

CONFERENCE PROCEEDINGS

Listed below are abstracts of student-faculty collaborative work presented at regional, national, and international conferences.

Ashley Polhemus, Bhushan Borotikar, Frances T. Sheehan

Individuals with patellofemoral pain exhibit altered joint contact location and pattern compared to healthy controls: A dynamic, in-vivo study during concentric and eccentric muscle control

Presented at the Biomedical Engineers Society Annual Meeting, Atlanta, GA, October 24-27, 2012

Introduction: Chronic idiopathic patellofemoral (PF) pain is a debilitating knee pathology, common in female athletes, and is a likely precursor to osteoarthritis [1]. Despite its prevalence, the sources of PF pain are poorly understood, making it difficult to treat. Increased PF contact stress and altered physiological loading [2] have been suggested as possible sources of pain, indicating that altered contact kinematics (area and location) may be associated with pain. To date, contact area (CA) has been studied at discrete knee flexion angles during static loading, without dynamic consideration, in unimpaired subjects and those with PF pain. [2]. Thus, the purpose of this study was to compare *in vivo* dynamic cartilage contact mechanics between individuals with PF pain and healthy controls, based on a previously validated methodology [3].

Materials and Methods: Ten healthy females (10 knees) and 11 females (14 knees) clinically diagnosed with chronic (> 6 months) idiopathic PF pain exhibiting lateral patellar maltracking participated in this IRB approved study. Dynamic cine-PC (CPC) and multi-plane cine (MPC) sagittal-plane knee scans were acquired while subjects performed volitional flexion-extension movement in a Philips 3.0T scanner. Static scans were acquired with the knee in full extension. 3D static bone and cartilage models were developed from static scans. Sparse dynamic bone models derived from MPC scans were used to align static models with a single dynamic location and CPC kinematic data were then applied to the rigid cartilage contact model [3]. These accurately animated models were then used to determine the CA, the CA centroid, the peak strain, and the peak strain location.

Results and Discussion: Cartilage CA was significantly reduced in individuals with PF pain at high flexion angles (Figure 1, 23°-40°, $p < 0.05$). CA centroid location showed similar patterns between flexion and extension, as well as between cohorts. The path of peak strain location differed between flexion and extension only in individuals with PF pain. The peak strain location deviated significantly laterally when compared to the CA centroid during extension in individuals with PF pain ($0.001 < p < 0.05$). These findings support two theories for the origin of PF pain: an increase in joint stress due to decreased contact area, and an excess loading of tissue surrounding peripheral femoral cartilage due to skewed cartilage contact. Increasing our understanding of *in vivo* joint mechanics will aid clinicians in developing effective diagnostic tools and treatment methods.

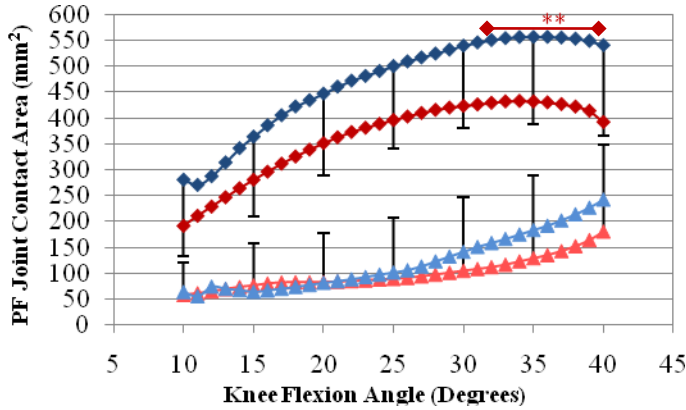


Figure 1: Average PF contact area of individuals with PF pain and healthy controls during flexion and extension cycles (\pm 1SD). Angles at which significant differences ($p < 0.05$) between PFP and control flexion contact area occurred are indicated with a **.

◆ PFP Flexion Cycle ▲ PFP Extension Cycle
◆ Healthy Flexion Cycle ▲ Healthy Extension Cycle

Conclusions: Individuals with PF pain exhibit decreased PF joint contact area and abnormal peak strain location. These contact parameters are likely related to the etiology PF pain, and *in vivo*, dynamic study provides a means to evaluate and improve current treatment methods for PF pain.

