable face-to-face pursuits such as group work, discussions, debate, assignments, interaction, projects, and even community engagement.

## **COMPUTER ACTIVITIES AND JUST-IN-TIME TEACHING IN UNIVERSITY PHYSICS I**

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The traditional way of teaching physics follows a historic perspective where classical physics is taught first and modern physics, which includes relativity and quantum mechanics, are taught later as theories that fix shortcomings of classical physics. Chabay and Sherwood published the textbook *Matter and Interactions* that proposes to teach the University Physics sequence in a non-traditional way that incorporates the concepts of atoms, molecules, materials, and even the relativistic definition of momentum from the start. Another goal of the text is to show that physics can be taught as a small set of fundamental principles. One of the fundamental principles of mechanics is the momentum principle which is better known as Newton’s Second Law. When writing the momentum principle in approximate form ( $\Delta\vec{p} = \vec{F}_{\text{net}} \Delta t$ ) one can write very simple computer programs that can be used to simulate the trajectories and physical properties of a wide range of systems. It is then natural to incorporate computer based simulations into the course. We created computer based as well as physical laboratory activities that integrate the concepts learned

in the course and actively engage the students in the learning experience. To better relate to the students taking the course these activities were developed by two current undergraduate physics students. For each activity a key concept was identified and the activity was built around it. The activity starts with conceptual questions to help the students formulate models that explain the phenomenon being studied. Then the students use the computer simulations to help answer these questions and revise their initial assumptions. Whenever possible we added a physical laboratory component to further explore what the students learned in the simulations. All the computer simulations use VPython which is the visual module of the Python programming language. This allows for easy real time 3D visualization and manipulation of the simulations. In addition to the integration of computer activities in the lab portion of the course we also use it as a way to prepare students to the lecture portion of the class. We use the Just-in-Time Teaching (JiTT) method developed by Novak *et al* that blend active learning with Web Technology. One of the staples of JiTT is the use of online warmup exercises to help the students prepare for the lecture. Prior to the lecture the students are asked one open ended conceptual, one estimation, and a multiple choice question. They are also asked to provide a feedback about the exercise and about the chapter they just read. The deadline to submit the exercise is 2 hours prior to the lecture and the results are used to modify the lecture according to the student's understanding of the subject. The effectiveness of the computational exercises and JiTT is assessed through the use of Self-Assessment of Learning Gains (SALG) questionnaires.

## **DIGITAL ART AND ANIMATION BASED ON RECURSIVELY DEFINED TILING PATTERNS INCLUDING A NOVEL PATTERN UTILIZING THE GOLDEN MEAN**

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Computer Graphics has employed various means to add complexity and variation to deterministically generated patterns. Over the last thirty years I have explored a variety of techniques with the aim of creating images that meet my personal requirements for a kind of Dynamic Symmetry. My presentation is equal parts mathematics, technical process, and visual examples. The math is simple: transformations and particular ratios like  $\sqrt{2}$ ,  $\sqrt{3}$ , 1, and Phi. These are used to generate layered, recursively defined tiling patterns. This means that the patterns are applied repeatedly at different scales to create images with the property of self-similarity. The methodology is inspired by my early computer science training and is algorithmic in nature, but these techniques were developed using off the shelf software like Adobe Illustrator. I have several video projected still images and one animation to present.

Repetition with transformation defines symmetry. The term originally referred only to the type of bilateral symmetry exhibited by people's faces and bodies, but now generally

includes rotational transformations as in the spoked pattern of a wheel. Allowing scaling produces what is referred to as self-similar forms. People are recognized as being exceedingly adept at seeing pattern. Because people are so good at quickly identifying and pigeonholing patterns, that repetition is understandably equated with the term “boring”. People also delight in discovering new or unexpected patterns. This then becomes the challenge.

Some approaches to creating complexity involve breaking the pattern in some way. These include breaking the symmetry, leaving the pattern incomplete, or introducing some amount of randomness. The fractal geometry of Mandelbrot is popular as a way of producing forms that are similar at different scales, but the artist using his formulas is limited to cropping and coloring what are essentially graphs.

Imagine having a rectangular tile with an image and you want to overlay this with a scaled pattern of the same image. If you make the new tiles half the width and height of the original then you can create an overlaid pattern using four tiles. Of course you would want there to be some interesting interplay between the two layers. Repeating this process yields a new layer with sixteen tiles (4x4). Another repetition - 64 tiles (8x8). In four layers the number of tiles has quickly grown and the size of the tiles diminished as quickly. What I set out to do is find ways to design layered patterns where the number of tiles does not grow by a factor of four each layer to allow for a more gradual decrease in size. An exercise in pure classical harmony.

## **ASSESSING COMPUTATIONAL THINKING**

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In her seminal article, Wing (2006) was clear that “computational thinking” (CT) skills should be a part of everyone’s education, not just computer science majors. While the alarm has been sounded, and organizations like the Computer Science Teachers Association (CSTA) and the International Society for Technology in Education (ISTE) mobilized to begin promoting CT in K-12, Wing has argued that learning research had yet to be sufficiently utilized to maximize the impact of CT on K-12 education (National Research Council, 2011). This is readily apparent in the gaps that exist in research aimed at CT assessment (Grover & Pea, 2013). The lack of research and guidelines available for CT assessment is problematic because it makes both teaching CT appropriately, as well as incorporating it into other domains, difficult for K-12 educators.

To address this, we developed a task analysis using Gagne's outcomes of learning (1977) as a framework in a GEAR UP summer robotics program at NEIU, giving us a structure by

which to align CT objectives with the appropriate assessment. The entire learning task analysis included each CT skill as an overall goal, and then a breakdown of each task that included the situation in which the task was presented, the capability the student should demonstrate, the object of that action, how the action is to be demonstrated, the tools or constraints under which the student should operate, and then connecting it back to the category of capability. We developed our instruction to meet the various desired outcomes for CT skills. The objectives were carefully aligned with the assessment to ensure that objectives were met. The alignment of outcome to instructional approach to assessment avoids the misalignment problem of wanting the student to learn one thing, teaching another and assessing yet a third.

This is our first attempt at using Gagné's taxonomy, as well as aligning our curriculum to the CT outcome skills. In our next attempt, we plan to include a broader range of learned capabilities and break down the skills into more discrete elements. We would also like to take a look at other opportunities within the K-12 academic curriculum where similar projects would be appropriate.

This careful alignment of capabilities, outcomes, and assessments is indeed methodical work, but would result in innovative curricula that would expand the possibilities for our students. By concretizing what it means to have CT skills and subsequently aligning those skills to capabilities and assessments, we can measure CT skills effectively in various contexts, including those outside of computing. This will allow for the creation of curricula that will assist a larger number of students to acquire the skills that are vital for being active and engaged citizens in the 21<sup>st</sup> century.

### **AMYTROPHIC LATERAL SCLEROSIS IN *C. elegans*: UNDERSTANDING HOW TDP-43 AFFECTS MOTOR NEURON FUNCTION**

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Neurodegenerative diseases are both devastating and puzzling. Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disease characterized by the progressive loss of motor neurons, leading to paralysis and death typically within 2-5 years of onset. In certain familial and sporadic cases of ALS, mutations in TDP-43, a gene that encodes an RNA-binding protein, have been linked to neurodegenerative diseases, such as amyotrophic lateral sclerosis, though the pathological mechanisms of TDP-43 are unclear. Protein aggregates containing TDP-43 have been detected in affected tissues. In its mutated form, TDP-43 becomes inappropriately cleaved, leaks into the cytoplasm of

neurons and acquires a toxic gain-of-function. The toxicity may be caused by TDP-43 protein misfolding, and the accumulation of these nonfunctional proteins may form into insoluble aggregates resulting in neuronal dysfunction. Cells have evolved a quality control system that monitors and keeps protein production in check resulting in a properly folded proteome. Disruption of the cellular protein folding balance may be associated with TDP-43 aggregation and neurodegeneration. To systematically examine the relationship between the ALS-associated TDP-43 protein and disease pathology, we have established a disease model in the nematode *Caenorhabditis elegans*. *C. elegans* provides an excellent model system to address the mechanism of TDP-43 neurotoxicity. This model organism is highly amenable to genetics and the development and homeostasis of its nervous system has been well characterized. Our model expresses the human TDP-43 gene in all *C. elegans* neurons. Well-characterized behavioral assays that monitor neuronal function are being utilized to determine if our “ALS worms” recapitulate disease pathology. To assess motor neuronal function, we are monitoring the behavioral readouts of motility, pharyngeal pumping, and egg-laying. We are also analyzing the function of a different class of neurons, sensory neurons, using a nose-touch behavioral assay. Our data show that expression of human TDP-43 in the *C. elegans* neurons has significant, detrimental effects on worm motor neuron and sensory neuron function. Taken together, we anticipate that TDP-43 is disrupting a fundamental process shared by all neurons, possibly the quality control mechanisms preventing protein aggregation. Our future experiments will assess whether aggregation of TDP-43 correlates with loss of neuronal function.

## **DISCOVERY OF NOVEL PLANT-BASED ANTI-VIRAL COMPOUNDS**

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Prophylactic therapeutics and vaccines continue to be critical strategies to fight the spread of viral infections. For example, vaccines are the primary method of controlling the spread of influenza A virus. Due to the ability of the virus to constantly acquire genetic changes, new vaccines are formulated and produced annually based on the most widely spread strains in the previous year. In addition to vaccines, several prophylactic therapies are available, such as Tamiflu and Relenza, which can be taken after infection to halt the spread of the virus. These antivirals provide a treatment option post-infection, however, not all influenza A viruses respond to these treatments and some strains are resistant to these treatments. Thus new antiviral therapies are urgently needed. One impediment to developing antiviral therapeutics for highly pathogenic viruses, such as H5N1 influenza and Ebola, which require enhanced BSL-3 and BSL-4 containment respectively, is the safety concern. To circumvent this problem, we have established a surrogate pseudotyping

system, referred to as One-stone-two-birds approach here, which allows us to study the HA-mediated entry mechanism of influenza virus and the replication process of HIV. In this study, we evaluated and identified plant extracts that demonstrated antiviral activities by this approach. Several antimicrobial and medicinal therapies currently used have taken advantage of plants as a powerful resource. One such example is *Cinchona ledgeriana*, the rainforest plant from which quinine is extracted. Quinine was first discovered to have anti-malaria activity. For many years, quinine was processed from the bark of the tree and put into pill form until it was discovered that the chemically synthesized form was active and that plant material was no longer needed. The cinchona tree is just one powerful example of how plants can be incredible sources of medicinal compounds. In this study, 1,859 plant extracts were evaluated using the One-stone-two-birds protocol. We have identified 17 lead antiviral extracts against influenza viral entry and HIV replication. Several of the anti-HIV compounds are similar in efficacy to AZT, a currently prescribed HIV therapeutic. Furthermore, these select anti-HIV compounds are effective against infectious HIV virus as well. Combined, this study demonstrates the power of this screening method to identify novel antiviral compounds for therapeutic development.

