Discoveries
in the Public Interest

Research, Scholarship and Creative Works
at the University of Northern Colorado

UNIVERSITY of NORTHERN COLORADO

Bringing education to life.

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Grounded Discoveries

In numerous settings — public schools, university classrooms, scientific laboratories, clinics, sports fields, theaters, concert halls, art studios, libraries, businesses, community groups, national parks, and even outer space — faculty, staff, and students at the University of Northern Colorado are engaged in impressive research, scholarship, and creative works.

The significance of this work can be documented in several ways. Certainly, it achieves the traditional indicator of impact by yielding publications, presentations, and performances in prestigious outlets and venues. Likewise, the receipt of funding from the National Science Foundation, National Institutes of Health, U.S. Department of Education, National Endowment for the Arts, National Endowment for the Humanities, National Aeronautics and Space Administration, and many other national, state, and local agencies speaks well of the substantial merit of this work.

Yet UNC research, scholarship, and creative works also transcend conventional indicators of excellence with two additional qualities. First, UNC work is noteworthy because of its practical value. Many UNC scholars guide their inquiries with deep concern for pressing issues in society. They design thoughtful investigations that address vexing problems in education, physical and mental health, business, and social services. They roll up their sleeves, work collaboratively with others, and generously share their expertise in the community — locally, regionally, and internationally. They contribute to an understanding of humanity with ethical deliberations, cultural and historical analyses, and compositions in literature and poetry. They inspire others with art, music, and dramatic performances. And they push the boundaries of basic understandings in such diverse fields as earth science, mathematics, physics, and psychology — in topics that do not always have immediate application but accumulate into a data base that will ultimately guide decision making.

Second, UNC's work is exceptional in another important way. UNC students are regular partners in this cutting-edge work. Students — both undergraduate and graduate — are involved in numerous fascinating projects, some of which are featured in this magazine. Our students acquire high levels of technical expertise while being nurtured and challenged by experienced faculty and staff. They gain the confidence they need to join and eventually lead the next generation of scholars.

As you read through the profiles in this magazine, notice a commitment to serving the common good that motivates scholars from a wide spectrum of disciplines. Look for the vibrant sense of discovery that radiates into the education of students. And keep in mind that these projects are a small subset of a broader array of transformative investigations, partnerships, and creations by UNC faculty, students, and staff. We look forward to sharing more profiles in the future.

Look for the vibrant sense of discovery that radiates into the education of students.

Best regards,

Robbyn Wacker
Acting Provost and Senior Vice President
University of Northern Colorado

Teresa M. McDevitt
Acting Assistant Vice President for Research
University of Northern Colorado

Unlocking the Mystery

Searching for Keys to Prevent the Spread of Mosquito-Borne Diseases

There has never been a greater need to combat West Nile virus, yellow fever, dengue fever, and other constantly evolving mosquito-borne diseases. With more than 2 billion people at risk of infection with dengue virus, a further 600 million people at risk of yellow fever, and no currently available drug options, new treatments are desperately needed.

Australian-born UNC Professor Susan Keenan has spent more than a decade researching and developing compounds to help prevent the growth of *flaviviruses*, more commonly known as mosquito-borne viruses. Such viruses must replicate to grow; Dr. Keenan's research team is identifying compounds that will inhibit such replication. The most widely-known flaviviruses are West Nile, yellow fever and dengue fever. The West Nile Virus entered the United States in 1999, and the threat of certain other mosquito-borne diseases entering the southern United States grows as the world's climate changes.

Dr. Keenan summarizes the need for her research with a sense of urgency. "These diseases are killers, and there are really no drugs to combat them," she said. Dr. Keenan recently received a $1.4 million grant from the Rocky Mountain Regional Center of Excellence, funded by the National Institutes of Health, for her collaborative work with a colleague at Colorado State University. Through their unified approach, which combines computational modeling tools with molecular biology and pharmacology, the team members have discovered compounds that will bind to a flavivirus enzyme and prevent the viruses from replicating. This discovery comes after testing more than 300,000 compounds for antiviral activities. Another grant is allowing the team to test another 300,000 compounds in hopes of discovering even more disease-preventing compounds. The researchers have initiated live-virus studies with the long-term goal of developing the small molecules into drugs that would help combat mosquito-borne diseases.

"We are currently working on identifying the small molecules that can prevent these proteins from functioning correctly," Dr. Keenan said, explaining her computational drug design approach. "We then use the computational tools to predict the activity of the molecule and then test the compounds that we believe are most likely to succeed against the protein target — it is rather like finding a key that can fit a particular lock."

Dr. Keenan's research team also includes undergraduate and graduate students at UNC. These students have an opportunity for hands-on research experiences in the laboratory, which is a huge benefit of a UNC education. Students gain technical skills, substantive knowledge of biology, and inspiration from being part of a cutting-edge research program.

Of course, the quest continues. "There is a long road to go," Dr. Keenan said.

Bringing a new drug to market for any of these diseases will be a challenging endeavor since most people affected by these diseases live in poorer areas of the world, and the cost of developing a single drug generally exceeds $15 million. Additionally, the viruses regularly mutate and become resistant to drugs, making the research on flaviviruses an ongoing process. Dr. Keenan optimistically expects new drugs and targets to be developed in about five to 10 years.

"These diseases are killers, and there are really no drugs to combat them."
–Susan Keenan

Brain Matters

Computer Models as a Future Tool in Diagnosing Brain Injuries

"An ounce of prevention is worth a pound of cure."
–Dr. Igor Szczyrba

According to the National Institute of Neurological Disorders and Stroke, approximately 1.4 million people experience a traumatic brain injury and 50,000 people die from head injuries annually. More than 5 million Americans who have survived traumatic brain injuries need ongoing help in performing daily activities.

UNC Mathematical Sciences Professor Dr. Igor Szczyrba and his team of researchers, including Dr. Martin Burtscher, Texas State University at San Marcos, and Mr. Rafal Szczyrba, M.Sc., Funiosoft LLC (and Dr. Szczyrba's son), have been conducting investigations for the past decade in how traumatic brain injuries unfold. The general idea behind the research is that the interface of mathematics and computers provides an effective way to represent how brain matter or brain tissue behaves during accidents.

The research has evolved and is currently being applied in collaboration with Intel Corporation and helmet manufacturer Riddell to simulate collisions on the football field. This process enables a comparison with similar impacts that cause no injury. The predictive analysis will then lead to the design of new and improved helmets with the ability to track hits and identify real-time potential injuries via an embedded microchip.

According to the American College of Sports Medicine, approximately 85 percent of sports-related concussions are typically undiagnosed, which can negatively affect players' health and well-being, both short and long term. According to Dr. Szczyrba, many people share the misconception that no injury is sustained if the skull is not broken. In fact, in many closed head-injury cases, very serious injuries, are sustained within an intact skull. As an avid skier, Dr. Szczyrba's desire to contribute to the field of mathematical sciences is compelled by the adage, "An ounce of prevention is worth a pound of cure."

"Some of the most dangerous [traumatic brain] injuries are those that you cannot diagnose immediately," said Dr. Szczyrba. "According to National Institute of Health statistics, millions are affected every year. Traumatic brain injuries cost societies not only financially but also in physical harm. It is almost impossible to recover 100 percent."

Dr. Szczyrba described the brain as "a physical medium — like Jell-O," housed within the skull, with no void space, and incompressible since it is essentially 80 percent water. When different portions of the brain move, regardless of how slight, a critical strain on the veins and neurons can occur.

"The model helps us understand how the brain reacts to the different movements, which then predicts which brain matter is displaced and which neurons could be damaged. The head injury criterion is currently well established for translation, as when the head moves from front to back or from side to side. However, we are trying to develop a new brain injury criterion for rotations as well since there is no good measure currently," Dr. Szczyrba said. He and his team examine real-life instances depicting head movements that occur during various accidents.

Computer simulations are instrumental in the design of improved brain injury criteria and may ultimately be used by physicians to guide diagnosis of actual brain injuries, Dr. Szczybrz reports. Computer simulations have already helped advance the study of traumatic brain injuries in accidents, such as those involving automobiles, leading to safer features in vehicle interiors. Other potential implications of the research could improve protective sporting helmets.

"An injured brain can heal and even adapt, but it might not be back to 100 percent," said Dr. Szczyrba, stressing the importance of being aware of the devastating reality of traumatic brain injuries and the need to take protective measures.

Transforming Education

Learning to Implement Effective Strategies for Students with Autism

Through Quick and Handy tools published by Autism Asperger Publishing Co.

Autism is a developmental disorder appearing in the first three years of a child's life that affects the child's brain development. According to the Centers for Disease Control (2012), one out of every 110 children has some form of autism. The incidence for boys is even higher at one out of every 70 boys. Autism Spectrum Disorders, a cluster of conditions that vary in character and severity, occur in all ethnic and socioeconomic groups and affect every age group.

For children with autism, a type of Autism Spectrum Disorder, delays in social interaction and communication present challenges for their own adjustment and for the adults who care for them. Children's difficulties are typically evident in impaired social interaction (e.g., avoidance of eye contact), communication skills (e.g., impediments in learning language), and unusual repetitive interests (e.g., repeatedly flipping through pages of a book). Although the characteristics of autism may change and become less severe with age and treatment, autism has no known cure.

Without special training, parents and teachers regularly find themselves unprepared to support a child with autism. Parents may be puzzled by the vast amount of technical and sometimes inaccurate information that exists about the needs of children with autism. Teachers and other practitioners may struggle to find accessible advice for including children with autism in their classroom and addressing their unique social and behavioral issues.

The perspectives and responsibilities of adults who educate children with autism have inspired UNC special education professors Robin Brewer and Tracy Gershwin Mueller to team up and translate autism and behavioral research into a unique set of publications for teachers and parents. The *Strategies at Hand: Quick and Handy Strategies for Working with Students on the Autism Spectrum* and *Strategies at Hand: Quick and Handy Positive Behavioral Support Strategies* provide practical interventions that are based in the latest research in the field of autism and behavior.

"The number one question we get when we present to educators is, 'I have a child who does this (fill in the blank), what do I do?'" Dr. Mueller said. "My answer is that every child is unique and every need is different, and consequently, there is no simple list of interventions or 'recipes' to use. However, we wanted to come up with something that is packed full of interventions and has been validated in tackling common situations for children who have autism." Their work has gained tremendous support from the Colorado Department of Education and the Council for Exceptional Children.

