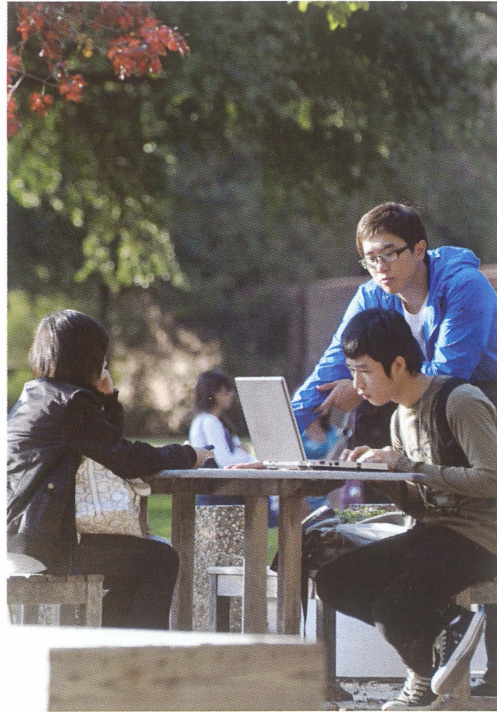


# McNair Research Journal

THE UNIVERSITY OF TEXAS AT ARLINGTON

Summer 2010 • Volume 14





The Ronald E. McNair Postbaccalaureate Achievement Program is a federally funded **TRiO** program.

The McNair Research Journal is the annual research publication of the Ronald E. McNair Postbaccalaureate Achievement Program (McNair Scholars Program), a TRiO Program funded by the U.S. Department of Education, at The University of Texas at Arlington. The journal consists of summaries of papers written by McNair Scholars who participated in the McNair Research Internship the preceding summer. Journal contents solely reflect the research and opinions of the individual authors. Presentation of this material was made possible by a limited license grant from the authors who have retained all copyrights in the contributions. All other elements of the journal such as its structure and organization also are protected by copyright. The University of Texas at Arlington holds copyright to the journal but permits reproduction of its contents (not to exceed 100 copies) for non-commercial or educational purposes.

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Message from the Senior Vice Provost and Dean of Undergraduate Studies	2	Patricia Mann, Russian/Philosophy	15
Notes from the Director	3	Characterizations of Lara as a Human Representation of an Axis Mundi: An Examination of the Symbolism and Mysticism in Boris Pasternak's <i>Doctor Zhivago</i>	
McNair Scholars Program	4	Kimberly Nicole Sams, History/English	16
Acknowledgements	5	Claiming Power and Agency: Medieval Women's Self-Perceptions in Fifteenth-Century Family Letters	
Friends of the Library McNair Scholarship Awards	6	Daniel Wagner, Sociology	17
Graduate Scholar Profile	7	Mexican Immigrants in Cleveland, Ohio: An Exploratory Case Study of New Immigration Patterns and Reception	
Mentor Profile	8		
<b>ARCHITECTURE</b>		<b>SCIENCE</b>	
Jacob Narvaez, Architecture	9	Elizabeth Awad, Psychology	18
"For the Right Thing and Not for the Wrong:" Historic Preservation and the Black Knights of Pythias Temple in Dallas		The Effects of Co-Rumination on Victimization and Health	
<b>BUSINESS</b>		Cam Liu, Biology	19
Christian Torres-Lopez, Economics	10	Sex Differences in DeltaFosB Induction in Reward-Related Brain Regions of the Rat Brain	
Addressing Free Riding in Local Southern Baptist Congregations		Gabriela Romero, Biochemistry	20
<b>EDUCATION AND HEALTH PROFESSIONS – KINESIOLOGY</b>		Synthesis of a Mutated Bacterial Cell Wall for Use in Drug Discovery	
K. Bruce Rollins, Exercise Science	11	Melanie Verna, Biochemistry/Biology	21
Assessment of Maximal and Submaximal Aerobic Capacities of Wheelchair Basketball Athletes		Mechanism of Insertion of Non-LTR Retrotransposons	
<b>ENGINEERING</b>		<b>INTERDISCIPLINARY STUDIES</b>	
Justin Erdmann, Mechanical Engineering	12	Brocke Addison, Interdisciplinary Studies: Biology/Psychology (Neuroscience)	22
Microwave Antenna Sensors for Fatigue Crack Monitoring Under Lap Joints		Sex Differences in Orexin Expression after Chronic Cocaine Conditioning	
<b>LIBERAL ARTS</b>		Sharie Vance, Interdisciplinary Studies: Art (Video Production)/Social Sciences	23
M. Faye Hanson, Sociology	13	Love Online: A Look at Perceiver Characteristics and Physical Attractiveness in the Initial Formation of Online Dating Relationships	
Perceptions of Race and Poverty			
Ashley Liggins, Art History	14		
Noble Savages and Extraordinary Negroes: Race and Representation in Late Eighteenth-Century European Art			

## Message from the Senior Vice Provost and Dean of Undergraduate Studies

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In today's increasingly fast-paced and flat world where technology allows individuals to communicate, network, and socialize with others around the globe from a hand-held device, I am reminded of the importance of sustained, in-depth examination as a means of discovery. While the answer to your query of the moment may be as simple as entering a search via Google, the knowledge that underlies today's rapid communication tools is grounded on scholarship that took years to develop. Far too often we tend to forget that new discoveries and new knowledge are the result of scholars engaged in the hard, time-consuming work of intellectual discovery.

The University of Texas at Arlington has been a supporter of the McNair Scholars Program for more than twenty years. This program pairs aspiring graduate students who meet the program's requirements with faculty mentors who agree to work closely with their Scholar. At its base, this program seeks to transfer the scholarly skills of inquiry from a successful faculty member to the next generation of scholars. Along the way, so much more happens. Students develop lasting relationships with their

mentors, they discover that they are capable of scholarly inquiry, they make new intellectual discoveries, and they broaden their understanding of what is possible for their future. In short, this experience is truly transformative for the Scholar.

I would like to congratulate the Scholars on their acceptance into this program, and I make special note of the outstanding work each of you has completed under the supervision of your faculty mentor. I am not overstating matters to proclaim that this program has transformed you from simply a consumer of information to a discoverer of knowledge, from a student to a scholar.

I also would like to acknowledge the important contributions of our faculty mentors who spent considerable time and effort in developing these fine Scholars. Your knowledge transfer and mentorship literally has changed a life and possibly helped hone the skills of a scholar who will make the next major discovery to advance your discipline.

Intellectual discovery is a methodical, rigorous process, and through the McNair Scholars program another generation of scholars has been prepared by today's members of the academy. Remember the names of the Scholars listed in this research journal because I predict we will see more than one of them contributing to their disciplines for years to come.

A handwritten signature in black ink that reads "Michael Moore". The signature is written in a cursive, flowing style.

