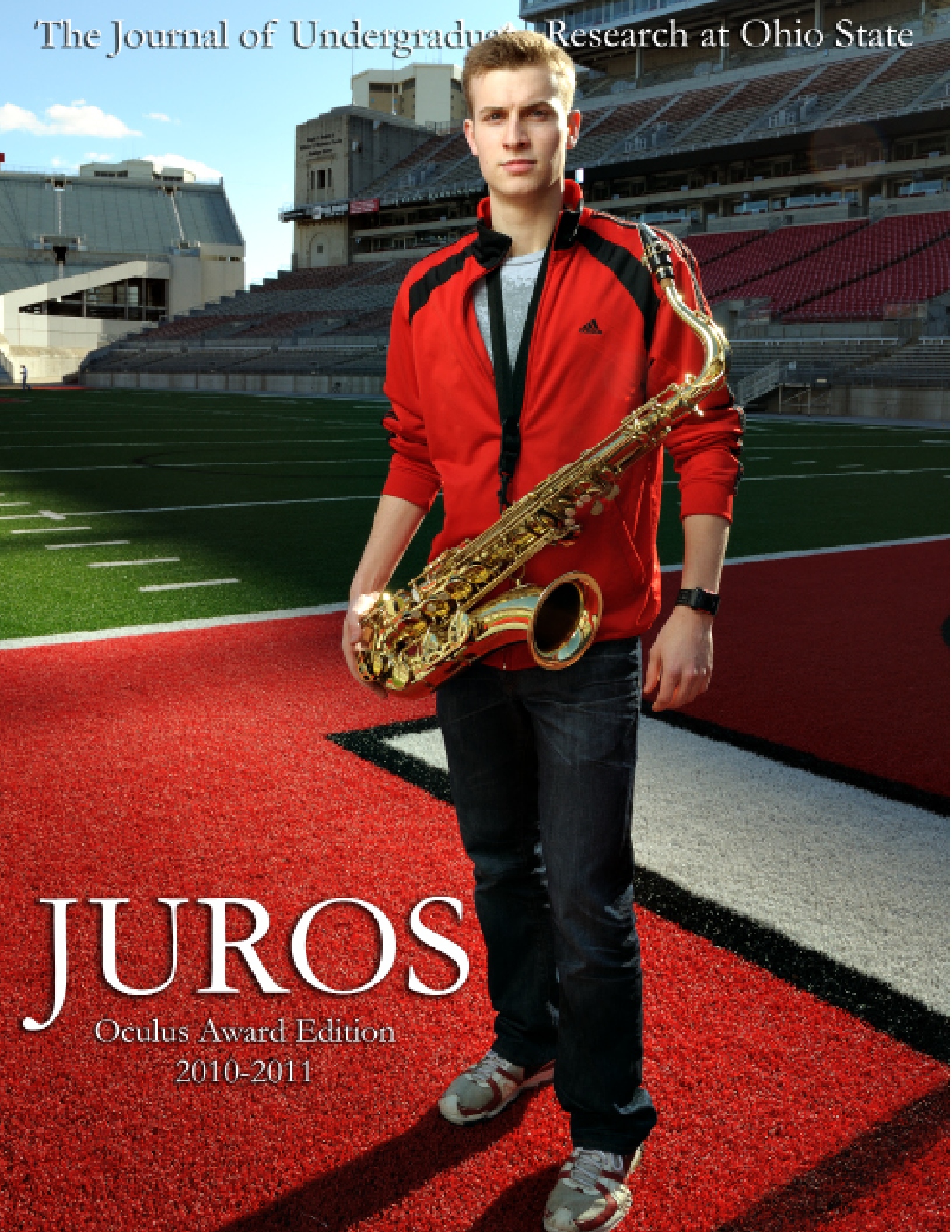


The Journal of Undergraduate Research at Ohio State



JUROS

Oculus Award Edition
2010-2011

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Letter from the Undergraduate Research Office

On behalf of the entire OSU community, I thank editors Jennifer Kmetich, Zachary Goodman, Olga Borodulin, Jinwei Hu, Sean Michael Craig, and their many collaborators and friends for creating this wonderful publication. We are extremely proud of the researchers, writers, editors, photographers, and designers who contributed to this outstanding issue of Oculus. Congratulations to the entire JUROS team for another excellent issue!

With best wishes,

Professor Allison A. Snow
Director of the Undergraduate Research Office



Letter from the Editors

Dear Reader,

The *Journal of Undergraduate Research at Ohio State* (JUROS) is proud to present to you our second print edition. JUROS is, first and foremost, an online journal, but the volume you are holding exists to highlight and celebrate, in tangible form, some of the most exciting work being done by Ohio State's undergraduates. JUROS: Oculus Award Edition is the successor publication to Oculus, published in the spring of 2010. It contains, now as it will in the years to come, the research manuscripts adjudged to be the best of those published online by JUROS in the past academic year. These manuscripts are our Oculus Award Winners. Congratulations to A. Jordan Grier, Melissa C. Herman, and Michael E. Newell for their excellent work! In addition to these manuscripts, the pages that follow offer articles and commentaries that highlight ongoing undergraduate research and that share perspectives on the undergraduate research experience.

