Minot State
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2016 Faculty and Students
Research Poster Session
April 29, 2016
Book of Abstracts

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Edited by Mikhail M. Bobylev
Professor of Chemistry
Faculty Research Committee

2016 MSU Research Poster Session – Book of Abstracts

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Comprehension of Internet Humor by Adolescents with Language Disorders and Adolescents with Hearing Loss

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With ever increasing access to the Internet, adolescents are able to share humor via social media. One form of humor adolescents share are funny, captioned photos, known as memes. This study investigated whether there was a difference in the number of memes comprehended on an assessment test among adolescents who were typically developing, adolescents who were deaf or hard of hearing, and adolescents with language disorders. It also sought to determine if the meme's picture, whether related to the wording or unrelated, contributed to adolescents' comprehension. Participants were given a short reading screening and a multiple-choice test of meme comprehension. Results were analyzed to determine how many adolescents selected the correct answer. An error analysis was also performed. Adolescents who were typically developing out-performed adolescents who were deaf or hard of hearing or who had language disorders. In addition to struggling to identify humorous elements of memes, adolescents from the latter populations also struggled to identify not-funny, foil memes created by the researcher. An ANOVA found no significant difference between memes with a picture related to the humor and memes with an unrelated picture. Findings from this study suggest the need for practicing clinicians to include direct, explicit, authentic instruction of humor when working with adolescents who are deaf or hard of hearing or who have language disorders. Future research may investigate a teaching method to teach the humor in memes.

Comparison of the Efficiency and Approximation Capability of Lasso Algorithms on Inverse Linear Problems

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Inverse problems arise in many branches of science and engineering including statistics, geophysics, remote sensing, astronomy, physics, weather predictions, and numerous other fields. An equation $Ax = b$ in which the matrix A is generally very ill-conditioned and the data b is not exact represents an inverse problem. The solution to the perturbed problem is usually dominated by errors. In such a case, it is essential to use a special method to compute a solution that is less sensitive to the noise in the data. To ease this difficulty, we intend to use techniques looking for a sparse solution with a small number of positive elements. In this work, we summarize several known sparse optimization techniques such as the Constraint Optimization method, the Gauss Seidel method and the Grafting method. We go over the science and the theory behind these methods and then we compare their performances by running numerical experiments on eight different test problems for various noise levels. The referred methods may not be as effective as the well-known Tikhonov regularization method, but they are numerically less expensive. The results for the optimization algorithms applied on the eight test problems cannot provide a conclusive answer because of the scarcity of more open-source test problems. Additionally, certain test problems, at different noise levels, yielded results favoring the efficiency and approximation capability of the Grafting method and some favored the Gauss-Seidel and others, the Constraint Optimization method.

Rapid Synthesis of N-Vanillylacetamide

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Background: Recently, we investigated acetamide as an alternative solvent for the Leuckart reaction. In reactions conducted on several substituted benzaldehydes, the respective benzylacetamides were isolated only as minor products with the yields of 10-15%. However, the reaction conducted on 2-hydroxybenzaldehyde produced N-(2-hydroxybenzyl)acetamide as the main product with an isolated yield of 32.9%.

Hypothesis: The presence of a hydroxyl group in benzaldehydes shifts the reaction from producing the respective benzylformamides towards producing the respective benzylacetamides. In this work, this hypothesis was tested on 4-hydroxy-3-methoxybenzaldehyde (vanillin).

Methods: The reaction was conducted on 10 mmol scale at 195^0C. Column chromatography was used for the isolation of the products. NMR-spectroscopy and elemental analysis were used to determine the structure of the products.

Results: The reaction was completed in 6 minutes. N-vanillylacetamide was isolated as the main product of the reaction with the yield of 35.8%.

Conclusions: The first one-step synthesis of N-vanillylacetamide from vanillin was conducted. The reaction may lead to a new general method for the synthesis of capsacinoides.

Support: Research reported in this publication was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103442.