Michael Moore  
*Senior Vice Provost and Dean of Undergraduate Studies*



## Notes from the Director

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During the past twelve years, I have had the opportunity to work with a wonderful group of students within the McNair Scholars Program. It has been a rewarding experience to observe how

this program develop as McNair Scholars throughout the several semesters that they participate. With the encouragement of their faculty mentors, McNair staff, and their program peers, they come to realize that goals perhaps once regarded as too ambitious—even unattainable—are indeed realistic objectives.

I congratulate our Scholars for the enthusiasm and self-discipline that they exhibit while planning for and engaging in the McNair Summer Research Internship. Program history confirms that for McNair Scholars the internship is an excellent opportunity to refine their

research skills, further explore their fields, and acquire a taste of what graduate school will be like. Essential to their success in this task is the support provided by faculty mentors, who continue to offer guidance to Scholars throughout their undergraduate careers, if not beyond. Indeed, mentor encouragement is crucial to the ultimate success of McNair participants and well complements program seminars and staff services that focus on the graduate school application process.

Since 1990 the University has been an active and enthusiastic supporter of the McNair Scholars Program in many ways. I would especially like to recognize President James D. Spaniolo, Provost Donald R. Bobbitt, Senior Vice Provost Michael K. Moore, Vice President for Research and Federal Relations Ronald L. Elsenbaumer, and Dean of the UT Arlington Libraries Dr. Gerald D. Saxon for their ongoing encouragement of the McNair dream.

And, of course, I wish all of our Scholars, current and past, great success with their graduate studies and professional careers.

A handwritten signature in black ink that reads "Joan W. Reinhardt". The signature is written in a cursive style with a prominent flourish at the end.

Joan W. Reinhardt  
*Director of McNair Scholars Program*

## McNair Scholars Program

The McNair Scholars Program (officially known as the Ronald E. McNair Post-Baccalaureate Achievement Program) came to the campus of The University of Texas at Arlington in 1990. At that time the U.S. Department of Education funded a grant proposal submitted by Kathryn Head, director of the federal Student Support Services program. The new program, created by the U.S. Congress in 1988, honored Dr. Ronald E. McNair, who had tragically perished with his fellow astronauts on the space shuttle Challenger two years earlier.

The McNair program endeavors to assist talented undergraduates—either first-generation/low-income or underrepresented students (African American, Hispanic, Native American)—to prepare for graduate study leading to the Ph.D. and the professoriate. McNair Scholars follow in the footsteps of Dr. McNair, who came from a modest African-American family in a small South Carolina town. He tenaciously pursued his dream of a life in science, earning a Ph.D. in physics at the age of 26 from the prestigious Massachusetts Institute of Technology and later joining NASA.

Since its beginning at this institution, the McNair program has encouraged and assisted more than three hundred students in various majors with their preparation

for graduate study. UT Arlington McNair graduates have subsequently earned masters and doctorates not only from their alma mater but also from an impressive array of universities including Indiana University, the University of Pennsylvania, Rice University, the University of Michigan, and Southern Methodist University, among others.



Dr. Ronald E. McNair, Scientist & Astronaut, 1950-1986

Currently the UT Arlington McNair Scholars Program works with a minimum of thirty students each academic year, providing seminars and classes on topics relating to graduate school and the GRE, a May institute to heighten Scholars' understanding of the culture of research, and the opportunity to engage in a summer research internship (supported by a \$3,000 stipend) as rising seniors. The program also provides guidance with the graduate school application process and travel funds for Scholars

to participate in McNair (or professional) conferences and to visit prospective graduate programs.

The McNair Scholars Program enjoys strong support from the UT Arlington administration and greatly benefits from the expertise and enthusiasm of both faculty and staff. Faculty members who serve on the McNair Selection Committee or who act as research mentors to McNair interns deserve special recognition.



## Staff Members

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Cheri Counts  
Administrative Assistant



Najla Khan  
Graduate Research Associate II



NaKeshia Guillory  
Learning Specialist II  
(as of Fall 2010)



Brandon Jones  
Learning Specialist II  
(through Summer 2010)

## Acknowledgments

### FACULTY MENTORS

Shawn Christensen, Ph.D.  
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Sarah Davis-Secord, Ph.D.  
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Frank Foss, Ph.D.  
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Lonny Harrison, Ph.D.  
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Kathryn Holliday, Ph.D.  
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Haiying Huang, Ph.D.  
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Lauri Jensen-Campbell, Ph.D.  
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Robert Kunovich, Ph.D.  
Department of Sociology and Anthropology

Benjamin Lima, Ph.D.  
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Roger Meiners, Ph.D., J.D.  
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Linda Perrotti, Ph.D.  
Department of Psychology

Linda Rouse, Ph.D.  
Department of Sociology and Anthropology

Jason Shelton, Ph.D.  
Department of Sociology and Anthropology

Judy Wilson, Ph.D.  
Department of Kinesiology

### MCNAIR SELECTION COMMITTEE

ACADEMIC YEAR 2009-10

James Grover, Ph.D.  
Department of Biology

Laureano Hoyos, Ph.D.  
Department of Civil and Environmental Engineering

Raymond Jackson, Ph.D.  
Office of Graduate Studies; Department of Psychology

Joan Reinhardt, Ph.D.  
Director of McNair Scholars Program

Joan Rycraft, Ph.D.  
School of Social Work

Roberto Trevino, Ph.D. (temporarily replacing Dr. Zlolski)  
Department of History; Center for Mexican-American Studies

Christian Zlolski, Ph.D. (on leave)  
Department of Anthropology and Sociology;  
Center for Mexican-American Studies

## Friends of the Library McNair Scholarship Awards

The Friends of the UT Arlington Library awarded three scholarships and plaques to McNair Scholars for their summer research papers and presentations.

**Justin Erdmann** won first place and a \$500 scholarship, while **Bruce Rollins** and **Sharie Vance** shared second place and \$250 each.

Faculty mentors Dr. Linda Rouse and Dr. Judy Wilson also attended the ceremony at the Friends' November 12, 2010, meeting.

To select the winners, members of the Friends' McNair Scholarship Committee were present for all fifteen research presentations on August 5, 2010, and also reviewed Scholar papers.

This marks the sixth year that the Friends of the UT Arlington Library have presented such awards to McNair Scholars. The creation of a special endowment enabled such awards to be offered annually. To date, fourteen McNair Scholars have benefited from this award.

The McNair Scholars Program congratulates Justin, Bruce, and Sharie on their exceptional work and thanks the Friends of the UT Arlington Library for their ongoing generosity to UT Arlington McNair Scholars.