The first *Strategies at Hand* guide focuses on working specifically with children with autism and uses straightforward language so that teachers, teaching assistants, administrators, and the general public can understand the characteristics of children with autism without needing much background knowledge on the condition. The second guide, written much like the first, focuses on Positive Behavior Support Strategies that can be used for all students, not just those with special needs. Both guides offer a variety of strategies that can be implemented schoolwide, classwide, and individually in a classroom or at home.

"When creating our Positive Behavior Support Strategies publication, we considered one of our mantras; that is, that we shouldn't develop an individualized behavior plan for a student unless we've tried schoolwide and classwide strategies first," Dr. Brewer said. "We know there may be other strategies that we can implement for everyone, including students with behavioral problems, that will prevent the behavior." Therefore, readers of their publications learn new skills that will benefit not only children with autism but many other students in their charges as well.

The investment it takes to learn how to assess students' behaviors and determine which practical strategies to use in particular situations can pay enormous dividends for teachers and students alike. "Our research shows that early intervention for 20-25 hours per week (regardless of the chosen program) can lead to good results for most students," Dr. Brewer said. "The earlier the intervention, the better the results. Some children can now be identified as early as 12 to 14 months, and this early intervention is critical."

Reaction to the two books by parents, teachers, and other experts in special education has been heartening. "Our next publication focuses on helping educators understand the special education law, and another will include strategies for teaching students with severe needs," Dr. Mueller said. "The feedback we've received has all been positive. People like the "Strategies at Hand" books — they are handy, inexpensive, and very user-friendly."

"The number one question we get when we present to educators is, 'I have a child who does this (fill in the blank), what do I do?'"
–Tracy Mueller

Preparing Teachers to Help English-Language Learners Understand Science and Mathematics

Acting on Faith and Knowledge

"It's about believing that English learners can learn math and science. And they can learn if we use certain strategies…and don't have a deficit view on children's learning. There is a local context; we need to support and empower each other to make a difference."
–Elizabeth Franklin

Imagine you are a new teacher faced with a classroom of curious, energetic children. Your children are intrigued with many aspects of science — how animals communicate, what causes plants to grow, how mountains are formed, and the like. They are also interested in mathematics — in counting, adding and subtracting, and comparing the sizes and shapes of objects.

As you gain experience in your teaching, you find that you are fairly successful in capitalizing on children's inquisitive nature and in fostering their achievement — but with some children more than others. You begin to focus on children who are English-language learners. English-language learners come to your classroom with relevant ideas about science, basic skills in mathematics, and an eagerness to find out more. Yet they do not fully understand your lessons.

You wonder: How can you reach these children? How can you give them the same opportunities experienced by other children?

A team at the UNC has begun to answer these questions. The group is comprised of Drs. Elizabeth Franklin (Professor in Hispanic Studies), Lori Reinsvold (Director of Technology at the Mathematics and Science Teaching Institute), Jennifer Harding-Dekam (Assistant Professor in Teacher Education), Youngjin Song (Assistant Professor in Chemistry and Biochemistry), and Teresa Higgins (Assistant Professor in Biological Sciences). These educators are partnering with teachers and school leaders in Archuleta (Denver Public Schools), Dunn (Poudre School District), and Centennial and Dos Rios Elementary Schools (Greeley-Evans Weld County School District 6). Last year, these schools collectively enrolled more than 1,000 English-language learners.

According to Dr. Franklin, executive director of the Mathematics and Science Teaching for English Learners (MAST-EL) project, one important answer is that you must have a strong faith in the abilities of English learners. "It's about believing that English-language learners can learn math and science. It's about empowerment."

There are plenty of children to empower. The population of English language learners in the state of Colorado has increased 260 percent in the past 10 years (Medina, 2010). Yet teachers do not always feel adequately prepared to meet the needs of these children, either generally or in the specific areas of science or mathematics. Nearly half of all in-service teachers have English-language learners in their classroom, but teachers receive an average of only four hours of training in English as a Second Language strategies (National Research Council, 2010). Professional development that is available tends to focus broadly on methods for increasing achievement scores and does not provide teachers with strategies for daily classroom teaching, specifically in math and science.

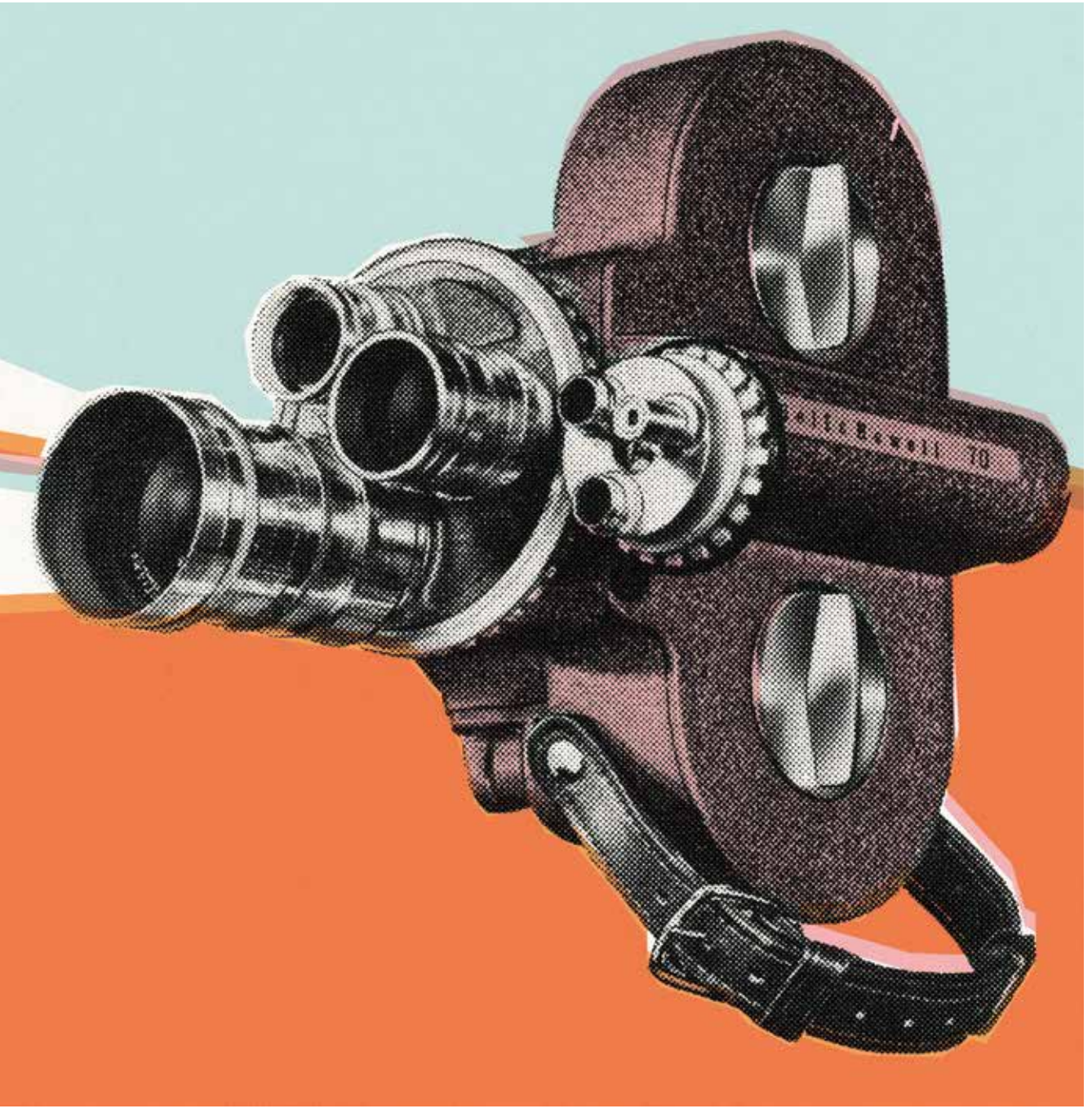
Dr. Franklin sees MAST-EL as an opportunity to collaborate with other experts and move forward together to prepare well-informed teachers who can make a difference in the achievement of English-language learners. The program will prepare 30 pre-service teachers to deliver high-quality mathematics and science instruction by giving them rich experiences working with kindergarten through fifth-grade English-language learners in the four elementary schools. The pre-service teachers will each complete UNC's English as a Second Language (ESL) endorsement, which is a unique elective program offered at UNC for prospective elementary, secondary, and K-12 teachers.

MAST-EL is funded by the National Professional Development Program of the U.S. Department of Education. Among other things, the project funds half-time instructional coaches to train teachers in the participating elementary schools to become exemplary educators of mathematics and science for English-language learners. The grant also provides the opportunity for UNC faculty and students to build long-term relationships with administrators and teachers at the four partner schools.

"It's about believing that English-language learners can learn math and science," Dr. Franklin said. "And they can learn if we use certain strategies and don't have a deficit view on children's learning. There is a local context; we need to support and empower each other to make a difference."

She also strongly encourages other faculty to spend some time in Colorado schools to experience the changing demographics. Dr. Franklin stresses the importance of learning about the cultural backgrounds of children and their families and sees an opportunity for UNC to be a leader in related education and research.

References: Medina, B. (2010). Linguistically diverse learners in Colorado: A State of the state. Denver, CO: English Language Acquisition Unit, Colorado Department of Education. National Research Council. (2010). Preparing teachers: Building evidence for sound policy. Washington, D.C.: National Academies Press.



Understanding Humanity

Film in Culture; Culture in Film

Helping Viewers Appreciate the Complexity of Films

As an adolescent, Kenneth Chan loved to go to the movies. His parents, whose ancestors were Chinese immigrants to Singapore, thought films were largely a waste of time and believed that he should be investing that time in studying and other more productive pursuits. In responding to his parents' questions, Dr. Chan became increasingly reflective about the purpose of films in a multicultural society. Now an associate professor of English at UNC, Dr. Chan has been teaching film studies since 2008 and, thus, putting his reflections on film into educational practice.