Adoption of Mobile Banking among Small Businesses in Medium Income Countries: The Case of Kenya

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Banking away from stone and motor establishments is increasingly becoming common among individuals and businesses in many parts of the world. A case study of adoption of mobile phone banking among small businesses was conducted in the summer of 2015 in the city of Nakuru, Kenya. A stratified random survey of 300 businesses was carried out. The survey sought to elicit information about the use of mobile banking technology and its determinants. The unified theory of acceptance and use of technology (UTAUT) was used as a source of independent (perception) variables. Social demographic data as well as data on frequency of use for the various activities was also compiled. Structural equation modelling was applied to explore the variables likely to drive adoption of mobile banking technology. Technological anxiety was found to negatively influence use while presence of children in the household was found to have a positive influence. These findings should help the banking community create better business strategies towards increasing shareholder profits.

Support: Research for this project was supported by a Minot State University Small Grant for Faculty Research.

Rapid Synthesis of N-(2,4-dichlorobenzyl)-N-methylformamide

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Background: Recently, we developed a rapid procedure for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 4-chloro-benzaldehyde, a large amount of a by-product, N, N-di-(4-chlorobenzyl)-N-methylamine was produced with an isolated yield of 31.3%. N-(4-chlorobenzyl)-N-methylformamide was produced as the main product with an isolated yield of 52.0%.

Hypothesis: The reaction conducted on benzaldehydes with electron-withdrawing substituents may produce lower yields of the respective N,N-dibenzyl-N-methylamines. In this work, the hypothesis was tested by conducting the reaction on 2,4-dichloro-benzaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 180°C. Column chromatography was used for the isolation of the products of the reaction. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was fully completed in 10 minutes. N-(2,4-dichlorobenzyl)-N-methylformamide and N,N-di-(2,4-dichlorobenzyl)-N-methylamine were isolated with the yields of 44.2% and 35.7%, respectively.

Conclusions: A new rapid method for the synthesis of N-(2,4-dichlorobenzyl)-N-methylformamide was developed.

Support: Research reported in this publication was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103442.

Potential Correlations between Blood Pressure, Heart Rate, Mood and Caffeine Consumption

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The pharmacological effects of caffeine on the body have been regularly ascribed as beneficial, although the effects caffeine has on individual emotions often produces varied responses. However, escalations in blood pressure and heart rate after consuming caffeine are regularly reported, which has potential to affect one's mood. In this study, blood pressure and heart rate were monitored regularly alongside of the participant's completion of Brunel mood scales as well as three standardized mood scales. All of this is analyzed to determine potential correlations between caffeine consumption, mood, blood pressure, and heart rate.

North Dakota General Education Teachers' Knowledge of American Sign Language Interpreters in the Classroom

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As children who are deaf are increasingly educated in the general education classroom, it is likely that the related service of ASL interpreting in the classroom will also increase. The problem is that, while general education teachers are more likely to work with an ASL interpreter in their classroom, they may lack the knowledge of the roles and responsibilities of this professional and how to work with them. No published research on this topic was found. This poster session presents results of a survey conducted to answer the research question: "What do general education teachers in North Dakota know about working with ASL interpreters in the classroom?" Survey results are discussed in terms of implications for educators and administrators as well as direction for professional development and further research on this topic.

Effects of Transitions Live vs. Virtual Program on Cognition

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The purpose of this study was to explore how WELLBEATS™ Transitions live group instruction vs WELLBEATS™ Transitions virtual group exercise programs compare in regards to helping improve cognitive functioning as measured by the STROOP. Sedentary female adults aged 45 to 65 years were selected to be in live or virtual groups for a 10 week time frame: WELLBEATS™ Transitions live group or WELLBEATS™ Transitions virtual group. The 10-week program required participants in the WELLBEATS™ Transitions live group and the WELLBEATS™ Transitions virtual group to participate in two formats of Transitions program three days a week. WELLBEATS™ Transitions exercise programs positively impacted participants. Regardless of the delivery type of the exercise program (Virtual or Live), participants showed improvement on selective attention capacity and executive functioning skills as measured by the STROOP.

Rapid Synthesis of N-(3-indolylmethyl)acetamide

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Background: Recently, we investigated acetamide as an alternative solvent for the Leuckart reaction. In reactions conducted on several substituted benzaldehydes, the respective benzylacetamides were isolated only as minor products with the yields of 10-15%. However, the reaction conducted on 2-hydroxybenzaldehyde produced N-(2-hydroxybenzyl)acetamide as the main product with an isolated yield of 32.9%.