K. Bruce Rollins, Dr. Joan Reinhardt, and Sharie Vance.

### PREVIOUS MCNAIR SCHOLARSHIP AWARDEES

#### FALL 2009

Juandell Parker (Biology)

Mentor: Dr. Laura Mydlarz

Crystal Red Eagle (Physics)

Mentors: Dr. Manfred Cuntz and Dr. Zdzislaw Musielak

#### FALL 2008

Tara McKelvy (Psychology)

Mentor: Dr. James Kopp

Gerrell Williams (English)

Mentor: Dr. Peggy Kulesz

#### FALL 2007

Yonathan Tafesse (Biology)

Mentor: Dr. Perry Fuchs (Psychology)

Omid Zaré-Mehrjerdi (Biology/Chemistry)

Mentor: Dr. Ellen Pritham

#### FALL 2006

Samuel Odamah (Architecture)

Mentor: Gary Robinette, MLA

Monet Joseph (Biology/Biomedical Engineering)

Mentors: Dr. Kytai Nguyen and Dr. Hanli Liu

#### FALL 2005

Bianca Canales (Political Science)

Mentor: Dr. Victoria Farrar-Myers

Rachel Hansen (Biology/Biomedical Engineering)

Mentor: Dr. Raul Fernandez, ARRI

Faith Nibbs (Anthropology)

Mentor: Dr. Josephine Caldwell-Ryan

### DEAN OF THE UT ARLINGTON LIBRARY

Dr. Gerald Saxon

### FRIENDS OF THE UT ARLINGTON LIBRARY MCNAIR SCHOLARSHIP COMMITTEE (SUMMER 2010)

Shirley Applewhite

Kit Goodwin

Robert Ressler

### OFFICERS OF THE FRIENDS OF THE UT ARLINGTON LIBRARY (2010-11)

Greg McKinney, President

Shirley Applewhite, 1st Vice President

Richard Browning, 2nd Vice President

Linda Simmons, Secretary

Kit Goodwin, Treasurer

Tommie Wingfield, Parliamentarian

Photo courtesy of Maggie Dwyer, UT Arlington Library.



## Graduate Scholar Profile

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### Dr. Terrence Johnson

Dr. Terrence Johnson got an early start on success. The Marrero, Louisiana, native participated in the federal Upward Bound program in high school and was recognized by UT Arlington as the Upward Bound Math and Science Alumnus of the Year in 2003.

The former McNair Scholar graduated from UT Arlington in May 2002 with a Bachelor of Science in Mechanical Engineering. That fall, he began graduate studies with full funding at the Pennsylvania State University, where he earned a master's in mechanical engineering and a Ph.D. in aerospace engineering in August 2010.

Today, Terrence serves as an Oak Ridge Institute of Science and Education Postdoctoral Fellow with the U.S. Army Research Laboratory in Aberdeen, Maryland, where he researches structural design and optimization and structural failure and fatigue analysis.

While in graduate school, Terrence served as a graduate research assistant, a graduate teaching assistant, an intern, and a fellow. During summer 2004, he was an engineering intern at Bettis Atomic Power Laboratory in Pittsburgh, Pennsylvania, and the following summer he worked as a research assistant at Wright Patterson Air Force Research Laboratory in Dayton, Ohio. From 2006 to 2010, Terrence was the Office of Naval Research/HBCU Research Fellow in aerospace engineering, where he focused on designing and developing a bi-stable mechanism for morphing rotor blades in rotorcraft.



Terrence earned a few awards at Penn State, too, starting with the College of Engineering's top teaching assistant award for 2004-2005. In 2009, he also received a Sloan Fellowship, and in spring 2010, he won the SPIE/ASME Best Student Paper award.

He tells McNair Scholars to consider three points when choosing a graduate program: choose quality over location, choose the right faculty adviser for you, and spend extra time on your graduate course work.

Dr. Johnson notes that a quality program offers students access to the best thinkers and movers, and the best facilities and equipment in your field and funds to conduct research and attend conferences.

To choose the right adviser, visit with your potential adviser's graduate students, he advises. "Not choosing the right graduate adviser for you can ruin your graduate school experience," he says.

On course work, Terrence suggests, "Your adviser most likely will encourage you to spend more time on your research than in your courses. This is not the best advice because the information that's presented in your courses can be valuable to you. As a professional, you want as much knowledge in your memory banks as possible. Also, although your adviser may say grades are not as important as research, they still want you to get straight A's."

Among Terrence's professional goals are teaching at a four-year university and possibly pursuing a second field of study.



## Mentor Profile

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### Dr. Perry Fuchs

Dr. Perry Fuchs, an associate professor of psychology, has served several times as a faculty mentor for UT Arlington McNair Scholars. Dr. Fuchs came to UT Arlington in 1998 after completing post-doctoral appointments at McGill University and Johns Hopkins University School of Medicine. He earned his master's degree and his Ph.D. in psychology at The University of Texas at Arlington, after receiving his bachelor's degree from the University of Calgary.

Dr. Fuchs's research focuses on exploring the basic, underlying central and peripheral nervous system mechanisms associated with rewarding and aversive stimuli. Using a variety of experimental models, he investigates the central mechanisms of pain processing. His research on peripheral mechanisms explores the coupling between the sympathetic and somatic nervous system. For example, in 2004 Dr. Fuchs teamed with psychology associate professor Dr. Yuan Bo Peng and used electrophysiological techniques and behavioral methods to study potential mechanisms underlying pain in multiple sclerosis (MS) patients. Their objective was to better understand the mechanisms of

pain, possibly leading to better pain management for MS patients.

As an active researcher in pain studies, Dr. Fuchs has been awarded funding from a variety of sponsors to further his work, including the UT Arlington-UT Southwestern at Dallas Joint Institutional Research Program, University of North Texas-Health Science Center-UT Arlington Joint Institutional Seed Research Program, the National Multiple Sclerosis Society, the National Institutes of Health, and a number of other private and public sector sources.

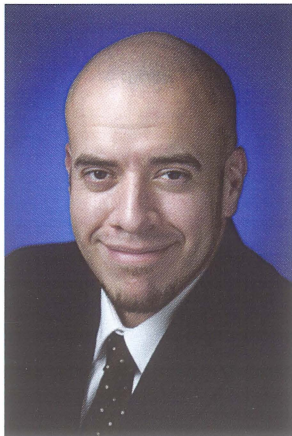


Dr. Fuchs has an established track record in the field of pain research and management. He has more than sixty peer-reviewed publications, a number of invited contributions and book chapters, and many conference presentations. He has made numerous invited presentations at various universities and medical centers.

Dr. Fuchs regularly teaches the 3000-level *Drugs and Behavior* course and has offered a number of graduate courses, such as a 6000-level seminar titled *Historical Problems in Psychology*.



## “For the Right Thing and Not for the Wrong:” Historic Preservation and the Black Knights of Pythias Temple in Dallas



### Jacob Narvaez

Architecture Major

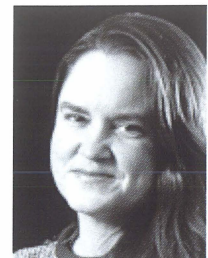
Originally from Austin, where he attended Austin Community College, Jacob transferred to UT Arlington and also entered the Honors College. A member of numerous honorary and professional associations (Phi Kappa Phi, Golden Key, Sigma Alpha Lambda, American Institute of Architecture, National Organization of Minority Architects), he is a recipient of the UT Arlington Continuing Student Scholarship. Jacob also was invited by his mentor, Dr. Kathryn Holliday, to make a presentation on his McNair research topic to the Dallas Architects' Forum in March 2011.

