

***Proceedings of the  
Upper Peninsula  
Interdisciplinary  
Student Research  
Conference  
(UPISRC-2015)***



Northern  
Michigan  
University



Tuesday, April 21, 2015

Northern Michigan University

Marquette, MI

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# Preface

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Welcome to the 2nd annual Upper Peninsula Interdisciplinary Student Research Conference 2015!

This conference, held at NMU for 2015, is a continuation to collaborative efforts between MTU and NMU and is focusing on student research in human and behavioral sciences. It also witnesses the diversity of areas that include psychology, human factors, education, human effectiveness, human-centered design, social science, kinesiology, neuroscience, and other related fields. This year we have more than 30 abstracts, and many of the authors are presenting research here for the first time.

We would like to acknowledge the sponsorship of **the college or Arts and Sciences at NMU and the NMU psychology department.**

I wish you a successful conference.

*Mounia Ziat*

# Conference Information

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## Presentation Format

### *Oral presentations*

Oral presentations will be 15 minutes in total (12 minutes for the presentation, 3 minutes for questions). A moderator will keep time during presentations and inform the presenter of how much time is left.

### *Poster presentations*

Posters will be presented on easels that will accommodate a 4'x4' poster.

## Citing presentations and posters

Lastname, F. (2015). Title of Paper. *Proceedings of the Upper Peninsula Interdisciplinary Student Research Conference (UPISRC-2015)*. p.#, MI: Marquette. Available from: <https://sites.google.com/a/mtu.edu/upirs/>

## Conference Organizing Committee

Mounia Ziat (NMU/Chair)

Shane T. Mueller (MTU/Chair)

Kelly Morrow (NMU/Student Chair)

# Conference Site

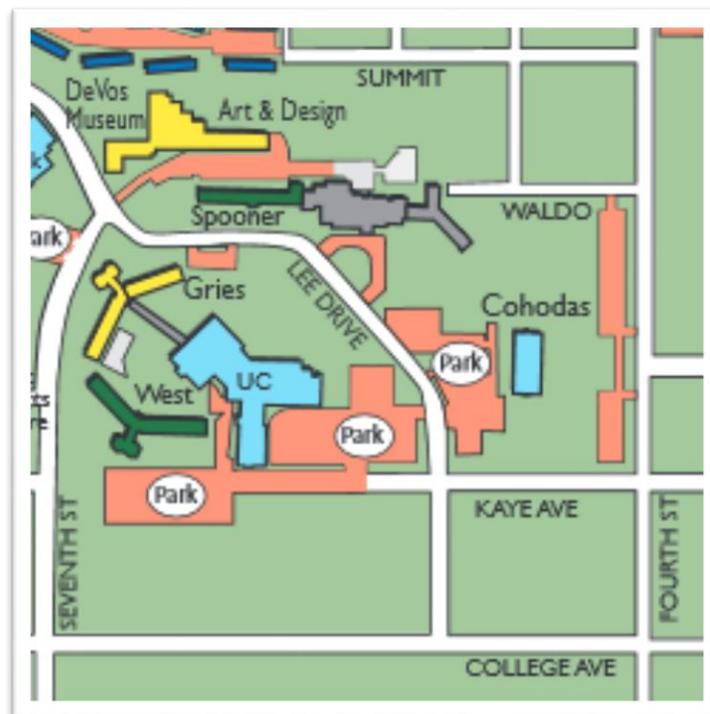
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The conference will be held at Northern Michigan University's **University Center** (located on the corner of **Kaye Avenue and Lee Drive**) in the **Ontario Room** located on the second floor.

*University Address:*

**1401 Presque Isle Avenue, Marquette, MI 49855**

Visitor parking will be available in the lot located outside of the University Center.



*Full map available at:*

[http://www.nmu.edu/sites/default/files/UserFiles/Files/Pre-Drupal/Images/CampusMap/09\\_campus\\_map.pdf](http://www.nmu.edu/sites/default/files/UserFiles/Files/Pre-Drupal/Images/CampusMap/09_campus_map.pdf)

# Conference Schedule

<b>Time</b>	<b>Presenter</b>	<b>Title</b>	<b>Pg.</b>
10:00am	Mounia Ziat	Welcome	
<b>Poster Session (10:00AM- 12:00PM)</b>			
10:00- 12:00pm	J. Gaboury E. Mayer	Orange You Sure You Red That? The Effect that Word Text and Color Memorabiliy has on Memory Recall	20
10:00- 12:00pm	T. Jones K. McMahon M. Watz	What Do You Remember? Testing Gender Differences in a False False Memory Task	21
10:00- 12:00pm	K. Shawbitz C. Shull C. Tindall	Video Games and Rage: The impact of bullying in a massive multiplayer battle arena	22
10:00- 12:00pm	R. Dumphrope W. Lehtola	The Role of Color, Meaningfulness, Order and Sequence on the Recall Of Word Lists	23
10:00- 12:00pm	M. Weber W. Rizer K. Morrow K. Kangas R. Torrence J. Carlson	Sustained, Not Habituated, Activity in the Human Amygdala During Threat-elicited Attention	24
10:00- 12:00pm	J. Beirne K. Garringer	The Impact of Unexpected Noise Stimuli on Memory Recall	25
10:00- 12:00pm	L. Konig	Intrinsic and Extrinsic Motivation In Team and Individual Athletes: Actual and Perceived Levels	26
10:00- 12:00pm	S. Aicher	The Interaction of Law and Morality: How Perception of Law Influences Moral Decision Making	27
10:00- 12:00pm	B. Campbell K. Grew	Gay and Greek: An observational study of the acceptance of LGBTQ individuals in the Michigan Technological Fraternal Greek System	28