Dr. Chan considers his cultural identity status in the United States to be a form of "double diaspora" because he grew up in a Chinese immigrant family in Singapore and then relocated to the United States and earned his Ph.D. from the University of Florida in 1999. This rich cultural background prompted his fascination with the immigrant experience and the idea of "otherness" that comes from being removed from the majority population. Dr. Chan's research journey began with concerns about the Chinese in the U.S. and evolved into an exploration of the impact of cultural texts,

as represented in film, literature, and other non-literary sources such as the World Wide Web. Dr. Chan explored this topic in his dissertation, and he continues to develop it by studying how cultural minorities are portrayed in film.

Dr. Chan's first publication was an essay on Black-action cinema. As he continued to publish in the area of film studies, he discovered he had a lot to say about Asians in Hollywood. An essay on the movie *Crouching Tiger, Hidden Dragon* spawned other pieces that eventually became the topic of his book, *Remade in Hollywood: The Global Chinese Presence in Transnational Cinemas*, in which he critically examined the nature and origins of Chinese stereotypes and representations in American and international films.

Social issues and politics motivate Dr. Chan's research. He views his writing as a small way of intervening in matters of cultural politics. Dr. Chan explains his need to stay personally connected to his work: "How can I carve out an area of research in which I identify with it, I believe in it, and I can speak on it with authority? I can only write about something if it truly means something to me."

Dr. Chan's research explores the argument that diasporic Chinese filmmakers "sell out" by often perpetuating racial stereotypes of the Chinese people in order to make it in Hollywood. On the other hand, he has discovered that stereotypical representations in films are part of a more complex cultural discourse, hence making a straightforward critique of stereotypes much more complicated. Films are a negotiation between what is pleasurable to watch and what is culturally and politically "real." It is important to understand how people consume films and their beliefs about cultures represented in them. Dr. Chan's research helps explain why certain stereotypes exist, and why the stereotypes continue to get reconfigured instead of just disappearing. Dr. Chan also emphasizes the importance of remembering that films are an international industry: "Hollywood culture is a global culture; you cannot run away from it. It's everywhere." American films are shown in China and in Asia eventually. So, films not only affect the way Americans think about the Chinese people; films also influence how the Chinese people think about America.

A long-term goal for Dr. Chan is to help others learn to appreciate the complexity of films. "There is intellectual pleasure that can be had from film. It's okay to just sit back and enjoy a film for the purpose of escaping into a fantasy, but that is only one of the multiple pleasures a film offers. If we can learn how to watch films in a way that allows us to tap into our intellectual pleasure, we have just multiplied the ways in which we enjoy a film." He encourages viewers to work toward understanding how the film industry works because it does impact the way we view the world. Intentionally or unintentionally, "We learn so much about each other through film."

Dr. Chan is grateful to UNC for providing the opportunity for him to travel and further his research. He hopes to continue his scholarly work to investigate portrayals of other populations and cultures in film that have personal meaning to him.

"As a scholar, you evolve. It's part of the discovery. You find yourself asking, 'What do I want to do with my research time?' You have to love your research topic; it has to mean something to you."

"If we can learn how to watch films in a way that allows us to tap into our intellectual pleasure, we have just multiplied the ways in which we enjoy a film."
–Kenneth Chan

A Fresh Look at a 15th Century Manuscript

A Critical View of the *Cancionero 1250 of Gómez Manrique*

"The University has been very generous, very gracious to me in backing my endeavors… Because of that, my manuscript is already being vetted, and I've been able to work on [other publications] at the same time."
–José Suárez

Advanced technology gives researchers instant access to the most current news, literature, and scholarly sources on a variety of topics. Increasingly, technology also provides researchers with the opportunity to reach back into history and search through priceless relics. For José Suárez, Ph.D., Professor of Hispanic Studies at UNC, obtaining a digital copy of the 15th-century manuscript of poet Gómez Manrique's *Cancionero 1250* was eventually more useful than holding the original artifact in his hands. This digital copy allowed him to study Manrique's historically significant work in detail and to complete the research he had started more than 30 years ago.

Dr. Suárez's research investigates cultural history through an analysis of the linguistic features of the poetry. In his recent work, he transcribed and edited a critical edition of Manrique's *Cancionero 1250*, a feat no one had previously accomplished in the 500-year time period since the poems were written. Dr. Suárez's critical edition includes the *Cancionero* in its entirety and also an appendix of additional poems not found in the *Cancionero*, collectively representing Manrique's complete works. Altogether, Dr. Suárez's critical edition includes more than 400 poems.

The dates of Gómez Manrique's life are uncertain. He was born sometime around 1412, the fifth of 15 children. His father was Pedro Manrique and his mother was Leonor of Castile, herself the granddaughter of King Henry II. Gómez Manrique blended a love of language with a noble upbringing and ultimately excelled as a court poet. He resided in Toledo, Spain until his death around 1490.

Dr. Suárez explains how the *Cancionero* demonstrates the evolving nature of the Spanish language in the 1400s. Also common for that era was dedicating poetry to noblemen as a way of currying favor. Manrique dedicated this collection of poems to Rodrigo Pimentel, Count of Benavente, sometime after 1476. The *Cancionero* opens with a preface in which Manrique dedicated the collection to Pimentel. Most of the poems in Manrique's collection are light-hearted verses and love poems, although there are a few political statements peppering the book. Dr. Suárez was surprised to discover a number of poems with hateful messages of misogyny and anti-Semitism. He describes these poems as the "ugly part" of Manrique's collection.

Last summer, Dr. Suárez was able to travel to Spain to examine the original *Cancionero 1250* manuscript, which has been in the Royal Palace Library in Madrid for more than 500 years. Most, if not all, of the poems have been published previously, but not this particular *Cancionero*. Dr. Suárez, wherever possible, modernized the spelling so as to make the poems more accessible to the modern reader of Spanish and also compared this *Cancionero* to other of Manriquez's published *cancioneros*, noting differences in the transcriptions.

Dr. Suárez is especially grateful for the support he has received from UNC to conduct his research. "The university has been very generous, very gracious to me in backing my endeavors," he said. Because of that, my manuscript is already being vetted, and I've been able to work on other publications at the same time. Without university support, I wouldn't be able to do half [of this work], because I wouldn't have the time or the feedback from presenting [my papers at international conferences]." Most recently, Dr. Suárez has traveled to Spain, Morocco, Japan, and Argentina to conduct research and share his findings internationally.

De Gómez Manrique a vna dueña que yua cubierta
El coraçón se me fue
donde vuestro vulto vi,
e luego vos conoçí
al punto que vos miré;
que no pudo fazer tanto
por mucho que vos cubriese
aquel vuestro negro manto
que no vos rreconosçiese.

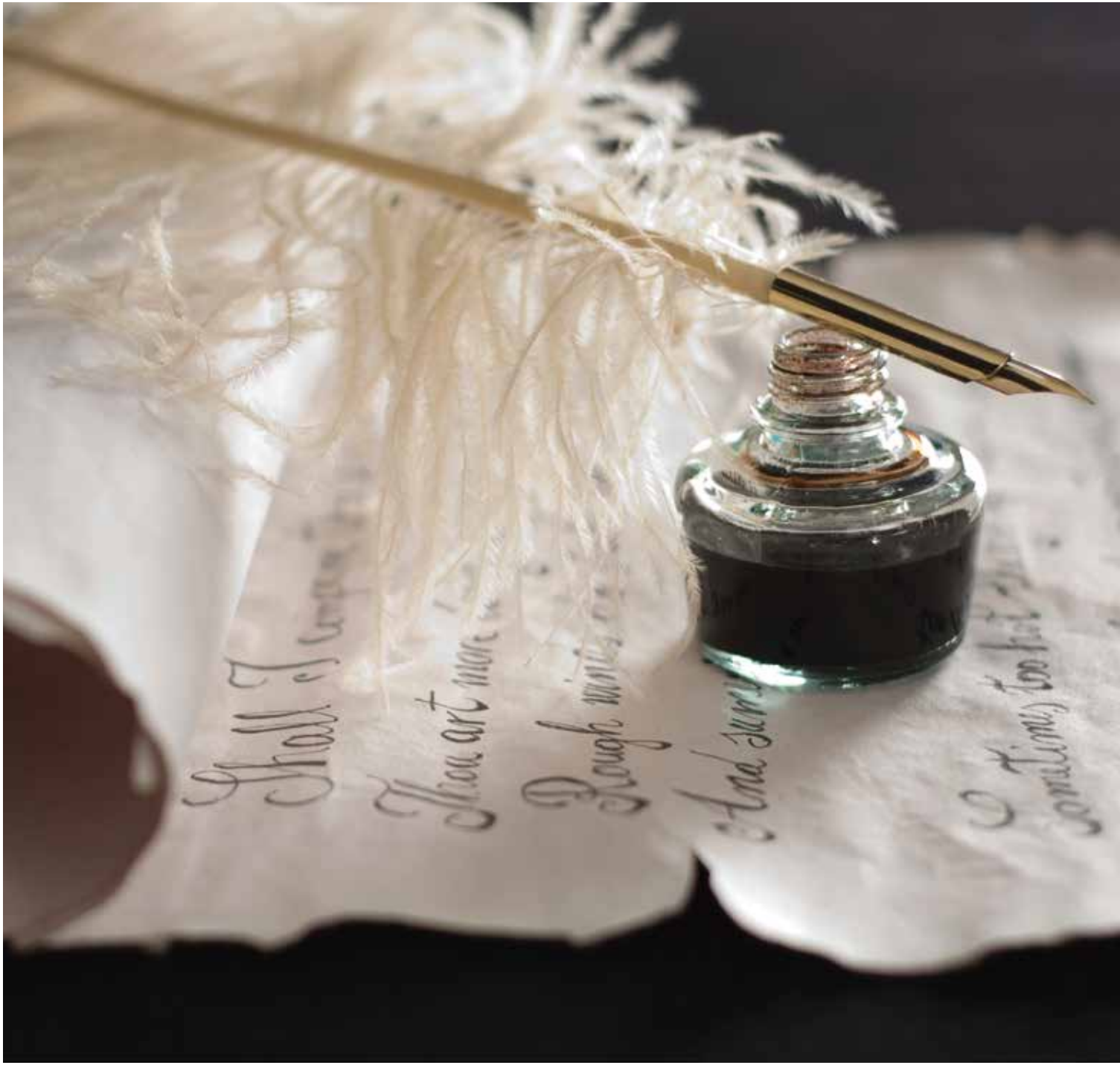
Que debaxo se mostraua
vuestra graçia y gentil ayre,
y el cubrir con buen donayre
todo lo manifestaua;
asy que con mis enojos
e muy grande turbaçión,
allá se fueron mis ojos
do tenía el coraçón.

