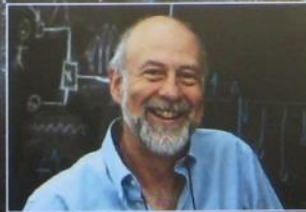


NINTH ANNUAL

# Colorado Springs Undergraduate Research Forum

# CSURF

Saturday, April 28, 2012 • hosted by Colorado College



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University of Colorado  
Colorado Springs



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Kinney Gaylord

STONE ARTS CENTER

825







PER TEAM:  
30-5 EVENTS  
10-1 EVENT  
KIRKSEY@COLORADO

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SPECIFICALLY STATED OTHERWISE







### Exploration of the Fundamental Dimensions of Social Perception in the Legal Domain

Cobun Keegan  
The Colorado College, Colorado Springs, CO

Introduction	Results	Discussion
<p>Introduction text describing the study's purpose and methodology.</p>	<p>Figure 1: Bar chart showing results of the study.</p> <p>Figure 2: Word cloud with terms like 'work', 'willing', 'situation'.</p>	<p>Discussion text summarizing findings and implications.</p>

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URGENT



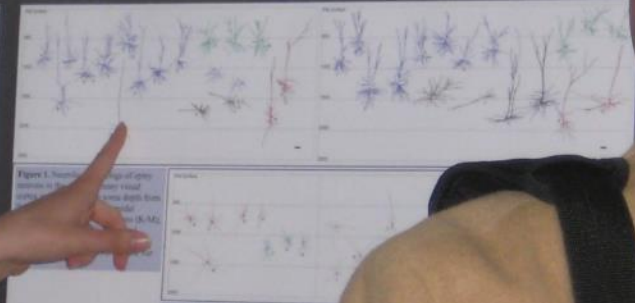




# Neuromorphology of giraffe (*Giraffa camelopardalis*) visual and motor cortex

Tessa Harland<sup>1</sup>, Deborah Kennedy<sup>1</sup>, Nicholas Johnson<sup>1</sup>, Bridget Wicinski<sup>2</sup>, Patrick R. Hof<sup>3</sup>, Chet C. Sherwood<sup>1</sup>, Paul R. Manger<sup>4</sup>  
<sup>1</sup>Laboratory of Quantitative Neuromorphology, Psychology, Colorado College, Colorado Springs, CO 80903 <sup>2</sup>Department of Medicine, New York, NY 10029. <sup>3</sup>Anthropology, George Washington University, Washington, DC 20052. <sup>4</sup>Anatomical Science, Johannesburg, South Africa.

**Abstract**  
 The morphology of neurons in the giraffe (*Giraffa camelopardalis*) neocortex is largely unexplored. The present study investigates giraffe primary visual and motor cortex removed from the perfused head brains of three adults and stained with a modified rapid Golgi technique. Neurons (N = 209) were quantified on a NeuroLucida computer-assisted microscopy system (NIM) which allowed examination of both dendritic and spine systems. Qualitatively, giraffe neurons consisted of many of complex spiny neurons that reflected both "typical" pyramidal neuron morphology (i.e., pyramidal neurons, n = 143; multipyramidal neurons, n = 16; beta-like neurons, n = 6; inverted neurons, n = 11) and "atypical" spiny neurons in terms of morphology and orientation (i.e., horizontal pyramidal neurons, n = 17, and spiky-like neurons, n = 4). In general, the neocortex appeared to exhibit a vertical columnar organization of apical dendrites. Although there was no significant difference in dendritic complexity for pyramidal neurons between primary visual (n = 74) and motor cortex (n = 63), there was a significant difference in dendritic spine density (motor cortex > visual cortex). Giraffe spiny neurons appeared to be morphologically consistent with those of terrestrial mammals. For cross-species comparisons, giraffe pyramidal neurons were compared to those quantified with the same methodology in eleven other mammals (e.g., bottlenose dolphins, mink, whale, humpback whale, elephant exhibited widely bifurcating apical dendrites, whereas giraffe and primate dendrites were more vertically oriented). Quantitative dendritic measures (length) showed that the elephant and humpback whale had the longest dendrites, whereas giraffe, mink, whale, and primate dendrites were shorter. Spine measures (total length) were similar in the giraffe, perhaps due to high levels of spine density. The present study provides the first description of the morphology of neurons in giraffe neocortex.



**Figure 1.** Horizontal range of apical dendrites in the primary visual cortex (V1) and motor cortex (M1). Scale bar = 100 μm.



**Figure 3.** NeuroLucida tracings of spiny neurons in the primary visual cortex (V1) and motor cortex (M1). Scale bar = 100 μm.

**Overview:** In general, pyramidal neurons had long apical dendrites with short, dense basilar dendrites. Typically, multipyramidal neurons had widely bifurcating dendrites whereas deeper neurons exhibited longer and more widely bifurcating dendrites. Spiny neurons were found in both V1 and M1.

**Introduction**  
 The morphology of neurons in the giraffe (*Giraffa camelopardalis*) neocortex is largely unexplored. The present study investigates giraffe primary visual and motor cortex removed from the perfused head brains of three adults and stained with a modified rapid Golgi technique. Neurons (N = 209) were quantified on a NeuroLucida computer-assisted microscopy system (NIM) which allowed examination of both dendritic and spine systems. Qualitatively, giraffe neurons consisted of many of complex spiny neurons that reflected both "typical" pyramidal neuron morphology (i.e., pyramidal neurons, n = 143; multipyramidal neurons, n = 16; beta-like neurons, n = 6; inverted neurons, n = 11) and "atypical" spiny neurons in terms of morphology and orientation (i.e., horizontal pyramidal neurons, n = 17, and spiky-like neurons, n = 4). In general, the neocortex appeared to exhibit a vertical columnar organization of apical dendrites. Although there was no significant difference in dendritic complexity for pyramidal neurons between primary visual (n = 74) and motor cortex (n = 63), there was a significant difference in dendritic spine density (motor cortex > visual cortex). Giraffe spiny neurons appeared to be morphologically consistent with those of terrestrial mammals. For cross-species comparisons, giraffe pyramidal neurons were compared to those quantified with the same methodology in eleven other mammals (e.g., bottlenose dolphins, mink, whale, humpback whale, elephant exhibited widely bifurcating apical dendrites, whereas giraffe and primate dendrites were more vertically oriented). Quantitative dendritic measures (length) showed that the elephant and humpback whale had the longest dendrites, whereas giraffe, mink, whale, and primate dendrites were shorter. Spine measures (total length) were similar in the giraffe, perhaps due to high levels of spine density. The present study provides the first description of the morphology of neurons in giraffe neocortex.

**Materials & Methods**  
 The brains of three adult giraffes (G1, G2, G3) were perfused fixed (Harland et al. 2008). Brains from the primary visual and motor cortex were removed and processed with a modified rapid Golgi stain, and processed at 120°C. Using rapid Golgi method neurons (137 from primary visual cortex and 142 from motor cortex) were quantified on a NeuroLucida computer-assisted microscopy system under a 10x objective.

**Statistical Analysis:** Neurons were quantified with 10 descriptive measures. Total dendrite length (TDL), mean segment length (MSL), dendritic segment count (DSC), dendritic spine density (DSD), and volume (Vol) were completed through 3D analysis. To explore regional differences, the numerically dominant pyramidal neurons (120) were compared to the numerically dominant multipyramidal neurons (16) in V1 and M1. The second pillar of 2 region (motor and visual) of spine of dendrite size, and (3) a Univariate Analysis of Variance (ANOVA) was used to compare spine and dendrite length between V1 and M1.





# Determining Caffeine Pharmacokinetics in Rat Blood and Brain Using High-Performance Liquid Chromatography

Juan Arias, Francis Restrepo, and Lori Driscoll

The Colorado College, Colorado Springs, CO and The Autonomous University of Manizales, Colombia

**Abstract**

Caffeine is a stimulant drug that is widely consumed. It is a xanthine derivative that acts as a central nervous system stimulant. The purpose of this study was to determine the pharmacokinetics of caffeine in rat blood and brain using high-performance liquid chromatography (HPLC). The study was conducted in a laboratory setting and involved the administration of caffeine to rats. The results of the study are presented in the following sections.

**Introduction**

Caffeine is a stimulant drug that is widely consumed. It is a xanthine derivative that acts as a central nervous system stimulant. The purpose of this study was to determine the pharmacokinetics of caffeine in rat blood and brain using high-performance liquid chromatography (HPLC). The study was conducted in a laboratory setting and involved the administration of caffeine to rats. The results of the study are presented in the following sections.

**Method**

The study was conducted in a laboratory setting and involved the administration of caffeine to rats. The results of the study are presented in the following sections.

**Results**

The results of the study are presented in the following sections.

**Conclusion**

The results of the study are presented in the following sections.

**Method**

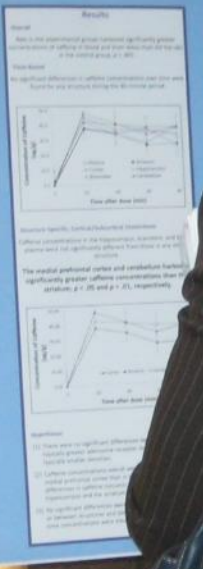
All young adult Wistar-Kyoto (WKY) rats were used. The rats were divided into two groups: a control group and a caffeine group. The caffeine group received a single dose of caffeine (10 mg/kg) intraperitoneally. Blood and brain samples were collected at 15, 30, 60, and 120 minutes post-administration. The samples were analyzed using HPLC. The results are presented in the following sections.

**Results**

The results of the study are presented in the following sections.

**Conclusion**

The results of the study are presented in the following sections.



**Conclusion**

The results of the study are presented in the following sections.

# Real Life Wilderness Therapy as Treatment for Self-Objectification in Adolescent Girls

Colorado College, Colorado Springs, CO

**Abstract**

Self-objectification is a common experience for adolescent girls. It is a process in which girls view themselves as objects to be looked at and evaluated. This can lead to negative psychological and physical health consequences. The purpose of this study was to determine the effectiveness of wilderness therapy as a treatment for self-objectification in adolescent girls. The study was conducted in a wilderness setting and involved the participation of adolescent girls. The results of the study are presented in the following sections.

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**Results**

The results of the study are presented in the following sections.

**Conclusion**

The results of the study are presented in the following sections.











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# Spatial Learning and Reference Thyroid Hormone Supplementation in Behavioral Neurotoxicology, Colorado Springs, CO

## General Overview

Polychlorinated dibenzofurans (PBDFs) are common byproducts of polychlorinated biphenyl (PCB) and polychlorinated dibenzodioxin (PCDD) synthesis. DE-71 is a common PCB congener.

Over time, PBDFs become liberated into the environment. Humans are primarily exposed through diet.

PBDFs are lipophilic and accumulate in adipose tissue and serum.

The molecular structure of PBDFs is similar to that of thyroid hormone (T4).



General chemical structure of a PBDF compound. The bromine atom (Br) and chlorine atom (Cl) are highlighted in red and blue, respectively, to show their positions relative to the furan ring.

Neurotoxicity  
• Postnatal  
• 2001  
• PBDFs  
• H4

Animals  
• Long  
• F1y

DE-71 and  
• DE-71  
• H4

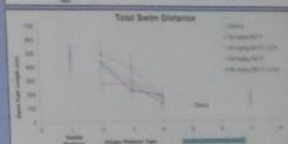
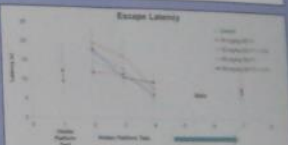
Control  
• Low DE-71  
• Low DE-71 + L74  
• High DE-71  
• High DE-71 + L74

Experimental exposure to DE-71 on spatial learning and reference memory in the Morris Water Maze (MWM) in a rodent model.