Hypothesis: The presence of a hydroxyl group in benzaldehydes shifts the reaction from producing the respective benzylformamides towards producing the respective benzylacetamides. Because of the similarity between indoles and phenols, we may expect a similar shift from indolecarbaldehydes. In this work the hypothesis was tested by conducting the reaction on indole-3-carboxaldehyde.

Methods: The reaction was conducted on a 10 mmol scale at 195C. Column chromatography was used for the isolation of the products of the reaction. NMR-spectroscopy and elemental analysis were used to determine the structure of the products.

Results: The reaction was fully complete in 6 minutes and produced N-(3-indolemethyl)-acetamide as a main product with a yield of 40.0%.

Conclusions: A new rapid synthesis for N-(3-indolylmethyl)acetamide was developed.

Support: Research reported in this publication was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103442.

What's So Special About Dads?: Supporting Fathers of Deaf & Hard of Hearing Children in Early Intervention

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While it is commonly accepted that fathers' play an increasingly important role in today's families, a paucity of literature exists regarding the role of fathers in families who have children with disabilities. While there is modest research on the subject of mothers of children who are deaf and hard of hearing (D/HH), almost no research is available specific to fathers of that population. This poster summarizes the results of three studies seeking to answer the question: What do fathers' experiences in the early intervention process tell professionals about family-centered practice? This information is presented as 8 action steps that professionals can take to address the needs of fathers in family-centered intervention for children who are D/HH. Further study of fathers' role in early intervention teams when their children are d/hh is needed in order for professionals to gain awareness and skills in facilitating greater father involvement and subsequent improved outcomes for their children.

Rapid Synthesis of N-methyl-N-(1-naphthylmethyl)formamide

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Background: Recently, we developed a rapid procedure for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on piperonal (3,4-methylenedioxybenzaldehyde), a large amount of a by-product, N-methyl-N,N-dipiperonylamine was produced with an isolated yield of 32.8%. N-methyl-N-piperonylformamide was produced as the main product with an isolated yield of 51.4%.

Hypothesis: The reaction conducted on electron-donating aromatic aldehydes may produce higher yields of N,N-diaryl-N-methylamines and lower yields of N-aryl-N-methylformamides. In this work the hypothesis was tested by conducting the reaction on 1-naphthaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 185°C. Column chromatography was used for the isolation of the products of the reaction. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was fully completed in 1 minute. N-methyl-N-(1-naphthylmethyl)formamide was still produced as the main product but with a slightly lower isolated yield of 46.0%. N-methyl-N,N-di-(1-naphthylmethyl)amine was produced with a slightly higher isolated yield of 34.9%.

Conclusions: A new rapid method for the synthesis of N-methyl-N-(1-naphthylmethyl)-formamide was developed.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences of the National Institutes of Health.

Leadership styles and ethics positions of nonprofit leaders: A quantitative correlational study

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Background: In the 21st century nonprofit organizations (NPOs) experienced a substantial increase in reported cases of financial improprieties and unethical acts by top leaders. Unethical acts resulted in significant financial loss to the nonprofit industry giving incentive to reduce ethical violations within NPOs.

Purpose: The purpose of this quantitative correlational study was to determine to what extent there is a correlation between leadership styles (authoritarian, democratic, and laissez-faire leadership styles) and ethics position (idealism and relativism) of nonprofit leaders within the United States.

Method: Data was collected from 111 study participants. The participants responded to a 40-question web survey that used the Leadership Styles Questionnaire and the Ethics Position Questionnaire. Multiple linear regression analysis was used to analyze the data.

Summary of Results and Conclusions: The results of the study indicated a statistically significant relationship between the laissez-faire leadership style and both ethics positions. The analysis did not detect a relationship between the authoritarian or democratic leadership styles and either of the ethics positions. The conclusion was nonprofit leaders who use a laissez-faire style have high ethics. This conclusion suggests that a leader may hold strong ethics positions, but act as a neutral leader. Specifically, laissez-faire leaders may not engage in or approve of unethical acts, but they will not direct their followers to act ethically. Based on the findings of this study, it may be of interest for the nonprofit board of directors to hire laissez-faire leaders and train them to engage their followers to act ethically.