## **DIFFERENTIAL ROLE OF TYPE TWO SECRETION EFFECTORS OF LEGIONELLA PNEUMOPHILA IN AMOEBAL INFECTION**

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*Legionella pneumophila*, the causative agent of Legionnaire's disease, is a Gram negative bacterium found ubiquitously in aquatic environments. Within these aquatic environments, *Legionella pneumophila* has been shown to interact and parasitize several genera of amoebae. Legionnaire's disease is a fatal type of pneumonia that affects immunocompromised individuals. Disease occurs when bacteria associated with droplets of water or protozoans are inhaled and establish infection within lung macrophages. *Legionella* encodes a type II secretion system (T2SS) that is required for intracellular infection of both macrophages and amoebal hosts. Through proteomic analysis the T2SS has been shown to mediate the export of greater than 25 effector proteins. While some of these proteins have been ascribed activity others are novel proteins that show weak similarity to proteins of known function. Previously, we have shown that type II secreted effector proteins play a role in the infection of several amoebae genera, including *Acanthamoeba castellanii*, *Hartmannella vermiformis*, and *Naegleria lovaniensis*. The acyltransferase, PlaC has been implicated in *H. vermiformis* and *N. lovaniensis* infection but not in *A. castellanii* infection whereas nttA was recently implicated in *A. castellanii* and *N. lovaniensis* infection but not in

*H. vermiformis* suggesting host specificity. *Willaertia magna* is a free-living amoeba found in aquatic environments has recently been shown to be susceptible to infection by the Paris strain of *Legionella pneumophila* but not by two other *Legionella pneumophila* strains (Lens and Philadelphia) belonging to the same serogroup (Serogroup 1). To further examine the role of type II secretion (T2S) in host specificity of other amoebal hosts, we tested a *Legionella pneumophila*-130b (Serogroup 1) mutant lacking the T2SS apparatus, *IspF*, in infection of *Willaertia magna*. We found the T2SS mutant to be defective, suggesting a role for T2S effector proteins in this amoebal host. To better understand the role of the T2S effector proteins in *Willaertia magna* infection we used co-culture techniques to test individual T2S effectors protein mutants. We found that PlaC and the newly described T2S effector protein, *nttA*, promote infection of *W. magna*. Interestingly, the metalloprotease, *ProA* and the ribonuclease, *srnA*-- two effector proteins that were previously described in promotion of *H. vermiformis* infection did not promote infection in *W. magna*.

### **BEYOND FREQUENCY AND DENSITY-DEPENDENCE: AN EXPERIMENTAL DEMONSTRATION OF THE IMPORTANCE OF NON-LINEAR TRANSMISSION DYNAMICS IN A HOST-MACROPARASITE SYSTEM**

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Understanding the form of pathogen transmission is important for modeling disease impacts on host population dynamics, forecasting disease persistence in host populations and establishment in new populations, and understanding the evolution of virulence. An embedded assumption in contemporary disease ecology is that the form of transmission is either density or frequency dependent. However, there are surprisingly few attempts to empirically test transmission forms, particularly for competing models beyond frequency and density dependent transmission. Here, we used a novel experimental approach in which we vary four different factors (duration of exposure, numbers of parasites, numbers of hosts, and parasite density) influencing transmission. We investigated transmission using the trematode *Ribeiroia ondatrae* and larval amphibian hosts. This macroparasite system offers several advantages as a model system (e.g., ease of manipulating infective stages and lack of intrahost replication). Furthermore, by manipulating host behavior we were able to isolate the influence of parasite behavior on transmission dynamics. We evaluated seven candidate transmission functions using maximum likelihood methods to identify the best fitting model to the experimental data according to Akaike's information criterion. Our results indicated that, among the candidate models considered, non-linear forms of transmission involving either a power law or negative binomial function were the best fitting models and

consistently outperformed classical density and frequency dependent functions. The power law function was the best fitting model for experiments varying the duration of exposure and host number, while transmission dynamics in experiments varying parasite number independently of parasite density was best represented by the negative binomial function. These functional forms are consistent with saturating infection with high parasite exposures. The negative binomial function remained the best fitting model when parasite behavior was isolated from host behavior using anesthetized hosts. Upon re-analysis of previous empirical data from other macroparasite systems, we found that non-linear functions were a superior fit to the data relative to density or frequency dependence, suggesting that non-linear transmission dynamics are general across multiple host-parasite systems. These functions highlight important parallels with models of other species interactions, including predator-prey and host-parasitoid dynamics. Suggested mechanisms for non-linear transmission include heterogeneity in susceptibility or distribution or density-dependence in the parasite population. Our results have implications for disease management and provide a basis for conceptually integrating models for pathogen and consumer resource systems.

## **RED-LIGHT PHOTORECEPTORS IN MYXOBACTERIA: IMPLICATIONS FOR LIGHT-DRIVEN MULTICELLULAR ASSEMBLIES**

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Photoreceptors are proteins that enable organisms to perceive and respond to light, an essential environmental signal. The physiological role of these proteins in photosynthetic bacteria is well established; however, these proteins are also found in non-photosynthetic bacteria, where their role and function remains largely unknown. We focus on the physiological role of red-light photoreceptors known as bacteriophytochromes (BphPs) in non-photosynthetic myxobacteria. Among prokaryotes, myxobacteria are distinguished by a unique multicellular stage in their life cycle known as fruiting bodies. Starvation-induced fruiting bodies house desiccation-resistant spores that can germinate into a vegetative cell upon nutrient availability. Interestingly, fruiting bodies of *Stigmatella aurantiaca*, a well-characterized myxobacterium, are markedly stimulated by red and/or blue light. The *S. aurantiaca* genome annotation indicates the presence of two BphPs while the genome of closely related *Cystobacter fuscus* contains three BphPs. Our primary goal is to determine the role of BphPs and light in stimulating fruiting body assembly in *S. aurantiaca* and *C. fuscus*. We use a complementary, multi-technique approach that spans from the atomic to the cellular level, to elucidate structural and functional roles of BphPs in *S. aurantiaca* and *C. fuscus*. Specifically, the three main objectives are to: a) investigate the mechanism of fruiting body formation in myxobacteria with respect to light by inactivating / mutating genes coding for BphPs and screening for expected phenotypes; b) characterize the function of



myxococcal BphPs *in vitro* through kinase activity assays and spectroscopic methods, including ultra-fast UV-vis absorption and fluorescence spectroscopy; and c) determine the structure(s) of the proteins from *S. aurantiaca* and *C. fuscus* in the respective light- and dark-adapted states to increase the limited structural knowledge of BphPs. Therefore, our research aims to determine mechanistic changes accompanying light-induced morphogenesis of myxobacteria and the novel role of photoreceptors in these non-photosynthetic microorganisms. By combining protein kinase function and structure(s) with bacterial multicellular behavior, we hope to provide new insight for fundamental, light-induced structural response mechanisms in biological systems.

## **DOMAIN STRUCTURE OF A UNIQUE BACTERIAL RED LIGHT PHOTORECEPTOR AS REVEALED BY ATOMIC FORCE MICROSCOPY**

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Bacteriophytochromes (BphPs) are red-light photoreceptors found in photosynthetic and nonphotosynthetic bacteria that have been recently engineered as infrared fluorescent tissue markers. Light-induced, global structural changes are proposed to originate within their covalently linked biliverdin chromophore and propagate through the protein. Classical BphPs undergo reversible photoconversion between spectrally distinct light absorbing states, Pr and Pfr respectively. RpBph3 (P3) from *Rhodospseudomonas palustris* is unique because photoconversion occurs between Pr and unique near-red (Pnr) light-absorbing states. Due to size and photosensitivity of BphPs, structures of the intact proteins have not been resolved by nuclear magnetic resonance and/or X-ray crystallography. Therefore, structural details about the light and dark-adapted structures of the intact BphPs are not well understood at the molecular level. For this reason, we have developed methods using scanning probe microscopy (SPM) to characterize the structure of BphPs when bound to a surface. SPM, more specifically scanning tunneling microscopy (STM) and atomic force microscopy (AFM), can provide topographical information of individual molecules on a surface by measuring the electrical and/or force response of the surface using a tip. This presentation will focus on the utilization of fluid cell, tapping mode AFM to investigate the domain structure of intact P3 in its light-adapted state (Pnr) on mica. By varying the concentration of the protein solution, deposition time, and the ionic strength of the buffer solution, the aggregation of P3 on a mica surface can be controlled and single dimers may be observed in a biologically relevant media. Domain resolution has been achieved for several orientations of the dimer on the surface. The structural dimensions of the dimer have been compared to a model, intact BphP generated using Pymol software. AFM experiments are currently underway to analyze the dark-adapted state (Pr) of P3 in order to

observe the anticipated structural changes. Another future goal is to characterize P3 in the Pnr state on a biocompatible surface, such as a functionalized poly-ethylene glycol (PEG) and N-hydroxyl succinimide functionalized self-assembled monolayers in order to better understand the impact of the surface on the observed topographies. Ultimately, the goal is to use AFM and other surface analytical methods such as scanning tunneling microscopy and scanning electron microscopy to gain new insight into the unique photochemistry of P3.

## **FROM ECOLOGY AND COGNITIVE PSYCHOLOGY TO POTASSIUM CHANNELS AND NEURAL NETWORKS: UNDERSTANDING HOW PRAYING MANTISES RECOGNIZE PREY**

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The praying mantises are a diverse group of charismatic predatory insects with a rich literary history both in the early scientific and popular presses. Despite the widespread interest that these animals engendered, however, much of what was published about mantises in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries was based on what are now understood to be erroneous assumptions about invertebrates in general, and mantises in specific. This is particularly true regarding what is arguably one of the most intriguing of mantis behaviors: the rapid visual identification of potential prey items. Until as recently as the late 1980's, mantises were thought to be reflex bound, and morphologically, behaviorally and neurologically designed to recognize and capture only small, "fly-sized" prey. However, this is inconsistent with the actual behavior of mantises in the field. In reality, mantises are adept predators that capture a wide range of prey items including same-sized conspecifics, and the occasional vertebrate. Psychophysical studies done in our lab have demonstrated that mantises do not recognize these various prey items *explicitly* (e.g., by a matching-to-template strategy). Instead, they do so *implicitly* by simultaneously assessing several stimulus parameters (e.g., size, orientation, movement, and contrast). If a sufficient number of parameters meet threshold levels, the object is seen as prey. This is analogous to how humans, for instance, identify an exemplar of an abstract category such as "attractive person". We are now beginning to unravel the neural networks that are responsible for this (proto-)cognitive ability. Electroretinograms (ERGs) recorded from the compound eyes of several mantis species demonstrate that luminance increments elicit robust photoreceptor depolarizations similar to those created by TRPL (transient receptor potential-like) cation channels. These depolarizations are opposed (and shaped) by rectifying (outward) currents similar to the voltage gated potassium currents seen in other insects. Luminance decrements (e.g., as would be caused by a moving prey item), elicit photoreceptor hyperpolarizations, and depolarizations in the lamina monopolar cells (LMCs) on which photoreceptors synapse. We believe that a subset of the LMCs synapse on more centrally

located lobula giant movement detector interneurons (LGMDs). We have shown that the activity of the LGMDs is correlated both with the appearance of prey-like stimuli, and with the occurrence of predatory strikes in intact mantises. It is the functional architecture of the neural network between the mantis' photoreceptors and the LGMDs that creates the remarkable prey recognition abilities of these charismatic predators.