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 2. Connolly KD, et al. *Journal of Biomechanics* 2009 (42) 2802-2807.
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Melissa Bradley

(Matthew Cathell, Faculty Sponsor)

Innovative Nanofiber Filtration Materials of the Biopolymer Alginate for Sequestration of Dissolved Lead from Water

Presented at the International Conference on Innovative Technologies, Rijeka, Croatia, September 26-28, 2012

We created nanofibers of the biopolymer alginate and investigated their ability to sequester the toxic metal lead from aqueous solutions. The noted capacity of alginate to biosorb metals makes it a compelling candidate material for biological purification of metal-contaminated drinking water. Nanofibers were produced by electrospinning aqueous solutions of alginate and polyethylene oxide in a high voltage electric field, producing fibers with diameters ranging from 100-500 nm. Calcium ions were used to crosslink the alginate component of the fibrous product to render it water-insoluble; the uncrosslinked polyethylene oxide was removed by rinsing with water. Nanofibers were characterized using electron microscopy and infrared spectroscopy. UV-Visible spectroscopy, with a colorimetric indicator, was used to quantify sequestration of Pb²⁺ ions from aqueous solutions using mats of alginate nanofibers.

Melissa Bradley

(Matthew Cathell, Faculty Sponsor)

Remediation of Metal-Contaminated Drinking Water using Electrospun Alginate Nanofibers

Presented at the 244th American Chemical Society National Meeting & Exposition, Philadelphia, PA, August 19-23, 2012

We have electrospun nanofibers of the biopolymer alginate and have investigated their capacity to sequester toxic metals from water. Nanofibers are ideal for filtration applications because of their high surface-area-to-volume ratios.

Alginate interacts with a number of metals through a variety of mechanisms, including electrostatic and ionic interactions and coordination. The noted capacity of alginate to bind metals makes it a compelling candidate material for biological purification of metal-contaminated

drinking water. Nanofibers, with typical diameters of 500–600 nm, were electrospun and imaged using scanning electron microscopy. The nanofibers were initially crosslinked with Ca^{2+} and subsequently covalently crosslinked with epichlorohydrin, rendering them insoluble and suitable for repeated filtration applications.

Using colorimetric analysis, we have determined the nanofibers sequester significant amounts of $\text{Pb}(\text{II})$ ions from aqueous solutions. In ongoing studies, we are examining the binding of alginate nanofibers with additional heavy metal species of concern.

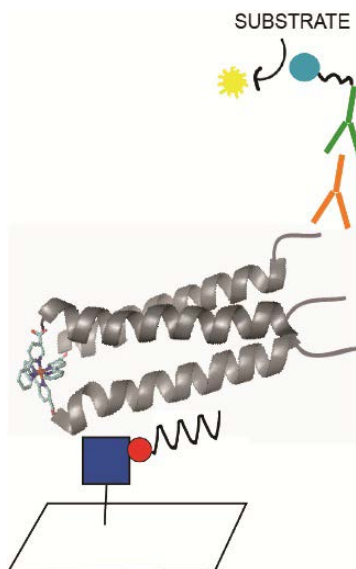
Jessica Gruskos, Ari Goldwaser, Danielle Guarracino

(Danielle Guarracino, Faculty Sponsor)

Competition of Peptide Hormone Mimics with Vasopressin and Oxytocin for Binding their Target Membrane Receptors

Presented at the 224th American Chemical Society National Meeting, Philadelphia, PA, August 19-23, 2012

Vasopressin and oxytocin are both peptide-based hormones involved in human regulatory functions. Despite near identical amino acid sequences, each hormone plays a specific biological role. Vasopressin regulates blood pressure while oxytocin is involved in neurotransmission and cell-signaling in the gonads. Each has a membrane receptor, from the GPCR family, to which it binds to exert its cellular effect. We created a panel of cyclic peptides that mimic both hormones. Using an Enzyme-Linked Immunosorbent Assay (ELISA), we measured the ability of each mimic to compete with immobilized vasopressin or oxytocin for binding its respective membrane receptors. The results indicate that the mimic compounds have favorable binding characterization and can serve as first-generation pharmaceutical leads. Future studies involve robust determination of mimic function in initiating the GPCR signaling cascade in cell studies.