From Gómez Manrique to a veiled lady
I could no more than scarcely breathe
When you drew on your veil
And hid yourself so well beneath
Your dark cloak's heavy trail.

But under it your gentle grace
And simple air were seen;
The very masque its charm would trace
And show, instead of screen;
So very great became my care
And trouble that I knew
My heart was swift entangled there
With my enraptured view.

–translated by Thomas Walsh

Hispanic Anthology: Poems Translated from the Spanish by English and North American Poets, collected and arranged by Thomas Walsh. G. P. Putnam's Sons, New York, 1920 (p 77). Reprinted with permission.



Engaging with the Community

Tragedies as Catalysts for Resilience

A Team Approach to Identifying Resilience in International Communities After Natural Disasters

Hurricane Katrina was the first of many devastating natural disasters to strike the globe since 2005. Although serious hurricanes, famines, earthquakes, and tsunamis have devastating effects, surviving individuals often exhibit considerable strength by rebuilding their homes, lives, and communities.

This courage has not gone unnoticed by UNC researchers who over time have identified the need for cross-disciplinary research with families and aging populations facing adversity and displaying resilience. Graduate students have also contributed to the work. Faculty Researchers included Drs. Robbyn Wacker (Acting Provost with specializations in gerontology and sociology), Ann Bentz (Special Assistant to the Dean of Natural and Health Sciences and expert in Exercise and Sport Science), Susan Collins (Assistant Professor of Gerontology), Nancy Karlin (Professor of Psychological Sciences), Sherilyn Marrow (Professor of Communication), Gary Swanson (Mildred Hansen Journalist in Residence), and Joyce Weil (Assistant Professor of Gerontology).

Drs. Karlin and Marrow joined forces in 2006 to develop a rhetorical and psychosocial framework for examining resilience. Their research started a year after Hurricane Katrina, during which they interviewed community members in New Orleans who were demonstrating strong coping skills. The research team discovered that the survivors viewed the disaster

as an opportunity to demonstrate their individual and family strengths. These individuals "stepped up," kept a positive attitude despite their hardships, and showed limited signs of depression. The survivors' resilience seemed to be directly associated with their positive frame of mind and fueled by the key variables of social support and communication. This correlation led the research team to wonder: Do similar patterns of resilience occur in other parts of the world following natural disasters?

In 2010, the researchers had the opportunity to examine another population in the aftermath of a disaster. Professors Marrow, Karlin, and Swanson, and two graduate students, Tara Spencer and Sara Baum, traveled to Peru and spent over a week with earthquake survivors in the small village of Vina Vieja. Previously a community of 350 people, only 186 individuals remained in the village after three earthquakes occurred between 2007 and 2010. Amazingly, no casualties resulted from the earthquakes, but numerous villagers left the area out of fear or an inability to sustain their livelihoods. With help from translators, the researchers interviewed 35 community members. The Peruvian survivors generally displayed negative moods, experienced low self-efficacy, and felt helpless in response to the three earthquakes they had endured. The villagers did not believe that they could control crucial aspects of their lives and commonly referred to a higher deity causing the natural disasters.

After obtaining different perspectives on survival in New Orleans and Vina Vieja, the research team speculated that resilience is directly linked to social support. Research participants in New Orleans had considerably more social, financial, and government support after Hurricane Katrina. On the other hand, the Peruvian villagers felt abandoned by fellow community members who left the village after the earthquakes, and they received no financial help from village leaders. The differences between the situations and the survivors' responses reinforced the need for cross-cultural research on resilience. However, there were also similarities in the two populations. Both communities had individuals striving to create better lives for themselves after the natural disasters struck.

In order to refine their conceptual framework on resilience, the research team took on the challenge of addressing two questions: What experiences are universal after a natural disaster? Which other experiences are culture-specific? They have used both quantitative and qualitative methods and are trying to develop *etic* (universal) and *emic* (cultural-specific) constructs with regards to resilience.

Drs. Karlin and Marrow, and Dr. Weil, who joined the group in 2009, intend to continue to investigate cultural differences. For example, to understand the daily experiences of Italian elders (ages 63 to 90), Drs. Karlin and Weil analyzed 27 in-depth interviews conducted in a local organization that serves seniors in Rome. Further data will be collected from elders in Thailand this summer with comparison data from Botswana and the U.S. during the following acadmarremic year.

The research team is committed to giving back to the communities they research. In Peru, Betty Brown, UNC alumna and active member in Partners of America, taught English classes, and Dr. Marrow and two graduate students delivered a program called "Talk Share Care," in which they encouraged children to express their feelings in the aftermath of the crisis. In Italy, UNC students spent time with Italian elders. In Thailand, students will interact with Orchid Bloom children from north of Chiang Mai, work with a program addressing prostitution in Thailand, and travel with a relief worker who trains farmers to grow mangos and grapefruit instead of opium. "We walk away feeling energized, knowing we left a situation better than we found it," Dr. Karlin said.

Photo courtesy of Sherilyn Marrow

"We walk away feeling energized, knowing we left a situation better than we found it."
–Nancy Karlin

The Story of a Polish Ballade

Music Professor Uncovers Story Behind Chopin's Composition

Musical works are often categorized by genre instead of being portrayed as individual stories or statements, so that "Brahms's symphonies" or "Beethoven's piano sonatas" tend to be viewed with an eye toward the commonalities between them rather than those elements that make each individual work unique.

Stories can be told with words, images, and even gestures. To those with musical expertise, stories can be told in tones as well. Musical compositions have their own vocabularies and narrative strategies, and these have a great deal to tell about the cultural conditions in which such works were produced.

Although the story a musical composition tells is not always clear at first blush, a close inspection of its narrative structure can illuminate its meaning. A recently written book by UNC Professor of Music Jonathan Bellman, titled "Chopin's Polish Ballade: Op. 38 As Narrative of National Martyrdom," helps to unravel the mysteries behind Frédéric Chopin's Second Ballade. Chopin, a Warsaw composer and virtuoso pianist, is considered to be one of the great masters of Romantic music. He composed this ballade between the years of 1836 to 1839, completing it on the Spanish island of Majorca. In his book, Dr. Bellman critically analyzes Chopin's Second Ballade, uncovering a powerfully nationalistic story.

Dr. Bellman originally encountered the ballade as an undergraduate university student, and he became captivated with the peculiar structure of the piece. Adding to the fascination was the fact that his girlfriend at the time (now wife, Dr. Deborah Kauffman of UNC's School of Music) played it in her senior recital. Later, in the course of his graduate study, he became further intrigued as he observed scholars analyzing it while failing to reach any kind of agreement. Superb piece of music + mystery = scholarly obsession.

Because music not only tell stories but also offers glimpses into the culture of its own time, Dr. Bellman's careful analysis, which integrates biographical, historical, and musical contexts, provides a coherent account of Chopin's ballade. Focusing on the work's style was key, because it turns out that there are strong connections, associations recognized by Chopin's contemporaries, with certain operas — those in which an idealized past was ruined by subsequent disasters. As it happened, Chopin wrote his ballade shortly after his native Poland was crushed by a Russian invasion, a circumstance that affected him deeply. Not coincidentally, the successive sections in the ballade — beginning with a pastoral scene and progressing through a ferocious storm, tentative return to the pastoral scene, increasingly troubled unrest, return to the storm and a final catastrophe — reflect the dramatic trajectory by which Poland virtually ceased to exist as a political entity at the beginning of the 1830s. Chopin had been encouraged by many of his friends to compose an actual opera, and so what materializes in the ballade is an opera for piano, a composition that uses the dramatic gestures and narrative strategies of contemporary operas, idealized and integrated, to tell the story of Poland's suffering. In support of his analysis, Dr. Bellman uncovered largely forgotten evidence that several perceptive contemporaries of Chopin had recognized as evocative historical themes in the masterpiece.