## THE ROLE OF DOPAMINE IN THE MODULATION OF SIGNALS AT THE PHOTORECEPTOR-BIPOLAR CELL SYNAPSE IN THE ADULT ZEBRAFISH RETINA

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In the retina, dopamine has been shown to differentially modulate the response properties of glutamate receptors in outer retina at the photoreceptor to bipolar cell synapse (Maguire & Werblin, 1994). The purpose of the project is to examine dopamine neuromodulation of glutamate receptors in retinal bipolar cells in zebrafish. Adult male and female zebrafish were randomly selected and divided into two groups, control and experimental. The experimental group was exposed to 880  $\mu$ M of the neurotoxin 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) to cause the degeneration of dopamine neurons. Responses of on and off bipolar cells were examined with an analysis of the *b* and *d*-waves in the electroretinogram (ERG). Light-adapted ERGs responses were recorded to white light stimuli of varying intensity and duration. The *b* and *d*-wave amplitude was measured and the intensity response function was determined for the *b*-wave. The intensity response function is fit with a model that assumes a single contribution to *b*-wave response that has a linear rise followed by a hyperbolic saturation. The light adapted ERG response to a brief flash is dominated by the positive going *b*-wave. As intensity is increased, the amplitude of the *b*-wave (the on-bipolar cell component) increases. After exposure to MPTP, the ERG response has a similar time course as the control but the *b*-wave amplitude is reduced. The corresponding intensity response function shows an increase in the response amplitude measured near the peak of the *b*-wave with increasing stimulus intensity, however the relationship cannot be described with a hyperbolic function. The data fall above the model curve, suggesting multiple cellular contributions to the *b*-wave of the brief flash ERG. After exposure to MPTP, the intensity response function supports the result of a reduced *b*-wave. As the duration of the flash is increase from 50 to 5000 ms, a separation between the on (*b*-wave) and off (*d*-wave) components can be seen. Once separated, exposure to MPTP reduced in the amplitude of *d*-wave and increased the sustained potential between the *b*- and *d*-waves. The results from this study provide evidence for the role of dopamine in the modulation of glutamate receptors on retinal bipolar cells using a methodology that does not require disruption of the cellular environment in the retina. The ERG is recorded

noninvasively and is used in both human and animal species, thus allowing direct comparison of retinal function under a variety of conditions.

## **THE FUNCTION OF REPETITION IN DISCOURSE COMMUNITY INITIATION: A CASE STUDY OF PEER TUTORING IN A WAC WRITING CENTER**

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For decades, writing center administrators have debated whether or not writing center tutors should be—or need to be—familiar with course content in order to be helpful to a tutee (Hubbuch, S., 1988; Kiedaisch, J. & Dinitz, S., 1993; Walker, K., 1998). One argument is that generalist writing tutors don't *need* to be familiar with the content and actually they shouldn't be; being unfamiliar with discipline-specific knowledge forces tutees to articulate and explain themselves much more thoroughly, which may result in a deeper understanding of the tutee's subject knowledge (Healy, D., 1991; Hubbuch, S., 1998; Luce, H., 1986; Pemberton, M., 1995). On the other hand, some argue that writing center tutors need to be familiar with not only the course content but also the discourse community in order to help students connect disciplinary writing with disciplinary thinking and internalization (McLeod, S., 2001). As a result, these specialist discipline-specific writing tutors can help initiate students into the academic community that establishes, regulates, and maintains disciplinary epistemology, and in order to do that, these writing tutors must be more than familiar with the discourse: they must practice and live it (McLeod, S. 2001; Kiedaisch, J. & Dinitz, S., 1993; Walker, K., 1998).

With this debate as its foundation, this IRB-approved sociolinguistic case study examines whether discourse community initiation actually occurs in a writing center session when a student meets with a discipline-specific writing tutor, and if it does, how it manifests in that interaction. The analysis focuses on a single student who is enrolled in two writing-intensive courses in two un-related fields: English and Psychology. Transcripts and video clips from two video recorded tutoring sessions—one session involving this student and her ENGL peer tutor and the other session involving this student and her PSYC peer tutor—provide the data for an ethnomethodological, pragmatic, and discourse analysis. Data allow for both description and comparison of how this student and her writing are supported in each discipline.

Interesting linguistic patterns emerged in both tutoring sessions, the most frequent being word and phrase repetition—first on the tutors' parts and then on the student's part. I argue that the peer tutors engage in lexical, syntactic, and paralinguistic repetition in their sessions in order to explain discipline-specific information and encourage the student to feel

more comfortable with the organizational configurations of knowledge within a particular discipline.

Comparing how a single student learns to write and think in two distinct disciplines yields a rich discussion of the composition standards of these disciplines and how discipline-specific writing tutors can promote academic discourse community membership through their writing center sessions. With this investigation I am hoping to shed new light on the stale and abandoned deliberation of the generalist vs. specialist and suggest implications for future writing center models.

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**JUST BELOW THE SURFACE: LINGUISTIC IDEOLOGIES IN THE URBAN CLASSROOM**

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Discrepancies between "home English" and "school English" for urban students have been addressed for decades by a number of scholars in the fields of linguistics, education, and sociology (Baratz 1969, Baugh 1995, Charity et al 2004, Alim 2009, Edwards 2010). Those students who speak prestige varieties of English tend to do better in school settings, in

which the teacher's language is that of the mainstream middle class. Some researchers have examined the teachers' contrastive analysis of non-prestige varieties of English with that of the prestige variety (Pandey 2000, Wheeler and Swords 2006), but there is a dearth of literature about classroom language strategies from the perspectives of both the teachers and the students.

This paper presents the linguistic situation in one Chicago high school in which most of the teachers hail from different dialect backgrounds from their students. In order to critically understand what teachers are trying to do in their interactions with their students, interviews were conducted at the beginning of the study in November 2010, and at the end of the study in June 2011. These interviews lasted 30-40 minutes, and were conducted with each teacher individually. Many of the questions in the first interview focused on relationship- and rapport-building strategies. The second interview questions focused more explicitly on the linguistic strategies teachers use in their classrooms, and thoughts the teachers had on the use of non-prestige dialect in their classrooms. The questions in the second interview also asked teachers to reflect on the classes under study.

Additionally, questionnaires were administered to the students regarding their teachers' language use in the classroom. These questionnaires were meant to assess the effectiveness of the teachers' language strategies from the students' perspective, and to indicate whether the students' and the teachers' beliefs about what happened in the classroom were compatible.

Through the use of the two methods, a more complex picture of teachers' language strategies is presented. Perceived use and rapport-building strategies are examined through the teacher interviews, while the effect of the teachers' strategies is revealed through the student questionnaires.

This type of study has the potential to expose linguistic tensions apparent in the mainstream urban American classroom, with the further possibility for discussion, demystification, and deconstruction of language ideologies and linguistic identities inherent in the makeup of urban societies.

## **WINNING TEACHERS, WOEFUL TEACHERS: HOW TO TELL THE DIFFERENCE**

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This study investigates working teachers' beliefs about effective teacher evaluation within the context of current education reform. Teacher evaluation is undergoing increased

scrutiny and standardization. Yet, teacher evaluation protocols are, often, designed apart from the input and control of teachers themselves. The purpose of this study is to probe what professional teachers believe is important in their evaluations.

**Significance of project:** This study is significant because, nationally, teacher evaluation is undergoing a major revision. While checklists of teaching criteria have been commonly used over the last century, these have not, until now, been standardized. The common use of the Danielson Framework (Danielson, 2013) and other, similar, protocols represent a codification and extension of current practice in teacher evaluation. The sole innovation in teacher evaluation is the use of students' standardized test scores to evaluate teachers. This practice, which began under the No Child Left Behind Law (NCLB) in 2002, has been steadily promoted since, and has found its way into state law and district policy. This study probes teachers' beliefs about these practices.

**Methodology:** This study uses Q methodology (Stephenson, 1953). The concourse was developed based on an analysis of open-ended responses written by forty-three classroom teachers in answer to the prompt, "How should teachers be evaluated?" The conditions of instruction were designed to elicit what teachers themselves recognize as valid indicators of performance in the profession. Thirty-eight teachers, none of whom contributed to the development of the concourse, participated in the sort that was analyzed using PQMethod 2.11 (Schmolck, 2002) with principal components analysis and varimax rotation to extract factors. The authors chose to elaborate on a two-factor solution in which 37 of the 38 participants represent a defining sort and which accounts for 49% of the variance.

**Summary of results:** The results suggest that teacher beliefs, identified in each of the two factors that emerged, occupy a harmonious profession spectrum. One factor focuses on relationships between teachers and students, while the second factor focuses on academic rigor. A salient result that emerged from a consensus item revealed that teachers unanimously and strongly reject the premise that students' standardized test scores should be used as an element in their evaluation.

**Conclusions:** This study was conducted to tap the voice of teachers. The two-factor solution yielded positive and optimistic information on teacher beliefs, beliefs that are fortunately reflected in current teacher evaluation protocols nationwide. A consensus statement, however, identified the fact that the participating teachers neither value nor respect the only innovation in current teacher evaluation, the use of students' standardized test scores.

*Keywords:* supervision, education reform, student achievement, teacher quality, Q methodology.

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## THE RESPECTED SCHOOL LEADER

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The research objective of this study is to make a contribution to the field of school leadership by determining the variables that contribute to defining school respect and leadership. Our review of the research/ literature in school leadership to date revealed no books and limited research on the domain of school leadership and the attribute of respect. Our hypothesis is that it is only possible to achieve and maintain leadership status or influence over followers with the respect attribute. As such, a book entitled, "The Respected School Leader" (RSL), currently under publisher's contract (Routledge/Taylor and Francis Group, New York), would be of value to educators aspiring to be leaders. Additionally, practicing school leaders should find this work significant for their own personal and professional development in attaining an awareness of their own respect status.