DE-71 exposure impairs performance in the MWM.

Thyroid hormone supplementation partially rescues the effects of DE-71 on MWM performance.

Maze (MWM)  
• 18.5 cm in height  
• 18.5 cm in diameter  
• 18.5 cm in length  
• 18.5 cm in width  
• 18.5 cm in depth



### Discussion

Overview of Findings  
• As evidenced by improved performance across trials, rats were capable of learning and remembering the location of the platform.  
• No significant effects of DE-71 exposure on learning or memory were found.  
• The possible benefits of T4 supplementation could not be determined.

Possible Explanations for Contrary Results  
• Differences in study methodology between the current experiment and past research.  
• Time of DE-71 exposure and neuroplasticity.  
• Delayed neurotoxicity of DE-71 and differing degrees of PBDF potency.

Future Research  
• Future research should examine a learning paradigm in which the platform is in a new location for the last day of testing.  
• A larger sample size should be added to further performance measures.  
• Testing should be performed after various subjects are older.

Implications  
• PBDFs are ubiquitous in our environment and continue to affect humans.  
• Further research is needed to determine the extent of exposure to these endocrine-disrupting chemicals and to explore further modes of exposure to these endocrine-disrupting chemicals.

### References

1. ...  
2. ...  
3. ...



**Propellant Stream Momentum Transfer**

**Overview**

...ing momentum between space  
... streams

potential fuel cost savings for lunar  
missions

... mission

... fuel cost

...	...	...	...
...	...	...	...
...	...	...	...
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**Placebo Effect**

**Perceived Sleep Quality Affected**

Christina...

The Colorado...







### Exploration of the Fundamental Dimensions of Social Cognition in the Legal Domain

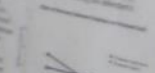

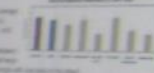
Cobun Keegan  
The Colorado College, Colorado Springs, CO

**Introduction**

**Results**

**Method**

**Implications for Legal Practice**

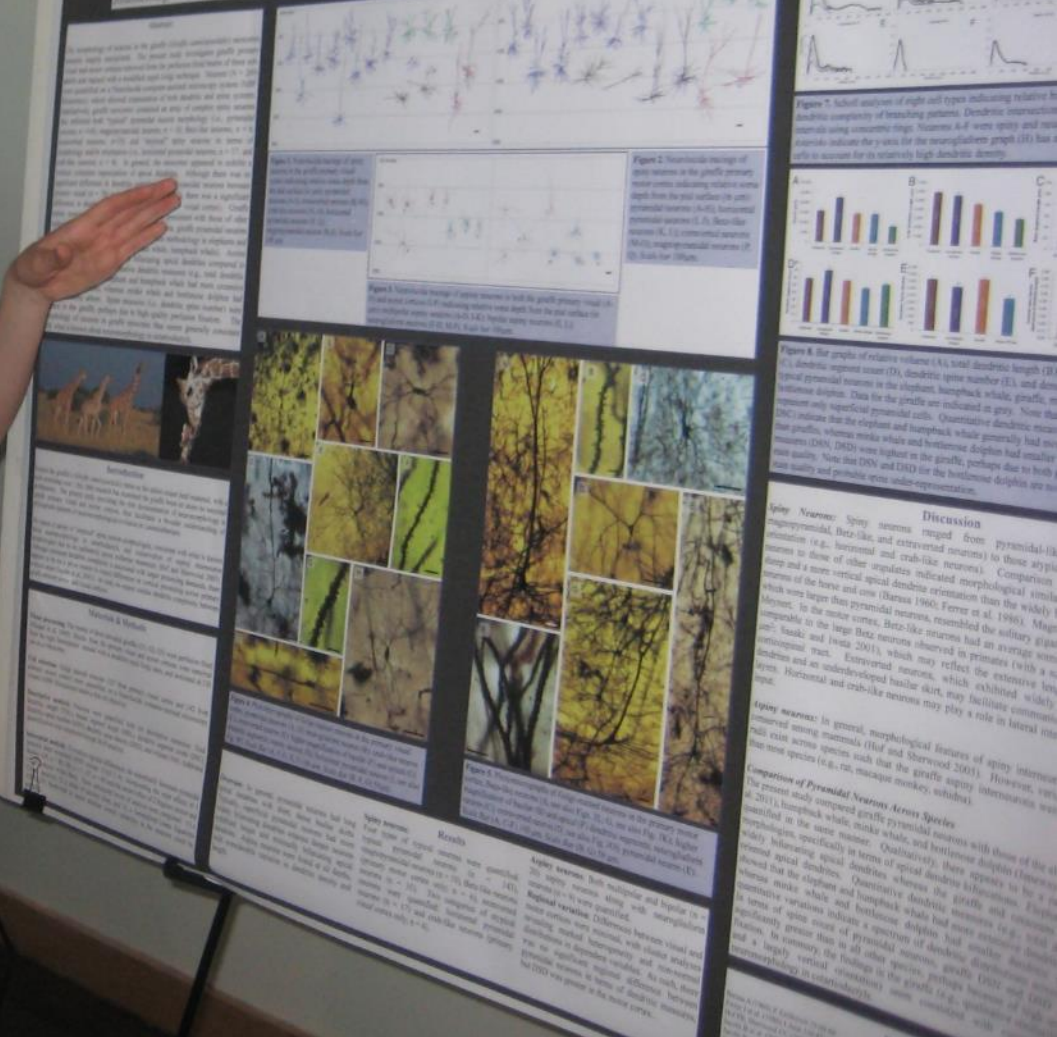


**Colorado College**



# Neuromorphology of giraffe (*Giraffa camelopardalis*) visual and motor cortices

Chava Harland<sup>1</sup>, Deborah Kennedy<sup>1</sup>, Nicholas Johnson<sup>1</sup>, Bridget Wicinski<sup>1</sup>, Patrick R. Hoff<sup>2</sup>, Chet C. Sherwood<sup>3</sup>, Paul R. Manger<sup>4</sup>, Matthew Schall<sup>1</sup>, and Bob Jaco<sup>5</sup>  
<sup>1</sup>Laboratory of Quantitative Neuromorphology, Psychology, Colorado College, Colorado Springs, CO 80903 <sup>2</sup>Department of Neuroscience, Mount Sinai School of Medicine, New York, NY 10029 <sup>3</sup>Anthropology, George Washington University, Washington, DC 20052 <sup>4</sup>Anatomical Sciences, University of Witwatersrand, Johannesburg, South Africa









RICHARD F. CELESTE THEATRE

### DE-71 Exposure on Spatial Learning and Reference Memory: Attenuation by Thyroid Hormone Supplementation

Sharon Haran, The Laboratory of Behavioral Neurotoxicology, Colorado College, Colorado Springs, CO

**Purpose**

- To further test the effects of early prenatal exposure to DE-71 on spatial learning and reference memory using the Morris Water Maze (MWM) in a rat model.
- To examine if DE-71 induced deficits in spatial learning and reference memory could be attenuated by thyroid hormone supplementation.


**Hypothesis**

- DE-71 exposure would dose-dependently impair performance in the MWM.
- LTH would partially attenuate the effects of DE-71 on MWM performance.

**Morris Water Maze (MWM)**

**Apparatus**

- The MWM measured 183 cm in diameter and 63.5 cm in height.
- The water was made opaque with latex paint and kept at room temperature.
- A food platform could be raised above the water in submerged and fixed.



**Protocol**

- Rats were placed in a pseudo-random starting location facing the wall of the water.
- They were allowed to swim for 60 s or until they found the escape platform. If they did not find the platform in the allotted time, the researcher guided the rat to the platform with their hand.

**Tasks**

- Visible Platform Task:** One testing period of four trials.
- Hidden Platform Task:** Four trials of four days per day.
- Probe Trial:** One testing period consisting of one trial.


**Performance Measures**

- Escape Latency:** Time to reach the platform.
- Swim Distance:** Average swim velocity, time in target quadrant, percentage of time spent in quadrants, and the time spent in quadrants.
- Probe Trial:** Amount of time spent in the target quadrant.

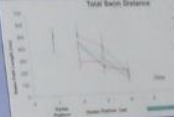
**Results**

- Visible Platform Task:** Both improved across trials on all dependent measures.
- Hidden Platform and Probe Trial:** No main effects of treatment or treatment x trial interaction effects.
- Overall:** Improvement in performance on all dependent measures.
- Overall:** No main effects of treatment or treatment x trial interaction effects.

**Escape Latency**



**Swim Distance**



**Discussion**

**Overview of Findings**

- An elevation in impaired performance across trials, but were unable to learn and remembering the location of the platform.
- No significant effects of DE-71 exposure on learning in memory were found.
- The possible benefits of LTH supplementation could not be determined.

**Possible Explanations for Contrary Results**

- Differences in study methodology between the current experiment and past research.
- Time of DE-71 exposure and target periods.
- Dose and neurotoxicity of DE-71 and differing degrees of MWM probe severity.

**Attention Not Further Replicated**

- MWM testing should become a standard component in which the platform is moved to a new location for the last day of testing.
- Initial water weight should be weighed as initial performance measure.
- MWM testing should be performed over several subjects as seen.

**Implications**

- MWMs are ubiquitous in our environment and harmful to affect humans and animals.
- It is important to continue exploring further results of treatment by exposure such as thyroid hormone supplementation.

**Reference**

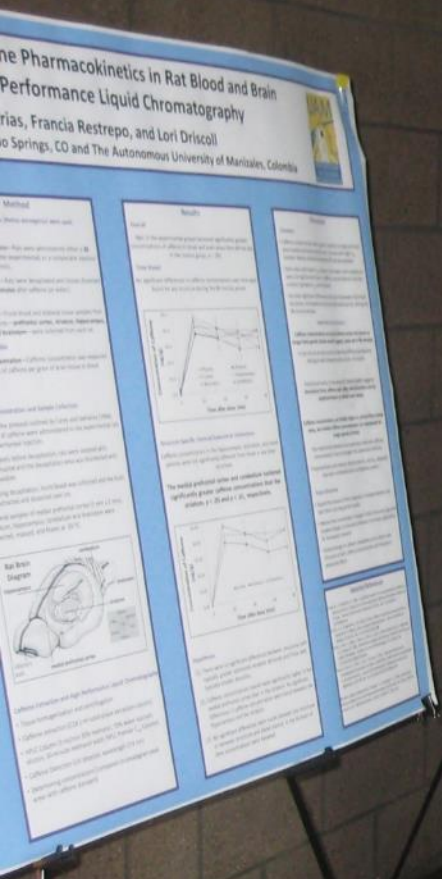
Haran, S., & Haran, S. (2012). *Thyroid hormone supplementation attenuates the effects of DE-71 on spatial learning and reference memory in a rat model.* *Behavioral Neurotoxicology and Pharmacology*, 33(1), 1-10.