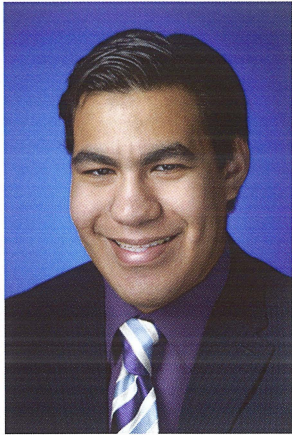
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“The McNair Scholars Program at The University of Texas at Arlington offered me opportunities that are invaluable to my future. The summer research project/paper, working with my mentor Dr. Kathryn Holliday, and presenting the results at the McNair research presentation forum will all aid in preparing me for a graduate program I wish to attend.”

Of the countless buildings and warehouses that risk being demolished in the east Dallas historic district of Deep Ellum, the Grand Temple of the Black Knights of Pythias is the most significant to have survived. Constructed in 1916 by William Sidney Pittman, Texas's first African-American architect, the Temple served as headquarters for the Fraternal Order of the Black Knights of Pythias, the largest African-American organization in the state of Texas during the early twentieth century. It was the first commercial building constructed by and made for African Americans in the City of Dallas, and it accordingly provided commercial office space for every trade, business or profession of African-American operation. Social functions and gatherings, as well as community meetings and public demonstrations, took place in its grand ballroom. The hall was added to the city's local landmark list in 1989, but currently sits unoccupied. This paper aims to provide a better understanding of why this cultural landmark should be put back into use and additionally examines how preserving the building can produce positive results in improving the Deep Ellum area. Information on the cultural history of the district and the larger context of the city of Dallas will be provided, as well as insight on the Black Knights of Pythias Fraternal Order and the life of William Sidney Pittman, the Temple's architect. It is through such historic research that progress can be made (currently the future of this district is unsure). The possible destruction of the Black Knights of Pythias building would be a great loss for the cultural heritage of the African-American community in Dallas.

Mentor:  
**Dr. Kathryn Holliday**  
School of Architecture





## Christian Torres-Lopez

Economics Major

Christian was born in Moca, Puerto Rico, and began his post-secondary education at the University of Texas in Austin. At UT Austin and UT Arlington, he has received a number of scholarships and awards. He is the recipient of the Richard Greene, Honors College, and the C.J. and Clara Earle scholarships at UT Arlington and is a National Hispanic Scholar. Christian was appointed in fall 2010 as the Honors College senator for Student Congress. In November he presented his McNair research at the 19th Annual National McNair Research Conference and Graduate Fair in Delavan, Wisconsin. As an Archer Fellow, Christian will spend spring 2011 in Washington, D.C., at the U.S. Treasury Department's Office of Economic Policy.

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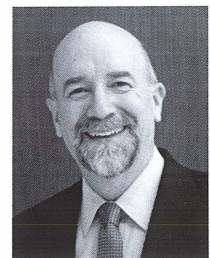
"The most beneficial part of the program for me was going through the process of doing my own research. Before this program, I didn't really appreciate what academic research entailed.

Having gone through the process, I'm very glad to have learned what it takes now rather than finding out the hard way in graduate school. There is no doubt in my mind that meeting the challenges of a graduate education will be easier having gone through this program beforehand."

## Addressing Free Riding in Local Southern Baptist Congregations

The application of economic theory to the study of religion has increased significantly in recent years and brought welcome insights into the structure of religious organizations and, in some instances, into religious doctrines themselves. One such line of research has sought to understand religious organizations as economic clubs, in which members share the costs of producing a mutually beneficial good. As with any such organization, however, research has found that churches and religious denominations suffer from the free-rider problem (i.e., people who receive the benefits of an organization but do not contribute to the costs of production). Different organizations address this problem in different ways. Some authors argue that stigmatizing behaviors serve that purpose. Other researchers focus on excludable goods as the method of choice. The role of social pressure to eliminate free riding appears to be a rich area for analysis. Using detailed information gathered at three Southern Baptist churches in Arlington, this paper discusses how the use of monitoring and small groups employs peer pressure to reduce free riding and enhance the mission of large, complex organizations.

Mentor:  
**Dr. Roger Meiners**  
Chair, Department of Economics







## K. Bruce Rollins

Exercise Science Major (Clinical/Research Track)

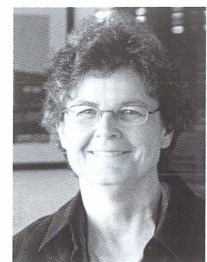
A native of McKinney, Texas, Bruce attended Collin County Community College and the University of Texas at Austin before transferring to UT Arlington and entering the Honors College. He is a member of Golden Key International Honour Society and Phi Theta Kappa and is a PTK scholarship recipient. Bruce received the UT Arlington Outstanding Transfer Scholarship. He is the founder and president of the Global Medical Training group on campus. In November Bruce presented his McNair research at the 19th Annual National McNair Research Conference and Graduate Fair in Delavan, Wisconsin. He also was one of three Scholars who won a scholarship from the Friends of the UT Arlington Library for his 2010 McNair research project and presentation. Bruce graduated in December 2010.

"I would like to extend my gratitude to the McNair staff for their tremendous support throughout my journey as a scholar. My summer research internship not only taught me to compose professional-quality research, but it afforded me the opportunity to work with some outstanding people along the way. I have been greatly influenced by all who have assisted me and will carry this experience with me for the rest of my life."

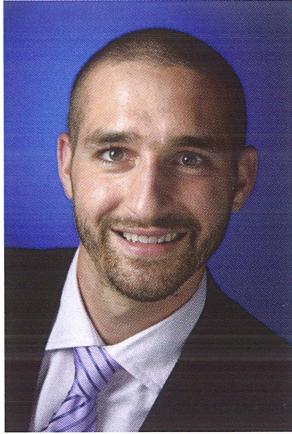
## Assessment of Maximal and Submaximal Aerobic Capacities of Wheelchair Basketball Athletes

The purpose of this study was to evaluate and compare peak oxygen consumption ( $\dot{V}O_{2\text{peak}}$ ) values obtained by wheelchair basketball players under maximal exercise conditions in the laboratory and on the basketball court. Six male players from the University's wheelchair basketball team volunteered to participate in this study. Each player made two visits to the Exercise Science Research Laboratories for aerobic testing utilizing an arm crank ergometer (ACE; Monark) and a treadmill (Fitnax). Heart rate was measured with a Polar Heart Rate Monitor and sent by telemetry along with the oxygen consumption to a portable K4b<sup>2</sup> device (Cosmed) for gas analysis. Measures of oxygen consumption were taken during scrimmages that varied between 15 and 25 minutes in duration. Due to the limited number of subjects, the nonparametric Friedman ANOVA was employed in the statistical analysis. There was a significant difference ( $p < .05$ ) in both the absolute and relative  $\dot{V}O_{2\text{peak}}$  values among the three exercise conditions. Post-hoc analysis, utilizing the Wilcoxon signed ranks test, identified a significant difference between ACE  $\dot{V}O_{2\text{peak}}$  and scrimmage  $\dot{V}O_{2\text{peak}}$  measures (mean = 2.38 and 2.79 L/min, respectively). No other differences were identified. This study confirms that specificity is crucial when researching subjects who are wheelchair users. Therefore, it is recommended that researchers use modalities that most resemble the subjects' habituated exercise modality when attempting to elicit peak physiological responses.