In creating our research design and methodology, which has been approved by the NEIU Institutional Review Board (December 19, 2011), we have categorized public schools by size: small, medium and large. The schools are defined as "small," school student population under 500, "medium," school student population greater than 500 and less than 1000, and "large," student population greater than 1000. Schools were also divided into three categories by grade level structure/organization: Elementary K-5, Middle School/Junior High 6-8 and High School 9-12. As such, twenty-seven schools in urban and twenty-seven schools in non-urban settings were selected that met the criteria of school size and grade level organization.

The authors have developed a three dimensional model that includes the following potential variables to be correlated: Effectiveness, Relationship Building, and Time. These variables will be measured using surveys distributed to students, teachers and community members in urban and suburban schools identified in the research design. In addition selected focus groups will be formed from the surveyed populations to discuss potential variables in-depth. We intend that our research will reveal the rank ordering of variables of effectiveness and



relationship building skills. When in combination, the variables might determine the school administrator's respect status and the length of time required to become respected in a school setting.

Currently the research work is in progress and there are no results to report at this time. Our presentation will focus on a progress report to date.

## **EFFECTS OF SCIENCE INQUIRY PRACTICES ON DIVERSE 7TH GRADE STUDENTS' SCIENCE ACHIEVEMENT AND ATTITUDES**

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Science inquiry using an interdisciplinary approach has been more emphasized, but elementary teachers often struggle with how to design and implement inquiry instruction for their students (Banchi & Bell, 2008; Padilla, 2010; Rommel & Ronald, 2012). For many, just understanding what "inquiry" is can be difficult. Science inquiry among diverse learners, including English language learners (ELL), is getting more attention than before since we all know the amount of ELL students keeps increasing in all, and educators must become better prepared to accommodate them. Teachers need to know how to integrate English language learners into this new way of teaching science (Nabors & Edwards, 2012; Ortega, Luft, & Wong, 2013). The goal of the study is to examine participating students' science achievement and attitude changes after inquiry based activity experiences.

A total of 30 students from an urban elementary school who were entering the eighth grade were recruited for this study. Demographic information on the students indicated that 27.0% were Hispanic, 24.3% were White, 13.5% were African American, 24.3% were Asian, and 10.8% were of unknown ethnicity. In addition, 54.1% of the students said English was their first language, while 8.1% responded Spanish, 5.4% responded Korean, and 32.4% said that a language other than English, Spanish, or Korean was their first language.

Thirty 7<sup>th</sup> grade students explored harmful/helpful effects of Ultra Violet (UV) rays on the human environment using their own scientific methods. They were encouraged to define problems, develop models, plan and carry out investigations, analyze data using mathematical thinking, engage in argument from evidences, and communicate obtained information. These processes are mainly known as inquiry-oriented approaches (NRC, 2000) and also defined as the Science and Engineering Practices in the next generation science standards (Achieve, 2013; NRC, 2012). Individual students designed their own experiments by choosing different materials to test for the best protector of UV light.

The Science Exploration Sheet (SES) which measured their scientific achievement showed that 92% of students were able to answer their own questions using their own scientific models. However Pre- and Post-Attitude surveys revealed that there was no significant change on students' attitudes about science/scientists after the inquiry intervention ( $p < .05$ ). Finally participating teachers' views of teaching science as inquiry for their ELL students

were collected. They said that inquiry-based learning is more beneficial for both non-ELL and ELL students because they are more productive and are able to design/develop science experiments on their own. For example, teacher A said: "Inquiry approach can open up opportunities for working with others, sharing ideas, and most importantly students teaching students."

## **MEASURING TEST PERFORMANCE IN DEVELOPMENTAL MATHEMATICS: INCREASED EXPOSURE TO A TESTING ENVIRONMENT LEADS TO GREATER PASS RATES**

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The purpose of this research is to identify how Developmental Mathematics (DM) instruction supplemented by online learning resources can most effectively increase student performance and pass rates in the following three courses: Math 090, 091, and 092. A greater pass rate is a result of an increased exposure to a testing environment. A newly developed instructional model incorporates Practice Tests (PTs) and Test Study Plans (TSPs) into the online resource curriculum. The PTs contain content similar to that of the Module Tests (MTs), and simulate the testing environment. The TSPs will allow for the student to recover lost skills that are identified from the PTs. With this particular model employed over two semesters (Summer 2013 and Fall 2013) in five (5) DM courses, students actively engaged in these two activities are scoring *higher* passing grades on their MTs.

More than 60% of the NEIU students have taken a DM course(s). Unfortunately, due to failure in these courses, many of these students do not continue to pursue a degree and withdraw from the University. We hope to increase attrition with these instructional methods that simulate a testing environment and allow for a refinement of study skills. Online resources have become an integral part in the learning of DM. The mode of online resources used in this research was confined to MyMathLab (MML), which is a product of Pearson Education. MML has been used within the DM department for the past 8 years now. Direct feedback continuously identifies the ease of use and likability of the MML resource used in the DM courses since the department has been using it.

Greater pass rates in DM courses is an objective the entire country has been striving for. These new online resources have increased the pass rates steadily since they have been incorporated. Now that these resources have evolved, new methodologies have allowed for immediate feedback for students and have given them more confidence in an otherwise disliked and discouraging subject. The more time our students spend on preparing for their MTs, the better they perform. Instructors teaching DM courses need more time to interact with their students in the classroom. The sense of urgency can be supplied and provided for

with immediate feedback from the instructor in a longer class period. The request for an increased timeframe of instruction should be honored for future DM courses offered at NEIU.

Statistics have been collected from five (5) DM courses from the Summer/Fall 2013 semesters. The statistics are all generated from MML data for each student in these courses. These datum are specifically chosen from the actively engaged students to supplement the study. Methods of statistical mathematical modeling are used in generating the probabilities of success in a DM course. Success is identified by an average MT score of 70%. Several PowerPoint slides can be displayed to allow for the audience to observe the findings and understand how the statistics are generated. These slides will have some graphs for each of the five classes and each students' performance in several categories: Homework, PTs, TSPs, and MTs. The presentation of statistics found in support of this newly employed DM model should allow for the audience to understand how the teaching of DM has evolved at NEIU and how important it is that these new models continue to be used in the future.

**A TIME FOR EVERYTHING:  
ASSESSING LEARNING EFFECTIVENESS AND STUDENT EXPERIENCE IN AN  
ENVIRONMENTAL INTERPRETATION SERVICE-LEARNING SETTING**

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Students enrolled in the Fall 2012 Environmental Interpretation course (GES 309) completed a collaborative service-learning project with the Norwood Park Historical Society (NPHS). The learning objectives for this project focused on student integration, practice, and application of course-developed skills in an actual interpretive setting. Specifically, students worked with the NPHS to design interpretive materials surrounding the collaboratively developed theme of “Norwood Park: A Time for Everything.” Connecting to and providing services for a community organization also strengthened the service-learning and community partnership missions of both the course and the department. The objectives of this research were to assess the effectiveness of service learning in terms of the integration and retention of interpretive principles, as well as to measure the experiences of students in a service-learning environment. Final projects and presentations from six student groups (3-4 students per group) were measured to determine how students integrated various interpretive skills. Interpretive skill measurement included student integration of the main theme and sub-theme, the production of two interpretive outcomes, and the effectiveness of the presentation of the themes and outcomes to the client. Student experiences were measured by a qualitative analysis of self and group evaluations as well as an end-of-semester reflective paper in which students documented their growth as

environmental interpreters in light of the service-learning project. Anonymous comments from end-of-semester course evaluations were also analyzed to determine students' reflections about the project. These evaluations were compared to end-of semester evaluations from a previous section of the same course (Fall 2011) in which the final project was designed within the University setting to determine any differences. Results demonstrate that students developed not only well-rounded and effective interpretive skills through service-learning projects, but high levels of personal investment and group identity related to the field site. Assessments of student experiences compared with those who did not complete the service-learning aspect of the course indicate that the service-learning model helps students integrate course skills in ways that a University-centered project do not. Results from studies such as this can inform future research regarding the effectiveness of service-learning opportunities related to both the enhancement of student academic experiences and the benefits of community partnerships.

## **EXAMINING A NEW TEACHER PREPARATION PROGRAM'S EFFECT ON PRESERVICE TEACHERS' VIEWS OF NATURE OF SCIENCE**

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Nature of Science (NOS): Perceptions and attitudes toward what science is and how scientists acquire scientific knowledge.

VNOS: Views of Nature of Science Survey

The purpose of the study is to explore the preliminary effects of a revamped elementary teacher education program on preservice elementary teachers' NOS views. Researchers in this study hypothesize that participants' science content knowledge has a strong effect on their attitudes toward learning nature of science concepts. The ability to understand basic science concepts and solve related problems requires analytical and logical thinking skills. In learning basic scientific concepts, students need to make meaningful connections among abstract concepts so they develop various solutions for particular scientific problems. To do so, students should employ their reasoning rather than repeating the steps provided by textbooks or teachers. Likewise, students should question the facts, hypotheses, theories, and laws regarding values that influence the way in which scientists develop scientific enterprise.

The research maintained a mixed-method approach using explanatory techniques of qualitative research to explain quantitative data (LeCompte & Priessle, 1993; Creswell, 2003). The data was collected from two sections of a course designed for elementary

preservice teachers focused on science teaching methods during the spring semester of 2012. In these classes a set of scientific inquiry-based nature of science activities was implemented, and the NOS concepts were explicitly discussed.

Thirty-two preservice teachers, 3 males and 29 females, participated in the study. Most of the participants came from low-income families and are first generation college students. Many of the participants work part time or full time in addition to attending school.

The authors scored the views together reaching an interrater agreement above 80%. Only the participants who responded to both the pre and post NOS questionnaires were analyzed. The participants' responses were sorted and organized based on the seven NOS concepts. For each participant, the questionnaires were scored on a 4-point scale.

In the revised elementary teacher education program, nature of science was made to be an explicit outcome of the teacher preparation program. Our findings indicate that the score average of students taking this sequence of courses attain near adequate understanding of all NOS concepts except for the function and differences between theories and laws. In conclusion, the results of this study have shown that even with an explicit nature science focused course, students still need further supports to reach fully informed views on the nature of science. Furthermore, the misconceptions related to the function of theories and laws are particularly resistant to conceptual change. Further research is needed into whether this instruction is facilitated by the content knowledge or independent of it. If prospective teachers improve their content knowledge and related process skills needed to understand science concepts, then they may learn NOS concepts better and appreciate teaching them in their future classrooms.