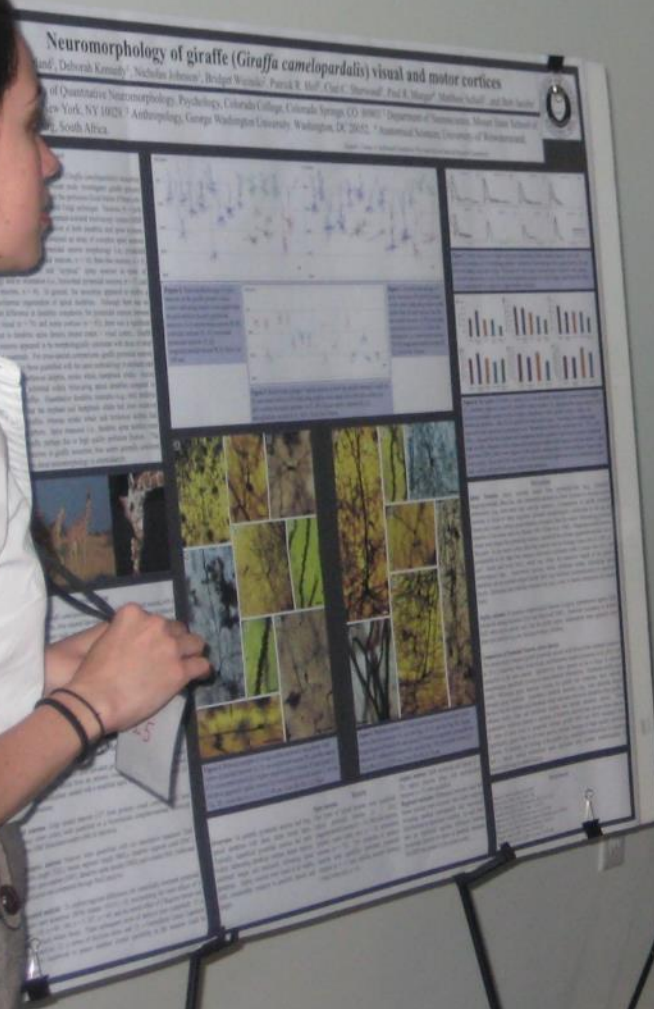
















# Placebo Effect: Perceived Sleep Quality Affects Cognitive Functioning

Christina Draganich and Kristi Erdal  
The Colorado College, Colorado Springs, CO

### Introduction

**Placebo Effect**  
The placebo effect is a psychological response to a treatment that has no therapeutic value. It is a form of self-healing that can be triggered by a variety of factors, including the belief in the effectiveness of a treatment.

**Neurobiological Processes**  
The placebo effect is thought to be mediated by the brain's endogenous opioid system. This system is involved in pain regulation and is also thought to be involved in the placebo effect.

**Current Controversiation**  
There is ongoing debate about the extent of the placebo effect. Some researchers believe that it is a powerful force, while others believe that it is a relatively weak effect.

**Significance**  
Understanding the placebo effect is important for a variety of reasons. It can help us to understand how the brain works and how it responds to treatment. It can also help us to develop more effective treatments.

### Method

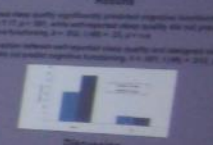
**Participants**  
Twenty-four college students (12 men and 12 women) participated in the study. They were randomly assigned to either the placebo group or the real treatment group.

**Independent Variables**  
The independent variables were the perceived sleep quality and the cognitive functioning.

**Dependent Variables**  
The dependent variables were the cognitive functioning scores on the Stroop test and the Digit Span test.

**Design**  
The study used a randomized, controlled, double-blind design. The participants were randomly assigned to either the placebo group or the real treatment group. The researchers were blind to the group assignments.

### Results



### Discussion

**Conclusions**  
The results of this study suggest that perceived sleep quality affects cognitive functioning. The placebo group, which reported lower sleep quality, performed worse on the cognitive tests than the real treatment group, which reported higher sleep quality.

**Implications**  
These findings have important implications for clinical practice. They suggest that improving sleep quality may be an important way to improve cognitive functioning. This could be done through a variety of methods, including cognitive behavioral therapy and sleep hygiene.

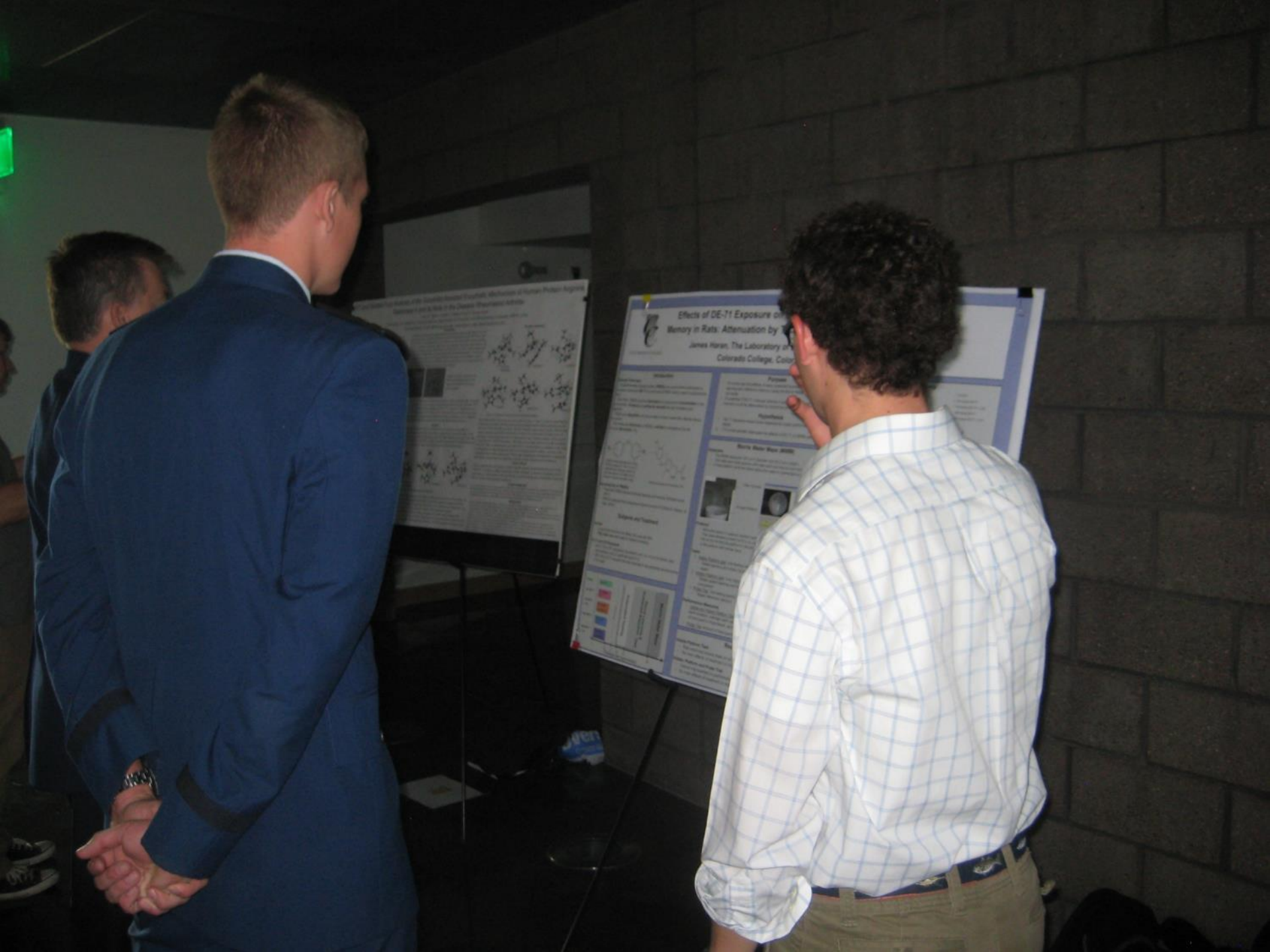
**Limitations**  
There are several limitations to this study. First, the sample size was relatively small. Second, the study did not measure actual sleep quality, only perceived sleep quality. Third, the study did not measure cognitive functioning over a longer period of time.

**Future Research**  
Future research should investigate the relationship between sleep quality and cognitive functioning in larger samples. It should also investigate the mechanisms of the placebo effect and how it can be used to improve cognitive functioning.

### References

- Draganich, C., & Erdal, K. (2015). Placebo effect: Perceived sleep quality affects cognitive functioning. *Journal of Cognitive Psychology*, 147(1), 1-10.
- Draganich, C., & Erdal, K. (2016). The placebo effect: A review of the literature. *Journal of Cognitive Psychology*, 148(1), 1-10.
- Draganich, C., & Erdal, K. (2017). The placebo effect: A review of the literature. *Journal of Cognitive Psychology*, 149(1), 1-10.
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**Effects of DE-71 Exposure on Memory in Rats: Attenuation by ...**  
James Moran, The Laboratory of Colorado College, Colorado

**Abstract**  
The present study was designed to determine the effects of DE-71 exposure on memory in rats. Rats were exposed to DE-71 for 14 days and then tested on a memory task. The results showed that DE-71 exposure significantly impaired memory performance. However, co-exposure to a specific agent significantly attenuated these effects, suggesting a protective role for this agent against DE-71-induced memory impairment.

**Introduction**  
DE-71 is a potent neurotoxin that has been shown to cause significant damage to the central nervous system. One of the primary effects of DE-71 exposure is the impairment of memory, which is a critical component of cognitive function. Understanding the mechanisms underlying this impairment is essential for developing effective interventions to mitigate its effects.

**Methods**  
The study was conducted using a randomized, controlled design. Rats were divided into three groups: a control group, a DE-71 exposure group, and a co-exposure group. The DE-71 exposure group received a daily dose of DE-71 for 14 days. The co-exposure group received the same dose of DE-71 along with a specific agent. Memory performance was assessed using a standardized memory task.

**Results**  
The results of the study showed that DE-71 exposure significantly impaired memory performance in rats. However, co-exposure to the specific agent significantly attenuated these effects, resulting in memory performance that was significantly better than the DE-71 exposure group alone.

**Conclusion**  
The findings of this study suggest that the specific agent used in the co-exposure group has a protective effect against DE-71-induced memory impairment. This finding has important implications for understanding the mechanisms of DE-71 toxicity and for developing potential treatments for neurotoxicity.

**References**  
Moran, J. (2010). Effects of DE-71 exposure on memory in rats: Attenuation by ... Colorado College, Colorado.

**Abstract**  
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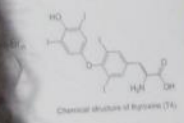
**References**  
Moran, J. (2010). Effects of DE-71 exposure on memory in rats: Attenuation by ... Colorado College, Colorado.



# Effects of DE-71 Exposure on Spatial Learning and Reference Memory in Rats: Attenuation by Thyroid Hormone Supplementation

James Haran, The Laboratory of Behavioral Neurotoxicology, Colorado College, Colorado Springs, CO

**Introduction**  
 Polychlorinated biphenyls (PCBDEs) are used as flame retardants in commercial PBDE mixture used in polyurethane foams. PCBDEs are released from products and accumulate in the environment. PCBDEs are exposed through inhalation and ingestion. PCBDEs accumulate in human breast milk, adipose tissue, and placenta. PCBDEs are similar to endogenous thyroid hormones.



**Purpose**  
 To further test the effects of early neonatal exposure to DE-71 on spatial learning and reference memory using the Morris Water Maze (MWM) in a rat model.  
 To examine if DE-71-induced deficits in spatial learning and reference memory could be attenuated by thyroid hormone supplementation.

**Hypothesis**  
 1. DE-71 exposure would dose-dependently impair performance in the MWM.  
 2. T<sub>4</sub> would partially attenuate the effects of DE-71 on MWM performance.

