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**ACF 2010 July – September Presentations**

**Biegalle, Neil**

July – September FY10

MathFest 2009

“The Extremality of Bernstein Polynomials”

Extremal problems in the geometry of polynomials concern which polynomials possess certain maximal or minimal geometric properties. We seek to employ results related to polynomial root dragging and root motion to further understand such problems. Of special interest is our investigation into why Bernstein polynomials frequently arise as maximizers.

**Brege, Wyatt**

July – September FY10

MathFest 2009

“Symmetry Analysis of the Lane-Emden Equation”

We will focus on Lie theory and how it can be used to find symmetries of the Lane-Emden equation. This equation has provided a simple, physical description of the density distribution in many a stellar structure. Symmetry results of the equation will be presented.

**Cohan, J.P.**

July – September FY10

2009 PRSSA National Conference

“Change in Economic System Leads to a New Hope”

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**Dahlberg, Samantha**

July – September FY10

MathFest 2009

“On Proofs of Summation Identities”

The problem of finding closed-form expressions for various sums and proving identities among them is among ancient and attractive mathematical problems. One of the most exciting discoveries in the early nineties, due to H. Wilf and D. Zeilberger, was that finding close-form expressions for various sums and proofs for special class of summation identities can be efficiently and elegantly handled by the computer. In this talk we explore and highlight the Wilf-Zeilberger (WZ) method and show various practical applications of Zeilberger’s algorithm. This work was done at the 2009 REU program at Grand Valley State University.

**Ferre, Matt**

July – September FY10

Midwestern Criminal Justice Association

“Mediating in the Streets: Exploring the Intersections of Common Policing and Common Mediation Practices”

Managing and resolving interpersonal conflict reflect a common and recurring responsibility for police officers. Research suggests that resolving these responsibilities through traditional policing methods may have situational limitations (Cooper, 1999). Other policing philosophies, including community policing and problem-oriented policing, have also been implemented in law enforcement, but evaluations into their effectiveness has produced mixed results. Notwithstanding attempts to transform policing through these approaches, mediation has been proffered as a viable skill set beneficial to police officers. However, minimal research exists exploring the compatibility of traditional policing practices and the management of conflict through mediation in the field. This research recommends exploratory case study protocol that will assess both the formal and “natural” mediation and conflict resolution practices of officers in the field.

**Gallaway, Meghan**

July – September FY10

The 14th European Conference on Developmental Psychology

“Societal and Personal Views of Criteria for Adulthood: A Cross-National Comparison”

This poster aims to investigate how university students from modernized nations view criteria for adulthood from both a societal and personal perspective. Three countries were included in this study: Slovenia, Austria, and the United States. The facts that individuals in the late teens and early twenties in such nations tend to put off some criteria until later in life (e.g., marriage, start of career) and that there is a lack of clear markers of adulthood, the transition into adulthood has become of increasing interest to developmental psychology. Three central questions were asked here: (1) Which personal criteria of adulthood are most important? (2) How well defined are students’ conceptions of societal norms regarding adulthood? (3) Does the importance of these criteria vary across the three countries and/or between societal and personal perspectives?

N = 636 participants (210 in Austria, 201 in Slovenia, 225 in USA) (M = 21 years, SD = 1.8) completed the Conception of the Transition to Adulthood (Arnett, 1998). In this instrument they rated 38 specific criteria as personally important to becoming an adult or not, and also how important these same criteria were to the society that each participant lived in. These specific criteria comprised six larger categories, e.g., Role Transitions and Independence.

Nationality was found to be a significant factor for personal image of adulthood in four out of the six categories and for societal image of adulthood in three out of the six categories. To evaluate the strength of shared social norms, the standard deviations of societal and personal importance were compared. With one exception, there were no differences; this rather supports the claim that the societal criteria seem to be vague. In addition, the means of societal importance of criteria are higher than personal views, except in the case of the Independence category.

Sean Townshend, Meghan Gallaway, Wolfgang Friedlmeier Ph.D.,

\*Ulrike Sirsch Ph.D., & \*\*Melita Puklek-Levpuscek Ph.D.

Department of Psychology, Grand Valley State University, Grand Rapids, MI, USA

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**Gardner, Sharon**

July – September FY10

Lilly Conference on Teaching and Learning

“Student Conference Attendance: Bridging the Gap between School and the Professional World”

Session Type: Round Table

Abstract: Upon graduation, Public Administration students are often unaware of the struggles they will face in their profession. Public administration educators have a vested interest in encouraging their students to attend or present at academic conferences in order to help their students make connections between school and the professional world. Conferences serve as an arena for students to meet and mingle with experienced professionals who can provide valuable insight about the interworkings of the field of PA.

Objectives: The School of Public and Nonprofit Administration at Grand Valley State University is developing a program which will encourage students to present at academic conferences. The three major goals of this program are: 1) Improve students’ abilities to communicate by presenting research they have performed on a topic relating to public administration, 2) Have students gain greater insight into field of public and non-profit administration by attending conference presentations, 3) Facilitate networking between students and public administrators at academic conferences.

**Golenbiewski, Kyle**

July – September FY10

MathFest 2009

“Modeling Nonseparable Preferences in Referendum Elections”

Referendum Elections often require voters to cast ballots simultaneously on multiple proposals, some of which may be interrelated. When a voter's preferences on one proposal depend on the known or predicted outcomes of other proposals, the voter's preferences are said to be nonseparable. In this talk, we will explore ways to mathematically model and analyze various forms of nonseparability. This work was completed as part of the 2009 REU program at Grand Valley State University.