10:00- 12:00pm	E. Wylie R. Torrence K. Reinke J. Carlson	The Time-Course for the Capture and Hold of Visuospatial Attention by Fearful Faces	29
10:00- 12:00pm	B. Rasmusson I. Buentello S. Akans C. O'Brien	Facilitated Orienting Underlies Fearful Face Enhanced Gaze Cueing	30
10:00- 12:00pm	W. Rizer D. Wilbern S. Prychitko A. Savord M. Ziat	Haptic Hallucinations: Evidence from Event-Related Potentials	31
10:00- 12:00pm	M. Y. Tsalamal W. Rizer J-C. Martin M. Ammi M. Ziat	Event Related Potentials Using an Air Jet Tactile Stimulation	32
10:00- 12:00pm	J. Aday L. Piggot M. Rosado J. Carlson	NMU Cabin App for Attention Bias Modification Training: Phases One and Two	33
10:00- 12:00pm	M. Hopp S. Conger J. Carlson	Beware the Eyes Behind the Mask: The Capture and Hold of Selective Attention to Subliminal Fearful Eyes	34
10:00- 12:00pm	F. Steele S. Whitehouse T. Ritchie J. Aday E. King A. Prus	The Brain Neurotensin System Mediates Anxiety-like Behavior in Rats	35
10:00- 12:00pm	R. Torrence J. Carlson	Variability in Human Insula Gray Matter Volume Predicts Awareness for Peri-Threshold Backward Masked Fearful Faces	36
10:00- 12:00pm	R. Torrence K. Kangas J. Carlson	Rapid Involvement of the Prefront Cortex During Attentional Bias to Fearful Faces: A Near-Infrared Spectroscopy Study	37

10:00- 12:00pm	B. Thiele I. Buentello J. Carlson	Facilitated Attention by Fearful Faces and Gaze: A Two Stage Process?	38
10:00- 12:00pm	D. Bjorkman I. Grundmanis	University Undergraduate Financial Status and Its Effect on the Food Purchase Decisions	39
10:00- 12:00pm	Z. Messer S. Crowel J. Ebsch S. Welch C. Fishell J. Carlson	Stress Induced Decline in Accuracy on Arithmetic Assessment: A Near-Infrared Spectroscopy Study	40
10:00- 12:00pm	Z. Evans J. Allan B. Nelson K. Boston D. Gillom E. Cokely	Development of a Test of Sustainability Literacy	41
10:00- 12:00pm	B. Nelson	The Definition of Death Scale	42
10:00-12:00pm	K. Kangas R. Torrence J. Carlson	Prefront Cortex Activation during an Emotional Stroop Task: A Near Infrared Spectroscopy (NIRS) Study	43
<b>12:00-1:30pm Lunch Break</b>			
<i>Lunch can be purchased at the Wildcat Den located on the second floor of the University Center or at local restaurants</i>			
<b>Presentations</b>			
1:30-1:45pm	Y-Y. Tan S. Mueller	Differences of Visual Information Processing between Americans and Taiwanese	12
1:44-2:00pm	A. Mills	Emergent Themes Surrounding the Implementation of the Common Core State Standards for Mathematics for Students with Learning Disabilities in Mathematics	13
2:00-2:15pm	Z. Evans D. Schreifels	Oral Tradition in the Modern Era: A Case Study of the Huskies Pep Band at Michigan Technological University	14
2:30-2:45pm	R. Torrence	Using Fearful Faces to Condition Attentional Bias Towards Neutral Stimuli	15

2:45- 3:00pm	H. Hawkins	Study on the Effects of Head Impact on the Brain in College-aged Divers	16
3:15- 3:30pm	M. Minnick T. Morris J. Williams W. Omerza	Familiarity and Complexity Effects in Mental Rotation Performance	17
3:30-3:45pm	K. Morrow D. Wilbern R. Taghavi M. Ziat	Is the Neck Side Dominant? Efficacy of Directional Vibrotactile Stimulation to the Neck	18
3:45-4:00pm	R. Schmitt M. Ziat	Learning Assessment of Technology Usage by the Elderly	19

# Oral Presentations

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## Differences of Visual Information Processing between Americans and Taiwanese

Yin-Yan Tan & Shane T. Mueller

*Michigan Technological University*

Previous research suggests that Asians have global visual attentional advantage compared to Westerners (McKone et al, 2010). However, distinguishing two distinct cultures can be difficult as there are multiple factors confounded with global and local processing (e.g., interference suppression, response inhibition, and spatial uncertainty). The present study uses the PEBL global-local task (Mueller, 2014) to assess cross-cultural differences between Westerners (Americans,  $n = 38$ ) and Easterners (Taiwanese,  $n = 66$ ). This task incorporates both spatial uncertainty and global/local processing to examine how these separately contribute to cultural differences in perception. The results show an advantage for Westerners while perceiving large object configuration as opposed to detailed object information, which conflicts with McKone et al's (2010) finding that Asians are better at global processing than Westerners. However, Asians did have an advantage when information was spatially uncertain. The plausible explanations include that simply using global vs. local processing to discriminate two distinct cultures is insufficient, and that the varied task complexity might contribute to the conflicting results. The results suggest that Easterners are better at suppressing interference, dealing with spatial uncertainty, and searching for smaller, detailed configurations, while Westerners are better at

attending to large, salient objects. These results can have application for object design, interface, and website design.