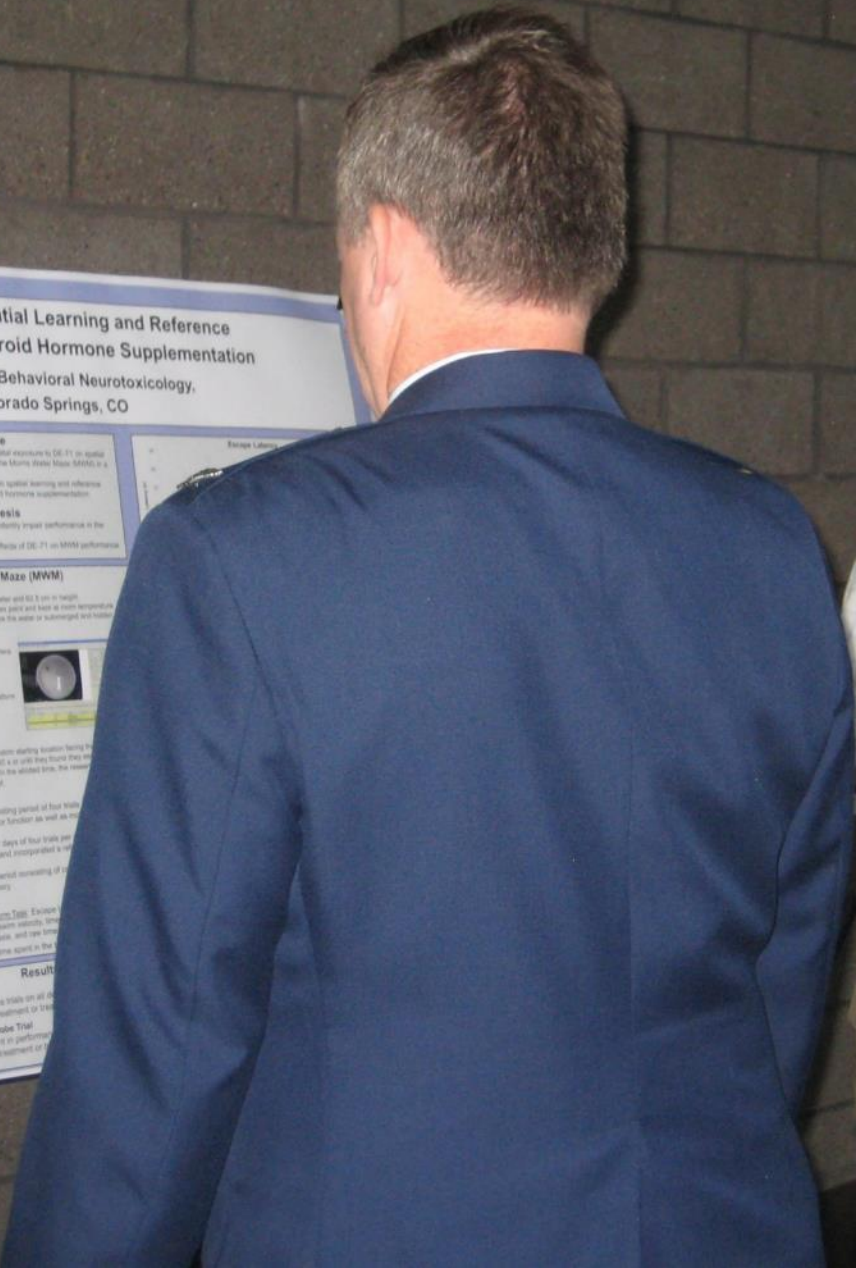
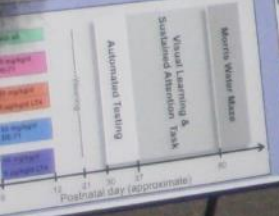
**Morris Water Maze (MWM)**  
**Apparatus**  
 The MWM measured 180 cm in diameter and 60 cm in height. The water was made opaque with black paint and kept at room temperature. A fixed platform could be raised above the water or submerged and hidden.

**Protocol**  
 Rats were placed in a circular arena starting location facing the platform. They were allowed to swim for 60 s or until they found the platform. The rat did not find the platform in the allotted time, the swimmer was placed on the platform with touch help.

**Tasks**  
 1. **Visible Platform Task:** one testing period of four trials per day. Tested sensory and motor function as well as motor learning.  
 2. **Hidden Platform Task:** Four days of four trials per day. Tested spatial learning and motor learning.  
 3. **Probe Trial:** One testing period consisting of four trials. Tested reference memory.

**Performance Measures**  
**Visible and Hidden Platform Task:** Evaluate swim function, average swim velocity, time spent in the quadrants, and total time spent in the platform.  
**Probe Trial:** Amount of time spent in the platform.

**Results**  
**Visible Platform Task**  
 Rats improved across trials on all days. No main effects of treatment or treatment x day interaction.  
**Hidden Platform and Probe Trial**  
 Overall improvement in performance across trials. No main effects of treatment or treatment x day interaction.





# Exploration of the Fundamental Dimensions of Social Perception in the Legal Domain

Cobun Keegan  
The Colorado College, Colorado Springs, CO

## Introduction

Introduction text describing the study's purpose and background.

## Results

RESULTS - Results in the legal domain. Includes a bar chart showing data for various categories.

## Discussion

General Conclusions. The length and better subjects in the primary of assessment in response formation. The effects of presenting negative impressions based on comparison to the standard. Implications for Legal Practice & Future Research.

## Methods

Methodology text describing the experimental design and procedures.

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COLORADO COLLEGE

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Handwritten notes on a spiral notebook held by the man on the left.







# Comparing Caffeine Pharmacokinetics in Rat Blood and Brain Using High-Performance Liquid Chromatography

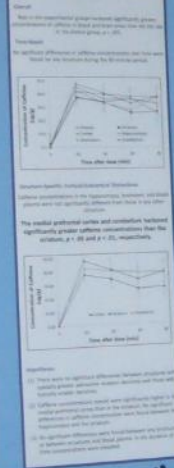
Juan Arias, Francis Restrepo, and Lori Driscoll  
Colorado Springs, CO and The Autonomous University of Manizales, Colombia



## Method

**Abstract:** Caffeine is a widely used stimulant drug. The purpose of this study was to compare the pharmacokinetics of caffeine in rat blood and brain. The study was conducted using high-performance liquid chromatography (HPLC) with a fluorescence detector. The results show that caffeine is rapidly absorbed and reaches its peak concentration in the blood within 15 minutes. The concentration in the brain is significantly lower than in the blood. The elimination half-life of caffeine in the blood is approximately 5.5 hours, while in the brain it is approximately 3.5 hours. The results suggest that caffeine is more readily eliminated from the brain than from the blood.

## Results



## Discussion

The results of this study indicate that caffeine is rapidly absorbed and reaches its peak concentration in the blood within 15 minutes. The concentration in the brain is significantly lower than in the blood. The elimination half-life of caffeine in the blood is approximately 5.5 hours, while in the brain it is approximately 3.5 hours. The results suggest that caffeine is more readily eliminated from the brain than from the blood.

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Juan Arias











### Overview

Transferring momentum between space droplet streams  
 include potential fuel cost savings for lunar primary missions

**Benefits**

- Eliminates the need for ERS to carry heat shield
- 2 satellites (1ST each, 30T fluid and 1T battery on moon)
- Systems reused 100s of times with minimal loss of fluid
- Acceleration of space station can offset orbit degradation due to drag
- Droplet collector serves as collector for LDR

	10T Mass	30T Mass	Required Mass	Propulsion Savings
Market	330T	281T	15T	21.5%
Propulsion	84.1T	54.1T	10T	12%

**Mars Mission**

Creating Ionic Fluid on Phobos  
 Phobos is a carbon rich asteroid  
 Fueling on Phobos could reduce fuel cost  
 Mars escape by 25%  
 Fuel created on Phobos could reduce fuel cost by almost 80%

	10T Mass	30T Mass	Required Mass	Propulsion Savings
Market	330T	281T	15T	21.5%
Propulsion	84.1T	54.1T	10T	12%

### Placebo Effect: Perceived Sleep Quality Affects Cognitive Functioning

Christina Draganich and Kristi Erdal  
 The Colorado College, Colorado Springs, CO

**Introduction**

Placebo effects are not understood in a scientific framework but rather in a cultural context. Researching the placebo effect in sleep is interesting because of its potential to improve sleep quality and cognitive functioning.

**Method**

**Participants**  
 20 students from The College of Arts and Sciences at Colorado College participated in the study.

**Independent Variables**  
 Self-Reported Sleep Quality  
 Assigned Sleep Quality

**Dependent Variable: Cognitive Functioning**  
 Participants completed a series of cognitive tests including a word fluency test, a Stroop test, and a working memory test.

**Procedure**  
 Participants were randomly assigned to either a placebo or a sleep quality improvement condition. They completed the cognitive tests before and after the intervention.









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**Bridging Theory and Evidence to Illuminate Future Directions in Mindfulness-Based Cognitive Therapy**  
Amrit Calhoun and Tricia Waters  
The Colorado College, Colorado Springs, CO

**Introduction: Causes of Chronic Depression**  
Chronic Major Depressive Disorder (CMDD) is a leading cause of disability and an economic burden due to its prevalence and chronicity. The etiology of CMDD is complex, involving genetic, neurobiological, and environmental factors. The current model of CMDD is based on the diathesis-stress model, which posits that CMDD is caused by a combination of genetic vulnerability and environmental stressors.

**The Role of Cognitive Theory in CMDD**  
Cognitive theory posits that CMDD is caused by negative cognitive appraisals of the self, the world, and the future. These appraisals lead to negative affect and behaviors, which in turn maintain and exacerbate the depressive state.

**Mindfulness-Based Cognitive Therapy (MBCT)**  
MBCT is a form of cognitive therapy that combines mindfulness practices with cognitive behavioral techniques. It is designed to help individuals with CMDD by teaching them to become aware of their thoughts and feelings without becoming entangled in them. This awareness allows them to see their thoughts and feelings as just that—thoughts and feelings—and not as reflections of reality.

**MBCT Mechanisms of Action**  
MBCT is thought to work by several mechanisms. First, it helps to reduce rumination, a key feature of CMDD. Second, it helps to improve emotional regulation skills. Third, it helps to increase self-compassion, which is often lacking in individuals with CMDD. Finally, it helps to increase mindfulness, which allows individuals to be more present and engaged in their lives.

**Conclusion**  
MBCT is a promising treatment for CMDD. It is effective, safe, and easy to learn. Further research is needed to explore the mechanisms of action and to determine the optimal duration and frequency of treatment.



EXIT





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1874

# Creating Melanin, Melatonin, and Monoamine Neurotransmitters: The Evolution of the Tyrosine and Tryptophan Metabolic Pathways

Katrina Kutchko<sup>1</sup>, Jessica Siitberg-Liberles<sup>2</sup>, and John Horner<sup>1</sup>  
<sup>1</sup>The Colorado College, Colorado Springs, CO; <sup>2</sup>The University of Wyoming, Laramie, WY

**Introduction**

**Tyrosine and Tryptophan Metabolism**

- Tyrosine is the precursor of melanin and the catecholamines, neurotransmitters, dopamine, norepinephrine, and epinephrine.
- Tryptophan is the precursor of melatonin and serotonin.
- Melatonin has been shown to be produced primarily in a response to a precise number of species within a genus.
- Tyrosine induces photoreactive tyrosine as signaling system—new signaling systems may have evolved as melatonin is produced.

**Gene trees**

- A gene tree describes the evolutionary history of a gene's descendance across different species.
- Homologous genes may have diverged through speciation events or gene duplication events.
- Gene trees are created through amino acid alignments.
- Similar regions of amino acids are found in different proteins, and the proteins are then aligned with each other using Tree-View.
- Based on sequence similarities and differences, a tree is generated.

**Enzymes**

- In the tyrosine metabolism pathway (tryptophan (TYR), serotonin (5HT), and indole-3-pyruvate (INDO) pathway) tryptophan (TRP) is converted to 5-HT, indole-3-pyruvate, and indole-3-pyruvate (INDO).
- In the tryptophan metabolism pathway (tryptophan (TRP), serotonin (5HT), and indole-3-pyruvate (INDO) pathway) tryptophan (TRP) is converted to 5-HT, indole-3-pyruvate, and indole-3-pyruvate (INDO).