Mentor:  
**Dr. Judy Wilson**  
Department of Kinesiology



## Microwave Antenna Sensors for Fatigue Crack Monitoring under Lap Joints



### Justin Erdmann

Mechanical Engineering Major

Justin grew up in Midland, Texas, and attended South Plains College and Collin County Community College before entering UT Arlington, where he received the Outstanding Transfer Scholarship and additional support from the College of Engineering. Justin is a member of the American Society of Mechanical Engineers. In September he presented at the ASME 2010 Conference on Smart Materials, Adaptive Structures and Intelligent Systems. In November he was awarded a \$500 scholarship by the Friends of the UT Arlington Library for his 2010 McNair research project and presentation.

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“The McNair program really puts things into perspective. If you have never done research before, it provides a great stepping stone into what it is all about. If you are continuing research, it allows you to go places you never thought you could. It really does prepare you for life as a graduate student.”

The ability to detect and monitor fatigue cracks in lap joint structures is an important goal of Structural Health Monitoring (SHM). Cracks that develop around screw holes or rivet holes under lap joints are common in aerospace structures but are extremely difficult to inspect by visual means or even with traditional non-destructive inspection methods without requiring a multiple-day tear down. These locations also may be under compressive forces after assembly, which prevents installation of many SHM sensors. A low-profile microwave sensor that can detect a crack and monitor its growth in areas under a lap joint is proposed.

The crack detection and monitoring sensor is a patch antenna that consists of two ground planes and a metallic antenna patch sandwiched between a substrate and a superstrate. For lap joints, the metallic structures serve as the two ground planes of the antenna sensor. A crack in either ground plane will result in a shift in resonant frequency of the patch. Based on the measured resonant frequency shift, the crack length can be determined.

The capability of the antenna sensor to detect under lap joints was verified with experimental measurements. A pre-crack was created on the bottom plate and fatigue loadings were applied to the sample to propagate the crack slowly. The resonant frequency of the patch antenna at different crack lengths was measured and compared to the physical crack length.

Mentor:  
**Dr. Haiying Huang**  
Department of Mechanical  
and Aerospace Engineering







## M. Faye Hanson

Sociology Major/Political Science Minor

Born in Milwaukee, Wisconsin, Faye began her higher education at UT Arlington, where she joined the Honors College, receiving the Honors Presidential and the Swan Sociology scholarships. Selected for Who's Who for 2009 and a member of Alpha Kappa Delta sociology honors society, Faye serves as president of the UT Arlington Sociology Student Association. She presented her McNair research at the 19th Annual National McNair Research Conference and Graduate Fair in Delavan, Wisconsin. She also will present her research in March 2011 at the Southwest Sociological Association Annual Conference in Las Vegas.

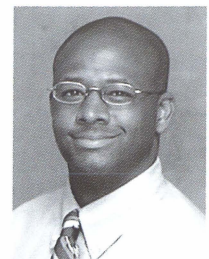
"The McNair Scholars Program and its staff have far surpassed my expectations in every way. I feel confident and exceptionally well prepared for the graduate school experience to come. I am so very grateful to have been selected for this opportunity."

## Perceptions of Race and Poverty

This paper examines the role that stratification ideologies play in shaping attitudes toward poverty in the United States, as well as answers the call for greater attention to the perceived causes of poverty across a wide range of racial and ethnic groups. More specifically, it utilizes an embedded experiment survey technique that permits for comparing and contrasting commitments to individualistic and structural causal attributions with respect to poverty-stricken members of the following four racial/ethnic groups: Asians, blacks, Latinos, and whites. The data set includes a diverse sample of college students within non-degree-specific core classes at a large public institution in Texas. The total number of respondents in the preliminary study is 1586 (N = 1586).

Several findings discussed are that: (1) racial and ethnic minorities do not seem to exhibit a "dual consciousness" of being at once structural and individualistic when explaining poverty within their own racial and ethnic groups, (2) whites' beliefs about poverty among minority groups would seem to be fundamentally shifting from historically individualistic and are now largely structural, based on race and/or class, with the notable exception of (3) stratification beliefs regarding whites in poverty, which are universally individualistic across racial and ethnic groups, including whites.

Mentor:  
**Dr. Jason Shelton**  
Department of Sociology  
and Anthropology





## Ashley Liggins

Art History Major

Ashley is originally from Baltimore, Maryland, and lived in the Midwest. She attended Chicago State University, where she was a member of the Honors College and a Presidential Scholar, before coming to UT Arlington. In November Ashley presented her McNair work at the 19th Annual National McNair Research Conference and Graduate Fair in Delavan, Wisconsin.

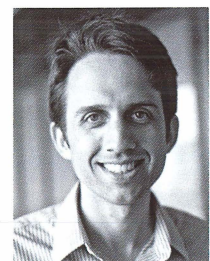
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“I really enjoyed working closely with a faculty member in my area of study. There is nothing better than learning your craft from an expert in your field.”

# Noble Savages and Extraordinary Negroes: Race and Representation in Late Eighteenth-Century European Art

In this paper, I have investigated how artists like Anne-Loius Girodet were influenced by mainstream beliefs of the time regarding race, politics, and the societal roles of slaves and former slaves in late eighteenth century Europe, and how this affected the way these artists portrayed their black sitters. I also explored the rationale behind the French belief that the Africans were incapable of self-governance and how this translated into depictions of Africans in French art. I comprehensively examined the process of artistic creation, with particular attention to the various political and racial/ethnic contributions that shape the formations of representation. Using the theories from Enlightenment philosophers such as physiognomist Johann Lavater, I examined the views of leading thinkers of the time about Africans and how this was translated into popular attitudes toward former slaves. I used iconographical analysis to explain the visual elements of each painting, therefore gaining a deeper understanding of the subject matter. Finally, I compared other paintings to the portrait of Jean-Baptiste Belley to further illustrate and reinforce my theory that the depiction in paintings was based primarily on the scientific, cultural, and political beliefs held by eighteenth century France and England. This research can help to better explain some of the reasoning behind the characteristic ways that blacks have been portrayed not only in eighteenth century European art but also in more recent media. My research will prove that painting is not only informed by the cultural and political atmosphere of a society, but that it helps shape it as well.