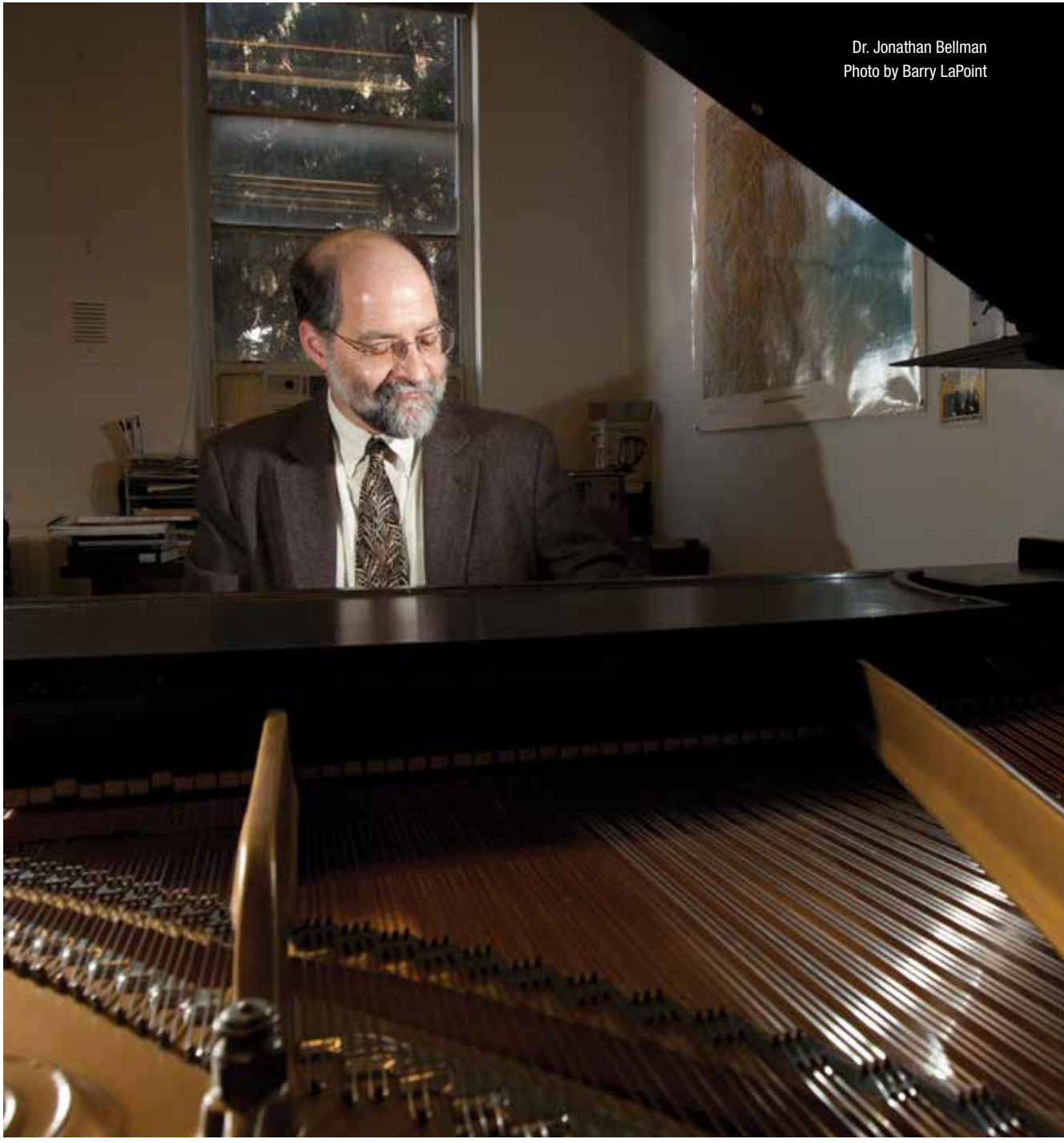
One of the main implications of Dr. Bellman's research is the need to focus on unique works and their musical languages rather than the larger generic groups. Musical works are often categorized by genre instead of being portrayed as individual stories or statements, so that "Brahms's symphonies" or "Beethoven's piano sonatas" tend to be viewed with an eye toward the commonalities between them rather than those elements that make each individual work unique. Because of the stories being told, such works can be compared to literature, with the difference being that Shakespeare's plays or Hemingway's novels get studied one

at a time, whereas musical works are often over-generalized without identifying their distinct properties.

The analysis that Dr. Bellman has conducted yields advice. For the general listener trying to understand classic musical pieces, Dr. Bellman emphasizes the importance of informed listening. Works are composed in musical languages specific to their own time and place, and individual listeners interpret compositions somewhat differently. Musical languages change from one decade to the next; hence, the same kind of musical and cultural vocabulary does not apply to Renaissance church music, classical symphonies, Romantic virtuoso piano music, and modernism. Thus, listeners can learn as much as possible about musical languages while attending to their own personal responses. They can also become as familiar as possible with elements of musical expression (e.g., the tempo, dynamics, and style of compositions) and consider them while enjoying a musical performance.

An informed appreciation for music obviously takes considerable knowledge. Yet everyone can start somewhere. Dr. Bellman encourages motivated novices.

"Just keep listening. In other words, we learn to understand music best as we learn to understand other languages: by immersion."



Dr. Jonathan Bellman
Photo by Barry LaPoint

Four Saxophones for Six Suites

Developing the Saxophone as a Classical Instrument

Three years ago, Andrew Dahlke, associate professor of Music, began researching Johann Sebastian Bach's *Six Suites for Unaccompanied Cello*, some of the most performed and recognizable solo compositions ever written for the cello. Recently he became the first musician to transcribe and professionally record Bach's cello suites using four different types of saxophones.

Previously, the suites had been transcribed and recorded using a variety of instruments, including a single style of saxophone. However, Dr. Dahlke, to his knowledge, is the first musician to transcribe them and professionally record them using a soprano, alto, tenor, and baritone saxophone. He began his research by studying the suites in literature and listening to numerous recordings of them before studying how famous Russian cellist, Mstislav Rostropovich, played the suites.

"As a saxophonist I thought a really great starting point would be to study how a master cellist actually plays the suites," Dr. Dahlke said. "That was a big part of the project — to put on the music and literally transcribe every phrase marking, every nuance that he put into the suites." Those nuances helped determine which type of saxophone he chose for each suite.

Transcribing Rostropovich's performance took Dr. Dahlke a year but was worth the effort because he developed a solid foundation for interpretation and felt confident when it came to his own interpretation of the suites. He then took his project to recording engineer and producer Scott Burgess of the White Pine Music record label at Central Michigan University, who had expressed interest in his work. Funding through the UNC's Faculty Research and Publication Board helped pay for his travel costs and enabled Dr. Dahlke to work collaboratively with the label to record his first solo CD.

UNC students learn from his creative efforts. "Spending that much time studying the suites and learning about them has really enhanced what I am able to offer my own students here," he said.

The energetic musician also devotes time to the Capitol Quartet, a saxophone quartet of four professors from universities around the country. The group divides its time playing with symphony orchestras, doing recitals, and performing small, community concerts all over the United States. "Community concerts bring music to rural places that don't have access to the major metropolitan areas filled with culture and arts," Dr. Dahlke said. "Those are really fun." When performing at a college or university, the quartet offers master classes for music students.

"I'll have some of the guys in the quartet who are professors from other schools work with my own students, who have music prepared for them," Dr. Dahlke said. "After the students perform they get feedback from the professors and the audience in a classroom setting."

Dr. Dahlke has been in the Capitol Quartet for almost five years and is thankful for the opportunities and encounters his membership has given him." I've enjoyed being able to form strong relationships with professors at other universities," he said. "Joining the Capitol Quartet has been wonderful in terms of my professional development and in terms of recruiting students to the university."

Dr. Dahlke noted that a large part of his job at UNC involves teaching classical saxophone. "Most people don't associate a saxophone with the orchestra or classical music," Dr. Dahlke said. "I'm trying to continue to develop the saxophone as a classical instrument."

"Spending that much time studying the suites and learning about them has really enhanced what I am able to offer my own students here."
–Andrew Dahlke

Promoting Health

Noise-Induced Hearing Loss

Preventing Irreversible Damage

"Noise-induced hearing loss is preventable and an unnecessary consequence of lifestyle, occupation, or environment."
–Deanna Meinke

We live and work in a noisy world. Fire alarms, factories, concerts, subways, and explosions are just a few sources of excessively loud sounds.

Yet our sense of hearing is not something we can turn on and off. As a result, our ears can be intentionally or unintentionally assaulted with sounds loud enough to cause permanent hearing damage. We can also develop tinnitus, more commonly known as ear ringing.

A common misconception is that noise-induced hearing loss (NIHL) occurs immediately and is obvious to the listener. In fact, auditory damage due to hazardous noise exposure typically happens gradually over time. Unfortunately, current surveillance programs for hearing loss prevention often detect hearing loss only after it has occurred, when opportunities for prevention and early intervention have already passed.

Noise-induced hearing loss is common among members of the military as well as in individuals working around loud machinery. Currently, the risk of NIHL in military personnel is the highest it has been in 30 years. The Veterans Administration has reported that disabilities of the auditory system, including tinnitus and hearing loss, were the top two most common type of service-connected disabilities, accounting for nearly 18 percent of the total number of disabilities among veterans in 2010. Currently, VA compensation claims exceed $1 billion for this typically preventable injury.

Dr. Deanna Meinke, professor of audiology at UNC, is presently conducting research funded by the Office of Naval Research to develop sensitive techniques for the early detection and monitoring of NIHL, while intervention is still an option for those being affected.

Current research efforts involve the development of hardware, software, distortion product otoacoustic emission (DPOAE) mapping processes, and analysis strategies. DPOAEs are extremely low-level sounds emitted by the ear in response to tones and are detected with a sensitive "microphone" in the ear canal. Because there are only subtle differences between people with normal hearing and those with hearing losses, it is important for the research team to follow individuals with NIHL over time to account for any significant changes on an individual basis. Dr. Meinke conducts this valuable research with three audiology graduate students at UNC, colleagues at Dartmouth Medical School, and collaborators at Creare Inc.

"We have a snapshot at the start of the project and at six to twelve months later. Individual [DPOAE] maps are generally consistent — we are interested in detecting the change [in DPOAEs] over time," Dr. Meinke said. "We also hope to determine what parts of this map we should be focusing on in order to detect the changes early as well as to minimize the testing time."

Dr. Meinke's other research interests focus on the development of ear probe systems, hearing conservation software development, measurement of impulse sound levels from recreational firearms, noise exposure assessments for both children and adults, hearing protector attenuation in children and the development and implementation of educational programs targeting youth. Many of these interests are pursued with assistance from UNC audiology student researchers and UNC colleagues in Audiology & Speech-Language Sciences.

"Not only does hazardous noise cause you to lose sounds you enjoy, but they might be replaced by a never-ending unwanted sound (tinnitus). If an individual permanently

loses hearing from noise damage, he or she should visit an audiologist and be fitted with hearing aids," Dr. Meinke advises. "For those individuals who develop tinnitus, they either learn to tolerate the ringing and buzzing sounds or may need to undergo treatment therapies and perhaps wear ear-level devices to help tune out their own ear sounds. If someone participates in noise hazardous activities, he or she should have hearing monitored regularly to check for subtle changes and ensure the effectiveness of the hearing protection devices."

Besides conducting research, Dr. Meinke also focuses on prevention efforts by serving as a faculty member of Dangerous Decibles educator workshops, which are conducted in the U.S., Canada, and New Zealand (www.dangerousdecibles.org). K-12 classroom presentations teach children to value their hearing and implement specific strategies for preventing noise-induced hearing loss and tinnitus based upon health communication theories. She feels it is critical that her research contribute not only to the scientific knowledge base but also be transferred to the public through improved services, community outreach, and public health education. Dr. Meinke emphasizes that "noise-induced hearing loss is preventable and an unnecessary consequence of lifestyle, occupation, or environment."