**Purpose**

- The purpose of this project was to find the evolutionary history of enzymes involved in tyrosine and tryptophan metabolism.
- A better understanding of tyrosine and tryptophan metabolism.
- In addition, this study could provide insights into signaling systems involved in creating melatonin.
- E.g. Pathways in humans and melatonin are compared from various species.

**The tyrosine and tryptophan metabolism pathways in humans**

**Methods**

**Multiple Sequence Alignment**

- Similar amino acid sequences found through NCBI BLAST search.
- Sequences were aligned to create a multiple sequence alignment.
- Sequences were aligned and aligned with MAFFT.
- MAFFT is an algorithm algorithm that aligns multiple amino acid sequences based on homologous patterns.

**The Building**

- Aligns amino acid substitution model with PhyML.
- PhyML, a fast building algorithm, creates a phylogenetic tree using the substitution model as the evolutionary model.
- Bootstrapping (1000) was used to test the reliability of the tree.
- Tree is generated—iterative relationships but not tree.
- Tree is aligned with Subtree.
- Changes gene tree with Subtree and determine the evolutionary origin to check the tree reliability.

**Species Used**

Species	Phylum	Class	Order	Family	Genus	Species
Arabidopsis thaliana	Plantae	Angiosperms	Brassicales	Brassicaceae	Arabidopsis	thaliana
Drosophila melanogaster	Animalia	Insecta	Diptera	Drosophilidae	Drosophila	melanogaster
Mus musculus	Animalia	Mammalia	Rodentia	Muridae	Mus	musculus
Homo sapiens	Animalia	Mammalia	Primates	Hominidae	Homo	sapiens
Canis lupus familiaris	Animalia	Mammalia	Carnivora	Canidae	Canis	lupus familiaris
Equus caballus	Animalia	Mammalia	Carnivora	Equidae	Equus	caballus
Chimpanzee	Animalia	Mammalia	Primates	Hominidae	Chimpanzee	
Human	Animalia	Mammalia	Primates	Hominidae	Human	
Goat	Animalia	Mammalia	Ruminantia	Caprinae	Goat	
Sheep	Animalia	Mammalia	Ruminantia	Ovis	Sheep	
Cattle	Animalia	Mammalia	Ruminantia	Bos	Cattle	
Pig	Animalia	Mammalia	Carnivora	Suidae	Pig	
Chicken	Animalia	Aves	Columbiformes	Columbidae	Chicken	
Guinea Pig	Animalia	Mammalia	Rodentia	Caviidae	Guinea Pig	
Golden Hamster	Animalia	Mammalia	Rodentia	Cricetidae	Golden Hamster	

**Results**

- A phylogenetic tree was created and evaluated to test enzymes.
- Enzymes were in phylogenetic order down the pathway.
- Results in molecules: TRP, AAAC, and TRP.
- Results in molecules: TRP, AAAC, and TRP.
- Results in molecules: TRP, AAAC, and TRP.

**Discussion**

**Evolutionary Relationships**

- Evolutionary relationships were found between the species.
- Evolutionary relationships were found between the species.
- Evolutionary relationships were found between the species.

**Conclusion**

The study found that the tyrosine and tryptophan metabolic pathways in humans are highly conserved across species. The results suggest that these pathways have evolved in a similar manner across different species, indicating a common ancestor. The study also found that the tyrosine and tryptophan metabolic pathways in humans are highly conserved across species.

## Daily and Seasonal Movement Patterns (hemionus) on the U.S. & Canada

Author: [Name]

**Introduction**

**Methods**

**Results**

**Conclusion**



CSURF 2012  
Colorado College  
Katrina Kutchko





# Predictors of Appearance Contingent Self-Worth

Shiho C. Ushijima and Emily Chan

The Colorado College, Colorado Springs, CO



### Method

#### Participants

- One recruited 200 women from various parts of the United States using Amazon Mechanical Turk
- Amazon Mechanical Turk is an online market place for work. Researchers have found it to be a reliable way to obtain participants
- All participants were between the ages of 18-60

#### Treatments

- Treatment 1: Control condition
- Treatment 2: "Have been measured developed by Fard et al. (1987)"
- Treatment 3: "How important is it for you to be similar to the ideal woman?"
- Treatment 4: "No actual content is being added to the real woman as important part of who she is"
- Treatment 5: "7 point Likert scale (1=strongly disagree, 7=strongly agree)"

### Results

Table 1: Multiple Regression Analysis Predicting Appearance Contingent Self-Worth

Variable	B	SE	β	p
Control	0.12	0.05	0.15	.02
Attachment to Gender Roles	0.08	0.03	0.12	.00
Age	-0.01	0.01	-0.02	.15
Appearance Contingent Self-Worth	0.15	0.04	0.20	.00

### Follow-Up Analysis

We conducted regression analyses with each of the five treatments separately.

Table 2: Multiple Regression Analysis Predicting Appearance Contingent Self-Worth

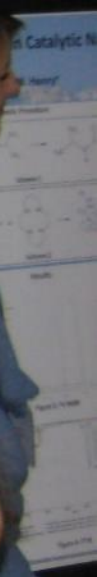
Variable	B	SE	β	p
Control	0.10	0.04	0.15	.01
Attachment to Gender Roles	0.05	0.02	0.08	.00
Age	-0.01	0.01	-0.02	.15
Appearance Contingent Self-Worth	0.12	0.03	0.18	.00

### Summary

- Attachment to gender roles predicts appearance contingent self-worth
- Attachment to gender roles predicts appearance contingent self-worth
- Attachment to gender roles predicts appearance contingent self-worth

### Future Directions

- Investigate the role of appearance contingent self-worth in other domains
- Investigate the role of appearance contingent self-worth in other domains





# Spared and Impaired Aspects of Motivated Cognitive Control in



Claire L. Mann<sup>1</sup>, Lori L. Driscoll<sup>1</sup>, and Deanna M. Barch<sup>2</sup>  
<sup>1</sup>The Colorado College, Colorado Springs, CO  
<sup>2</sup>Washington University in St Louis, St Louis, MO

## Introduction

**Motivation in schizophrenia**  
• Chronically blunted motivation is commonly documented in individuals with schizophrenia (Schultz)  
• Motivation impacts day-to-day functioning including maintaining employment, maintaining relationships  
• Patients report experiencing the stress of daily activities  
• However, patients experience normal levels of pleasure in response to rewarding stimuli  
**Schizophrenia and the motivational response**  
• The motivational response is divided into two phases  
• Identifying the drive (want) & stimulus, learned anticipatory pleasure  
• Linking the pleasurable response after initiating a stimulus  
• Patients show deficits in anticipatory pleasure due to disruption of the dopaminergic prefrontal cortex (DLPFC)  
• DLPFC mediates cognitive control: the ability to focus attentional resources on task-relevant stimuli  
• Mediated cognitive control is a learned response that involves cognitive control during multiple testing  
• Patients show decreased initial flow to the DLPFC  
• DLPFC impairment may manifest as a failure to inhibit task-relevant processes to achieve desired  
**The delay-reversal conflict task**  
• The current study was modeled after a task examining the effect of dopamine on the DLPFC (Fulbright & Peterson, 2011)  
• Reaction time (RT) of the Stroop-like task was made faster by reward  
• Findings were modeled to interpretation of functional regions involving the DLPFC  
**Hypothesis: Patients RTs would not respond as slowly as controls in monetary incentive**

## Method

**Participants**  
• 40 patients and 30 controls matched on age, gender, ethnicity, and educational status

**Procedure**  
• The reverse conflict task began with a baseline condition and transitioned into a monetary incentive condition  
• Stimuli were pictures of houses or buildings with congruent (congruent) or neutral words overlaid  
• Monetary trials were presented for \$20 or \$0 (loss)  
• Points, changed into real money at the end, could only be won on \$20 trial trials

**Baseline Section Trial**  
Stimulus  
Response  
Feedback  
Reward  
Loss

**Incentive Section Trial**  
Stimulus  
Response  
Feedback  
Reward  
Loss

**Trial Type Examples**  
Building Congruent, Building Neutral, Building Incongruent, House Incongruent

## Results

Significant main effect of Reward ( $p < 0.001$ ) RTs decreased for reward trials  
Significant main effect of Trial type ( $p < 0.001$ ) RTs were faster for congruent trials and slower for incongruent trials

Marginally significant Reward x Trial interaction ( $p < 0.05$ ). When reward was present, RTs on incongruent trials became more similar to RTs on congruent trials

Marginally significant Reward x Group ( $p < 0.05$ ). Controls RTs decreased less on incongruent and \$0 trial trials than patients

**Controls**  
• Controls showed faster RTs on congruent trials and slower RTs on incongruent trials  
• Controls spent less time on incongruent trials  
**Interpretation:** Controls showed general promise of fully intact cognitive control  
**Dual mechanisms of cognitive control**  
• Cognitive control involves two mechanisms (Basson, Gray &...





CSURE 2012  
Colorado College  
Julia Hall

# The Neuropsychological and Cognitive Impacts of Deep Brain Stimulation In Treating Advanced-Stage Parkinson's Disease

Jeffrey Nadel  
The Colorado College, Colorado Springs, CO

### Parkinson's Disease

A chronic neurodegenerative disorder which progressively erodes the basal ganglia of the brain.

Typical motor symptoms:

1. Tremor
2. Rigidity
3. Bradykinesia
4. Postural instability

Non-motor symptoms:

- Depression
- Anxiety
- Sleep disturbances
- Autonomic dysfunction
- Cognitive impairment

### Deep Brain Stimulation (DBS)

Procedure in which a surgical implantation of high frequency electrodes in the basal ganglia or subthalamic nucleus.

Reported treatment benefits:

1. Decreased medication of levodopa, which causes side effects in part of the striatum
2. Substantive modulation of the striatum
3. Substantive modulation of the subthalamic nucleus

DBS has shown moderate promise in treating the motor symptoms of PD.

Neurostimulation via subthalamic nucleus (STN) has been shown to improve motor symptoms in PD.

In a single-blind, randomized, controlled trial, STN DBS was shown to be more effective than MPT in the treatment of motor symptoms of PD.

### Effects of DBS on Executive Functions

Executive Functions

Controlled processes including verbal reasoning, problem-solving, planning, monitoring the ability to control attention, and the ability to deal with novelty.

Example Assessment Tools:

- Stroop Test
- Selective attention and cognitive flexibility
- Color Word Test
- Stroop Test
- Stroop Test
- Stroop Test

Results:

- Small to moderate decline post-DBS (1 study)
- Improvement post-DBS (2 studies)
- No significant change post-DBS (12 studies)

Conclusions and Limitations:

- Small that factor declines in executive functions post-DBS and other patient population
- Several lack of ecological validity of the tasks used

### Effect of DBS on Global Cognitive Ability

Global Cognitive Ability

Measure of cognitive measures including attention, comprehension, memory, inhibition of thoughts, and ability to follow directions.

Example Assessment Tools:

- Mini-Mental State Exam
- Matrix Reasoning
- Block Design
- Verbal Fluency
- Digit Span
- Trail Making Test
- Stroop Test
- Stroop Test

Results:

- No change in global cognitive ability post-DBS (18 studies)
- Improvement in global cognitive ability post-DBS (1 study)
- Decline in global cognitive ability post-DBS (1 study)

Conclusions and Limitations:

- There does not appear to be any negative treatment significant enough to have a substantial, adverse effect on day-to-day living with PD
- Better ecological validity and clinical applicability than assessment of executive functions and flexibility

### Research Issues with DBS and Neuropsychological Decline

Researcher debate regarding the overall impact of DBS on neuropsychological decline.

Challenges in studying cognitive decline from DBS:

1. Difficulty in isolating cognitive decline from DBS
2. Difficulty in isolating cognitive decline from PD
3. Difficulty in isolating cognitive decline from medication

Researcher propose changes to traditional methods to study cognitive decline in PD.