Size-Control Chemical Synthesis of Silver Nanoparticles

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Silver nanoparticles have unique interactions with visible light which can be directly linked to the size of the nanoparticle. Silver nanoparticles were synthesized by a reduction reaction involving silver nitrate, sodium borohydride and citric acid in an aqueous solution. The amount of sodium borohydride, the primary reducing agent, was varied between $2.5x10^{-4}$ and $2.5x10^{-3}$ M. Samples were analyzed by determining the extinction spectrum in a UV-Vis spectrometer with Mie theory calculations to determine size. Large variability in the particle size was seen between similar samples. Using a temperature bath and $1.8x10^{-3}$ M sodium borohydride, synthesis was performed with variable temperature between 25 and 35 °C. Lower temperatures generated larger average nanoparticles, with an average of 11±2 nm at 25 °C and 8.9±0.8 nm at 35 °C. Samples were noted to be unstable in solution and polyvinylpyrrolidone (PVP) was added to decrease aggregation. Samples still appeared unstable after PVP addition.

Support: Research for this project was supported by a Minot State University Small Grant for Faculty Research.

Method Optimization of Caffeine Extraction from Human Saliva for GC/MS Analysis

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Saliva has been growing in popularity as the preferred sample for study in clinical and forensic chemistry. Caffeine levels within human saliva were analyzed using a gas chromatograph-mass spectrometer (GC/MS) coupled with a liquid-liquid extraction. Several parameters were examined to determine the optimum method. The type and volume of solvent used, volume of saliva, type and volume of surfactant, centrifuge time, type and concentration of internal standard, cell disrupter time, volume of extraction, and lastly GC/MS parameters. The final method included using 1000 µL of ethyl acetate as the extraction solvent, 500 µL of human saliva, and 200 µL of 15% SDS (sodium dodecyl sulfate). Cell disruption was set for 1 minute and centrifugation for 10 minutes at 1400 x g. 390 µL of ethyl acetate was extracted and 10 µL of Acetaminophen was added (ISTD). The GC/MS analysis was done by a Thermo Scientific Trace GC 2000 gas chromatograph with a Thermo Scientific Polaris Q mass spectrometer. The instrument parameters included a constant 1.00 mL/min helium flow rate with a 1 µL sample injection in splitless mode. The temperatures of the instrument were set to 200 °C for the ion source, 220°C for the injector, and 300 °C for the transfer line. Initial oven temperature was set at 100°C for 1 minute, ramped at 40°C/min to 250°C and held for 3.75 minutes. The MS detection was set for selective ion monitoring (SIM) at 194 m/z for caffeine and 109, 151 m/z for the ISTD.

Support: Research reported in this publication was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103442.

Rapid Synthesis of N-(4-chlorobenzyl)-N-ethylformamide

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Background: Recently, we developed a rapid procedure for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 4-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(4-chlorobenzyl)-N-methylamine was produced with an isolated yield of 31.3%. N-(4-chlorobenzyl)-N-methylformamide was produced as the main product with an isolated yield of 52.0%.

Hypothesis: The reaction conducted with N-ethylformamide may produce slightly higher yield of the by-product, N,N-di-(4-chlorobenzyl)-N-ethylamine as well as slightly lower yield of the main product, N-(4-chlorobenzyl)-N-ethylformamide.

Methods: The reaction was conducted on 10 mmol scale at 178-181°C. Column chromatography was used for the isolation of the products of the reaction. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was fully completed in 15 minutes and produced N-(4-chlorobenzyl)-N-ethyl-formamide as the main product with an isolated yield of 41.6%.

N,N-di-(4-chlorobenzyl)-N-ethylamine was produced as the main by-product with an isolated yield of 34.0%.

Conclusions: A new rapid method for the synthesis of N-(4-chlorobenzyl)-N-ethylformamide was developed.

Support: Research reported in this publication was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103442.

The Role of Physical Attraction in the Possibility of a Dating Relationship

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Is physical attraction actually the defining characteristic of a person? In an attempt to answer this, we asked college students at the Minot State University Student Center if they would go on a first date with an attractive person with less than average accomplishments. We also asked other subjects if they would go on a first date with a less attractive person with above average accomplishments. The results of our research showed non-significant support for our hypothesis leading us to conclude that people are not as superficial as we had speculated.