**Jensen, Tarah**

July – September FY10

MathFest 2009

“Extreme Curvature of Polynomials”

Let P be a real polynomial of degree n. We are interested in the number of points of extreme curvature. Curvature is defined by:

1

and to find the points of extreme curvature we look at k' = 0. We will discuss our progress in showing that the number of points of extreme curvature is at most n -1. This problem is reminiscent of the P2 + P' problem.

**Kelch, Timothy**

July – September FY10

Globalization and the Challenge of the Humanities and Social Sciences

“Change in Economic System Leads to a New Hope”

China has been in a state of reform and change since December 1978 when the Third Plenum of the Eleventh National Party’s Congress of the Chinese Communist Party (CCP) changed the main party focus from class struggle to economic development. In turn, this leads to a complex relationship between the private and the public sector. As a result, “The CCP is increasingly integrating itself with the private sector, both by co-opting entrepreneurs into the Party and encouraging current Party members to go into business” (Dickson 2007, 852). Therefore, a relationship is built between the wealthy class and the party as well as the private sector. With economic development, the middle class in China has just recently emerged. However, the creation of a middle class leaves the people wanting a greater involvement in their own government. Global organizations such as the World Bank and the World Trade Organization help China loosen its government’s control. Considering all points in mind with privatization, can China move forward with political reform? Or will the government command the economy with partnerships between private and public? My argument is that with the complex relationship between the public and private sector, the elite business owners and party members, a creation of the “new bourgeoisie class” or middle class, and the influence from the World Bank and the WTO; influences political change in China. It fits the entrepreneurs, party members, and the middle class growing into a more democratic China.

**Larsen, Angela**

July – September FY10

The Annual Wildlife Society Conference

“Impacts of Savannah Restoration on Small Mammal Density and Diversity in West Michigan”

Savannah and other grassland ecosystems are one of the most endangered ecosystems in Michigan and much of North America. Consequently, species which rely on habitat found in this ecosystem are frequently species of concern for management agencies. The US Forest Service is currently beginning a program to restore areas of mixed deciduous forest that were traditionally savannahs. The impetus for this effort is to provide habitat for the federally endangered Karner Blue butterfly (Lycaeides melissa samuelis). Our objective is to monitor and analyze the impacts of the restoration project on small mammal diversity and density. A control and three treatment plots (shearcutter, bulldozer, and masticator) were monitored. Small mammals were trapped in a grid of 36 Sherman live traps within each replicate. Trapping results indicated that White-footed mice (Peromyscus leucopus) had the highest number of captures in all replicates. Other small mammal species present included Short-tailed shrew (Blarina brevicauda), Masked shrew (Sorex cinereus), Eastern chipmunk (Tamias striatus), Southern flying squirrel (Glaucomys volans), Thirteen-lined ground squirrel (Spermophilus tridecemlineatus), and Meadow vole (Microtus pennsylvanicus). The intent is to continue monitoring for the foreseeable future to determine the long-term impacts of the restoration effort.

**Lechy, Jennifer**

July – September FY10

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**Lincoln, Jesse**

July – September FY10

Botany & Mycology 2009 (Botanical Society of America)

“Ailanthus altissima increases nodulation in Trifolium pratense: A novel weapon for an invasive species”

Ailanthus altissima (Simaroubaceae) is an invasive tree from China that has spread over much of North America. A number of characteristics contribute to its success, notably tolerance of poor soils, rapid growth rates and production of allelopathic compounds. A mechanism increasing soil nitrogen would facilitate rapid growth on poor soils and previous studies indicate sites invaded by A. altissima have increased soil nitrogen levels. Increased soil nitrogen may be achieved through an alleochemical impact on legumes which solicit nitrogen-fixing rhizobia by emitting flavonoids into the rhizosphere under low nitrogen conditions. We investigated if and how A. altissima root exudates impact nodulation and growth in Trifolium pratense (Fabaceae). The experiment included a factorial design with the following treatments: soil leachate source (presence / absence of A. altissima), leachate source fertilization, and T. pratense fertilization. Treatment effects on T. pratense total biomass and shoot:root ratio were complex. Trifolium pratense treated withA. altissima leachates had a significantly increased nodule biomass to total biomass ratio and were twice as likely to be nodulated compared to control groups. We are currently monitoring changes in transcript abundance for T. pratense genes encoding enzymes chalcone synthase and chalcone isomerase in response to A. altissima leachates. These genes are involved in the production of the flavonoid released by T. pratense to solicit rhizobia for nodulation. Flavonoid signaling molecules are analogous to early responsive defense genes, suggesting increased nodulation results from an upregulation along a defense pathway. This previously unreported plant-plant interaction potentially facilitates rapid growth of A. altissima in poor soils via increased nitrogen fixation in neighboring legumes.

**Miara, Sheila**

July – September FY10

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**Norris, Rebecca**

July – September FY10

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July – September FY10

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**Townshend, Sean**

July – September FY10

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**Xhumari, Sandi**

July – September FY10

MathFest

“Generating Functions and their applications”

A lot of problems turn into Recurrence Relations, where the next term depends on the previous ones. For example, every term in the Fibonacci sequence is defined as the sum of the two previous terms, which is a Recurrence Relation. One of the most powerful tools to solve Recurrence Relations is Generating Functions. In this presentation, I will introduce you to Generating Functions and apply them to some specific problems. Next time you are faced with a Recurrence Relation, you will have a brand new secret weapon up your sleeve!