- Use of ecological validity and validity with real-world situations
- Use of more complex tasks
- Use of more complex tasks
- Use of more complex tasks

### Effects of DBS on Memory

Memory

Executive functions processes involving the monitoring, inhibition, and recall of information.

Example Assessment Tools:

- Color Word Test
- Stroop Test
- Stroop Test

Results:

- Small to moderate decline post-DBS (1 study)
- Improvement post-DBS (2 studies)
- No significant change post-DBS (12 studies)

Conclusions and Limitations:

- Small that factor declines in executive functions post-DBS and other patient population
- Several lack of ecological validity of the tasks used

### Conclusions

Younger PD patients with DBS greatly reduce the motor pathologies of the disease.

- Progressive cognitive deterioration steady
- Patients should carefully consider DBS as a treatment option to alleviate their most distressing PD symptoms and regain high quality of life.

Further research into the neuropsychological changes in PD patients from DBS is vital since many of the current studies are inconsistent and methodologically flawed.

- Continued to the use of ecologically valid tasks
- Greater sample sizes and appropriate statistical methods

### Selected References

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Albin, R. L., Marsden, C. D., & Marsden, C. D. (1984). The basal ganglia: A review of the anatomy, physiology, and pathology. *Journal of Neurology, Neurosurgery, and Psychiatry, 47*, 1-10.





EXIT

# The Effect of Disgust Embodiment on Moral Decision Making: Can Disgust Embodiment be Desensitized?

Kathryn Post and Tomi-Ann Roberts  
The Colorado College, Colorado Springs, CO

## Results

### Morality Subcategory Reliability

The following summarizes three consequences of moral decision (Bendure, 2007):

- Consistency - links and associations in determining repeat and voluntary action
- Autonomy - sense in which justice, rights, utility, or equity are a choice
- Flexibility - spontaneity, adaptability, the ability to solve problems of the day with novel solutions

Although these moral domains seem potentially isolated, we were unable to measure reliable consequences related to the Parity (1 = 2011).

The significant differences between groups in ratings of the morality of justice decisions:

Group	Mean Morality Evaluation
Control	~4.2
Disgust Embodiment	~3.2
Disgust Desensitization	~3.8

Figure 1: Mean morality evaluations of the items in the moral parity subcategory. Autonomic desensitization to a disgust stimulus did not change the behavioral disgust reaction.

### Gender Differences

There was an overall significant main effect of gender for disgust responses in the Parity (1 = 2011).

Group	Gender	Mean Morality Evaluation
Control	Male	~4.0
	Female	~4.4
Disgust Embodiment	Male	~3.0
	Female	~3.4

## Discussion

Although the results were consistent, we have several important limitations and suggestions for future research to use in the context of disgust.

### Embodiment

- Disgust stimuli used did not appear to elicit equal disgust responses.
- The study suggests that not all disgust stimuli may be equally effective in eliciting disgust, and some may be more effective than others.
- Disgust stimuli used may have different reactions for some individuals than others.
- Disgust stimuli used may have different reactions for some individuals than others.
- Disgust stimuli used may have different reactions for some individuals than others.

### Disgust

- Disgust stimuli used may have different reactions for some individuals than others.
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# Community Perceptions of Post-Traumatic Stress Disorder in Northern Uganda

Charlotte Pfeffer & Kristi Erdal  
The Colorado College, Colorado Springs, CO



**Method**

**Participants**

- Ethnic Acholi community living in northern Uganda
- Medical professionals (n = 40)
- Marine health professionals (n = 20)
- Ug participants (n = 20)

**Materials**

**Introduction vignette**

LRA Soldier vignette

Victim vignette

**Occupational measures**

- Occupation (medical professional, mental health professional)
- Disorder Measure
- Social Distance measured attitudes towards living and working with PTSD
- Social Assessment measured attitudes towards the vignette and behaviors in post-war
- Dangerousness measured attitudes towards the vignette as a danger to himself or others
- The Dangerousness Scale was unavailable in a Ugandan sample

**Procedure**

- Participants were randomly assigned to read the victim or the LRA soldier vignette
- After reading the vignette, participants completed the Social Distance Scale, Social Assessment, and Dangerousness Scale about the vignette character

**Social Distance**

A 2 vignette (LRA, victim) x 2 disorder (PTSD, non-PTSD) design

Age, gender, and the language in which the vignette was read were also measured

There was a significant main effect of vignette

- F(1, 100) = 3.85, p = .05,  $\eta^2 = .04$
- Ug participants were more likely to rate the LRA soldier as a danger to himself or others than the victim

**Social Assessment**

A 2 vignette (LRA, victim) x 2 disorder (PTSD, non-PTSD) design

Age, gender, and the language in which the vignette was read were also measured

There was a significant main effect of vignette

- F(1, 100) = 3.85, p = .05,  $\eta^2 = .04$
- Ug participants were more likely to rate the LRA soldier as a danger to himself or others than the victim

**Dangerousness**

A 2 vignette (LRA, victim) x 2 disorder (PTSD, non-PTSD) design

Age, gender, and the language in which the vignette was read were also measured

There was a significant main effect of vignette

- F(1, 100) = 3.85, p = .05,  $\eta^2 = .04$
- Ug participants were more likely to rate the LRA soldier as a danger to himself or others than the victim

**Conclusions**

- Ug participants were more likely to rate the LRA soldier as a danger to himself or others than the victim
- Ug participants were more likely to rate the LRA soldier as a danger to himself or others than the victim

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**Authors**

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# Spared and Impaired Aspects of Motivated Cognitive Control in Schizophrenia



Claire L. Mann<sup>1</sup>, Lori L. Driscoll<sup>1</sup>, and Deanna M. Barch<sup>2</sup>  
<sup>1</sup>The Colorado College, Colorado Springs, CO  
<sup>2</sup>Washington University in St Louis, St Louis, MO

### Introduction

#### Motivation in schizophrenia

- Dramatically blunted motivation is commonly documented in individuals with schizophrenia (patients)
- Anomalous impacts day-to-day functioning, including maintaining employment, relationships
- Patients report experiencing low levels of daily pleasure
- However, patients experience normal levels of pleasure in response to rewarding stimuli

#### Schizophrenia and the motivational response

- The motivational response is divided into two phases:
  - Wanting: the drive toward a stimulus, termed anticipatory pleasure
  - Liking: the pleasurable response after actualizing a stimulus
- Patients show deficits in anticipatory pleasure

#### Could motivational deficits in schizophrenia be due to disruption of the dorsolateral prefrontal cortex (DLPFC)?

- DLPFC mediates cognitive control, the ability to focus attentional resources on task-relevant stimuli
- Motivated cognitive control is a reward response that improves cognitive control
- Patients show decreased blood flow to the DLPFC during cognitive testing
- DLPFC impairments may manifest as a failure to initiate task-relevant processes to achieve reward

#### The delay-response conflict task

- The current study was motivated after a task examining the effect of monetary incentive on cognitive control (Padmanabhan & Peeske, 2011)
  - Reaction time (RT) in the Stroop-like task was made faster by reward
  - Findings were mediated by upregulation of frontoparietal regions (including the DLPFC)
- Hypothesis: Patients' RTs would not respond as robustly as controls' to monetary incentive

### Method


#### Participants

- 45 patients and 35 controls matched on age, gender, ethnicity, and developmental socioeconomic status

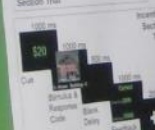
#### Procedure

- The response conflict task began with a baseline section and transitioned into a monetary incentive section
- Stimuli were pictures of houses or buildings with congruent, incongruent, or neutral words overlaid
- Incentive trials were presented by \$20 or \$0 cues
- Points, changed into real money at the end, could only be won on \$20-cued trials

#### Baseline Section Trial



#### Incentive Section Trial

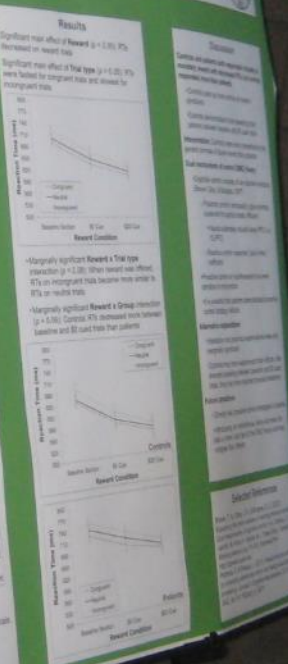


#### Trial Type Examples



#### Independent variables (2 x 2 x 2)

- Reward condition: baseline section, \$0-cued trials, \$20-cued trials
- Trial type: congruent, neutral, incongruent
- Group: controls, patients





EXIT

# The Power of Yucky: Can Disgust Embodiment be Desensitized?

M Kathryn Post and Tomi-Ann Roberts  
Colorado College, Colorado Springs, CO



**Introduction**  
Embodiment refers to the process of...  
**Disgust**  
Disgust is an emotion that...  
**Embodiment Desensitization**  
This current study...  
**Hypotheses**  
Participants...  
**Participants**  
...  
**Materials**  
...  
**Procedure**  
...

## Results

### Disgust Subcategory Ratings

Participants rated the disgust subcategory of...  
The results showed that...  
The data is presented in the following bar chart:



Condition	Rating
Control	~2.5
Embodiment	~3.0
Repeat Embodiment	~4.5

### Disgust Differences

Participants rated the disgust subcategory of...  
The results showed that...  
The data is presented in the following bar chart:



Condition	Rating
Control	~2.5
Embodiment	~3.0
Repeat Embodiment	~4.5

## Discussion

...

## References

...







COLORADO COLLEGE  
1874

# A Cross-Sectional Study on the Development of Sharing Behavior: An Evolutionary Perspective

Eleanor Olson  
The Colorado College, Colorado Springs, CO

## Introduction

**Guiding Question:** What are the innate and socialized aspects of sharing behaviors? How and in what ways, does sharing behavior from an evolutionary perspective, develop during maturation?

### Theory and Prior Evidence

Pro-social preferences to donate  
... have demonstrated preference for pro-social behaviors in others (Hamilton & Wymor, 2011)

... of social and developmental factors ... during maturation

... impacted by the degree of ... and the receiver

... to the receiver in a sharing act

... of relatedness to the ... (More, 2006)

... the giver's genes to be ...

... vs. the perspective of the parent



... between 3-8 years of age shared most with ... than friends and least with strangers (Olson & ... 2008)

... theory of kin selection, how should socialization occur?

... motivated to socialize a sharing norm to increase ... between their offspring

... socialization would decrease the impact ... on sharing behaviors

... of relatedness, would increase ... when share more equally than ... (Mckenzie & Muckenbach, 2008)

... on friends and ... with less ...

## Method

### Participants

- 36-68 months ( $n = 32$ ) and 96-69 months ( $n = 31$ )
- Recruited from two day care centers and two elementary schools from a urban city in the West
- Gender and birth order *evenly* distributed across cohorts
- Compensation: 15¢ gift card to a local toy store.

### Procedure

- Participants were introduced to three dolls representing different relationships – a sibling, a best friend, and a stranger
- Dolls were randomly selected based on their gender
- Each participant sibling and best friend condition was assigned using a random number generator



- A matching game was then played



- Correct answers earned dollars. In the trial, participants received 2 dollars and 3 trials.
- More dollars kept = larger reward at end of the game
- After dollars were placed in the box, one out of the three dolls was the participant

When 3-8, the ... you would like to ... you give ... to ... you would like to ... you give ... to ... you would like to ... you give ... to ...

When 9-12, the ... you would like to ... you give ... to ... you would like to ... you give ... to ... you would like to ... you give ... to ...

When 13-18, the ... you would like to ... you give ... to ... you would like to ... you give ... to ... you would like to ... you give ... to ...