The Impact of Direct Instruction on the Decoding and Comprehension Skills of Deaf Readers

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This multiple case study is based on the work of Guardino, et al (2009 & 2011), investigating the impact of a direct instruction, phonologically-based reading program supplemented by visual phonics on the decoding and comprehension skills of three deaf and hard of hearing (d/hh) students. The purpose of this multiple case replication study was to investigate the impact of a direct phonological instruction curriculum supplemented with Visual Phonics on the reading decoding and comprehension skills of three middle school aged Deaf/Hard of Hearing students. The intervention was implemented for a period of 5 weeks, with direct instruction daily. Pre and post tests of nonsense word reading and reading comprehension using the Woodcock Johnson-III and Texas Primary Reading Inventory were used to measure the effect of instruction. Results indicated all cases made gains in reading decoding skills while two of the three cases improved their reading comprehension. The relationship of language ability in the reading development process was noted. Implications for practitioners and future research are discussed.

Rapid Synthesis of N-(4-t-butylbenzyl)-N-methylformamide

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Background: Recently, we developed a rapid procedure for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 4-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(4-chlorobenzyl)-N-methylamine was produced with an isolated yield of 31.3%. N-(4-chlorobenzyl)-N-methylformamide was produced as the main product with an isolated yield of 52.0%.

Hypothesis: The reactions conducted on benzaldehydes with electron-donating substituents may produce larger amounts of the respective N,N-dibenzyl-N-methylamines. In this work, the hypothesis was tested on 4-t-butylbenzaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 184 C. Column chromatography was used for the isolation of the products of the reaction. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Result: The reaction was completed in 2 minutes. N,N-di-(4-t-butylbenzyl)-N-methylamine and N-(4-t-butylbenzyl)-N-methylformamide were isolated with the yields of 25.9% and 35.7%, respectively. The molar ratio of the by-product to the main product increased from 6:10 to 7:10.

Conclusion: A new rapid method for the synthesis of N-(4-t-butylbenzyl)-N-methylformamide was developed. N-(4-t-butylbenzyl)-N-methylformamide can be used in the synthesis of butenafine.

Support: Research reported in this publication was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103442.

The Vascular Flora of the Sioux County, North Dakota

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North Dakota is among a few North American regions which have not been researched in full for plant diversity. Before 2011, only 55% of state territory was researched botanically. From 2011, we are surveying "botanical white spots" using 30×30 miles virtual grid. Every plant was photographed, geo-referenced (with precise GPS coordinates) and collected for the herbarium of Minot State University (now officially registered and internationally recognized as "MISU"). However, in North Dakota we also have the different type of locations, unresearched "hot spots" where plant diversity is dramatically higher than in the surrounding areas. One of them is Sioux county.

Sioux county as a whole has never been the focus of a floristic study. The only known document describing their flora is Hansen's (2008) report but it was restricted with the territory of Cedar River National Grassland. Only few species from these counties are represented in herbarium collections. For example, flora of Emmons county (according to the Flora of North Dakota checklist) contains 796 species whereas the neighboring Sioux county has only 426 species registered. In essence, Grant and Sioux counties belong to the Missouri Plateau. But what makes them unique in the state, is the significant proportion of "Moreau prairie", an ecological region which occurs mostly in South Dakota (Bruce et al., 1998). This type of prairie has occasional buttes, areas of badlands, numerous salt plains therefore making this county more diverse ecologically then most of North Dakota prairies types.

With the permission of Tribal Council, we made multiple collection trips in June to August 2015, and prepared plant samples deposited now in MISU herbarium. These herbarium specimens along with plant photographs made in natural environment complement our existing records and are the source of the comprehensive plant list for the Sioux county of North Dakota.

Self-determination (Intrinsic motivation)

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College students are found to be motivated by intrinsic motivation that may lead to extrinsic motivation. Self-determination theory (intrinsic motivation) is supported by autonomy, competence, and social relatedness (Louw, Muller, 2004). College students who have shown the use self- determination manage to have good health behavior and self- motivation in their work (Williams, 2012). These students develop higher regards for learning by having intrinsic motivation (Lei, 2010). This self-determination survey will show a sample of 106 individuals attending Minot State University in five introductory courses. The survey will contain seven questions about demographics including intrinsic and extrinsic motivation. We analyzed the following majors: nursing, social work, elementary education, and criminal justice. We predicted there would be differences in the levels of self-determination and intrinsic motivation.