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Dana Morton

(Jean Slobodzian, Faculty Sponsor)

Watershed Moments in the Autobiographies of Deaf Adults: A Pilot Study

Presented at the Eastern Sociological Society Conference, New York City, NY, February 23-26, 2012

This study employs qualitative research methodology to examine the autobiographies of deaf adults. The goal of this research project is to examine first-person reports told by deaf people, locating and classifying descriptions of identity and sense of place within the context of American society. Narrative analysis is used to organize selected life experiences. Watershed moments, which are the pivotal instances of declared self and cultural identification, are revealed during the analysis phase. The deaf identity is unique in that all deaf people ultimately define themselves in terms of either belonging primarily to the Deaf or hearing culture. Between three to five such watershed moments occurred in each of the four life stories examined. The coded data further demonstrates that, across the board, the two issues of communication and attitudes towards deafness critically impact identity development on both the group and individual levels. These two themes are used to discern why these individuals have classified themselves as either culturally Deaf or culturally hearing. The research reflects the Eastern Sociological Society's 2010 theme "Storied Lives" in several ways. First, by examining autobiographical accounts of these individuals, we garner a greater understanding of their personal identity through the stories that they tell. Additionally, by examining identity development via the lens of Deaf or hearing cultural norms, we ascertain the influences over the collective identities of these individuals. As this is a pilot study, analyses of further autobiographical texts will be needed to garner a greater understanding of whether or not these themes are reinforced by the experiences of the diverse deaf population.

Melissa Gutworth and Jason Dahling

(Jason Dahling, Faculty Sponsor)

Applying the Normative Conflict Model to Organizational Deviance

Presented at the 27th Annual Conference of the Society for Industrial and Organizational Psychology, San Diego, CA, April 26-28, 2012

In this study, we extend the normative conflict model of group dissent (Packer, 2008) to identify conditions that give rise to constructive versus destructive organizational deviance. Our results show that affective commitment and normative conflict interact to determine the type of deviance that employees express in the workplace.

Cynthia Holcombe

(Blythe Hinitz, Faculty Sponsor)

Fostering Developmentally and Culturally Literacy Experiences for Boys of Color

Presented at NAEYC 2010 Annual Conference and Exposition, Anaheim, CA, November 4, 2011
 The purpose of this session is to help practitioners revisit their classroom curricula and practices with the following questions in mind: Is my literacy program geared to meet the active learning styles that research has shown to be most engaging for boys and beneficial for all students?
 Do I plan curriculum projects with the needs of boys, particularly boys of color, in mind?
 Do I have workable strategies for keeping the curriculum playful to meet children's social/emotional needs while meeting current mandates regarding developmental and cultural appropriateness? The session will present research on developmentally and culturally appropriate literacy experiences related to social-emotional development. There will be a specific emphasis on working with boys of color. The work of Froschl, Gilliam, Hill, Kunjufu, and Sprung provides the theoretical foundation for the session. The session will be interactive with small and large group opportunities for participants to discuss issues and share strategies. This session will engage participants in examining research about developmentally and culturally appropriate literacy experiences, with a focus on boys of color. Attendees will gain information from the ongoing work of a multicultural group of teacher educators who have been addressing the issue of boys' success in school over the past several years. The interactive session will provide opportunities for participants to share strategies in small and large group activities.

Samantha Rose Coughlin

(Regina Morin, Faculty Sponsor)

Origins and Development of the Written Accentuation System in Spanish

Presented at the 40th Annual Meeting of the Linguistics Association of the Southwest, South Padre Island, TX, University of Texas at Brownsville, September 29-October 2, 2011.

The current study focuses on the evolution of the written accentuation system throughout the evolution of Spanish from Latin. Although the tonic accentuation system has remained fairly stable and most Spanish words have retained the tonic accent of Latin (Penny 1991: 33), in some cases phonological processes that resulted in changes in syllable structure promoted the need for a written accentuation system. Such a system was unnecessary in Latin because the tonic accent depended on syllable weight. Phonological changes that made a system of written accentuation necessary were the loss of long vowels, syncope, the elimination of word final /-e/, the loss of vowel hiatus and the formation of yod, the loss of consonantal case endings, and changes in the inventory of diphthongs between Latin and Spanish. Surprisingly little has been written about this topic. Douglass (1964; 1988) traces the early evolution of written accentuation from Quintilian through 1726. However, until 1884 there was a great deal of variation both in orthography and in the system of written accentuation, with instability apparent in the system. Indeed, until 1844 when the Spanish Government promoted the standardization of Spanish orthography in conjunction with the *Real Academia Española* (The Royal Spanish Academy) we continue to see significant discrepancies between earlier written accentuation systems and the one that is generally accepted today across all varieties of Spanish.