When 19-24, the ... you would like to ... you give ... to ... you would like to ... you give ... to ... you would like to ... you give ... to ...

When 25-30, the ... you would like to ... you give ... to ... you would like to ... you give ... to ... you would like to ... you give ... to ...

When 31-36, the ... you would like to ... you give ... to ... you would like to ... you give ... to ... you would like to ... you give ... to ...

When 37-42, the ... you would like to ... you give ... to ... you would like to ... you give ... to ... you would like to ... you give ... to ...

When 43-48, the ... you would like to ... you give ... to ... you would like to ... you give ... to ... you would like to ... you give ... to ...

When 49-54, the ... you would like to ... you give ... to ... you would like to ... you give ... to ... you would like to ... you give ... to ...

## Results

### Design

- A 2 (7-dollar condition, 11-dollar condition) x 2 (36-66 months, 60-69 months) x 2 (sibling, stranger, friend) mixed ANOVA

### Hypothesis 1

- Significant main effect of relatedness,  $F(2, 122) = 7.33, p = .01, \eta^2 = .158$

Participants shared 27% of their dollars with siblings, 28.8% with friends, and 21% with strangers

... significant difference in sharing behavior between ...

... between the sharing behaviors in ...

... effect between money ...  $F(2, 122) = 10.1, p = .001, \eta^2 = .074$

... effect between money ...

... effect between money ...

... effect between money ...

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... effect between money ...

## Discussion

**Summary:** Results supported the hypothesis ... influence of genetics, relatedness on sharing behavior ... the expected change in sharing behavior with ...

### Conclusions / Implications

**The Importance of Relatedness or Familiarity?**

- All participants shared more with siblings than with stranger as predicted by kin selection
- Sharing behavior was the same when the recipient was a sibling or a friend
- Preference for familiar individuals over unfamiliar individuals in a sharing scenario

• Possible that reciprocity, over kin selection, impacts behavior during 3-6 years of age

• Similarities in age and sex between the parent and child in contrast to the siblings → "value of Rank, 2012)

**Friend to share in more proportional ways with ...**

- Age did not impact the sharing behavior recipient in the expected direction
- Older cohort more likely to give to the younger cohort
- Piagetian stages of development

**Sharing did not become egalitarian**

- The two decisions that participants made, whether or not to share, and how much to share, were observed to be ...
- Inequity aversion may not ... maturation, around age 7

**Limitations / Future Directions**

- The experimental ...

**References**

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### Comparative Neuromorphology of Florida Manatee, Giraffe, African Elephant, and Human

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**Abstract**

There has been divergent convergent patterns of brain evolution in the Florida manatee, giraffe, African elephant, and human. We have used quantitative neuroanatomy to compare the brain structure of these species. We have found that the Florida manatee (Trichechus senegalensis) has a brain that is highly specialized for aquatic life. The giraffe (Giraffa camelopardalis) has a brain that is highly specialized for long necks. The African elephant (Loxodonta africana) has a brain that is highly specialized for social life. The human brain is highly specialized for complex cognitive functions. We have found that the Florida manatee has a brain that is highly specialized for aquatic life. The giraffe has a brain that is highly specialized for long necks. The African elephant has a brain that is highly specialized for social life. The human brain is highly specialized for complex cognitive functions.

**Figure 1:** Micrographs of Florida Manatee brain tissue. Panel A shows a low magnification view of the cerebral cortex, and Panel B shows a high magnification view of the cerebral cortex. The Florida Manatee brain is highly specialized for aquatic life.

**Figure 2:** Micrographs of Giraffe brain tissue. Panels A, B, C, D, and E show different regions of the giraffe brain. The giraffe brain is highly specialized for long necks.

**Figure 3:** Micrographs of African Elephant brain tissue. Panels A and B show different regions of the African elephant brain. The African elephant brain is highly specialized for social life.

**Figure 4:** Micrographs of Human brain tissue. Panels A and B show different regions of the human brain. The human brain is highly specialized for complex cognitive functions.

**Purification**

email: rhenry@uccs.edu

**Current Work**

Completed with an average percent...  
 was characterized using...  
 and 4.0 ppm (1), near...  
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 to its relative purity

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 to the binding...  
 (K<sub>d</sub>)...  
 ...







# Effects of Exposure to DE-71 on Visual Discrimination in Rats and the Attenuation Effects of Levothyroxine

Megan M. Lieb  
Colorado College, Colorado Springs, CO

## Introduction

**DE-71 Use**

- DE-71 is a commercial mixture of polybrominated diphenyl ethers (PBDEs). Flame retardants used as additives to polymers in textiles, electronics, furniture, and various building materials.

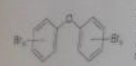
**Bioactivity**

- The structure of PBDEs (see below) is similar to that of thyroxine (T4) in the body. PBDEs produce an acute reduction of circulating T4 levels.

**Figure 1:** The basic structure of a single PBDE molecule. Br<sub>n</sub> and Br<sub>m</sub> indicate the general position of attached bromines which can be 0-10 on each of the benzene rings.

**Purpose of the Study**

- In the current study we investigated the extent to which associative learning is impacted by developmental exposure to DE-71 at doses of 30 and 80 mg/kg body weight per day.
- Additionally, we investigated how introduction of a synthetic version of thyroxine, levothyroxine (L4), could ameliorate neurobehavioral deficits caused by DE-71.
- The hypothesis that learning would be slowed by DE-71 exposure based on previous research (Culbick et al., 2002), and that L4 would help to reverse the impact of DE-71.



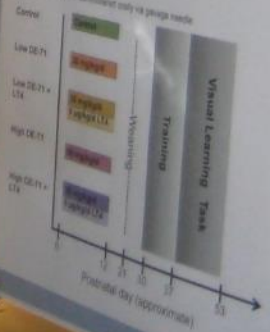
## Method: Subjects and Treatment

**Subjects**

- 30 male Long Evans rats from 10 separate litters (3 male pups from each litter).
- Pups from each biological litter were cross-fostered into other litters, and a given treatment was administered to the entire fostered litter.

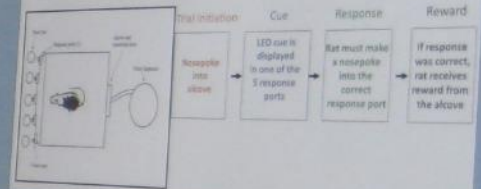
**Exposure and Treatments**

- All treatments were administered orally via gavage needs.



## Method: Visual Learning Task

- Automated testing was administered to each rat 6 days per week, with each session lasting 60 minutes or 100 trials.
- A series of four shaping tasks were administered to train the rats on the behaviors necessary for completion of the visual learning task.
- Criterion for completion of the visual learning task was achieving at least 80% correct responses for 2 out of 3 days in a row.



## Results



Figure 2. DE-71 exposure did not affect the number of trials to criterion in the learning task. Additionally, there were no significant effects of L4 supplementation on learning, although the supplemented groups required slightly fewer trials than their non-supplemented counterparts to reach criterion. (Error bars = +/- 1 SE.)

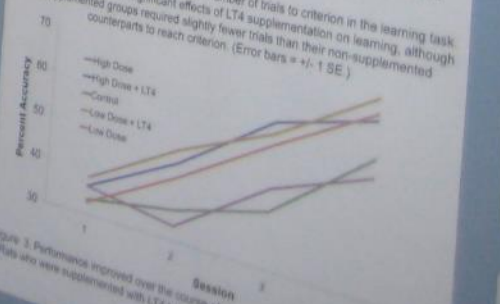


Figure 3. Performance improved over the course of the first four sessions for all groups. Rats who were supplemented with L4 tended to respond more accurately than their non-supplemented counterparts.



Advanced Study Group in the Classroom  
Megan M. Lieb, PhD  
Colorado College, Colorado Springs, CO

## Summary

All treatment groups showed significant differences in learning between treatment groups.

## Specific Points

- Rats in their non-supplemented groups
- Rats in their non-supplemented groups
- Rats in their non-supplemented groups
- Rats in their non-supplemented groups
- Rats in their non-supplemented groups
- Rats in their non-supplemented groups
- Rats in their non-supplemented groups

## Limitations

- Changes in results.
- The task.

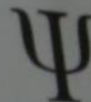
## Future Directions

- When the increased differences
- A new view
- The effects of DE-71



# Gender and Gender Stereotypy in the Classroom

Allison Lurie and Patricia L. Waters  
The Colorado College, Colorado Springs, CO



## Method

### Participants

Participants included 48 undergraduate students (Males = 14) from five consecutive years of the same First Year Experience (FYE) course.

- 15-16 students per class (average)
- Same professor every year

### Measures

Born Sex Role Inventory (BSRI; Ben, 1974)

-60 items (20 male, 20 female, 20 androgynous)

-Likert scale 1 (Almost never true for me) to 7 (Almost always true for me)

Gendered Speech Code Book

### Feminine Speech

-Rephrase/Question (e.g. asking for clarification on one's point and continuing discussion on that point) ( $\alpha = 0.91$ )

-Buffers (e.g. "...kind of..." ( $\alpha = 0.97$ ))

-Tag statements ( $\alpha = 0.61$ )

-Rising statements (e.g. statements ending with a rising intonation) ( $\alpha = 0.98$ )

-Acknowledgement (e.g. "Yes...", "I agree with what Andy said..." ( $\alpha = 0.71$ ))

-Injection of one's own idea (e.g. acknowledging another's statement and then continuing with your own) ( $\alpha = 0.95$ )

### Masculine Speech

-Assertive speech ( $\alpha = 0.97$ )

-Hour-long video recorded four weeks into the semester

-Participants recorded data (alphas)

-Participants recorded data (alphas)

-Participants recorded data (alphas)

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-Participants recorded data (alphas)

## Results

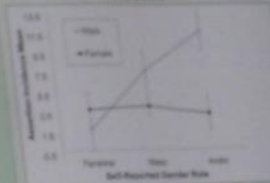


Figure 1: Mean Self-Reported Gender Role vs. Frequency of Self-Reported Gender Role

-Assertive speech:  $F(1, 40) = 5.52, p < .01, \eta^2 = .14$  (Males = 7.75 - Females = 4.87)

-Injection of one's own idea:  $F(1, 40) = 7.88, p < .01, \eta^2 = .16$  (Males = 3.52 - Females = 1.27)

Speech Type	Males		Females		Androgynous	
	M	SD	M	SD	M	SD
Classifications	3.00	.25	2.90	.15	2.67	.46
Buffers	4.00	1.48	2.15	1.15	3.48	1.45
Tags	.80	.37	.92	.28	1.00	.35
Rising	2.06	1.29	3.00	1.00	3.00	1.00
Acknowledge	3.27	.87	3.79	.30	3.43	.94
Own Idea	3.38	.80	1.55	.46	1.92	.58
Assertive	4.80	1.25	3.47	1.06	3.67	1.12

Note: Means with different superscripts are significantly different from each other ( $p < .05$ )

Main Effects of Gender Stereotype (Table 1):  
-Classifications:  $F(2, 40) = 3.42, p < .05, \eta^2 = .15$

-Assertive speech:  $F(2, 40) = 3.69, p < .01, \eta^2 = .14$

Interaction Effect Between Sex and Gender (Figure 1):  
-Assertive speech:  $F(2, 40) = 4.12, p < .01, \eta^2 = .32$

Androgynous males engaged in significantly more assertive speech than feminine males, masculine females, androgynous females, and feminine females ( $.50, p < .05$ ).

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Effects of Processing Fluency on Readers' Judgments  
Margaret Hild Schott and John Horner  
The Colorado College, Department of Psychology



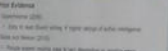
**Theory**

• Reading fluency is the automatic state of recognizing a word from orthography (Zeno, 1969).