It is an exciting time to be a part of the undergraduate research community at Ohio State. Statistics from the Undergraduate Research Office's 2010 Annual Report show that in the past four years there has been a dramatic increase in the number of undergrads enrolling in research courses and presenting at the Denman Undergraduate Research Forum each spring. Likewise, more students are submitting senior theses and are graduating with distinction than ever before. In 2009, Ohio State spent \$715 million in research expenditures. Ohio State is truly a place where research is happening everywhere, and more and more often that research is being conducted in part by undergrads.

The future is bright for undergraduate research at Ohio State. So it is for JUROS. This volume marks the beginning of a change in leadership at the journal. We would like to recognize Rising Co-Editors-in-Chief Jennifer Kmetich and Zachary Goodman, who will guide the journal in the coming years.

This volume could not have been produced without the contributions of many people. The JUROS Editorial Staff would like to thank Dr. Allison Snow, Helene Cweren and Mike Bierschenk for guiding and funding this publication. We would also like to thank our Oculus Award Winners, all the authors who submitted their manuscripts to JUROS, our features article and commentary authors from Ohio State, Dr. Amanda Simcox, and Jessica Hanzlik for sharing their work and experiences with us. Finally, we would like to thank you, our audience, for all of your support.

As you page through this volume, we hope that the research and perspectives excite you as much as they excite us. In our features articles and commentaries, take a look at the dynamics of music in Leah Batstone's research, the origins of gay rights through Justin Hanson, and the path to rock stardom with cover subject and OSU senior Dan White. Explore the scholarship of our Oculus Award Winners. As a final note, everything contained in this volume is available online, along with many more research manuscripts, at JUROS.osu.edu.

Sincerely,

The Editorial Staff



Olga Borodulin



Jennifer Kmetich



Zachary Goodman



Sean Craig



Jinwei Hu

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JUROS: Oculus Award Edition is an abridged edition of *The Journal of Undergraduate Research at Ohio State (JUROS)*'s online publication, a review of the best research manuscripts submitted to the journal in the preceding academic year. *JUROS: Oculus Award Edition* includes all of the features articles contained in the full online edition, abstracts from the selected research articles, and research opportunities for undergraduates at The Ohio State University.

To view a copy of the full-length online publication, please visit JUROS.osu.edu.

Abstracts of Manuscripts Accepted for Online Publication

To view full articles, please visit juros.osu.edu

Visualization of Pulsed Vortex Generator Jets with Porous Pressure Sensitive Paint

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Department of Aerospace Engineering

This work highlights the use of porous pressure-sensitive paint (PSP) as a visualization tool for unsteady flows in turbomachinery. Surface pressure measurements on turbomachinery components with semiconductor sensors or pressure taps are limited by sparse spatial resolution and complex installation. As a result, resolving high-frequency pressure fluctuations in unsteady flows has proven to be difficult. Recent advancements in the development of porous pressure-sensitive paint (PSP) have enabled unsteady surface pressure measurements at frequencies of at least 20 kHz with very fine spatial resolution. Conventional PSP formulas use a polymer binder which results in a response time of several seconds; however, response characteristics have recently been improved by the formulation of a porous matrix binder. Dynamic response calibrations are presented, and the application of PSP to a low pressure turbine blade is discussed. In particular, PSP is used to visualize the unsteady behavior of a spanwise row of vortex generator jets (VGJs) on an LIA low-pressure turbine blade placed in a cascade wind tunnel. The blade was painted with polymer/ceramic PSP (PC-PSP), and the VGJs were pulsed at 10.6 Hz with nitrogen. Intensity-based, time-resolved PSP measurements reveal the development and structure of the VGJs.

Effects of Marital Status on Material Conditions

Megan Hicks*, Dr. Kazimierz M. Slomczynski
Department of Sociology

How does marital status affect material conditions? This work focuses on how marital status may affect social stratification; specifically the differences in material conditions between married couples and cohabitating couples as compared to single people. This topic is important because rates of marriage are declining. According to Bumpass and Sweet, this large decline is largely offset by increasing cohabitation rates. Since 1970, the proportion of couples cohabitating - living together and not being married in the United States and other Western nations - has been steadily increasing (Bumpass, Sweet, & Cherlin, 1991). In terms of social stratification, it is important to identify the factors that are different between changing living situations and identify the material conditions that are affected by these living conditions.