## **MOLECULAR DYNAMICS INVESTIGATION OF THE ALKANE/WATER: THE EFFECT OF ALKYL CHAIN LENGTH AND IONIC SPECIES ON INTERFACIAL PROPERTIES COMPARED TO THE AIR/WATER INTERFACE**

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An in-depth understanding of a wide range of physical, chemical, atmospheric, and biological processes can only be achieved after the structure and dynamics of interfaces and the interfacial behavior of aqueous species, such as ions, are thoroughly studied and understood. This molecular dynamics study was conducted to gain a more comprehensive understanding of the behavior of ions in the bulk and interfacial regions of the alkane/water and air/water interfaces. Computational scientists have successfully studied the behavior of isolated ions dissolved in specific liquids under *ideal* conditions. Although this information is

very useful, real systems are often made up of many species interacting with some kind of interface (two phases that do not mix) where conditions are far from ideal. In this work, the behaviors of ionic species are compared at the air/water and alkane/water interfaces to determine the effect of the interfaces on the ionic species. The ionic species examined were found to have more favorable interactions with the air/water interface than with the alkane/water interface. At the air/water interface the effect of counterion (sodium cations) charge and the influence of ion pairing on anion (chloride) propensity for the air/water interface was investigated. It was found that the counterion has a significant effects on the behavior of the anions. Higher counterion charge led to greater interfacial activity of the chloride anions and also caused stronger binding between the sodium and chloride ions. Shorter sodium-chloride interatomic distance also led to greater anion interfacial propensity while dampening the interaction strength between the counterion and anion had a small effect on propensity of the anions for the interface. The alkane/water interface was also investigated to determine the effect of changing the length of the alkyl chain on the water/alkane interfacial width. Longer alkane chain length led to shorter alkane/water interfacial widths. In the future, similar studies will be carried out at the alcohol/water interface and the effects of the nature of the organic phase (alkane or alcohol with varied alkyl chain lengths, degrees of branching, and solubility in water) will be examined.

## **STRUCTURAL ANALYSIS OF BACTERIOPHYTOCHROMES ON GRAPHITE AND MICA USING SCANNING PROBE MICROSCOPY**

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Bacteriophytochromes (BphPs) are red-light photoreceptor proteins found in photosynthetic and nonphotosynthetic bacteria. Classical BphPs undergo reversible photoconversion between distinct red-light (Pr) and far red-light (Pfr) absorbing states. We are studying RpBphP3 (P3) from *Rhodospseudomonas palustris* that has unique photoconversion between Pr and near-red-light (Pnr) absorbing states. To investigate the structure of intact P3, we are using Scanning Tunneling Microscopy (STM) and Atomic Force Microscopy (AFM), two powerful surface analytic methods that can produce images of the macromolecules with individual domain resolution. The protein molecules studied by us self-assemble onto a surface due to protein-protein and protein-surface interactions. We have used STM and AFM to image the proteins on a hydrophobic graphite surface and a hydrophilic mica surface. Thus, we have obtained images of P3 dimers on the surface with nanoscale resolution. The STM data shows that P3 assembles into periodic fibrous structures. We are trying to gain insight into how the nature of the surface affects protein self-assembly, and how does the surface impact protein structure. We have compared our

results with published cryogenic electron microscopy data on related BphP from *Deinococcus radiodurans* and have determined quaternary organization of P3 dimers in the Pnr state.

## MODELING METAL-BASE INTERACTIONS OF NUCLEOBASES

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Computational molecular modeling using rigorous first-principles techniques has widely been recognized to lead to an insight into bonding at an atomistic level not typically accessible through experiment. These modeling methods have been applied to a variety of physical, chemical and biological problems – from finely-tuned electronics and catalysts to site-targeted drugs. This particular study addresses the interaction of metal atoms and small metal clusters with nucleobases, and details how the presence of these metal atoms has the potential to inhibit the pairing of complementary base pairs in DNA. In particular, this study uses density functional theory to investigate the bonding of nucleobases (adenine, thymine, cytosine and guanine) mediated by silver, gold and platinum atoms. The theoretical methods utilize the Becke exchange functional combined with the Perdew Wang correlation functional within the Gaussian-03 suite of programs. All calculations were first tested on the known properties of metal atoms and those of the tautomers of cytosine and uracil. To establish a benchmark to understand the metal-mediated bonding, the binding energy of each of the bare base pairs in their canonical forms were calculated before metal atoms were introduced. The results of the study show that metal atoms tend to bond preferentially near the nitrogen atoms. The effect of the metal on the bonding between nucleobases, and therefore its effectiveness as an intervention agent, is dependent on whether or not the metal atom bonds to one of the inter-nucleobase bonding sites. The metal atoms can block one of the hydrogen bonding sites thus preventing the normal cytosine-guanine and adenine-thymine pairings. When the metal bonds to a site that is not an inter-nucleobase bonding site, the effect on the overall bonding of that base-pair ranges from a slight enhancement of the cytosine-guanine bonding energy to an almost negligible effect on the adenine-thymine pairing. The calculations also show that no single atom mediated cross-linking is predicted. We compare the energetics of different metal atoms at different bonding sites with an aim to achieve a level of understanding of the preferential binding mechanisms that are at the heart of drug therapies that utilize apoptosis or programmed cell death through preferential ligand binding. The overarching goal of these studies is the rational design of drugs through an understanding of the metal-base interaction at an atomistic level.

## ARSENOPLATINS – ANTICANCER AGENTS DESIGNED AS A COMBINATION OF PLATINUM AND ARSENIC DRUGS

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Platinum compounds (cisplatin, carboplatin, oxaliplatin) and arsenic trioxide are the FDA approved inorganic drugs for treatment of various malignancies. Cisplatin, [Pt(NH<sub>3</sub>)<sub>2</sub>Cl<sub>2</sub>], the most known platinum(II) drug, is used in combination therapy to treat testicular, ovarian, neck, head, and bladder cancer. Unfortunately, cancer cells often develop resistance to cisplatin and other platinum drugs and there are intensive efforts to develop new anticancer agents to overcome resistance obstacles (N. Grafand S. J. Lippard, *Advanced Drug Delivery Reviews* 2012, 64, 993-1004; A. Casini and J. Reedijk, *Chemical Science* 2012, 3, 3135-3144). Another inorganic agent, the traditional Chinese medicine arsenic trioxide (As<sub>2</sub>O<sub>3</sub>), is an FDA approved drug for the treatment of acute promyelocytic leukemia. Cisplatin and arsenic trioxide induce apoptotic cell death, but through different pathways: cisplatin targeting DNA, and arsenic trioxide targeting thiol groups of proteins and enzymes. Synergistic effect between cisplatin and arsenic trioxide is established in some cisplatin resistant cancer cell lines. Recently, co-encapsulation of aquacisplatin and As<sub>2</sub>O<sub>3</sub> in a liposomal delivery vehicle has been developed, and it was discovered that the formulation inside of a nanoparticle is stabilized by presence of a novel type of Pt<sup>II</sup>-As<sup>III</sup> adduct (H. Chen and co-authors, *Angew. Chem. Int. Ed.* 2009, 48, 9295-9299). Inspired with that discovery we have synthesized and structurally characterized the first compounds containing the aqueous form of As<sub>2</sub>O<sub>3</sub> directly bound to platinum as an As(OH)<sub>2</sub> moiety – arsenoplatins (Đenana U. Miodragović and co-authors, *Angew. Chem. Int. Ed.* 2013, 52, 10749-10752). Arsenoplatins form in water-nitrile solution, retain a Pt-As(OH)<sub>2</sub> core in substitution reactions, and exhibit potent cytotoxic activity against different cancer cell lines. Arsenoplatins are stable in saline solutions and obey the Lipinski rule of five which is used to predict ability of a drug to be membrane permeable and easily absorbed by the body (drug-likeness). Based on the resistant factors (RF < 2) these type of rare compounds that contain metal-metalloid adducts have the potential to overcome drug resistance mechanisms. Currently, arsenoplatins are screened *in vitro* against NCI60 cancer cell line panel. The complexity of a 60 cell line dose response produced by arsenoplatins will result in a biological response pattern which can be utilized either to assign one of the already known mechanisms of action or to determine that the response pattern of arsenoplatins is not similar to that of any of the standard prototype compounds included in the NCI database (NCI, National Cancer Institute).



**EXQUISITE UTERI, WUP CONCIERGE DESK: LIFE AND DEATH AND TEXAS & DREAM PALACE: RATED F(EMINIST) F(ANTASY) F(ARCE): THE WORK OF THE WANDERING UTERUS PROJECT**

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In 2013 The Wandering Uterus Project debuted its first production of *Dr. Womb and Dr. Tomb's Wondrous Wandering Ward of Cures, Clarifications and Creams for All that Ails and Avails the Utilitarian and Utterly Unreliable Uterus* at Northeastern Illinois University in celebration of International Women's Day. Since then, the project has created a number of other performance pieces that engage the audience directly and ask them to (re)consider the anti-woman rhetoric and policies that have invaded the American political sphere. This presentation will focus on the Wandering Uterus Project's participation in the Exquisite Uterus Project, as well as its

For our collaboration with the fine artists coordinating the Exquisite Uterus exhibition, The Wandering Uterus Project prepared "Interior Gifts and Other Acts of Love" and "Texas H.B. 2." Both pieces transform the museum into a stage, and ask the spectator to reconsider or engage in different "acts." In "Texas H.B. 2—An Act" the viewer serves as a witness to the acts of violence on women's rights enacted by the recent Texas law. In "Interior Gifts and Other Acts of Love" the audience is invited to interact with the piece even more directly. The audience is offered "gifts" that include selected quotations, as well as affirmations of love and political encouragement to viewer/gift-recipient. In order to receive these gifts the viewer must engage with the piece by drawing out their gift from the uterus and clipping the cord/string that connects them. "Interior Gifts" is inspired, in part, by Carolee Schneeman's performance art piece "Interior Scroll."

This presentation will also include a discussion of "WUP Concierge Desk," a site-specific performance designed for the 2013 American Society for Theatre Research Conference. The "WUP Concierge Desk" will provide maps, information, and a personal tour guide (Wanda the Wandering Uterus) for conference participants interested in engaging with Texas's complex and frustrating history of when and how life begins and ends. Tours integrated QR code technology to provide tourists information for each site on our "Life in Texas" and "Death in Texas" tours. We also provided a means for tourists to submit their photos of/with Wanda as a means to fight against legislative attempts in Texas to limit women's reproductive rights.

I will also preview The Wandering Uterus Project's piece in development: Dream Palace Rated F(eminist) F(antasy) F(arce), a collaboration with other feminist artists that tackles

the way women have been depicted as the source of male fantasy and nightmares. It juxtaposes anti-women texts from antiquity with Margaret Atwood's novella *The Penelopiad*.