Promoting Health

Movement My Way

Examining Physical Activity in Children

Childhood obesity in the United States has tripled in the past 20 years, now affecting 12.5 million children between 2 and 19 years of age (Centers for Disease Control, 2011). Obesity presents serious problems to children's health and puts them on a trajectory of health risks. Yet children's obesity can in many cases be prevented. In fact, obesity is only determined 20 percent by genetics, with the other 80 percent being caused by poor nutrition, excessive calories, and inadequate physical activity.

One obvious but poorly understood entrée into addressing children's obesity is to encourage physical activity. Two UNC faculty members in sports and exercise science, Dr. Megan Stellino and Dr. Christina Sinclair, have spent the past eight years conducting research with children to determine predictors of physical activity that may ultimately help prevent childhood obesity.

"The bottom line of our research is identifying the factors that help children choose to be active during their own free, discretionary time, which is the key to a lifetime of activity," Dr. Sinclair said. The investigators and student collaborators began their research by observing children during recess because children generally are allowed to direct their own activities during this school period.

Observations of children's behavior revealed important group differences. "We found that girls took fewer steps than boys, older children were more active than younger children, and children with an obese body mass index

(BMI) took fewer steps and engaged in lower intensity activities," said Dr. Stellino, sharing some of their findings from these initial observations. The researchers learned that girls were more motivated by competence — wanting to engage in physical activities they were good at while boys were more motivated by engaging in their choice of activity.

The researchers also asked children to draw themselves as they acted during free time. Children varied in the themes they included in their artwork, with some children relating their free time to competition and others focusing on peer interaction. These and other distinctions in themes, which reflect on children's underlying motivations during free time, have implications for interventions. Programs designed to foster physical activity need to appeal to the full range of motivations that children pursue in their play, exercise, and personal initiative.

The researchers' focus on motivation led them to interpret children's actions in terms of children's self-determination, the strong drive that youngsters have to make their own choices. Aggregating across their multiple studies, Drs. Stellino and Sinclair have found that children's self-determination is associated with a range of factors, including children's need to feel competent, autonomous, and connected with other people. "We are mapping on to self-determination; anyone would be more regulated in their activities if their distinct psychological needs are met," Dr. Sinclair explained. "An example would be that boys' need for autonomy predicted their need for more physical activity."

Most existing programs for overweight children are highly regimented and fitness-based, not getting to the core issue of children's motivations to engage in physical activity. "The problem with the current programs is that they are too structured — it is our antithesis. The essence of our research is about the children and their-well being," Dr. Stellino said.

Both researchers said that overweight youth usually want to be more active on their own if they find something that they are good at.

What, then, can teachers and parents do to help children be more active? The research team emphasize the importance of allowing *access* and *opportunity* for children to explore and engage in physical activities in which they perceive themselves as skilled. Additionally, children need developmentally appropriate equipment, which can be as simple as having jump ropes of certain sizes that are aligned to children's height. More importantly, Dr. Sinclair and Dr. Stellino assert that physical activity should be a priority during the school day. Teachers should avoid taking away recess as punishment; some children are motivated to stay inside with their teacher during recess instead of engaging in physical activities with their peers. Recess is as important to a child's school day as mathematics instruction because it encourages healthy child development.

The next step for the research team is to investigate social predictors of physical activity in order to determine the roles that parents, teachers, and other individuals have on this important aspect of children's health. Dr. Sinclair and Dr. Stellino are continually collecting data and determining their implications for intervention strategies that they hope will foster children's decisions to engage in healthful levels of physical activity and good habits for a lifetime.

"The bottom-line of our research is identifying the factors that help children choose to be active during their own free, discretionary time, which is the key to a lifetime of activity."
–Christina Sinclair

An Organizational Place in the Community

Drawing Attention to Dimensions of Place in Organizations

"We're starting to challenge what people have always believed is social responsibility. It's the ability to stretch beyond it."
–David Thomas

What are your favorite childhood memories? Chances are, these memories involve enjoyable activities with loved ones in special *places*—perhaps playing ball with friends at a local park, hiking with your mother and father in the mountains, or helping your grandfather tinker with cars in the garage. For Dr. David Thomas, Assistant Professor of Management at UNC, childhood memories have always taken him back to rural Kansas.

The experience of being grounded in a setting always fascinated Dr. Thomas, leading him to a dissertation topic and eight years of research on the topic of how organizations value and build *place*. He describes *organizational place building* as "how an organization values place on five place dimensions, which can advance a new way of thinking about what types of organizations are likely to advance the community's interests, solve collective problems, and improve or maintain the well-being of the community."

Dr. Thomas's grounded-theory dissertation has since grown into a substantive theory of *organizational place building*, a framework that explains how organizations value place in a certain settings, such as a community. "Having worked in corporations, I always believed that organizations wield a lot of power in a community," he said. All organizations, whether they are small businesses, non profits or large multi-national corporations, each value and build place in qualitatively different ways."

Organizational place building refers to how an organization values place: "It's how an organization balances its fiscal success with community well-being," Dr. Thomas said. His research classifies an organization as fitting one of four types: An *exploitive* organization (callous of any obligation to the community), *contingent* (recognizing its roles as a participant in the community), *contributive* (seeing itself as an investor and contributor to the community), or *transformational* (having committed to being a change agent in improving lives in the community).

To determine the status of an organization, Dr. Thomas administers a survey focusing on five place dimensions: nature, social relationships, material environment, ethics, and economic relationships. He emphasizes place building as a way for organizations to balance fiscal responsibility with community well-being and suggests that organizations can and should strive to do well on each of the five dimensions.

The process of completing the survey influences executives, who may not have previously considered their place in a community. "One of the fascinating aspects of the research is the sudden awareness of an organization's impact on its community," Dr Thomas said. "In fact, people within the organization comment, 'You know, I never really thought about our impact and how it might be measured or typed until answering these questions.'" Some community members react the same way when asked to think about the types of organizations they are recruiting to their place.

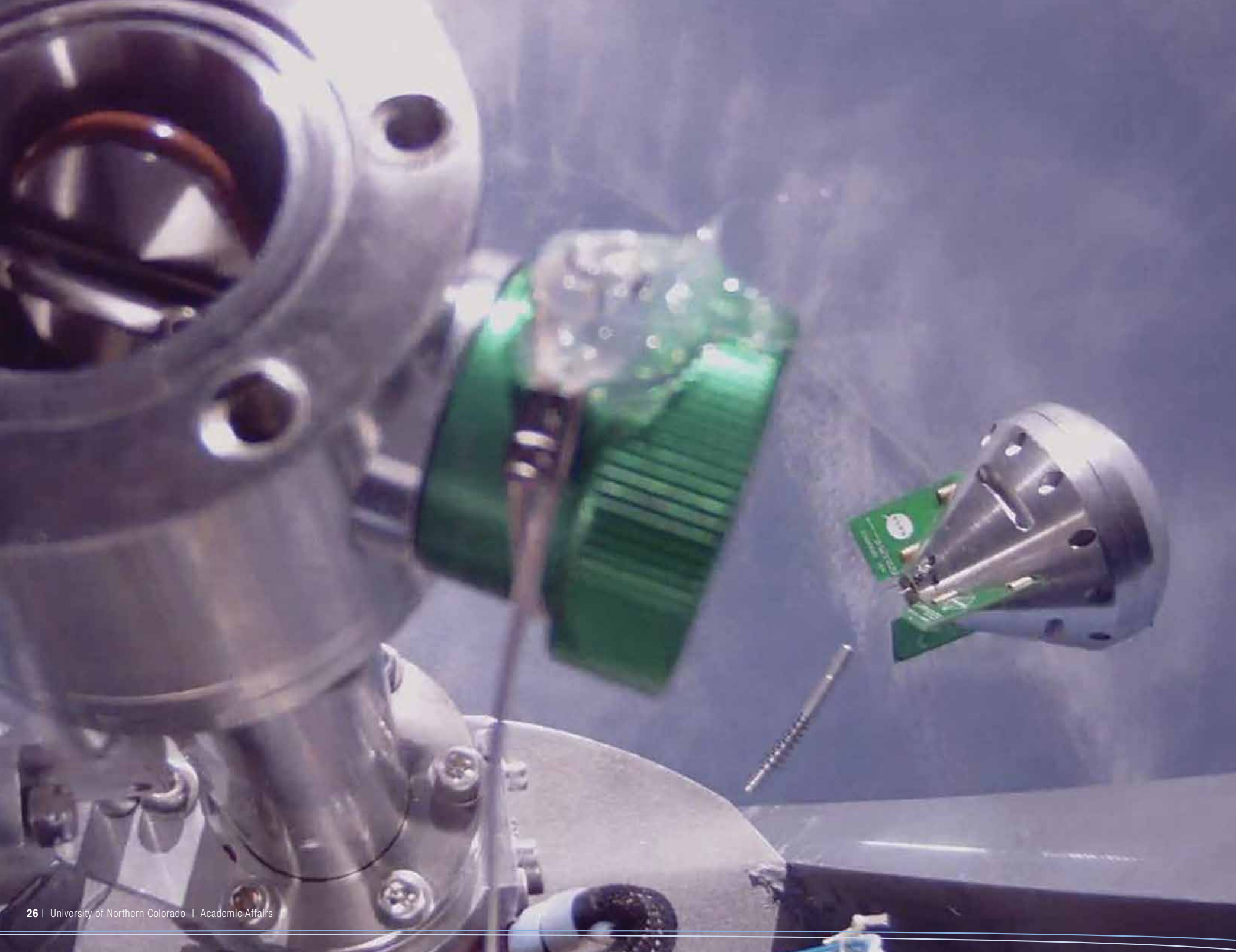
The organizations Dr. Thomas has worked with range from small businesses to large government agencies. He is now broadening his work to include other types of organizations in order to generalize and predict how they might build place. In addition, he is currently examining the implications of place building for an organization's business model.

Dr. Thomas has discovered that his place-building typology not only applies to organizations as a whole, it also applies to individuals within an organization. Individuals can ask

themselves, “To what extent do I value my own place and the place of others along these five dimensions?” At the same time, organizations can start evaluating how they value place by doing an inventory of their communications to see if their language is exploitive, contingent, contributive, or transformational.