Mentor:  
**Dr. Benjamin Lima**  
Department of Art and Art History





# Characterizations of Lara as a Human Representation of an Axis Mundi: An Examination of the Symbolism and Mysticism in Boris Pasternak's *Doctor Zhivago*



## Patricia Mann

Russian/Philosophy Major

Born in Long Branch, New Jersey, Trish arrived at UT Arlington after attending Tarrant County Community College where she was selected for Phi Theta Kappa. She received both a PTK Transfer Scholarship and a UT Arlington Transfer Achievement Scholarship. Trish also was awarded the Bart Lewis Scholarship in modern languages and the International Education Fee Scholarship to study in Russia in summer 2009. Recognized as a University Scholar in 2009 and a member of Who's Who for 2010, Trish has won many awards. She is president of the Russian Culture Society and of Phi Sigma Tau philosophy honor society. Trish presented her McNair project at the 19th Annual National McNair Research Conference and Graduate Fair in Delavan, Wisconsin.

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"The opportunities that the McNair program has granted me have been invaluable to my academic experience. I feel very privileged to be among so many outstanding scholars and academics involved in the McNair program."

Among various religions, an axis mundi represents the sacred space in which humans gather to transcend to a higher realm. An axis mundi is seen most often as an object (a tree, a pole, or a steeple) or as a meeting place (a church, a living room, or a kitchen). Each of these representations of an axis mundi allows for humans to feel united with a higher sense of reality by being the point of connection between the physical world and the spiritual world. Various religious documents, however, confirm that a human can serve as an axis mundi, acting as an intercessor between the physical world and the spiritual world. In Boris Pasternak's *Doctor Zhivago*, Larisa Feodorovna's connection to the natural world and her ability to articulate the inarticulate principles of existence are essential components in understanding her role in *Doctor Zhivago*. Further examination of her spiritual powers demonstrates that her ability to act as a mediator between humans and the ineffable elements of existence provides evidence that she is a human manifestation of an axis mundi and, furthermore, the central healing force within the novel.

In this thesis, I explore the symbolism and mysticism in Boris Pasternak's depiction of Lara as symbol of nature, Lara as a representative of the Divine Feminine, and finally the significance of Lara's relationship with Yuri. By providing examples of Lara's connection to the physical world and the spiritual world, I confirm that Lara is a human representation of an axis mundi and the central healing figure in Boris Pasternak's *Doctor Zhivago*.

Mentor:  
**Dr. Lonny Harrison**  
Department of Modern Languages  
(Russian)





## Kimberly Nicole Sams

History Major (Medieval)/Early Modern Studies Minor

English Major/Classical Studies Minor

Kimberly grew up in the small town of Groton, New York. She began her undergraduate education at Tarrant County Community College, where she was admitted to Phi Theta Kappa and received the PTK Scholarship. At UT Arlington she became a member of Phi Kappa Phi Honor Society and the Medieval and Renaissance Society and serves as secretary for both Phi Alpha Theta history honor society and Eta Sigma Phi classical language honor society. Kimberly also was awarded the Holmes Scholarship for Classical Studies and the UT Arlington Outstanding Transfer Scholarship. In September she presented her McNair research at the annual meeting of the Texas Medieval Association at Southern Methodist University.

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“My experience with McNair has been better than I could have dreamed. Being given the opportunity to explore my interests led me to a topic that I’m excited about and plan to study for years to come. Now that I have completed the summer research internship I have a newfound confidence in my ability to get into a competitive graduate program and to succeed once I’m there. Just as important, I’ve found an amazing group of friends in the other McNair Scholars, McNair staff, and my amazing mentors.”

## Claiming Power and Agency: Medieval Women’s Self-Perceptions in Fifteenth-Century Family Letters

The desire of historians to explore personal motivations and feelings beyond individual actions has stimulated scholarship examining the identities of select segments of society, within the framework of every imaginable time period. Within medieval Europe this scholarship has led to a consideration of women’s identities, but it has primarily been limited to their traditional roles within the family or religious orders. Very little has been done to explore the historical process of women’s formation of a self-identity, partially because some scholars have questioned the existence of self-identity in pre-modern times and have suggested that women did not become fully self-aware until the sixteenth century. The presence of distinct feminine identities in pre-modern Europe was established in Ruth Mazo Karras’ scholarship on medieval prostitutes, and a study conducted by Caroline Walker Bynum asserted that medieval pious women used their roles to exercise agency and power. We therefore can conclude that women exercised similar autonomy in other areas, including as wives and mothers. This paper builds upon established knowledge to ascertain specific women’s development of self within their familial roles. With the goal of gaining a significantly personal view, the primary source for each woman will be the letters she wrote. I will assert that, despite living in societies that were repressive, these women were fully aware of themselves as individuals and that the letters grant us a personal view demonstrating the presence of strong, deeply unique identities.

Mentor:  
**Dr. Sarah Davis-Secord**  
Department of History







## Daniel Wagner

Sociology Major

A California native, Daniel was born in Los Angeles. Prior to UT Arlington, he attended Los Angeles Pierce College and Texas Tech University, where he was on the Dean's List, accepted into Phi Theta Kappa, and received the Presidential Transfer Scholarship. Daniel is a member of the Golden Key Honour Society and the UT Arlington Sociology Student Association. He also was nominated for Who's Who among American Universities and Colleges.

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"Since joining the McNair Scholars Program, doors have been opened for me that I never thought possible, and I have gained a confidence in myself that surely will stay with me for a lifetime."

## Mexican Immigrants in Cleveland, Ohio: An Exploratory Case Study of New Immigration Patterns and Reception

The majority of the literature written on Mexican immigrants in the United States focuses on the southwestern United States and other major destinations such as Chicago. This paper is an exploratory case study of migration to the American Midwest. Information was taken from various journals, books, and newspaper articles from the Ohio area, and the paper explores the development and consequences of new migration patterns of Mexican immigrants to the Midwest, in particular those moving to Cleveland, Ohio. A historical overview of Mexican immigration patterns to Ohio from the early 1900s to the 2000s was conducted, also. The push-and-pull factors that bring Mexican migrants north are discussed, as well as their reception by the local population. A look at the local response in Ohio, and specifically Cleveland, examines legislation aimed at deterring further immigration, as well as informal practices including segregation of neighborhoods and racial profiling of Hispanics in the Cleveland area. Treatment of the new immigrants in Ohio is consistent with the overall reception they receive in other parts of the country. While Ohio may be a new destination for Mexican immigrants, the patterns of a difficult assimilation process remain the same. The implications of the situation in Ohio are discussed, as they may prove relevant to the rest of the United States and thus deserve additional study.

Mentor:  
**Dr. Robert Kunovich**  
Department of Sociology  
and Anthropology





## Elizabeth Awad

Psychology Major

Born in Mexico City, Elizabeth is a veteran of the U.S. Marine Corps. A member of several honor societies (Phi Theta Kappa, Psi Chi, and National Society of Leadership and Success), she graduated in December 2010.

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"I would specially like to thank the UT Arlington McNair program for giving me this great opportunity of being part of the 2010 summer research experience and opening the door to my future. The McNair program provided me and my fellow Scholars with many benefits to become more competitive in the graduate school application process. It was hard work; however, if you push yourself, anything is possible."