## **Emergent Themes Surrounding the Implementation of the Common Core State Standards for Mathematics for Students with Learning Disabilities in Mathematics**

Andrew Mills

*Northern Michigan University*

As the nation transitions into a new national curriculum, the Common Core State Standards for Mathematics (CCSSM), educators face the challenge of meeting the needs of a diverse student population coupled with a change in standards. The purpose of this phenomenological study was to understand educators' perceptions surrounding the implementation of these standards specific to students with learning disabilities in mathematics. Five rural, middle school educators were interviewed using a series of questions that investigated their experiences related to implementation of the CCSSM. Interviews were recorded and transcribed. Coding was used to identify emergent themes surrounding the phenomenon. Six emergent themes were identified: 1) disconnect between the focus on depth of knowledge and the unique learning characteristics of students with learning disabilities in math, 2) uncertainty surrounding teaching multiple strategies for problem-solving, 3) benefits from a streamlined set of standards 4) teacher and student challenges in transitioning to the CCSSM, 5) lack of professional development, and 6) acknowledgement of the cyclical nature of standards in education. The implication of this study suggests teachers acknowledge the benefits and limitations for implementing the CCSSM with students with learning disabilities in mathematics.

# **Oral Tradition in the Modern Era: A Case Study of the Huskies Pep Band at Michigan Technological University**

Zachary Evans, David Schreifels, & Shane Mueller

## ***Michigan Technological University***

Many campus organizations have histories and traditions that make them unique, promote their social cohesion, and provide a common collective history that members and alumni share. These include fraternities and sororities, athletic teams, secret societies, musical groups, and other organizations. The Michigan Technological University Pep Band is an example of such an organization, known for its musical traditions as well as its cheers, taunts, and uniform (black and yellow striped overalls and a hat). To examine the shared cultural knowledge of the band, we interviewed past members and compared their knowledge to that of current members, to examine how the band's culture shifts -- or does not shift -- over time. Results showed that unlike traditional marching bands that emphasize the importance of uniformity, the Huskies Pep Band builds its culture on a shifting array of instrument sections and an evolving roster of cheers, at times valuing creativity and innovation. It appears that the flexible culture of the organization has helped facilitate its creative environment and close social network.

# **Using fearful faces to condition attentional bias toward neutral stimuli**

Robert Torrence

*Northern Michigan University*

Responding to fearful facial expressions is suggested to be innate and elicits an automatic orienting of attention. Past research focusing on fear conditioning has used an unconditioned stimulus that the participant directly experiences (e.g. shock) paired with a neutral stimulus to create a conditioned response from the conditioned stimulus. Whereas other research has focused on observational fear learning where the participant watches another individual's experience. Both methods have shown that after conditioning or learning, a fear response occurs to the previously neutral stimulus. This study examined the extent to which the attentional bias to fearful faces transfers to neutral colored square stimuli when paired with fearful faces in the dot-probe paradigm. This study had two hypotheses 1) there would be an attentional bias toward fearful faces compared to neutral faces and 2) there would be an attentional bias toward the square paired with the fearful faces compared to the square paired with neutral faces. The results suggested that there was an attentional bias towards the square that was paired with the fearful face. These findings suggest that a fearful facial expression is a salient stimulus and can be used to create a conditioned stimulus.

# **Study on the effects of head impact on the brain in college-aged divers**

Hannah Hawkins & Dr. Maggy Moore

*Northern Michigan University*

In the world of sports medicine, high contact athletics are typically the main focus when it comes to physical injuries and neurocognitive deficits following concussion. However, some generally overlooked sports, such as diving, may also put athletes at risk for sub concussive forces that aggregate over time. Little research exists regarding potential gravitation forces the brain is subjected to in college aged divers in a single or repetitive diving situation. This research aims to provide primary data on the forces that the head encounters when a person dives head first into the water with three repetitions per height in a control group of recreational divers vs trained divers. To test this, participants were required to wear head-mounted g-force monitors under a swim cap when diving from a series of three different heights: 0 meters (side of pool), 1 meter and 3 meters (from diving board), to measure the forces from varying heights. There were 16 participants from ages 18 to 22 years, with an average weight of 147.94 lbs ( $\pm 24.00$ ) and an average height of 5.60 feet ( $\pm 0.33$ ). The results of this study showed that from a height of 0 meters, the average force of impact was 39.76 g's ( $\pm 23.89$ ), from 1 meter it was 54.44 g's ( $\pm 30.51$ ), and from 3 meters it was 70.27 g's ( $\pm 38.40$ ). There was a total of 60 mild impacts (0-50 g's), 50 hard impacts (51-80 g's), and 31 severe impacts (81-130 g's). The results showed that diving can have significant impact on the head.

## **Familiarity and Complexity Effects in Mental Rotation Performance**

Morghan Minnick, Troy M. Morris, Joshua Williams, Wendy P. Omerza, Sheila Burns & Charles Leith

*Northern Michigan University*

This research is intended to replicate our finding that both complexity and familiarity affect mental rotation. We manipulated complexity and familiarity by comparing familiar letter stimuli (single letters [simple] and three letter words [complex]) with unfamiliar shapes rated by Bethel-Fox and Shepard (1988) as either easy (simple) or difficult (complex) to sixty-five introductory psychology students were randomly assigned to a familiarity condition (letters/shapes) and within each list the students judged whether a pair of stimuli were the “same” or “mirror” images when rotated at one of six angles of rotation (0, 30, 60, 90, 120, and 150) over four blocks of 48 trials. Subjects were run individually on a computerized mental rotation task in which response reaction times were recorded. Two performance measures were evaluated: The speed (in milliseconds) to identify same or mirror pairs with no rotation and the added time taken to respond to rotated images in msec/degree of rotation. These are essentially the intercept and slope of a linear function. At zero-rotation, we found that responses to all stimuli become faster over the four blocks. All letter stimuli were faster than shapes. There was an interaction of complexity and familiarity: there was little or no difference between letters and words, while simple shapes were responded to faster than complex shapes. Rotation rate showed no difference over blocks for letters and words, but both simple and complex shapes were rotated faster on block four than on block one, while remaining slower than the letter/word stimuli.