Visual Attention and the Dimensional Change Card Sort

Nicholas Minar*, Dr. Vladimir Sloutsky
Department of Psychology

The current study examines cognitive flexibility and the development of executive function in children ranging from 3-5 years of age. The importance of executive function is seen in situations that involve multi-tasking, learning new routines, and functioning in a noisy environment. Our task is a variation of Zelazo's Dimensional Change Card Sort (DCCS), where young children are given one set of rules for sorting picture cards, which is then followed by a rule switch. Traditionally, 3 year olds fail to abide by the new set of rules and perseverate by using old rules, while 4 year olds effectively follow the new set of rules. The goal of the study is to understand what causes these perseverations. There is no agreement as to what causes perseverations; we suggest they stem from inability to inhibit irrelevant information. We test this hypothesis by examining patterns of eye movements using Tobii eye tracking equipment while children are tested on a computerized version of the DCCS. This approach elucidates children's ability to strategically allocate attention while looking at stimuli. We expect that children 3-4 years of age are unable to restrain their gaze from irrelevant dimensions, resulting in low efficiency of visual attention. We also predict that 4-5 year olds, who normally pass the postswitch phase, will also be unable to keep their gaze from irrelevant dimensions. However, we predict 4-5 year olds relative engagement with irrelevant features will be lower than that of younger children, which may be enough to reduce perseverations in the postswitch phase. We found similar behavioral data on our computerized version of the DCCS task, with the average 3-year old perseverating during the postswitch phase while on average 4 year olds passed. We also found via looking time data that 3 year olds had difficulty efficiently allocating their gaze away from irrelevant information.

From Poe to Rimbaud: A Comparative View of Symbolist Poetry

William Pietrykowski*, Dr. Elizabeth Renker
Department of English

Though geographically isolated from each other in the latter half of the Nineteenth Century, Walt Whitman, Edgar Allan Poe, and their French contemporaries, Charles Baudelaire, and Arthur Rimbaud, worked analogously to revolutionize poetic representation. Baudelaire and Rimbaud worked in the Symbolist tradition, while Whitman and Poe stood together in the United States as revolutionary poetic thinkers. While French civilization created the social and artistic contexts for Symbolism, French Symbolists probably appropriated much of their formally artistic ideas from Poe and Whitman. Most critics agree Poe was most likely more influential to the formation of Symbolist thought, while Whitman's force is a bit unclear. Aligning Baudelaire and Poe, as analogous artists, and Whitman and Rimbaud, *From Poe to Rimbaud, a Comparative View of Symbolist Poetry* will defend American importance in the formation and development of French Symbolist poetry.

To Reduce Hot Dose Spots in Craniospinal Irradiation: An IMRT Approach with Matching Beam Divergence

Alburuj R. Rahman*, Jian Z. Wang, Dr. Z. Huang, Dr. J. Montebello
Department of Radiation Medicine

In craniospinal irradiation (CSI), hot/cold dose spots are commonly seen with two overlapped fields to cover the spinal cord due to different beam divergences. The purpose of this study is to develop new techniques to reduce/eliminate the hot/cold spots and achieve more uniform dose coverage in the spinal cord and brain. A new approach to reduce the effect of beam divergence was investigated. Based on a phantom torso, plans were created for the new IMRT method and compared with the conventional technique. Both new techniques can improve the dose homogeneity of spinal cord. The new IMRT technique with matching beam-divergence has been developed for CSI to effectively reduce hot/cold spots and improve the dose uniformity in the spinal cord. The two-field IMRT technique has the greatest potential and is feasible to be implemented clinically. The remarkable improvement in dose coverage with the beam-divergence matching techniques warrants further studies with more patient data.

Education or Exotification? A Reexamination of the Smithsonian Folklife Festival

Kelly J Schultz*, Dr. Amy Shuman
Department of Anthropology, Folklore

As a central cultural event and meeting grounds for the diverse cultures of the United States, the Smithsonian Folklife Festival has a significant influence on the cultural education and intergroup understanding. The Festival has been a central case study in some of the central debates of Folklore: exotification, authenticity, traditionalism, presentation, and representation. In this study, I examine some of the key publications involved in the debate and reconsider their arguments in terms first person experience as an intern at the 2010 Festival, textual data, and ethnographic interview with Festival staff, curators, and participants.

Determining the Prevalence of Bitter Tasters in a Sample of College Smokers

Ashley Weber*, Karen Ahijevych
Department of Nursing

Social smoking is a growing trend among college students, characterized by occasional smoking, lack of nicotine dependence, and less intention to quit. Bitter taste phenotype (BTP), one's ability to test bitter, may help tailor appropriate oral nicotine replacement therapy (NRT) to help students quit. Research questions examined differences in BTP and nicotine dependence among regular and social smokers. A bitter taste test determined ability to taste bitter. Carbon monoxide (CO) breath levels and salivary cotinine were used as biomarkers of smoking. A final sample of 22 revealed that 14 (63.6%) subjects considered themselves "social smokers." Prevalence of bitter tasters was 59.1%, with 45.5% being categorized as medium tasters, 13.6% as supertasters, and 40.9% as nontasters. BTP was significantly and inversely correlated with smoking status; specifically, average number of cigarettes on a weekday (Kendall's tau $b = -.402$), and percentage smoked with others (Kendall's tau $b = -.434$). The trend of nontasters having a higher nicotine dependence score than bitter tasters was observed, although results were insignificant. As there is limited research about smoking habits of college students, understanding students' social smoking, oral NRT use, and BTP will aid in determining the most effective cessation products and programs.

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