## The Effects of Co-Rumination on Victimization and Health

Data collected and analyzed for this study was part of a larger ongoing study on friendship, peer relationships, and health. This paper examined how social support, specifically co-rumination, exacerbated the influence of victimization on health problems. Participants were fifth- and eighth-grade adolescents (N = 70) girls (N = 44) and boys (N = 26) from schools and organizations in the Dallas/Fort Worth area. Co-rumination refers to extensively discussing and revisiting problems, speculating about problems, and focusing on negative feelings. Victimization involves being the target of repeated aggression from one's peers. Although social support seems to act as a buffer against social stressors, some adolescents and children may not use social support correctly. Thus, adolescents and younger children may co-ruminate about their problems. An important empirical question may be why social support does not always help the bullied child. As expected, girls co-ruminated more than boys. Victimization, but not co-rumination, was positively related to physical health problems. Co-rumination did not exacerbate the link between victimization and physical health. Regarding psychological problems, a co-rumination X victimization interaction was identified. Bullied adolescents who co-ruminated with friends had the worse psychological outcomes. This effect was strongest for adolescent girls; no differences were found for boys. In sum, this study found that social support that involves co-rumination can actually lead to worse psychological problems for adolescents, especially if they are bullied girls. Parents and school administrators should take bullying seriously because it is clearly related to both physical and psychological health outcomes.

Mentor:  
**Dr. Lauri Jensen-Campbell**  
Department of Psychology







## Cam Liu

Biology Major

Cam comes to Texas from Vietnam. She is a member of the UT Arlington Environmental Society and the Society of Neuroscience. In November she had the opportunity to attend the Society for Neuroscience 40th Annual Meeting in San Diego.

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“The McNair Program has provided me many more opportunities than I could have imagined. It has allowed me to further reach my potential and opened many doors to new possibilities in my field. McNair has enabled me to take charge, learn, grow, and take command of my education.”

## Sex Differences in DeltaFosB Induction in Reward-Related Brain Regions of the Rat Brain

The neurobiological mechanisms behind cocaine use and reinforcement are inherently similar among individuals; however, variations in biological and behavioral responses do exist between males and females. Although rates of drug abuse are lower in women than men, women are increasingly using and abusing more prescription and illicit drugs including cocaine (Becker & Hu, 2008). Recent evidence implicates that DeltaFosB is thought to function as a sustained molecular switch for addiction (Nestler, Barrot & Self, 2001). DeltaFosB also is thought to be involved directly in addiction maintenance by enhancing the rewarding and incentive motivational properties of drugs of abuse through its actions on the dopamine transmission in the nucleus accumbens. To further understand sex differences in the long-term neuronal activation caused by chronic drug exposure in the reward pathways of the brain, levels of expression and accumulation were assessed following chronic cocaine exposure in the current investigation. We analyzed the amount of DeltaFosB present in the nucleus accumbens and ventral tegmental area of chronic cocaine-treated male and female rodents. Our preliminary results indicate that chronic cocaine exposure causes reduced activation of DeltaFosB in the nucleus accumbens and ventral tegmental area in females compared to males. Studies are under way to extend and confirm these findings.

Mentor:  
**Dr. Linda Perrotti**  
Department of Psychology





## Gabriela Romero

Biochemistry Major/English Creative Writing Minor

From Greenville, Texas, Gabriela began her undergraduate education at Paris Junior College where she was accepted to Phi Theta Kappa Honor Society. At UT Arlington she was chosen as an American Chemical Society Scholar and is vice-president of the UT Arlington Chemistry and Biochemistry Society. Gabriela also has served as an undergraduate teaching assistant, a tutor in the Chemistry Clinic, and as an undergraduate research assistant in Dr. Frank Foss's lab. In spring 2010 she won second place in the UT Arlington Undergraduate Creative Writing competition for her short story *No Glowing Embers Left*.

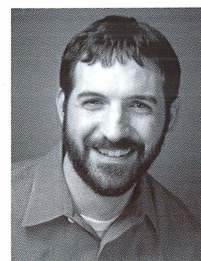
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"One thing I liked about the McNair program was the opportunity to perform research in my major for a summer and work on a research paper presenting that material. It was like previewing what life as a grad student would be like, and I was pleased to discover I found it enjoyable."

## Synthesis of a Mutated Bacterial Cell Wall for Use in Drug Discovery

Interrupting the growth of bacteria with small molecules that bind to the growing bacterial cell wall has been an effective method used to treat bacterial infections. However, bacteria obviate these treatments by mutation of the medicines' binding target. By mutating the structure of a small peptide chain crucial to cell wall assembly, the antibiotic drug cannot bind as strongly, thus allowing the bacteria to complete its cell wall synthesis and spread inside the host organism. Methods to find novel treatments that will combat drug-resistant bacteria are important to health care. As bacteria continue to develop resistance to current antibiotics, more effective antibiotics must be discovered. This paper describes the development of a biomimetic device capable of aiding in the discovery of potential new antibiotics that bind to mutated sequences of the bacterial cell wall. A common mutation is the conversion of tripeptide L-Lys-D-Ala-D-Ala to L-Lys-D-Ala-D-Ser, which is involved in the biosynthesis of bacterial cell walls. The device, a mesh screen coated with tripeptides mimicking the mutated bacterial cell wall, can be exposed to potential drug candidates and analyzed through transmission-mode desorption electrospray ionization-mass spectrometry (DESI-MS). This will give rise to information about the binding affinity of the molecule in question to the cell wall mimic, which will determine whether the molecule is a lead drug candidate.

Mentor:  
**Dr. Frank W. Foss**  
Department of Chemistry  
and Biochemistry







## Melanie Verna

Biochemistry/Biology Major

Melanie calls Arlington, Texas, home. Before entering UT Arlington, Melanie attended the University of Texas at Austin and Tarrant County College. Talented in the arts, she also loves science. Melanie is an Honors College member and received the UT Arlington Outstanding Transfer Student Scholarship.

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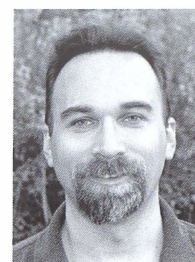
“The McNair program experience has been extremely challenging and fulfilling for me. The support from the staff and my fellow Scholars has been amazing, and I am a better student because of it.”

## Mechanism of Insertion of Non-LTR Retrotransposons

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R2 is a site-specific non-LTR retrotransposon that inserts into the 28S ribosomal RNA gene of many organisms. R2 protein has long been used to study the mechanisms of non-long terminal repeat (non-LTR) retrotransposons. The site-specificity of R2 is one of the reasons why it is a most interesting mechanism to research. The possible knowledge obtained from the R2 mechanism could pave the road for new biochemical tools and techniques in fields such as gene therapy. While the main domains of the amino terminal of R2 have been studied and characterized rigorously, it is still unknown what motifs in the protein structure are responsible for upstream DNA binding. Past experiments have used a targeted approach: isolating, mutating, and testing conserved domains. It was my intention to investigate the full-length protein binding activities using a more global approach and find the motif responsible for this upstream DNA binding. I used several techniques including protein purification; binding reactions with protein, DNA and RNA; and limited proteolysis to investigate this mechanism further. In initial R2 protein purifications, a number of naturally occurring proteolytic fragments were found in quantifiable amounts. Therefore, I attempted to use both these naturally occurring fragments, as well as performing limited proteolysis on the full-length protein in band shift experiments with DNA and RNA. I have yet to perfect the current limited proteolysis and plan on changing to a less robust enzyme for future experiments. Further work also will include using radio-labeled DNA in band shift experiments and working towards finding an appropriate technique for concentrating the R2 protein.