## **Is the Neck Side-Dominant? Efficacy of Directional Vibrotactile Stimulation on the Neck**

Kelly Morrow<sup>1</sup>, Daniel Wilbern<sup>1</sup>, Reza Taghavi<sup>2</sup> & Mounia Ziat<sup>1</sup>

*<sup>1</sup>Northern Michigan University*

*<sup>2</sup>Tactile Image, INC.*

The human vestibular systems gives the brain information about head rotation, acceleration, translation, and orientation in space using the otolith organs and semicircular canals of the inner ear. When there is dysfunction or disturbance in this system, the ability to maintain upright posture and balance becomes seriously compromised. In order to overcome the issues associated with vestibular loss, researchers have developed sensory substitution devices that reroute vestibular information to the brain using an intact sense and an artificial sensor. Although some devices already exist and are effective for this purpose, they are often bulky or intrusive. This pilot study was conducted to determine whether the neck is a viable location to receive tactile directional information to substitute a vestibular loss. While wearing a vibrotactile neck device, participants were asked to detect the location of the stimulus on the neck. The preliminary results showed that the location of the motor around the neck affect participants' performance, suggesting laterality and contralaterality position effects. These findings are important to note when exploring the possibility of using the neck as a site for vestibular substitution.

# **Learning Assessment of Technology Usage by the Elderly**

Rachel Schmitt & Mounia Ziat

*Northern Michigan University*

Technology has become a vital part to our society. However, it seems that older generations are being neglected with technology and are having difficulty utilizing it. The stereotypical idea is that it is difficult to teach an old person new devices and that they, themselves, have no interest in learning it. Previous studies have shown that the elderly are willing to learn. However, the problem with many devices is the lack of instructional manuals and features about the device functioning. In this study, seniors were taught on a one-on-one basis how to use the technology of choice at the Peter White Public Library, assisted by student volunteers. The objective is to teach the elderly how to use the desired device, having them use the device based on the guidance provided. This allows them to have a better understanding of their device as they memorize their actions. A questionnaire has been given to participants about the electrical devices. In addition, observational data has been recorded to understand the issues they face with technology.

# Poster Presentations

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## Orange You Sure You Red That? The Effect that Word Text Color and Rated Memorability has on Memory Recall

Jocelyn Gaboury & Evan Mayer

*Michigan Technological University*

Previous studies have been performed to study the effects of color on memory, but with mixed results. Sinclair et al. (1998), Eliot et al. (2007), and Martinez et al. (2007) have tested students' performances on IQ tests on different color paper. Some found that one color paper had better scores compared to others, and some found that the color of the test paper didn't have an effect, but the color of the study materials did. None tested the color of the text itself. To test the impact of color on memory, we conducted two studies. The first experiment was designed as a survey which included finding what colors are considered simple or complex as well as if there was a trend in predicting if a word will be remembered and remembering these words based on the word's concreteness and imagery. The second experiment consisted of flashing note cards with words written in different colors to participants, who then took a recognition test. The first survey showed that a majority of people are poor at predicting how well they will remember a word and that people are poor predictors of if they will remember a word in the recall test. The results for the second part of the study are anticipated to show a correlation between the color of the word and whether the word was recognized later in a word bank. Another possible correlation is between the level of difficulty of a word that the participant reported with whether it was recognized later. The implications and results of color on memory will be discussed further.

# What Do You Remember? Testing Gender Differences in a False Memory Task

Taylor Jones, Kailyn McMahon & Morgan Watz

*Michigan Technological University*

This study aimed to investigate how gender impacts episodic memory recall, and specifically the creation of so-called 'false' memories. We report the results of two experiments that studied false memory creation in an online test. In Experiment 1, 69 participants (43 female) watched a video clip and then memorized a list of words pertaining to the video. Participants were then asked to identify the words that had been studied, including words related to the video that had not been studied. The results showed that male and female participants did not differ in recall accuracy, either for hits or false alarms. Experiment 1 did not show a gender difference, but did not incorporate an appropriate control condition, making results difficult to interpret. Consequently, a second experiment was conducted that included three classes of words: words from the video, words semantically related to words in the video, and words unrelated to the video, with words from these classes either learned or serving as lures during a recognition test. Experiment 2 tested 97 participants (67 female) and results showed that memory discriminability increased as things became less related to the video, and improved for both hits and false alarms. These findings indicate that individuals rely on the video, to their detriment, to make decisions about what words they remember seeing. This experiment also showed no significant effect of gender, although there was a marginally significant trend for men to have higher memory discriminability than women. Results indicate that aspects of the memory events are more important than gender at predicting memory ability.

# **Video Games and Rage: The impact of bullying in a massive multiplayer battle arena**

Kara Shawbitz, Catherine Shull & Corey Tindall

*Michigan Technological University*

Research on the relationship between video games and anger has often focused on elements present inside the games themselves: difficulty and violence. Because of the increase of recreational video game play and the increase of engaging in online play, more recent research has focused on the positive and negative social aspects of video game play (Waddell and Peng, 2014, Kowert et al., 2015). In Experiment 1, an online survey revealed that other players are the most common cause of anger in Real Time Strategy games, First Person Shooters, Mobile games, and Roleplaying games. Among the reasons cited by participants, taunting, or verbal abuse, was given most often. A follow-up study compared the presence of taunting to player mood. Each participant played League of Legends with nine other players, one of whom was a confederate. The players' subjective mood was assessed before and after the game to determine if taunting had an effect. It is recommended that video game companies take into account the effect that taunting has on player attitude.