After learning about the framework, many individuals realize that their language is exploitive or contingent, even though they are striving to create a contributive and transformational organization. Dr. Thomas’s survey gives organizations a chance to alter their approach from the traditional sense of social responsibility to a new paradigm in which the organization’s role becomes fulfilling a place-building responsibility. It is a balancing strategy, a dynamic shift in the way an organization interacts in its community. “We’re starting to challenge what people have always believed is social responsibility. It’s the ability to stretch beyond it,” Dr. Thomas said.

Dr. Thomas credits his own accomplishments to strong support from other UNC scholars who have helped him clarify the purpose, direction, and impact of his work. “I am very fortunate to be at UNC and have the opportunity to do this… and be a part of something that has such breadth and richness to it.”



Into the Wild Blue Yonder

Recording Atmospheric Density in Space

Four current and two former UNC Physics majors saw a year long effort end successfully in July 2011 when the scientific apparatus they spent thousands of hours preparing was successfully jettisoned from a NASA sub-orbital rocket into outer space 76 miles above Earth.

As it fell toward Earth, the capsule the students built collected atmospheric density data that was transmitted to a radio receiver still in the rocket. After transmitting the data, the students' capsule, which was not intended to be recovered, burned up as it re-entered the Earth's atmosphere at 4,200 miles per hour. The rocket containing the received data was recovered by a NASA ship.

"It took more than a few sessions of working 48 hours straight" said project team member Maurice Woods. "We're proud of what we accomplished, and it was all worth it. I can't believe how much we learned."

Woods said the students' project included machining the capsule's aluminum parts and ejection system to exacting standards, modifying and incorporating electronics into the capsule, programming those electronics to accomplish their intended tasks, and providing required progress reports to NASA.

The project was supported by the NASA-funded Colorado Space Grant Consortium, which helps NASA develop the scientists who will play key roles in future U.S. space exploration, with additional support from faculty in the UNC Physics program.

The other current students on the team were Robert Shiely, Jordan Kohnen, and Aaron Adamson. Casey Kuhns and Motoaki Honda, who graduated with their Physics degrees before the launch, also played key roles, Woods said.

All six students made it to the launch at NASA's Wallops Flight Facility on the coast of Virginia, with the four current students transporting themselves there the old-fashioned way, with a summer road trip.

To stretch available funds, the four carried the capsule to the launch in a 1979 Winnebago that Woods' grandparents no longer needed. That 4,000-mile roundtrip journey was an adventure itself. Along the trip, the students dealt with engine trouble and toured the U.S. Department of Energy's Fermi National Accelerator Laboratory just outside Chicago. At 3.9 miles in circumference, it's the world's second largest energy particle accelerator.

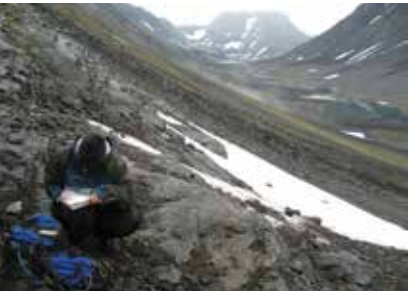
The students have not yet decided the future of their NASA research. "We're considering some ideas," Woods said. "We might try something new or we might build upon and refine this year's [experiment]."

"We're proud of what we accomplished, and it was all worth it. I can't believe how much we learned."
–Maurice Woods

Photos courtesy of Maurice Woods via NASA
Pictured from left, Jordan Kohnen, Robert Shiely, Maurice Woods and Aaron Adamson

Ground-Breaking Discoveries of a Supercontinent

Backtracking to a Fissuring Rodinia



"I feel extremely fortunate to have been able to travel to Sweden and work with Dr. Baird in the field. Dr. Baird guided me through the field processes, giving me the confidence and ability to work independently. He has pushed me to become a better researcher and geologist."
–Sean Figg

Hold onto your chair. Is the ground moving below your feet?

For most of us, this movement is not perceptible, but for UNC graduate student Sean Figg, the thick plates of land that undergird the Earth's continents and ocean floors are continually moving, usually slowly but occasionally rapidly, as is the case with earthquakes.

Like many graduate students at UNC, Mr. Figg has a drive to learn that has been supported by a faculty member with similar interests. When Mr. Figg first met Assistant Professor of Geology Graham Baird, he knew instantly he wanted to work with Dr. Baird, who had been examining the 600-million-year-old break-up of the supercontinent Rodinia. The research involves the study of plate tectonics, age-dating of rocks, and geo-chemistry, all of which were of interest to Mr. Figg. A research trip to Sweden to conduct field work was also a perk, providing Figg with incredible field experience.

Dr. Baird has studied the Caledonides mountain range in Sweden since 2003. The range was connected to the Appalachians as part of the supercontinent Pangea 300 million years ago. Dr. Baird's research aims to pinpoint when Rodinia, the supercontinent that existed prior to Pangea, broke apart. Mr. Figg joined Dr. Baird's research team in August 2010 when more questions than answers about the Caledonides were emerging. This location is presumed to be the original break-up point in the region of Rodinia.

Since traveling to Sweden in summer 2011, Dr. Baird and Mr. Figg have discovered that the rocks in the Caledonides may be older than previously recorded. Some of these rocks had been thought to be approximately 608 million years old. Yet their research on the mountain range suggests these rocks may actually be more than 642 million years old. Age is determined by analyzing minerals in rocks to determine the lead-to-uranium ratio — the higher the ratio, the older the rock.

When Mr. Figg joined the research in the fall of 2010, he spent most of his time gathering background information to determine which age-dating technique would work best given their research questions. He then had to determine how to identify rock samples to fit that technique. There have been only two or three other scientists who have conducted research on the same rock formations. Refinements of these methods are allowing Dr. Baird and Mr. Figg to hone in on the timeframe when the break-up of Rodinia really happened. They hope to be accurate within a few million years — actually a precise estimate and a remarkable achievement in the field of earth science. Such a discovery would show future researchers how to conduct this type of specific geological research.

Even when the research has been tedious and frustrating (making a slide for one rock sample can take him 7-8 hours of preparatory work), Figg reports that it has paid off. The field experience and data collection procedures he learned in Sweden have been highlights of the research. Now, Figg is starting to analyze the results of the samples he collected himself in the Caledonides.

All in all, the research journey has been a motivating experience for Mr. Figg, who has wanted to conduct field research since he was a freshman in high school and began rock-climbing. What's next for Mr. Figg? More research, of course, further graduate work, and ideally a career as a professor that allows him to continue to ask fundamental questions about plate tectonics and to share his fascination with the next generation of scholars.

Pictured from left, Dr. Graham Baird and Sean Figg
Photos courtesy of Graham Baird

Centers and Institutes

UNC has award-winning centers and institutes that lead the way in research, offer community services, and provide professional development opportunities for students and professionals in a variety of fields. Whether it is providing enhanced training opportunities for teachers or rehabilitation for cancer patients, our institutions aim to enrich the lives of those they serve. Many have received national recognition and awards for their work.

Bresnahan-Halstead Center on Disabilities

www.unco.edu/bresnahan-halstead

The Bresnahan-Halstead Center is committed to work for the advancement of knowledge and quality of services for people with disabilities through research, professional development, technical assistance, and scholarships. The Center works in partnership with the various agencies in Colorado, the nation, and internationally to achieve these missions.

Center for Integrated Arts Education (CIAE)

www.arts.unco.edu/ciae

The Center for Integrated Arts Education (CIAE) provides research and professional development for multi-disciplinary learning centered in an understanding of the arts. CIAE specializes in arts planning, arts policy formation, professional collaborations and curriculum development. It offers leadership training, facilitated planning and arts workshop opportunities for teachers, schools and districts and is engaged in research activities examining the impact of arts-infused curricula on school ecology and student achievement.

Center for the Education and Study of the Gifted, Talented, Creative Learners (GTCL)

www.unco.edu/cebs/gtcenter

Center for the Education and Study of the Gifted, Talented, Creative Learners supports and promotes gifted and talented education through graduate-level programs and opportunities for consultation, collaboration and research for program development. The center also provides education and support to parents and serves gifted, talented and creative students with day and residential summer programs.

Center for Engaged Research and Civic Action (CERCA)

http://www.unco.edu/cerca

UNC's Center for Engaged Research and Civic Action initiates, facilitates, and assists in coordinating and administering applied and fundamental engaged research projects over a wide range of civic engagement topics. CERCA programs involve local, state-wide, national, and international scale faculty-community partnered projects that emphasize direct student contributions through service learning activities.

Distance Opportunities for Interpreter Training (DO IT)

www.unco.edu/doit

The Distance Opportunities for Interpreter Training Center designs and delivers a variety of educational programs in the field of American Sign Language-English interpreting. These programs include a bachelor of arts in ASL-English Interpretation and numerous in-service training events. The DO IT center also conducts research on such topics as ASL-English interpreting and offers scholarships for students preparing to work with youths who are deaf and hard of hearing.

Education Innovation Institute (EII)

www.unco.edu/eii

The Education Innovation Institute works to leverage applied research to solve practical problems in education and foster collaboration through interdisciplinary academic work and the facilitation of communication among those involved in research, policy, and practice. Examples of EII projects include internships in research and policy for UNC graduate students, production of research briefs and opinion pieces on policy issues, and advisory work with state agencies and nonprofit organizations.

Hewit Institute

hewit.unco.edu

The William E. Hewit Institute for History and Social Science Education supports K-12 education in history and the social sciences. Hewit Institute focuses on teacher education, materials development, and history and social sciences teaching and learning research. It primarily serves schools, teachers and students in Colorado and the Rocky Mountain-Plains region.

Institute for Civic Education

www.unco.edu/psci/ice/index.html

The Institute for Civic Education offers content-related professional development opportunities for K-12 teachers in many aspects of American and comparative government, civics, political philosophy, and history. The mission of the institute is to advance civic education at all grade levels in the state of Colorado and throughout the country.

Institute of Professional Ethics

www.unco.edu/ethics

The Institute of Professional Ethics fosters research, teaching, and training in applied ethics. Consistent with UNC's statutory status as the primary institution for undergraduate and graduate teacher education in the state of Colorado, the institute focuses on ethics across the teaching professions, along with ethics in business and the health care professions.