Mentor:  
**Dr. Shawn Christensen**  
Department of Biology





## Brocke Addison

Interdisciplinary Studies:  
Biology/Psychology (Neuroscience)

A native of Fort Worth, Brocke attended North Central Texas College before entering UT Arlington, which awarded him the Transfer Honors Scholarship. A member of the Honors College, he serves as a supplemental instruction leader and tutor on campus. In November, Brocke attended the Society for Neuroscience 40th Annual Meeting in San Diego.

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“My experience in the McNair Scholars Program has more than prepared me for a continuation of my research at the graduate level; it has rekindled my enthusiasm to do so.”

## Sex Difference in Orexin Expression after Chronic Cocaine Conditioning

Since the discovery of the hypothalamic peptide orexin in 1998, scientific literature has grown extensively upon its implications in feeding behaviors, narcolepsy, and reward. With a recent discovery of a sex difference in orexin neuron activation in response to different feeding behaviors and glucose reward, there is evidence that orexin may be sexually dimorphic in response to cocaine conditioning and other drug usage. Research into sex differences in cocaine abuse is necessary because research has revealed that women using cocaine become addicted more quickly and have higher relapse rates after periods of drug abstinence than males. The purpose of this study was to examine possible sex differences in orexin neuron activation within the lateral hypothalamus of intact male and cycling female rats. It was hypothesized that after chronic injections of cocaine, immunohistochemical procedures would reveal higher activation of orexin neurons in the lateral hypothalamus of female rats, an area implicated in drug relapse. Male and female rats were given intraperitoneal injections of cocaine (15mg/kg) daily for 14 days. Their brains then were fixed and stained for orexin/c-fos co-expression, a sign of cellular activation within these neurons. The neurons then were quantified and analyzed statistically. Overall the preliminary results showed higher activation of orexin neurons within the cycling female rats than in intact male rats, thus providing more evidence that a sex difference exists in orexin activation after cocaine abuse. Due to orexin's high implication in drug relapse, such a difference might well explain why women have higher rates of relapse than men.

Mentor:  
**Dr. Linda Perrotti**  
Department of Psychology





## Love Online: A Look at Perceiver Characteristics and Physical Attractiveness in the Initial Formation of Online Dating Relationships



### Sharie Vance

Interdisciplinary Studies:  
Art (Video Production)/Social Sciences

Originally from Garland, Texas, Sharie attended Navarro College and North Lake College before transferring to UT Arlington. She is a member of the Phi Kappa Phi Honor Society and a recipient of two Women in Film scholarships, the Phi Theta Kappa scholarship, and the UT Arlington Outstanding Transfer Student Scholarship. In addition, a documentary she produced on animal rescue won a best documentary award at the North Lake College video festival and an honorable mention at the 2008 Texas Intercollegiate Press Association Conference. In November, Sharie presented her McNair research at the 19th Annual National McNair Research Conference and Graduate Fair in Delavan, Wisconsin. In the same month, she was awarded a \$250 scholarship from the Friends of the UT Arlington Library for her summer McNair presentation and research paper. Sharie graduated in December 2010.

“The best part about the program is that it stretched me beyond self-imposed limits. I CAN go to graduate school. I CAN do the work required. I CAN design and produce socially relevant research. A close second is the camaraderie that I’ve developed with other McNair Scholars. These friendships are priceless and will hopefully last a lifetime.”

Dating serves a purpose for society by helping individuals find a mate. Online dating is a contemporary adaptation of this social arrangement. Online dating sites require participants to write a personal profile and (typically) to provide a photograph. This study investigated the extent to which subjective self-confidence and self-rated attractiveness might affect decisions about whether or not to reply to a potential date’s written profile. This study also looked at how much influence a date’s physical appearance has on those decisions, based on seeing a photograph. An experiment was conducted to try to answer these questions with the intent to further understanding of interpersonal attraction and decision-making in online mate selection. Gender differences were apparent. Females definitely were more selective than the males in their responses to both the written profiles and the photographs. There was also a negative correlation between age, physical attractiveness, and self-confidence for the females, which seemed to affect their decisions. Additionally, response to the photographs suggested that physical attractiveness was more important to the females than to the males, which is an unusual finding. A competing explanation for the females’ choices is racial homogamy. It certainly warrants further investigation. Applying such knowledge can help Internet dating sites fine-tune their programs to help “lonely hearts” in their search for a significant other.

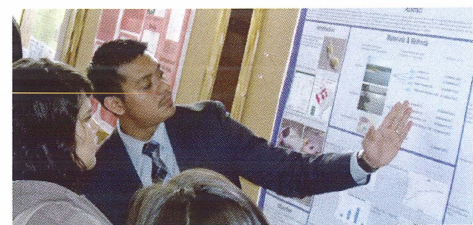
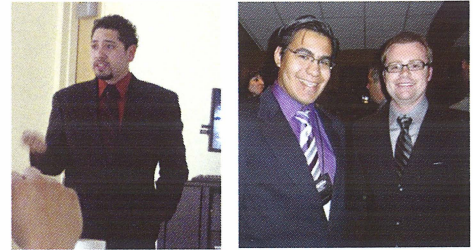
Mentor:  
**Dr. Linda Rouse**  
Department of Sociology  
and Anthropology



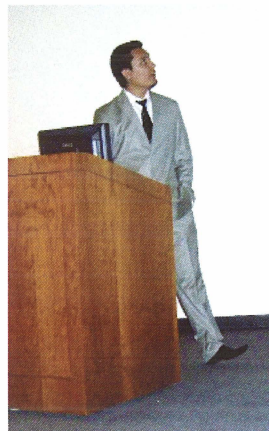


# Year at a Glance

## Conferences

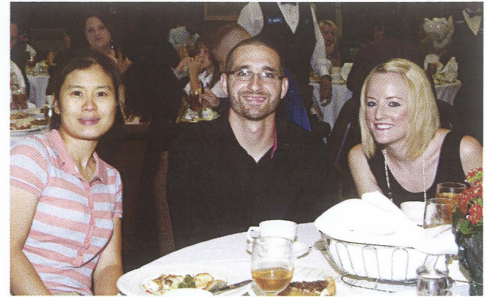
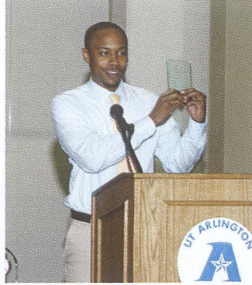


## Summer Research Presentations





## Summer Research Banquet



## Through the Year







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