# **The Role of Color, Meaningfulness, Order, and Sequence on the Recall of Word Lists**

Richard Dumpprope & Whitney Lehtola

*Michigan Technological University*

When students study for exams, it is suspected that contextual cues memorized during study periods may improve exam scores. With respect to such cues, significant color effects are hard to find (Meyer & Bagwell, 2012). The characteristics of the information being learned, as well as order and sequence effects might play a larger role. In Experiment 1, an online survey was conducted to test for color effects associated with the font used for the studied material. Results from Experiment 1 did not indicate a significant color effect with regard to the frequency of recalled words. Due to the fact that some words were significantly more likely to be remembered, a follow-up study tested the order and sequence to determine whether they were responsible for affecting word memorability. Also in an online survey format, Experiment 2 tested order effects for the words remembered more frequently than the others in Experiment 1. Interestingly, the results from Experiment 2 showed that some words are indeed significantly more likely to be remembered. For example, in both experiments the word “money” was remembered by approximately 50% of participants. This result could not be predicted by looking at the serial position curve, nor could it be anticipated by other factors since the words were all counter-balanced for color, meaning, order, and sequence effects. The implications of this result will be further discussed in the paper.

## **Sustained, Not Habituated, Activity in the Human Amygdala During Threat-elicited Attention**

Millicent Weber, Will Rizer, Kelly Morrow, Keara Kangas, Robert Torrence & Dr. Josh Carlson

*Northern Michigan University*

Research has shown that amygdala directs attention to conscious and nonconscious fearful facial expressions and that activity decreases after repeated exposure to fearful faces in viewing tasks. However, it is unclear to what extent the amygdala habituates while orienting attention to environmental threat signals. For this study, amygdala activity was recorded using functional magnetic resonance imaging (fMRI) while participants performed a dot probe task. The task required participants to locate a dot after two face stimuli were presented. Directed attention trials consisted of one fearful and one neutral face equally appearing the left or right visual field followed by a neutral mask. Half of these trials were congruent (fearful face-dot) or incongruent (neutral face-dot). Subject response times to dot location were significantly faster for congruent than incongruent trials because attention was oriented to that location. Undirected trials consisted of two faces of the same expression presented to either side of the fixation cross followed by a neutral mask. After analysis, significant sustained activity was found in the left amygdala for directed attention and undirected attention, but no overall habituation pattern was observed. The findings suggest that the demand for attention and action during the task leads to sustained amygdala activation.

# **The Impact of Unexpected Noise Stimuli on Memory Recall**

Jolene Beirne & Kelly Garringer

*Michigan Technological University*

Previous studies have examined the effect of emotional arousal on memory; for example, Nelson & Powless (2005, 2007) found that emotional events can enhance later recall for neutral information; Kensinger et al. (2006) showed that emotional arousal enhances memory for specific details of an item, and Brown & Kulik (1977) examined flashbulb memory, suggesting adrenaline is important for forming instantaneous memories that are remembered forever after shocking events. Our current study looks at whether moderate levels of arousal from noise stimuli leads to similar memory advantages. We tested memory with three forms of noise stimulus: loud, neutral, and spoken words, using 12 stimulus letters in various forms, with the main focus of measurement on the number of letters remembered out of a series. Results from this study indicate encoding is better in the presence of a loud stimulus versus a neutral stimulus. These effects could impact the validity of eyewitness testimonies, and may also have implications on the enhancement of teaching and/or study techniques.

# **Intrinsic and Extrinsic Motivation in Team and Individual Athletes: Actual and Perceived Levels**

Lisa Konig

*Michigan Technological University*

Motivation is an essential factor to perform highly and can determine whether an athlete continues or drops out of their sport. Research has been conducted to find differences of extrinsic and intrinsic motivation, for example between gender (Pelletier et al. 1995, Vallerand et al. 1998). Gillet et al (2008) found that individual athletes display a higher level of autonomy, but the difference of extrinsic and intrinsic motivation between team and individual athletes was not significant. For the present experiment, 69 student athletes were assessed using the Sport Motivation Scale (SMS) by Vallerand (1995) and a crossword puzzle task to examine differences in motivation. The hypothesis stated that individual and team athletes would have different levels of extrinsic and intrinsic motivation which would influence the number of correct answers from the crossword puzzle task. However, the results showed that participants who showed high intrinsic motivation also showed high extrinsic motivation. Furthermore, individual athletes, on average, had greater motivation in general, than team athletes. This might occur, because they are obligated to prepare and be responsible for themselves, which makes them motivated and determined to make the outcome of their performance perfect, because they can't rely on others.

# **The Interaction of Law and Morality: How Perception of Law Influences Moral Decision Making**

Sean Aicher

*Michigan Technological University*

This research sought to determine the degree to which law influences an individual's moral viewpoint. Using two studies, data was gathered to discover whether the legality of something can alter an individual's moral view of the situation. These studies were performed to gain a greater understanding of morally ambiguous situations and how a scenario in a legal framework affects moral decision making. The first study asked participants to provide personal experience of moral grey areas; information provided by participants categorized based on legal area. The second study placed selected cases of moral ambiguity from the first study into legal/illegal frameworks to determine how individuals judge the scenario from a moral viewpoint. Comparing responses across each of the individual questions showed significant differences in two of the questions. Previous research has suggested that law holds significant influence over individual moral views.