The Wandering Uterus Project website:

<http://thewanderinguterusproject.com/Home/Home.html>

Facebook page for The Exquisite Uterus Project:

<https://www.facebook.com/events/647181285305593/>

Description of WUP Concierge Desk

<http://standinginfield.net/menu/WUP.html>

## **FOLKTALES LIVE! CHAMBER THEATRE ADAPTATIONS FOR YOUNG AUDIENCES**

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Folktales, mythology and other literature from oral narrative traditions are common source material for Children's Theatre scripts. For the last two years the CMT Department's Children's Theatre Workshop has created and presented original Chamber Theatre productions based on folklore. In the Fall of 2012 about 1000 local school children saw *A GRIMM REALIZATION*, based on Grimm Fairy Tales. This Fall more than 1100 children are scheduled to see the 12 performances of *FEARLESS FEMALES OF FOLKLORE*, an adaptation of folktales from around the world featuring active female protagonists.

Chamber Theatre is a method of adapting non-dramatic literature for theatrical performance. It was devised by Professor Robert S. Breen (1909-1991), who introduced Chamber Theater to his Oral Interpretation classes at Northwestern University in 1947.

The techniques of Chamber Theatre were devised to present the novel, or narrative fiction, on the stage so that the dramatic action would unfold with full and vivid immediacy, as it does in a play, but at the same time allowing the sensibility of the narrator, or the central intelligence in the form of a character, to so condition our view of the action that we who listen and watch would receive a highly organized and unified impression of it. Robert S. Breen, Chamber Theatre (Caxton Press: 1986)

Chamber Theatre is characterized by maximal amount of the work's original text and by minimal and suggestive production elements. It stresses maintaining and honouring the text and tone of the original work, and the use of a narrative voice. The relative lack of sets,

lights and costumes allows for rapid changes of time and place, and for many characters to be played by very few performers.

How are Chamber Theatre adaptations created? How is material selected, edited and arranged for theatrical performance? The discussion of adaptation will be accompanied by a PowerPoint demonstrating the process of adapting an original text into script form. Both descriptive passages and dialogue heavy passages will be examined.

The PowerPoint will also include production photographs to illustrate the stories adapted and performed:

From A GRIMM REALIZATION:

“The Cat and Mouse in Partnership”

“The Frog Prince”

“Hansel and Gretel”

“Rapunzel”

“Rumpelstiltskin”

“The Twelve Dancing Princesses”

From FEARLESS FEMALES OF FOLKLORE:

“The Wife Who Was No Fool” from Africa (Liberia)

“The Girl Who Hugged the Trees” from India (Rajasthan)

“The Woman Who Ran With the Buffalo” from North America (Caddo Nation)

“The Princess Who Stood on Her Own Two Feet” from Europe (based on Grimm Fairy Tales)

## **TURNING A CRITICAL LENS ON MY PEDAGOGICAL ADVENTURES: TEACHING COMMUNICATION AT AN URBAN HISPANIC-SERVING HIGHER EDUCATION INSTITUTION IN THE MIDWESTERN UNITED STATES**

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Autoethnography is a method of research that seeks to understand the self in relation to others and her/his environment. As a research method, autoethnography is both process and product. As a process, autoethnography systematically examines mundane social performances and practices, how they affect and are affected by social actors. As a product, autoethnography seeks to produce texts that emancipate both the author and those with whom the author interacts in the author’s social matrix. In this paper, I explore complex layers of my social performances and practices in the role of “professor” at a

higher education institution. The institutional context presents the social actors who inhabit it with both interactional constraints and opportunities. This analysis has theoretical, methodological, and practical implications for intercultural, organizational, interpersonal, and critical communication pedagogy processes.

This paper aims to advance communication theory and research through an autoethnographic tale that depicts how researcher and institution mutually constitute each other. Specifically, I turn my critical gaze both out/inward to explore the ways in which social actors' bodies, including my own, are imbued with meanings that articulate particular cultural narratives in this institutional setting. This critical observation focuses on contributing practical knowledge about communication dynamics in ethnically diverse contexts where the researcher is both an insider (as a member of the organization) and outsider (as a researcher studying the organization). I take a reflexive approach where my perspective as a character in the story is juxtaposed with other characters' perspectives in an inductive process of the discursive co-construction of social selves.

This autoethnographic analysis also examines how identities are deployed and discursively co-constructed in the context of teaching communication courses. I explore relational dynamics between teacher and students and how parties position themselves to reach their interaction goals. The university context is significant because as a state, urban, Hispanic-serving institution, the institution plays a key role in the city where it is located. Its primary roles are to educate a student population of principally first generation, traditional and non-traditional students. This reality creates a particular type of institutional identity where the university crafts a "persona" as "the most ethnically diverse university in the Midwest." The university is also one of the most affordable higher education institutions in the United States. These characteristics create a relational space where both student and teacher learn to negotiate their roles through multiple cultural lenses. As a result, social identity intersectionality becomes a central characteristic of these encounters. Lastly, this paper contributes to the body of knowledge about crafting selves in highly diverse institutional contexts, organizational communication, and praxis(ing) communication as students and observers of human communication.

### ***IMPORTANCE, METHODOLOGY AND APPROACH TO SOFTWARE HISTORY***

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Software and how it has evolved over time, not only effects how software is built today, but also reveals trends that help predict how it will evolve. What software is developed and how that software is developed depends on many environmental factors. Like mathematics, it depends on previously developed theoretical findings. Like engineering, it depends on the

practical implementations of the past. Additionally, it has a dependence on the computing hardware available (and affordable) at the time as well as societal and funding influence. This work attempts to develop a pedagogical approach to software history, as well as documenting software history according to that approach.

Students of technology receive very little content in software history in most computer science programs. Even when it is taught, trends are usually not identified and implications for future technology development are not covered. The objective of this work is to develop a text that sufficiently covers software history for a semester long course.

The methodology is emerging for this work, but consists of several major steps. Initially, research on existing software history work is being collected. A pedagogical approach is being developed which will structure the text. Further prime sources of software history will be developed and analyzed. Then a concentrated effort will be required to produce and review the text with key authorities in software and in history.

The author will present preliminary findings of this approach and examples of important software trends that students of computer science and engineering will find useful.

## **DISCOVERING THE INTERNET TOPOLOGY WITH SIMPLE EXPERIMENTAL TOOLS**

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The Internet has changed the way people communicate and distribute information in all parts of the world. The Internet has been commercially available since 1995 and has become an essential part of the communication infrastructure of the world. Currently, more than one billion people use (users) the Internet to exchange emails, communicate via Facebook, access information on web pages, and perform financial transactions. The Internet structure is a three tier hierarchical system of interconnected commercial owned computer networks. The disposition of how these commercial computer networks are interconnected is called the Internet Topology. One or more of the interconnected computer networks that compose the Internet are own by specialized companies called Internet Service Providers (ISP). The ISPs provide Internet access to your home computer or to

small-localized networks (i.e. small area network such as the NEIU network) and regional networks (i.e. companies that have a regional computer network that extend over a local area). Additionally, large telecommunications companies such as ATT or a wide area ISP have deployed networks that allow regional companies to interconnect their computer networks. Thus, the hierarchical system of the Internet is based on the two types of ISPs (regional, and wide area) described before. Furthermore, because the Internet's topology is influence by commercial decisions and agreements over its interconnectivity, its topology may change over time. For example, recently companies such as Google are deploying their own network infrastructure, which may have an impact on the Internet's topology. *The question we seek to answer with this investigation is discovering the changes that may be occurring on the Internet's topology with the use of a simple freely available network tool.* Understanding and discovering the changes in the Internet topology or disposition on how its hierarchical system is interconnected can allow obtaining insights on 1) how new technologies (i.e., applications and protocols) will impact the Internet connectivity structure, and 2) how robust and secure is the Internet connectivity against an attack that will disconnect part of its structure. Furthermore, the method to study changes on the Internet's topology is based on the work done at HP Laboratories by Gill P., Arlitt M., Li Z., and Mahanti. Our results show evidence that the topology of the Internet is changing from its traditional hierarchical structure to a more flattening structure.

## **TOO NEUROTIC, NOT TOO FRIENDLY: STRUCTURED PERSONALITY CLASSIFICATION ON TEXTUAL DATA**

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and Aron Culotta (Assistant Professor, Computer Science at IIT)

Personality plays a fundamental role in human interaction. With the increasing posting of text on the internet, automatic detection of a person's personality based on the text she produces is an important step to labeling and analyzing human behavior at a large scale. To date, most approaches to personality classification have modeled feature representations of the text to produce output classifications. Because previous research suggests that some traits of personality may be correlated with others, we decided to try structured approaches to personality classification. Structured classification and Conditional Random Fields (CRF) in particular, learn and model both feature representations of text and dependencies between output labels (i.e. personality traits). CRFs define the probability of seeing a specific combination of labels (output variables) given that a sequence of words (input variables) has been observed. More generally, for any set of input variables  $\mathbf{x}$  and output variables  $\mathbf{y}$ , CRFs define a conditional probability depending on the variables and output as follows:

$$p(\mathbf{x}, \mathbf{y}) = \frac{1}{Z(\mathbf{x})} \prod_k f^k(\mathbf{x}, \mathbf{y}, \Lambda)$$

Here,  $\Lambda, x$  and  $y$  are parameters for a feature function  $f^k$  and  $z(x)$  is a normalization constant. We attempt two models of CRFs applied to the task of classifying personality. We called them CRF-P and CRF-PF. In the context of our experiment, the CRF-P model would learn the correlations between all pairwise combinations of personality traits to boost classification, while CRF-PF would learn many correlations of those combinations depending on the words observed.

In addition to the two CRF models (CRF-P and CRF-PF) we classified the data using Logistic Regression (Log-Reg), Naïve Bayes (NB) and SMO, the sequential minimal optimization algorithm for a support vector classifier that is part of the Weka (Witten and Frank 2005; Platt 1999) toolkit. Finally, to provide a baseline we used ZeroR, a majority classification approach. All these approaches have been traditionally used for this task.

To our knowledge, this is the first attempt at applying these methods to personality classification. The corpora for our experiment (input variables  $\mathbf{x}$ ) consisted of (a) the essays corpus produced by Pennebaker and King (1999) in which 2,469 individuals wrote a stream of consciousness essay for 20 minutes; and (b) the my Personality corpus which consists of 9,918 Facebook status updates and social network metrics associated to the authors of posts. Both corpora contain binary judgments as to whether the author of the text is a high or a low scorer of each of the Big Five personality traits (output variables  $\mathbf{y}$ ). Our study finds that there seems to be a correlation between Agreeableness and Emotional Stability and that it may be helping boost accuracy for Agreeableness when compared to more traditional approaches for supervised classification.