Math and Science Teaching Institute (MAST)

www.mast.unco.edu

Math and Science Teaching Institute provides leadership and coordination for projects and programs to improve mathematics and science education locally and nationwide. It also provides professional development for teachers and conducts research on teaching and learning.

Math Teacher Leadership Center (Math TLC)

www.mathtlc.org

The Math Teacher Leadership Center works to improve K-12 mathematics education through a master's for secondary math teachers and a mathematics teacher leadership program. The Math TLC produces research to contribute to the mathematics teaching knowledge base.

Monfort Institute

mcb.unco.edu/monfortinstitute

Monfort Institute conducts research with high performing organizations and their senior executives to create, disseminate, and apply knowledge for sustainable global excellence. The Institute disseminates the findings from their research in a variety of forums including academic journals and conferences, practitioner webinars and presentations, executive education workshops, and Monfort College business courses. The Institute's sustainable transformation program focuses on achieving and sustaining high performance in a changing world and taking organizations to the next level.

National Center on Severe and Sensory Disabilities (NCSSD)

www.unco.edu/ncssd

National Center on Severe and Sensory Disabilities conducts research and provides information, training and technical assistance for families and educators of children who are deaf and hard of hearing, blind and visually impaired, or who have significant support needs.

National Institute for Nursing Education and Scholarship (NINES)

www.unco.edu/nhs/nines

National Institute for Nursing Education and Scholarship impacts and facilitates scholarly resources and leadership for effective, high-quality health professions education. NINES engages nursing educators and scholars in research, professional development and policymaking with the Nursing Research Center, Learning Resource Center, Faculty Development Center and Assessment, and Evaluation Center.

North East Central Colorado Small Business Development Center (NEECCO SBDC)

www.neeccosbdc.org

The Northeast East Central Colorado Small Business Development Center (NEECCO SBDC) helps emerging and existing entrepreneurs maximize their business operations. The NEECCO SBDC works to help foster successful growth and development by creating positive economic impact with the following services; individualized FREE business consulting, assistance with financing opportunities, training seminars and webinars, business planning tools, and research resources.

Retired Senior and Volunteer Program (RSVP)

www.unco.edu/nhs/rsvp

Retired Senior Volunteer Program connects adults age 55 and older with the people and organizations that need them most by recruiting and interviewing interested retired or senior volunteers and matching them to the appropriate assignment based upon their skills, interests and time availability. RSVP has agreements with multiple nonprofit and civic agencies, and works with organizations to identify specific community needs that may benefit from the program.

Rocky Mountain Cancer Rehabilitation Institute (RMCRI)

www.unco.edu/rmcri

Rocky Mountain Cancer Rehabilitation Institute is a comprehensive cancer rehabilitation facility that provides individualized prescriptive exercise and dietary intervention in the recovery of cancer treatment-related symptoms. It offers ongoing basic and clinical research, advanced educational preparation and professional development to promote higher cancer rehabilitation standards.

Sport Marketing Research Institute (SMRI)

www.unco.edu/smri

Sports Marketing Research Institute seeks to enrich the learning experience of graduate students studying sport administration by conducting field research for sport enterprises that wish to better understand how sport affects our community. SMRI provides high quality research opportunities for both graduate students preparing for careers in sport management and organizations in need of management assistance.

Teaching with Primary Sources – University of Northern Colorado

www.unctps.org

Teaching with Primary Sources — UNC provides free professional development to K-12 educators. With a commitment to reaching schools in northern Colorado and outlying areas in Colorado and Wyoming, the center introduces educators to the online resources of the Library of Congress, including teacher pages with tools, materials and strategies supporting inquiry-based learning.

Technical Assistance and Continuing Education (TACE), Region 8

www.taceregion8.com

Technical Assistance and Continuing Education works to promote the employment of people with disabilities by providing technical assistance and continuing education to State Vocational Rehabilitation agencies and their partners. It offers services such as face-to-face training, web-assisted distance delivery options, and self-directed training modules.

Tointon Institute for Educational Change

www.unco.edu/tointon

The Tointon Institute provides professional development opportunities to Colorado principals, assistant principals and teacher leaders through residential academies and follow-up experiences that focus on research-based practices that build instructional leadership skills to improve student learning in schools.

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Bringing education to life.

Partners

The following organizations have offered support in recent years in the form of funds and partnerships for UNC research, scholarship, and creative works.

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Academy of Inquiry Based Learning
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Caring for Colorado
Centennial BOCES
Center for Disease Control & Prevention, US
Civilian Research and Dvlpmnt Fndn
CJ Fndn for SIDS
Collaborative Digitization Program
CO Campus Compact
CO Cancer Coalition
CO Center for Drug Discovery (C2D2)
CO Community College System
CO Dept of Education
CO Dept of Higher Education
CO Dept of Human Services
CO Dept of Local Affairs
CO Dept of Natural Resources
CO Dept of Public Health & Environment
CO Dept of Public Safety
CO Dept of Regulatory Agencies
CO Dept of Revenue
CO Dept of Transportation
CO Endowment for the Humanities
CO Governor's Energy Office
CO Governor's Office of Homeland Security
CO Health Fndn
CO Office of Economic Dvlpmnt & InterNat'l Trade
CO Parent & Child Fndn
CO School District – Adams 12
CO School District – Adams 14
CO School District – Archuletta 50 Joint
CO School District – Ft. Morgan Re-3
CO School District – Ignacio JT-11
CO School District – Jefferson Co
CO School District – Montezuma-Cortez Re-1
CO School District – Thompson R-2J
CO School District – Weld Co 6
CO State Library
CO State Univ
Community College of Aurora
Confraternidad de Pastores Hispanos de Nueva Inglaterra (COPAHNI)
Congregacion Leon de Juda
Congressional Appropriations
Corp for Nat'l & Community Service
Creare, Inc.
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Dept of Energy US
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Dept of Homeland Security US
Dept of the Interior US
Dept of Justice US
Dept of Labor US
Dept of State Bureau of Ed & Cultural Affairs
Dept of Transportation US
DOIT Center - State Agencies & FRCC
Dominion Community Dvlpmnt Project
Dreyfus Fndn, Camille & Henry
Educational Advancement Fndn
Environmental Protection Agency US
Ewing Marion Kauffman Fndn
Fogarty InterNat'l Center (NIH)
Ford Fndn
Fndn for Child Dvlpmnt New York
Fndn for Physical Therapy
Four Corners School of Outdoor Education
Freeman & Company Publishers, W.H.
French American Cultural Exchange
Friends First
Front Range Community College
Georgetown Univ
Grant Fndn, William T
Greeley Dream Team
Greeley, City of
Greeley/Weld Economic Development Action Partnership
IN Univ
Inst of Museum & Library Services
IREX
Island Grove Regional Treatment Center
Jackson Fndn, Henry M
KS State Board of Education
Komen Breast Cancer Fndn, Susan G.
Lance Armstrong Fndn
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L.I. Teen Freedom
LA Dept of Education
LA State Univ
Lumina Fndn
Mary Kay Ash Charitable Fndn
Mathematical Assn of America
Membrance Protective Technologies, Inc.
Metro Denver Economic Development Corp
MI State Univ
Mid-Continent Research for Education & Learning
Monfort Family Foundation
Montana State Univ
Nat'l Aeronautics & Space Administration
Nat'l Alliance for Research on Schizophrenia and Affective Disorders (NARSAD)
Nat'l Assn of Geoscience Teachers
Nat'l Campaign to Prevent Teen Pregnancy
Nat'l Endowment for the Arts
Nat'l Endowment for the Humanities
Nat'l Geographic Education Fndn
NATIONAL INSTITUTES OF HEALTH
Nat'l Cancer Inst
Nat'l Center for Complementary & Alternative Medicine
Nat'l Center for Research Resources
Nat'l Heart, Lung, & Blood Inst
Nat'l Inst of Allergy & Infectious Diseases
Nat'l Inst of Child Health & Human Dvlpmnt
Nat'l Inst of Diabetes & Digestive & Kidney Diseases
Nat'l Inst of Mental Health
Nat'l Inst of Neurological Disorders/Stroke
Nat'l Inst of Nursing Research
Nat'l Inst on Aging
Nat'l Inst on Alcohol Abuse & Alcoholism
Nat'l Inst on Deafness & Other Communication Disorders
Nat'l Inst on Drug Abuse
Nat'l Insts of Health (Generic)
Nat'l League for Nursing
Nat'l Oceanic and Atmospheric Administration
Nat'l Science Fndn
Nat'l Writing Project Corp
NEA Fndn
NV Dept of Education
Northern CO Medical Center Fndn
North Range Behavioral Health
OH State Univ
OK State Univ
Omega Protein
OR Health & Science Univ
Owl Mountain Partnership
Page Center, Arthur W.
Pal-Tech, Inc
PA College of Optometry
Penn State Univ
Planetary Science Institute
Portland State Univ
Quality Matters
Research Corp
Research Fndn of SUNY
Robert Wood Johnson Fndn
Rocky Mountain CESU
Rutgers Univ
Salus Univ
SatoriEdu
Siemens Hearing Instruments
Small Business Administration US
Southern Research Inst
Southern Univ – Baton Rouge
Spencer Fndn
Spring Inst for Intercultural Learning
Suder Fndn
Tech-X Corp
Tensor Fndn
TX Tech University
Think 360 Arts Complete Education
Tointon Family Foundation
Twin Cities Public Television
UChicago Argonne, LLC
Uniformed Services Univ of the Health Sciences
United Way of Weld Co
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Univ AR Little Rock
Univ AZ
Univ of CA Davis
Univ CO Boulder
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Wacoal Sports Science Corp
Women's Fund of Weld County
Weld Co
WestEd
World Health Organization
Zoom, LLC

Partners (continued)

Similar to those already listed, these companies and foundations support UNC events, programs, students, and faculty.

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Kinder Morgan Foundation
Leprino Foods
Mile High United Way
Monfort Family Foundation
National Western Stock Show Trust
NCMC, Inc.
Newmont Mining Corporation
Noble Energy, Inc.
OtterCares Foundation (OtterBox)
Schlessman Family Foundation
Sears Real Estate, Inc.
State Farm Insurance
Suncorp Energy USA Corporation
The Women's Foundation of Colorado
Tointon Family Foundation
Weld Count School District 6
Xcel Energy Foundation

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