# **Gay and Greek: An observational study of the acceptance of LGBTQ individuals in the Michigan Technological University Fraternal Greek system**

Brett Campbell & Kristin Grew

## ***Michigan Technological University***

This study was created to investigate the relative atmospheres of acceptance of LGBTQ (Lesbian, Gay, Bisexual, Transgender and Queer or Questioning) individuals within the fraternal Greek system (specifically social fraternities and sororities) on Michigan Technological University's campus as compared to a representative sample of the general student body at Michigan Tech. In this research, we will report the results of two related surveys - one of students in the Greek system, and a similar one of non-Greek individuals. Both surveys ask several questions exploring how the student viewed LGBTQ individuals, and their acceptance of those individuals in different areas of college life, including their social group and fraternity or sorority. Survey 1 found that 90% of Greek students reported knowing an LGBTQ individual and 70.6% of respondents reported being 'supportive' or 'strongly supportive' of having LGBTQ members within their organization. When asked whether having LGBTQ individuals in their organization was 'good' or 'bad', only 10.3% responded that it is 'bad'. These results will be compared with those of the non-Greek students to examine the differences Greek life may have on acceptance of LGBTQ individuals.

# **The time-course for the capture and hold of visuospatial attention by fearful faces**

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Fearful facial expressions are important social signals of potential environmental threat, which automatically capture observers' attention. Fearful faces both facilitate the orienting of attention to their location as well as delay the disengagement of attention from their location. However, little is known about the time-course for these orienting and disengagement effects. To address this knowledge gap we ran two dot-probe studies in which we systematically varied the time-point in which attention was sampled. Both experiments began with a central fixation point followed by two laterally presented faces. After which a dot was presented on the left or right side of the screen. In Experiment 1, dots occurred 133ms, 266ms, and 532ms post-face onset and in Experiment 2, dots occurred 84ms, 168ms, 336ms, and 672ms post-face onset. Participants were told to locate the dot as quickly as possible. Directed attention trials contained one fearful and one neutral face. Dots occurring behind a fearful face were labeled "congruent" and dots appearing behind the neutral face were labeled "incongruent". Undirected baseline trials contained two neutral faces. In Experiment 1, for both 133ms and 266ms conditions, reaction times were fastest for congruent trials and slowest for incongruent trials with reaction times for baseline trials falling between the two. The same was found for the 84ms and 168ms conditions in Experiment 2. For the later times in both experiments there was no significant difference between reaction times. Overall, the results suggest that attention is captured and held by fearful faces at times earlier than 300ms.

# **Facilitated Orienting Underlies Fearful Face Enhanced Gaze Cueing**

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The emotional expression behind an individual's gaze is a significant form of nonverbal communication. People tend to draw attention towards the expression of the eyes in order to better understand their environment. It is unknown as to whether or not fearful gaze elicit a response due to disengagement or orientation. If fearful eyes are directed towards a target, it is predicted that an individual will have a faster orienting reaction. A gaze cueing study that consisted of fearful and neutral face stimuli was performed to understand the difference between these two responses. A single face was presented with the eyes gazing either to the left, right, or forward. Regardless of whether the facial expression is fearful or neutral, congruent gaze elicited a faster response time than incongruent gaze when compared to forward gaze. When comparing fearful and neutral eyes congruent with the target, fearful eyes evoked an even faster reaction time than neutral eyes. This provides evidence of how the direction of fearful eye gaze has an influence on the orienting one's attention.

# **Haptic Hallucinations: Evidence From Event-Related Potentials**

Will Rizer, Daniel Wilbern, Sonja Prychitko, Andrea Savord & Mounia Ziat

*Northern Michigan University*

Haptic hallucinations, commonly known as formication, consist of the feeling of insects crawling on or beneath the skin. To further understand this phenomenon, we examined event-related potentials (ERPs) during trials in which participants wore a sleeve that delivers sensations similar to bugs crawling on the skin. The main goal was to identify the stimulus speed closest to a crawling insect. We tested three different speeds (low, medium, high) travelling distally (elbow to wrist) or proximally (wrist to elbow) along the left forearm. We compared distal conditions to each other, and proximal conditions to each other and found significant differences between speed conditions in electrodes FCz, PO3, PO4, Pz, POz, and Oz for the N140 component in distal conditions and P160 in proximal conditions. Distal high speed versus low speed showed significant differences at  $\alpha = .05$  in all analyzed electrodes, with lower amplitudes for slow conditions. Proximal high speed versus low speed showed significant differences in all electrodes except FCz, with higher amplitudes for slow conditions. Based on participants' survey answers, the slowest speed felt more like an insect crawling on the skin, which suggests that insect-like stimulus generates higher amplitudes for positive components and lower amplitudes for negative components.

# Event Related Potentials Using an Air Jet Tactile Stimulation

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In this study, we examined events related potentials during tactile air jet stimulation. The main goal was to investigate a suitable tactile stimulation intended for affective communication systems such as being touched by a robotic device that has the same features than a human touch. Participants were asked to rate a five point Likert scale the valence (attractiveness or averseness) of the stimuli presented on their forearm. The stimulus consisted of an air flow that varied in intensity (3 levels) and moving velocity (3 levels) along the left forearm. Generally, low intensity stimuli were rated more positively than high intensity stimuli. The EEG data were sampled to 256 Hz and high-pass filtered at 1 Hz and epoched into segments starting at -500ms prior stimulus onset and continued 2000ms post-stimulus onset. Independent component analysis was used for blind-source decomposition of the data into 64 components. Preliminary results showed significant differences between the conditions in the contralateral central-parietal electrodes sites (CP4). ERPs of low intensity stimuli show higher amplitudes compared to high intensity stimuli. Taking subjective ratings and EEG data together, results suggest that light air jet stimulation is perceived as pleasant and may be assimilated to a real human touch.