## **MATHEMATICAL MODELING OF NEGLECTED TROPICAL DISEASES IN DEVELOPING COUNTRIES**

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Many of the neglected tropical diseases are caused by vector-borne infections, which are transmitted by insects and ticks. Every year vector-borne infections results in many deaths, and fills hospitals in Africa, Asia, and South America with victims, suppressing the economies of nations and interrupting industrial operations where it remains endemic. Some less common infections cause permanent disability and horrible disfigurement. These diseases form array of potential threats to the health and livelihood of those who visit, work, or live in the tropics where they exert their greatest impact. Pharmaceutical companies have generally shied away from independently developing drugs for neglected diseases, as drug development is a costly and time-consuming process, and they are unlikely to get all their returns from selling it in poor countries. An integrated vector control program that involves assessment, ongoing surveillance, targeted treatment and training and education is necessary as it mitigate the risks associated with the spread of disease. One approach to

understanding the ecology of vector-borne diseases is to study their dynamics via mathematical and statistical models. The models capture changes in the size of affected populations as a function of the biological and environmental processes influencing those changes. Such study enables us to build effective and long lasting control programs as well as provide theoretical basis that enables the articulation and testing of hypotheses and generation of predictions from models that can represent hosts, vectors, and other aspects of the transmission cycle to describe the dynamics of vector-borne pathogens. These models can then be linked to experimental or observational data using statistical methods and help in forecasting future potential outbreaks. The talk will provide some examples on how mathematical models have been effective in translating the complex information into simple understanding.

## **RELATIVISTIC BROWNIAN MOTION IN A CURVED SPACE-TIME**

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We construct a model of Brownian Motion on a pseudo-Riemannian manifold which could be associated with general relativity. There are two aspects of the problem: The first is to define a sequence of stopping times associated with the Brownian “kicks” or impulses. The second is to define the dynamics of the particle along geodesics in between the Brownian kicks. When these two aspects are taken together, we can identify various distributions with the motion. For example, we find that the statistic for the coordinates describing the Brownian particle obeys a temperature dependent four dimensional distribution defined over the quaternions which locally can be identified with Minkowski space. In turn, the statistics of the 4-velocities obey modifications of the relativistic distributions found in the literature. In particular, our processes are characterized by two independent time variables defined with respect to the laboratory frame: a discrete one corresponding to the stopping times when the impulses take place and a continuous one corresponding to the geodesic motion in-between impulses. The subsequent distributions are then solutions of equations which contain derivatives with respect to both time variables.

KEY WORDS: geodesic, quaternions, stopping times, Markov processes,  
pseudo-diffusion equation

## **HOW TO FACTOR A POLYNOMIAL**

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As one of the oldest mathematical problems in history, factoring polynomials is a standard subject in the curricula of high school and college algebra for educational purposes. For general polynomials especially in multivariate cases, factorization has been an enduring subject of study in the field of computer algebra as well as one of the most significant achievements of symbolic computation. It is now a standard function of computer algebra software packages such as Maple and Mathematica. Even after thousands of years of studies by generations of mathematicians, however, many problems arising from polynomial factorizations are still not solved completely. One of such problems is the *numerical factorization problem*: How to factor a polynomial when its coefficients are known with limited accuracy. This type of problems arise in practical applications where problem data are usually inexact, and in such cases, the very notion of factorization becomes questionable since the data polynomial generally becomes unfactorable even though the underlying polynomial can be factored. In more precise terms, polynomial factorization in general is an “ill-posed problem” in the sense that it is infinitely sensitive to data accuracy. An infinitesimal perturbation to the polynomial coefficients alters the factorization beyond recognition. This singularity makes it seemingly hopeless to recover the factorization using empirical data.

As it turns out, polynomials of certain factorization structure form a complex analytic manifold with dimension deficit. This dimension deficit is the root of the ill-posedness in the factorization problem. On such a *factorization manifold*, however, we can prove that polynomials are Lipschitz continuous with respect to data variations. Furthermore, a small perturbation in data only decreases the dimension deficit of the manifold, not increasing it. As a result, the factorization of the original polynomial is possible using inexact data by searching the manifold of highest dimension deficit nearby and factoring the nearest polynomial on that manifold. Furthermore, computing the numerical factorization is a combination of numerical linear algebra and numerical nonlinear programming. This work provides rigorous formulation of the notion of numerical factorization along with its fundamental theorem, the basic algorithmic framework and the software implementation.

## **IN SELF – CONTRADICTION, MACH’S GEOCENTRISM LEADS TO ABSOLUTE SPACE**

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In attempting to advance Ernst Mach’s physics, Popov argues that the heliocentric system must be substituted by a geocentric system inspired by Tycho Brahe. (Mach believed the

*Ptolemaic* and the *Copernican* systems were “equally correct interpretations.”) We show that (1) while Popov relies on Mach’s contention that accelerations are relative, this contention is empirically false; (2) geocentrism is not consistent with the relativity of accelerations; (3) Popov’s geocentrism leads to absolute space while Mach argued against absolute space; and (4) all pertinent astronomical observations falsify Popov’s ‘Tychoonian’ system.

## **CIRCADIAN RHYTHMS IN *HIERODULA PATELLIFERA* (INSECTA: MANTODEA)**

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Many biological, physiological, and behavioral processes oscillate with a daily rhythm. These circadian rhythms synchronize with environmental signals, but will persist with a period of approximately 24 hours in the absence of environmental input. Circadian rhythms coordinate an organism and its external environment, allowing the organism to anticipate and adapt its behavior and physiology to changing environmental conditions, as well as to exploit temporal niches. Although circadian rhythms have been described in a variety of insect species, studies across multiple levels of analysis have only been done in a small number of key model systems such as *Drosophila*, cockroaches, and crickets. Further, with the exception of two studies conducted over thirty years ago, no thorough analyses have been carried out on the praying mantises. We used a multilevel experimental approach to determine whether and/or to what extent circadian rhythms modulate several key physiological and behavioral parameters in the praying mantis, *Hierodula patellifera*. The experiments included chronic electroretinograms (ERG) to assess compound eye sensitivity, photographic colorimetric analyses of changes in compound eye color resulting from the migration of shielding pigments, analyses of gross locomotor activity on a modified treadmill apparatus, and assessment of the differences between responsiveness to prey-like, computer generated visual stimuli during periods of maximum vs. minimum compound eye sensitivity. Our results clearly indicate that circadian clocks modulate the target behaviors across all levels of our analysis. Specifically, strong rhythms, which persisted in constant conditions with periods of approximately 24 hours, were discovered in optic lobe sensitivity to light, appetitive responsiveness to prey-like stimuli, and gross locomotor activity. Further, circadian clocks modulating both pigment migration and locomotor behavior strongly responded to light/dark cycles, suggesting these clocks were able to anticipate and entrain to environmental light cues. These data indicate that circadian rhythms are present at the cellular, systems, and organismal level in the praying mantis *H. patellifera*. This is the first time that such rhythms have been described in a praying mantis;

and our data represent an important step forward in our understanding of the complexities of circadian rhythms in the praying mantis.

## THE ROLE OF FUNGI IN BIOREMEDIATION OF CONTAMINATED WATER

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Wastewater pollution results in detrimental effects on ecosystems and poses human health hazards. As Chicago's industry and population increases, so do contaminants such as *E. coli* within the Chicago River waterway system. Current water treatment through the Metropolitan Water Reclamation District of Greater Chicago does not meet EPA freshwater river standards, creating a need for remediation alternatives in the Chicago River. Such an alternative is mycoremediation, in which fungal mycelia are used to break down and remove water contaminants. To explore this alternative for the Chicago River specifically, but also as a tool for bioremediation of contaminated waterways in general, this two-part study focused on the feasibility and time efficiency of mycoremediation of polluted waters through mycofiltration. In the lab-based experiments, known amounts of *E. coli*-inoculated water were processed through mycelia-inoculated, organic wheat straw treatments to assess if the mycelia were capable of *E. coli* removal. These treatments were compared to organic wheat straw treatments without mycelia, and controls that had no wheat straw and no mycelia. The first lab-based experiment was run for 48 hours for feasibility purposes and the second lab-based experiment was run for 96 hours to test the time efficiency of *E. coli* removal in mycelia treatments beyond 48 hours. The second part of the study replicated the lab-based experiments with water samples from the Chicago River. Results showed that mycelia treatments were able to remove *E. coli* in a lab-based setting and did so at higher rates within the first 48 hours. We also found that mycelia functioned optimally with an incubation period of at least three weeks; less incubation time resulted in lowered *E. coli* removal rates. In addition, and similarly to results from lab experiments, mycelia were able to remove more *E. coli* from Chicago River water samples during the first 48 hours than in the last 48 hours. It was also shown that an unexpected growth of *E. coli* in the non-mycelia treatments likely arose due to the organic wheat straw leaching nutrients and/or carbon into the water, providing additional resources that enhanced *E. coli* growth. With substantial *E. coli* reduction from initial colony counts by fungal mycelia across experiments, our study demonstrated that mycoremediation is a possible option for natural remediation for waterways in need of cost-effective, environmentally sound water contaminant removal.

## **RUNNING REDD: BROKERING TRANSNATIONAL EFFORTS TO REDUCE DEFORESTATION**

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Reducing Emissions from Deforestation and Forest Degradation (REDD or REDD+) entered international debates on climate change mitigation in 2005. Since that time, REDD+ has sparked the growth of nearly 200 pilot projects intended to slow or stop deforestation, particularly in tropical forest areas. REDD+ has also become an organizing framework for national policies for both donor and developing country governments. In this presentation, I report on ongoing research combining a global dataset of REDD+ pilot projects and interview-based fieldwork in Central Kalimantan, Indonesia. I begin by characterizing REDD+ as a policy activity that, while directed by international negotiations, has largely been shouldered by national and sub-national governments, firms, and civil society organizations. To illustrate this complexity, I present a brief geography of several transnational organizations supporting the development of REDD+ policy. Based on qualitative findings from Central Kalimantan and a historical review of the development of REDD+, I suggest that transnational non-governmental organizations like The Nature Conservancy, Care, International, and the World Wide Fund for Nature occupy key positions as brokers between international sources of funding and expertise and local governments and civil society organizations in tropical forest areas. Turning to my global dataset of REDD+ pilot projects, I utilize Poisson and negative binomial regression models to test the hypothesized role of transnational non-governmental organizations in attracting the involvement of potential donors in REDD+ pilot projects. I find that the number of transnational non-governmental organizations – but not the number of local non-governmental organizations or other organizations – leads to increases in the involvement of foreign firms in projects, while both the number of local organizations and the presence of transnational non-governmental organizations lead to increases in the involvement of donor governments, international organizations, and foundations. I end my analysis with a brief overview of the role of transnational non-governmental organizations in other aspects of REDD+ governance, including drafting private standards for REDD+ carbon offsets, advising on major policy documents, and producing literature on REDD+ policy options. I conclude by reflecting on the implications of the role of transnational non-governmental organizations in REDD+ for stakeholder participation, social learning, and effectiveness of REDD+ policy as it develops in national and international policy discussions.