Cindy Holcombe and Jessica Kubeck

(Blythe Hinitz, Faculty Sponsor)

The Elementary and Early Childhood Undergraduate Research Seminars at TCNJ: History Supporting the Work

Presented at the Council on Undergraduate Research Conference 2012, Ewing, NJ, The College of New Jersey, June 24, 2012

This interactive session begins with a brief history of how current work builds on the ECED 470 capstone seminar of the Day Care Management Minor and the national award-winning and published work [in Sprung et. al. (2010) & Jacobson (2010)] of early childhood education undergraduate majors at TCNJ from the 1970s to date. The session will survey the course pedagogy, including interactive PowerPoint presentations; review and discussion of lesson plans; and sharing of research hypotheses, procedures and findings. 2011 and 2009 graduates will

CONFERENCE PROCEEDINGS AND BIBLIOGRAPHIC LISTINGS

discuss their experience: "Literature Speaks": Meeting the challenges of incorporating multicultural practices in the primary classroom" and "Native American Mathematics: Striving to Find Success in Early childhood Education." The presenters will engage in dialogue with the participants on possible alternatives for future research work.

Cynthia Holcombe

(Blythe Hinitz, Faculty Sponsor)

Multicultural and International Perspectives on Early Education Research: The TCNJ ECE Research Seminar

Presented at NJ Association of Early Childhood Teacher Educators Spring Conference, Wayne, NJ, June 2, 2011

This study explored the implications of offering a more balanced approach to representing multiple cultures in the curriculum through the use of multicultural books and literature in a third grade classroom. The literature review includes the history of African American education; inequity and racial conflicts; teaching practices, pedagogy and public policy regarding the recognition of African American contributions; practices and theories of multicultural education and culturally responsive teaching; how multicultural books and literature can address challenges of implementing multicultural teaching; how to choose authentic multicultural trade books depicting African Americans; how to use multicultural books in the classroom. It was hypothesized that books and literature depicting African and African American contributions, culture, and role models will enhance the early childhood curriculum. After exposure to such materials and supporting lessons, students will begin to see the important contributions of Africans and African Americans. Research includes pre-assessment of students' knowledge and attitudes; classroom centers featuring books, art, artifacts, and music; mini-lessons featuring story readings, student responsive activities, and projects. Following the student post-assessment of attitudes and knowledge, results indicated an increase in positive perceptions towards Africa and the people in Africa, as well as positive attitudes, although limited, towards African Americans.

Janet Gray, Leigh Sullivan, and Tamra Wroblecky

(Janet Gray, Faculty Sponsor)

Colonial Moves: Asymmetrical Intimacies in Himalayan Space

Presented at the 16th Annual Mini-Conference on Critical Geography, University of Georgia in Athens, October 23 and 24, 2009

The Indian Alps and How We Crossed Them is an illustrated memoir of Elizabeth Sarah Mazuchelli's two-year stay in the hill station of Darjeeling with her husband, a British army chaplain, and of a trek she initiated into the high Himalayas so that she could sketch scenes of the mountains. Nearly a hundred porters carried equipment, supplies, and Mazuchelli herself, who rode most of the way in a dandy-chair. Led by "C--," a high-ranking British official, the expedition moved along the border of British control in a miniature replica of colonial India less than two decades after imperial rule replaced company rule. They depended for restocking on officials of the neighboring independent Himalayan nations, Nepal and Bhutan. Although the colonials transported trappings of the Victorian gendered spheres with them, the politically fissured, spatially unthinkable mountains provided an alternate space – neither "public" nor "private" – where markers of gender appeared in unstable and fragile forms. "C--"s masculine command of the political sphere faltered disastrously when the regional officials did not respond as expected to his orders for supplies.

The Indian Alps has not been as readily recuperated as a protofeminist text as have the writings of other Victorian women adventurers, such as Mary Kingsley. However, we find it compelling precisely because it cannot be reduced to a single critical narrative, and because it provides an opportunity to respond to Himani Bannerji's charge to Western feminists to narrate the experience of women of the dominant group and interrogate how cultural practices and

subjectivities normalize oppression. Mazuchelli's text has been discussed in several scholarly contexts since the 1980s, ranging from a description of her "naïve ramblings" as a travel writer to celebrations of her adventurousness and her innovative "feminine" approach to aesthetics and geography. Other scholars, following the lead of Sarah Mills's *Discourses of Difference*, emphasize how opportunities for agency departing from Victorian gender norms depended on Mazuchelli's status as a colonial exploiter. Our challenge has been to integrate and think beyond these perspectives by focusing on affect and personal interactions in relation to both socially and politically constructed *place* and the extraordinary *spaces* of the Himalayan landscape. We amend a gap in prior scholarship by addressing Mazuchelli's accounts of her relationships with local people, particularly a young woman named Lattoo whom she comes to love—relationships well described as "asymmetrical intimacies" characteristic of colonial contact zones (Mary Louise Pratt, *Imperial Eyes*).

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