# **NMU Cabin App for Attention Bias Modification Training; Phases One and Two**

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This study utilized attention bias modification (ABM) to investigate the role of neuroplasticity in the reduction of anxiety levels. Phase one included the collection of baseline Near-Infrared Spectroscopy (NIRS) data from all participants. NIRS sessions included the dot-probe task, which compared reaction time in identifying the location of a dot after being presented behind a fearful or neutral facial expression; the emotional stroop task, which measured reaction time in identifying the color of a presented negatively or neutrally valenced word; and personality questionnaires. Baseline data shows a difference in reaction time for the dot-probe task and no overall difference in the emotional stroop task. A select number of participants had MRI data collected, in order to compare structural differences in the brain between baseline and post-ABM training. Phase two began once participants downloaded the free NMU CABIN Lab app. App training included six, 15-20 minute sessions per week, and was done for a total of 6 weeks. After completion of the ABM training, participants were retested using the same measures as baseline testing. The goal was to research how ABM training can reduce affect bias towards fearful stimuli and to measure resultant structural changes in the brain.

# **Beware the Eyes Behind the Mask: The Capture and Hold of Selective Attention to subliminal fearful eyes.**

Maggie Hopp, Scott Conger & Joshua Carlson

*Northern Michigan University*

Fearful facial expressions capture attention on a subliminal and conscious level. Through research, fearful eyes have shown facilitated attentional orienting on a conscious level. It is currently unknown whether fearful eyes are a salient—attention grabbing— feature when processed subliminally. To test the hypothesis that fearful eyes are sufficient to capture spatial attention subliminally, we used a dot-probe task with backward masked fearful and neutral eyes. To verify that the participants processed the eyes subliminally, the last block of the experiment was an awareness check where participants were asked to detect the location of fearful eyes. Reaction time results demonstrated that fearful congruent eyes enhanced the orienting of attention. Reaction times for fear incongruent trials displayed delayed disengagement from their location. Thus, fearful eyes elicit a shift in subliminal attention.

# **The Brain Neurotensin System Mediates Anxiety-like Behavior in Rats**

Floyd Steele, Shannon Whitehouse, Taylor Ritchie, Jake Aday, Emma King & Adam Prus

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Neurotensin (NT) is a peptide neurotransmitter that interacts with brain monoamine neurotransmitter systems. It has been demonstrated that neurotensin type 1 and type 2 receptor agonists influence animal models of psychological disorders and pain regulation, respectively (Binder et al., 2001; Boules et al., 2013). Our lab has already shown that the systemic administration of the selective neurotensin type 1 receptor agonist PD149163 can attenuate the number of fear-induced 22-kHz ultrasonic vocalizations (USVs) produced by male Wistar rats (Prus et al., 2014). A reduction in the number of 22-kHz USV calls is indicative of an anti-anxiety effect (Brudzynski, 2009). The current study uses the USV model to evaluate the effects of PD149163 and endogenous NT when administered into the lateral ventricle of male Wistar rats. Using three different experimental procedures, both PD149163 and NT were shown to attenuate USV calls when administered into the lateral ventricle. PD149163 was found to have a higher potency than NT in the USV model. In addition, while 100ng of PD149163 significantly reduced USV calls, it did not reduce locomotion on an open field. These data suggest neurotensin type 1 receptor activation is a putative mechanism for novel pharmacological treatments of anxiety disorders.

# **Variability in human insula gray matter volume predicts awareness for peri-threshold backward masked fearful faces**

Robert Torrence & Joshua Carlson

*Northern Michigan University*

The threshold for conscious perception of stimuli within the environment varies from individual to individual. For example, behavioral research has noted that when administering an awareness task with fearful vs neutral faces to normal healthy individuals, some perform above chance level indicating that they have better perceptual awareness. Functional neuroimaging studies suggest that the insular cortex positively correlates with perceptual awareness. However, few have examined the structural differences among individuals. The purpose of this study is to examine neural differences in perceptual awareness. This study hypothesizes that there will be a positive correlation with insula gray matter volume and scores on the awareness task. The awareness task was designed to assess awareness for the presence and location of backward masked fearful face. The participants responded by indicating on which side the masked fearful face appeared, or whether there were two neutral faces. T1-weighted MR images were collected to measure gray matter volumes. The results indicated that there was a relationship between greater awareness and greater gray matter volume in bilateral insula. Individuals that were more aware of backward masked fearful faces had greater insular gray matter volume.

# **Rapid Involvement of the Prefrontal Cortex during Attentional Bias to Fearful Faces: A Near- Infrared Spectroscopy Study**

Robert D. Torrence, Keara Kangas, & Joshua M. Carlson

*Northern Michigan University*

Orienting attention towards threatening or emotional stimuli is evolutionarily important for survival. Previous research used fearful faces to capture visuospatial attention in the dot-probe task and has identified an amygdala – prefrontal network for the orienting of visuospatial attention to emotional stimuli. However, little is known about the temporal dynamics of prefrontal cortical activity in attentional capture by threat. Here, we examined PFC activity using near-infrared spectroscopy (NIRS) during the dot-probe task with three trial types: baseline congruent, and incongruent. This study had three hypotheses: 1) reaction time (RT) for congruent would be significantly faster than incongruent, 2) RT for baseline would be slower than congruent, but faster than incongruent, and 3) PFC activity would be greater during baseline and incongruent trials compared to congruent. Congruent trial were faster than incongruent with baseline falling in between. The NIRS data indicated that there was more activity in the PFC during baseline and incongruent trials compared to congruent trials. The data suggests that the PFC is involved in the engagement and disengagement of visuospatial attention to fearful faces