Normative Values for the Voice Handicap Index and Voice Handicap Index-10

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The present project replicated the Arffa, Krishna, Garnter-Schmit, and Rosen (2012) study with an expanded sample size to determine the effectiveness of the Voice Handicap Index-10 questionnaire when compared to the Voice Handicap Index. Results will be used to enhance the standards of assessment at the Minot State University Communication Disorders Clinic and for voice specialists across the United States. The project was a comparative study to determine if a difference existed between final scores on the VHI and the VHI-10 when taken by adults with no voice disorders. The VHI was developed by Jacobsen and colleagues in 1997 and was validated as meeting the criteria for reliability, validity, and availability of normative data in 2002. The shortened VHI-10 was developed by Rosen and colleagues in 2004 and included 10 statements from the 30-item VHI form. These 10 statements were chosen for having the highest mean difference between the study and control groups, for significant clinical relevance, and for exhibiting the highest mean difference between pre- and post-treatment groups when compared to the VHI. The VHI questionnaire was given to 160 participants with no history of voice disorders. Participants were randomly selected through convenience sampling procedures and asked to complete the VHI questionnaire, as VHI-10 questions were extracted from the VHI. Participants' VHI and VHI-10 responses were separated and analyzed. A t-test showed no significant difference between participants' scores on the VHI and VHI-10. Findings indicated the VHI-10 provided an accurate measure of perceived vocal issues despite its shorter length.

North Dakota "Man Camp" Photography Survey

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North Dakota's recent oil boom is the third and largest wave since the early 1950s. During its height, it created a significant demand for mostly temporary labor and sparked a corresponding housing crisis across much of northwestern North Dakota. However, in the past year, with the global drop in oil prices, the Bakken has entered a significant slowdown period. During the boom, many laborers took refuge in varieties of housing projects often dubbed, "man camps" that range from prefabricated modular housing to recreational vehicles and in some extreme cases, even tents. Our photographic records have evocatively imaged the patterns and variations of domestic options for oil workers for the past few years. As a result of the downturn, many of the previously surveyed camps are significantly diminished or empty. Recently occupied trailers have been found abandoned and even burned. Over the past year, my work has focused on this decline, slowdown of construction, and even abandonment. Many workers who have lost their positions have left the region, while others remain trying to wait out the slowdown or, in some drastic cases, are financially unable to leave.

This photographic survey of these camps is one component a larger international team researching the material and social environment of the crew camps associated with the Bakken oil fields in western North Dakota.

Support: Minot State University, Small Grants for Faculty Research (2014, 2015)

Rapid Synthesis of N-(3-indolylmethyl)-N-methylformamide

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Background: Recently, we developed a rapid procedure for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on piperonal (3,4-methylenedioxybenzaldehyde), a large amount of a by-product, N-methyl-N,N-dipiperonylamine was produced with an isolated yield of 32.8%. N-methyl-N-piperonylformamide was produced as the main product with an isolated yield of 51.4%.

Hypothesis: The reaction conducted on electron-donating aromatic aldehydes may produce higher yields of N,N-diaryl-N-methylamines) and lower yields of N-aryl-N-methylformamides. In this work the hypothesis was tested by conducting the reaction on 3-indolecarboxaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 183°C. Column chromatography was used for the isolation of the products of the reaction. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was fully completed in 10 minutes. Currently, N-(3-indolylmethyl)-N-methylformamide is the only isolated product with a yield of 39.8%. Work on isolating N,N-di-(3-indolylmethyl)-N-methylamine is underway.

Conclusions: A new rapid method for the synthesis of N-(3-indolylmethyl)-N-methylformamide was developed.

Support: Research reported in this publication was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103442.

Comparison on Internal Standards used for GC-MS Analysis of Caffeine Extracted from Human Saliva Samples

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In order to analyze caffeine in human saliva samples for use in a study done by the psychology department at MSU, an acceptable method for its extraction and analysis was developed. This method, consisting of a liquid-liquid extraction using ethyl acetate along with centrifugation and subsequent GC-MS analysis was capable of detecting caffeine in artificial saliva samples prepared in the lab. The focus of this particular research was the determination of an internal standard that would effectively improve the limit of quantification for this method. Lidocaine and acetaminophen were investigated, using human saliva samples. A number of internal standard concentrations were investigated along with a number of standard curves. The final method, producing complete peak separation for all human saliva samples analyzed utilized a 25 mg/L concentration of acetaminophen as an internal standard and a standard curve range of 0-50 mg/L.

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