## DEVELOPING A DIGITAL DATABASE FOR ARCHAEOBOTANICAL RESEARCH IN MESOAMERICA

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The largest obstacle to understanding ancient plant use in Latin America is a lack of comprehensive reference and plant identification resources, particularly online databases. We are constructing a Mesoamerican Online Ethnobotanical Database (MOED), an online ethnobotanical reference for over 1400 plant species.

Among indigenous populations of Central America, over 70% of the human diet consists of plants. Plants are also preferred sources of fuel, medicine, and construction material. Existing evidence suggests this pattern has been consistent for at least 1600 years. One might think that the archaeological identification of ancient seeds, fruits, flowers, and wood (macroremains) is therefore robustly developed and has revealed much about ancient daily life. The current reality, however, is that with the exception of a handful of species, a great deal more is known about the variety of animals in the ancient Maya diet than about plants. The list of plant species and genera represented by the archaeological recovery of seeds, fruits, flowers, and wood numbers between 150 and 200—this is in contrast to over 1500 species used and recognized by Maya populations studied by cultural anthropologists.

This project compiles data currently published in a variety of venues, many of which are out of print or prohibitively expensive to obtain; as well as unpublished data, and making these data available to a broad audience of researchers. Ethnobotanical information and scaled color images of plants, wood, seeds, fruits, flowers for over 1400 plant species currently do not exist in one published source. We have created scanned images of plant voucher specimens, closeup scans of reproductive parts of plants, and detailed photos of seeds, where applicable. We are also collecting common names and uses from over a dozen ethnobotanical sources for inclusion in the database.

MOED makes available resources of the Field Museum of Natural History's Searle Herbarium (known for its New World tropical plant collections) to traditionally underserved scholars, particularly those in smaller US institutions located far from large herbaria and in Latin America. This easily-accessed resource goes beyond the publication of an expensive book—such volumes with color photos and lengthy printed descriptions are out of reach for many individuals and institutions. Instead, this resource will be available to anyone with internet access, anywhere in the world. Plant identification can be taught to undergraduate and graduate students in classrooms; archaeobotanists can compare images from MOED to their recovered macroremains in the field lab; and underserved scholars will have a bounty of information to help train new generations of students and foster novel research in

the area. This database will serve scholars and train students in archaeology, cultural anthropology, and botany.

## **KIN AND KILOMETERS: A QUALITATIVE STUDY OF LONG-DISTANCE RELATIONSHIPS FROM THE PERSPECTIVE OF TRANSGENERATIONAL THEORY**

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This study explored the lived experiences of couples in long-distance relationships (LDRs) from the perspective of Transgenerational (TG) Theory, a foundational theory in the Marriage and Family Therapy (MFT) field. Extensive research into LDRs has been conducted since the late 1940s, but the majority of this research is based in theories of individual functioning and processes, not relational functioning. This individually-oriented perspective overlooks the multigenerational context of family and social relationships in which LDR couples are embedded. Thus, this study sought to enrich the understanding of LDRs by exploring interaction processes and patterns in LDR couples and their families of origin from the multigenerational, relational perspective encompassed in TG Theory.

Eligible couples were those who had been together in the same geographic location for at least one year prior to beginning the LDR, were in LDRs for work, family, and/or educational reasons, and had been in the LDR for at least a year, among other criteria. Semi-structured individual and conjoint interviews were conducted via web-based communication technology with six LDR couples. Genograms, a visual depiction of family emotional relationships, were constructed using information gathered in the first interview, and then used in the second interview to explore intergenerational relational patterns in the families of origin of the LDR partners.

Interview transcripts and genograms were analyzed with phenomenological methods. Multigenerational patterns were found in the families of origin of participants in work-related travel and/or relocation, commitment to caring for the family of origin, and in work ethic. Distance appeared to make some relational processes, such as triangles, more overt. The majority of these LDR couples were involved in providing physical and/or financial support to members of their extended families, which the LDR allowed them to do. Families of origin were important sources of support for these LDR partners and couples. The LDR lifestyle gave opportunities for the couples and families to both give and take relational support in a mutual cycle involving both families and the intimate partner.

Two core themes emerged from the interviews, commitment to the partnered relationship and resiliency. Couples undertook LDRs based on their perceptions that their relationship

had sufficient trust and commitment for them to be successful as an LDR couple, often after they had experienced economic or personal hardships. Trust and commitment were tested in the LDR and recursively helped strengthen the relationship while partners were apart. The findings suggest that LDRs be conceptualized as a way that some couples endeavor to fulfill their multiple multigenerational commitments to each other and their families of origin while living and working in separate locations.

## **COMPONENTS OF CREATING MICROENTERPRISE DEVELOPMENT PROGRAMS**

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In order to effectively fight poverty, social welfare programs must focus on improving human, financial and social capital of low-income individuals. Creating social programs that holistically address obtaining as much capital as possible is critical to promoting self-sufficiency and ending poverty. This study looks at two innovative models of social welfare policy that will allow entrepreneurs and government to become the catalysts of change together. The two models are Individual Development Accounts (IDAs) and Microenterprise Programs (MEPs). IDAs are matched savings accounts that empower the individual to save money while providing skills and development training. IDAs can eliminate the need for credit or collateral to start a small business, obtain higher education, buy a home, acquire technical assistance, or even to buy a car. Microenterprise programs (MEPs) are designed to provide training and financial capital to individuals that want to start to operate a small business or improve an existing business that would further increase human, financial and social capital. This study identifies eight main program components that can be applied to one comprehensive Microenterprise Development (MD) program that can aid in fighting poverty and creating self-sufficiency in disadvantaged communities. The methodology includes quantitative and qualitative research methods in form of surveys, personal interviews and pictures. The study sample consists of a total of 89 participants. The sample includes two sub-groups, which consists of 52 participants from Northeastern part of Illinois in the U.S., and 37 participants from the Southwestern part of Romania. The findings of this report suggest that the potential of creating local jobs and increasing human, financial and social capital in disadvantaged communities is increased by creating programs of microenterprise development that includes components such savings, training, counseling, mentoring and access to credit.

**Keywords:** Components of Microenterprise Development, Individual Development Accounts, Social Welfare Policy, Microenterprise Development, Ending Poverty, Innovative

## **PROMOTING, CAPTURING, SHARING, AND MANAGING THE VALUABLE KNOWLEDGE OF EMPLOYEES IN THE WORKPLACE**

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Knowledge sharing is the exchange of information, skills, or expertise among employees of an organization that forms a valuable intangible asset. The problem is that employees typically do not share valuable information, skills, or expertise with other employees and/or with the entire organization.

The general objective of my research is to discover ways in which organizations can promote, capture, share, and manage the valuable knowledge of their employees. This research is important to practitioners in the field of Human Resource Development (HRD) as well as organizations. To prove their value to organizations, HRD professionals must discover and adopt processes and procedures to increase workforce productivity and organizational competitiveness and profitability. These processes and procedures include promoting, capturing, sharing, and managing the information, skills, or expertise lying within employees of an organization. Organizations are realizing that the valuable knowledge residing in their employees is important in creating economic power and value, and if this knowledge is not shared, the organization stands to lose its competitive edge.

Based on literature review and three focus groups conducted with employees and managers of three different organizations, I have identified a foundation for understanding knowledge sharing research to benefit both the HRD practitioner and organizations in general. The foundation includes four areas of particular importance of knowledge sharing research: organizational culture, informal learning, performance support, and knowledge management.

The results of my research indicate that organizations are realizing that the knowledge residing in their human capital (employees) is important in creating economic power and value. Employees acquire ideas, skills and knowledge on the job, often through informal learning experiences, and it is this knowledge that makes a company competitive. Organizations must be able to identify and understand some of the tools that people can utilize to enhance knowledge sharing throughout the organization. Online collaboration tools such as wikis, social-networking sites and blogs are notable new tools for knowledge sharing. Rather than controlling knowledge sharing, some organizations are attempting to facilitate its growth by creating knowledge sharing events, such as employee trade shows and open forums to encourage employees to share knowledge with each other. But before



implementing knowledge sharing practices or new collaboration tools, organizations must have a good understanding of the organizational culture and its readiness to share.

In conclusion, organizations are focusing on workforce productivity and are beginning to increase their focus on human resource development, a win-win situation for the employer as well as the employee. Organizations are realizing that the knowledge residing in their human capital is important in creating economic power and value. Knowledge is power, and today's human resource development professionals have a major responsibility in leveraging the power of that knowledge to achieve the organization's goals.

## **ADDRESSING HOMOPHOBIA IN SOCIAL WORK EDUCATION**

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This national, cross-sectional study, used a purposeful sampling technique that surveyed school social workers across 42 states about their personal contact, Bachelor and Master's level education, and training regarding lesbian, gay, bisexual, transgender (LGBT) populations. The demographic analysis of the sample found that the average respondent resided in the United States, was 43 years of age, identified as White/Caucasian, Catholic, heterosexual female, and held a master's degree ( $N=283$ ). The sample in this study appears consistent with national social work characteristics, excluding age, as the national age for social workers is 50 years of age (Kelly et al., 2009; NASW, 2005).

Research indicates that personal contact, education, and training influence attitudes and beliefs about LGBT individuals (Cramer, 1997; Glenn & Russell, 1986; Herek, 1984, 1996, 2000; Krieglstein, 2002). Addressing these factors is important, because the Council on Social Work Education (CSWE) and the National Association of Social Workers' (NASW) policies and practices regarding social work practice, ethics and education, call for the inclusion of education and training about LGBT populations (CSWE, 1997; NASW 1992). Yet, research indicates that content in social work education about sexual minority populations continues to be excluded and marginalized, indicative of contradictions among social work education policies, espoused values and inclusion of sexual minority content in its curricula (Trotter & Leech, 2003; Charnley & Langley, 2007; Foreman & Quinlan, 2008). Additionally, results from this study appear to echo these ongoing contradictions. For instance, respondents in this study reported minimal education in their Bachelor and Master's level education focused on LGBT populations, and minimal supervision and case consultation hours, as well as, minimal professional development training in their work place about LGBT populations. Yet, bivariate analysis found a significant positive

relationship between non-homophobic views, personal contact, master level education, and training about LGBT populations. Thus, these results imply that more non-homophobic views is indicative of more personal contact, more master level education and more training about LGBT individuals.

Consequently, implications from this study point to the need for social work education to include teaching content in social work curricula that addresses homophobia, and provides more exposure, training, and supervision about LGBT individuals. Furthermore, implications from this study call upon social work education to include a pedagogical approach that infuses LGBT content across Bachelor and Master level curricula, similar to CSWE's call for an infusion of social work content across the curricula to cultural competency and diversity in social work education (CSWE, 2008). This is relevant, due to CSWE's accrediting standards requiring that social work education programs address content about LGBT populations, as well as, the NASW's long history of opposing discrimination against sexual minority populations (CSWE, 1991; NASW, 1993).

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