# **Facilitated Attention by Fearful Faces and Gaze: A Two Stage Process?**

Beth Thiele, Ian Buentello & Joshua Carlson

*Northern Michigan University*

Data from our previous research illustrates attentional bias through faster reaction times (RTs) to visual targets when gaze (direction which eyes are oriented) and stimulus are spatially congruent for both fearful and neutral eyes, but the effect is especially strong for fearful eyes. This experiment aims to test the hypothesis that attention is initially focused on eye/facial expression and thereafter on the direction of gaze, thus a two stage process of attentional capture. Each subject is asked to fix their focus on a crosshatch in the middle of a screen. They are briefly shown two faces, one above, and another below the focal point. The expressions on each face may be either fearful or neutral. Gaze may be either forward facing, left, or right. Subjects will then indicate where the target dot is located (left, middle, or right). Preliminary results demonstrate a greater effect of attentional bias for fearful gaze over neutral gaze than we have seen in prior studies. This may be attributed to multiple, competing stimuli resulting in a threat bias. We continue collecting data to test the hypothesis of attentional capture as a two stage process.

# **University Undergraduate Financial Status and Its Effect on the Food Purchase Decisions**

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Although nutritionists and educators understand the importance of proper nutrition in elementary and high-school settings, little research has focused on its role in university education. We hypothesized that different financial situations of university students would impact choice between two possible options for food that differ in cost, convenience, and healthiness. To test this hypothesis, we conducted a study to examine how financial status affects the food choices university students make. This online study tested undergraduate students attending Michigan Technological University, and consisted of several different scenarios in which individuals had either inherited money, lost their job, or found a certain amount of money on the ground. In each scenario two different food options were available to choose from. Results will be discussed.

# **Stress Induced Decline in Accuracy on Arithmetic Assessment: A Near-Infrared Spectroscopy Study**

Zachary Messer, Sigrid Crowel, Jacob Ebsch, Stephanie Welch, Crystal Fishell, & Joshua Carlson

*Northern Michigan University*

The pressure to perform well academically is something that students encounter on a daily basis. Arithmetic is a particular subject of interest to some scientists especially when it comes to children with learning disabilities. The relationship between different stress levels and arithmetic performance has been relatively understudied. We conducted a study to measure the relationship between prefrontal activation and performance on an arithmetic task under two different conditions. These conditions consisted of 15 participants in an individual assessment and 15 participants in a stress inducing competitive condition. All participants in each group underwent an arithmetic assessment task consisting of 75 questions using E-Prime software with a time limit of 2 minutes. We used Near Infrared Spectroscopy (NIRS) to measure hemodynamic activity in the prefrontal cortex while participants were issued the assessment. A post-task questionnaire was also given to measure perceived stress after the assessment. Our E-Prime data concluded that participants in the individual condition answered 18.7% of questions incorrectly whereas in the competitive condition 27.7% of questions were answered incorrectly. This suggests that when placed under a stress induced competitive condition, performance on an arithmetic assessment will decline.

# **Development of a Test on Sustainability Literacy**

Zachary Evans, Jinan Allan, Brittany Nelson, Kervis Boston, Donte Gillom & Dr. Edward Cokely

*Michigan Technological University*

Mismanagement of natural resources can have profound social, political, and economic consequences. Theoretically, sustainability literacy is the ability to identify and understand information about environmental sustainability, which in turn shapes attitudes and decisions related to effective management of natural resources. Recycling is one of the strategies that has been found to help mitigate some future consequences of resource depletion. Do most people understand the benefits of recycling? Are recycling behaviors better explained by differences in general risk literacy or differences in specific climate change knowledge? As part of the RiskLiteracy.org project, in this poster we will discuss ongoing efforts to create and validate better assessments and cognitive models of (1) climate change knowledge and (2) recycling knowledge.

# **The Definition of Death Scale**

Britney Nelson

*Michigan Technological University*

Recent events demonstrate that defining and understanding death has many practical, ethical, and legal implications. These implications include marital status, inheritances, life-insurance, use of finite resources, and organ donation. None of the three contemporary competing definitions of death—heart-lung, whole-brain, and higher-brain death—have achieved general consensus. Many scholars suggest the correct conception of death should be supported by the everyday usage of the term ‘death’. In 3 Experiments, we develop a scale to determine people’s preferred definition of death. No other tested and validated scale has been created with the ability to distinguish between these competing definitions of death. Theoretically, results suggest that there is no single everyday usage of the term “death.” Ethically, the scale could be used to help ensure patient autonomy and alleviate anxiety.

# **Prefrontal Cortex Activation during an Emotional Stroop Task: A Near Infrared Spectroscopy (NIRS) Study**

Keara Kangas, Robert Torrence & Joshua Carlson

*Northern Michigan University*

Near-infrared spectroscopy (NIRS) research measuring prefrontal cortex (PFC) activity during emotional processing is limited. Studies have shown cortical activation during an attention task measuring affective picture processing in the occipital lobe using brain-imaging, but little about visuospatial attention during an emotional Stroop task, measuring selective attention to emotional stimuli. This study used NIRS to measure the temporal dynamics of the PFC during this task. Threatening and neutral images were surrounded in a red, green, or blue border, in which the participant responded by using a keypad. An increased hemodynamic response is expected during emotional trials, bilaterally in the PFC, due to prefrontal interference processing during this condition. There also should be slower response times during the emotional trials. Current data suggests the PFC is differentially involved in interference processing during affective and neutral conditions. The neural affect was correlated with the behavioral aspect, which showed slower reaction times for emotional compared to neutral stimuli. Thus suggesting the PFC is involved in emotional processing of visuospatial attention to emotional stimuli, showing stronger brain activation during emotional trials due to interference – helping us understand the human brain-behavior relationship when looking at brain processes from nonverbal social signals of affect.