• Reading fluency is automatic in that it is not subject to conscious control (e.g., spelling, self-corrections, rereading, slow processing, etc.).

• Reading fluency is related to reading comprehension (Klaczarski & Gillund, 2015).

• Reading fluency is related to reading speed (Klaczarski & Gillund, 2015).



**Method**

**Participants**

• 114 college students

**Materials**

• 100 words

**Procedure**

• Participants read words and rated their fluency

• Participants read words and rated their comprehension

• Participants read words and rated their speed

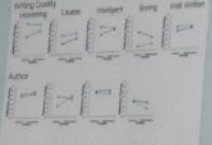


Figure 1. Reading fluency is related to reading comprehension and reading speed.

**Results**

Results were analyzed in a 2 (Familiar/Unfamiliar) x 3 (Reading Fluency, Reading Comprehension, Reading Speed) x 2 (Reading Fluency, Reading Comprehension, Reading Speed) ANOVA with repeated measures on all factors.

- The main effect of reading fluency was significant ( $F(1, 112) = 12.2, p < .001, \eta^2 = .10$ ).
- Reading fluency was significantly related to reading comprehension ( $r = .48, p < .001$ ) and reading speed ( $r = .42, p < .001$ ).
- Reading fluency was significantly related to reading comprehension ( $r = .48, p < .001$ ) and reading speed ( $r = .42, p < .001$ ).

**Discussion**

Consistent with the theory of reading fluency, reading fluency was related to reading comprehension and reading speed. Reading fluency was also related to reading comprehension and reading speed. Reading fluency was related to reading comprehension and reading speed. Reading fluency was related to reading comprehension and reading speed.

**Conclusion**

Reading fluency is related to reading comprehension and reading speed. Reading fluency is related to reading comprehension and reading speed. Reading fluency is related to reading comprehension and reading speed.

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**THE COLORADO COLLEGE**

## A Cross-Sectional Study on the Development of Sharing Behavior: An Evolutionary Perspective

Eleanor Olson  
The Colorado College, Colorado Springs, CO



**Introduction**

How and why does the sharing behavior of children develop? This study examines the development of sharing behavior in children from 18 to 36 months of age. The study is based on the theory that sharing behavior is a social skill that develops over time and is influenced by the degree of the parent and the caregiver's sharing behavior.



**Method**

**Participants**

- 360 mothers of 18- to 36-month-olds (N = 360)
- Recruited from the local newspaper and local television stations from a random list of the local area
- Gender and ethnic diversity distributed across groups
- Compensation: 100 gift cards a week for work

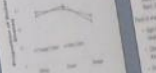
**Procedure**

Participants were instructed to have their children play different situations, including a sharing situation. The degree of their participation during each trial was recorded. The degree of their participation during each trial was recorded.

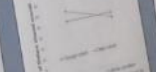



**Results**

**Figure 1**



**Figure 2**



**Discussion**

Results indicate that sharing behavior is a social skill that develops over time and is influenced by the degree of the parent and the caregiver's sharing behavior. The study also found that sharing behavior is a social skill that develops over time and is influenced by the degree of the parent and the caregiver's sharing behavior.





# Gender and Gender Stereotypy in the Classroom

Allison Lurie and Patricia L. Waters  
The Colorado College, Colorado Springs, CO

## Introduction

Linguistic differences between males and females suggests that gendered speech is a means of articulating gender context, and power in group situations. Masculine and feminine speech is linked to traditional gender roles of assertiveness and submissiveness; masculine speech embodies a directive, authoritative tone and feminine speech embodies a tentative, wavering tone. (Lakoff, 1975; Maltz & Borker, 1982; Tannen, 1992)

The current study investigated the use of gendered speech within a classroom setting.

## Gendered Speech

### Feminine Speech:

- Hedging (e.g. "kinda", "sorta", "maybe")
- Hesitating (e.g. "ah", "um", "well")
- Tag questions (e.g. "...aren't I?", "...don't you think?", "...you know?")
- Intensifiers (e.g. "very", "so", "totally"; Kramer, 1977)

### Masculine Speech:

- Argumentative tone
- Directly stated facts (Maltz & Borker, 1982)
- Greater use of "I" statements (Tannen, 1992)

## Social Functions of Gendered Speech

Gendered speech creates power differential in conventional social interactions (Bullock & Wolman, 1991)

Men are perceived as more influential if they utilize masculine speech stereotypically associated with men. Men are perceived as more dominant by men if they utilize masculine speech in group situations.

## Method

### Method

#### Participants

Participants included 48 undergraduate students (Males = 14) from five consecutive years of the same First Year Experience (FYE) course.

- 15-16 students per class (average)
- Same professor every year

#### Measures

Bern Sex Role Inventory (BSRI; Bem, 1974)

- 40 items (20 male, 20 female, 20 androgynous)
- Likert scale 1 (Almost never true for me) to 7 (Almost always true for me)

#### Gendered Speech Code Book

##### Feminine Speech

- Rephrase Question (e.g. asking for clarification on one's point and continuing discussion on that point)( $\alpha = 0.81$ )
- Buffer (e.g. "...kind of...", "to = 0.97)
- Tag statements ( $\alpha = 0.61$ )
- Rising statements (e.g. statements ending with a rising intonation)( $\alpha = 0.98$ )
- Acknowledgment (e.g. "yes...", "I agree with what Andy said...")( $\alpha = 0.71$ )
- Injection of one's own idea (e.g. acknowledging another's statement and then continuing with your own)( $\alpha = 0.95$ )

##### Masculine Speech

- Assertive speech ( $\alpha = 0.97$ )

#### Procedure

- Hour-long classroom conversations video recorded four weeks into a zero-week course
- Participants completed BSRI at the end of the seven-week course
- Videos recorded classroom conversations coded for incidences of gendered speech as defined by the Gendered Speech Code Book
- Interrater reliabilities were established using the Gendered Speech Code Book on 25% of the recorded data (alphas reported above)

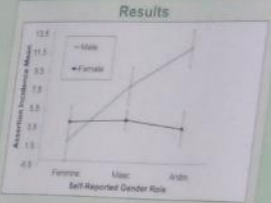


Figure 1: Gender Stereotype (BSRI) and Assertive Incidence. Main Effects of Sex (Figure 1) 85% confidence interval.

-Assertive speech:  $F(1, 40) = 6.52, p < .01, \eta^2 = .14$  (Males = 7.75 > Females = 4.97)

-Injection of one's own idea:  $F(1, 40) = 7.46, p < .01, \eta^2 = .16$  (Males = 10.2 > Females = 1.27)

Speech Type	Masculine		Feminine		Androgynous	
	M	SD	M	SD	M	SD
Buffer	3.99*	.91	3.96*	.72	3.62*	.88
Tag	4.51	1.48	3.13	1.18	3.48	1.43
Yes	3.88	1.29	3.02	1.03	3.19	1.25
Acknowledgment	3.37	.87	2.79	1.10	3.43	.84
Self-like	3.96	.60	3.23	.86	3.92	.38
Assertive	6.86*	1.32	3.43*	1.06	3.83*	1.31

Note: Means with different superscripts are significantly different from each other ( $p < .05$ ).

## Main Effects of Gender Stereotype (Table 1):

-Assertive speech:  $F(2, 40) = 3.42, p < .05, \eta^2 = .15$

-Injection of one's own idea:  $F(2, 40) = 2.60, p < .01, \eta^2 = .14$

-Assertive speech:  $F(2, 40) = 4.12, p < .01, \eta^2 = .32$

-Androgynous males engaged in significantly more assertive speeches than feminine males, masculine females, androgynous females, and feminine females ( $LSD, p < .05$ ).

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# Predictors of Appearance Contingent Self-Worth

Shiho C. Ushijima and Emily Chan

The Colorado College, Colorado Springs, CO



## Introduction

### Background

- Contingencies of self-worth are domains in which someone has defined his or her self-worth.
- The different domains can be categorized as being internal or external.
- External domains: physical appearance, social approval, academic achievement, competence.
- Internal domains: virtue and God's love.
- Researchers have extensively studied the existence of having external contingencies of self-worth.
- It is appearance contingent self-worth (ACSW) is positively associated with narcissism, eating disorders, and behaviors associated with the exhibition.
- However, limited research has investigated the predictors of contingencies of self-worth.

### Objectives

- To investigate what factors predict ACSW in women.
- To determine the relative importance of the predictors.

### Proposed Predictors of Appearance Contingent Self-Worth

#### Internalized Gender Ideals

- The degree to which an individual has internalized societal gender role expectations.
- Prior research found investment in gender ideals to predict external contingencies of self-worth in women (including physical appearance).

#### Contingency-Duality

- Degree to which an individual fears abandonment and exhibits a need for approval from a close other.
- Prior research found fearful and preoccupied attachment styles to predict externally contingent self-worth.

#### Self-Esteem

- People who value their contingencies of self-worth over self-esteem.
- Among adolescents, physical appearance is the strongest predictor of global self-esteem.
- Physical appearance correlates with age, but older women's self-esteem is not linked with age.
- Therefore, as women age, they may value their self-worth in other domains.

#### Media Exposure

- The media sends messages to women that their self-worth rests on their physical attractiveness.
- Prior research found that appearance-focused media exposure predicts internal self-identification (or "being confident to ACSW").

### Researcher Contact Information

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## Method

### Participants

- We recruited 200 women from various parts of the United States using Amazon Mechanical Turk.
- Amazon Mechanical Turk is an online market place for work. Researchers have found it to be a reliable way to obtain participants.
- 50 participants were between the ages of 18-40.

### Measures

- Investment in Gender Ideals
- Fearful Avoidance Measure by Worrel et al. (1987)
- "How important is it for you to be similar to the ideal woman?"
- "To what extent is being similar to the ideal woman an important part of who you are?"
- 7 point Likert scale (1=strongly disagree, 7=strongly agree) (alpha = .82).

### Attachment Styles

- Briefed version of the attachment anxiety subscale in the ECAR scale (Finkelhor & Brannan, 2002).
- 10 items on a 7 point Likert-type scale (alpha = .84).
- e.g. "I worry that romantic partners won't care about me as much as I care about them."

### Appearance-Focused Media Exposure

- The following variables were standardized and summed to create an appearance-focused media exposure score.
- Appearance-focused magazine exposure (Berry & Shiu, 2011). For all items.
- Music television exposure (Orlitz & Hahn, 2008).
- 7 items on a 7 point Likert-type scale (alpha = .82).
- e.g. "How often do you watch MTV?"
- Magazine exposure (Orlitz & Hahn, 2008).
- 7 items on a 7 point Likert-type scale (alpha = .82).
- e.g. "How often do you watch MTV?"

### Procedure

- Participants completed a 10-15 minute survey.
- Participants received \$2 cents for their participation.

## Results

Table 1

Multiple Regression Predicting Appearance Contingent Self-Worth

Model	Adjusted R <sup>2</sup>	F	p
1	.00	1.00	.95
2	.01	1.00	.95
3	.02	1.00	.95
4	.03	1.00	.95
5	.04	1.00	.95

Model	Adjusted R <sup>2</sup>	F	p
6	.05	1.00	.95
7	.06	1.00	.95
8	.07	1.00	.95
9	.08	1.00	.95
10	.09	1.00	.95

Model	Adjusted R <sup>2</sup>	F	p
11	.10	1.00	.95
12	.11	1.00	.95
13	.12	1.00	.95
14	.13	1.00	.95
15	.14	1.00	.95

Model	Adjusted R <sup>2</sup>	F	p
16	.15	1.00	.95
17	.16	1.00	.95
18	.17	1.00	.95
19	.18	1.00	.95
20	.19	1.00	.95





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# A Cross-Sectional Study on the Development of Sharing Behavior: An Evolutionary Perspective



Eleanor Olson  
The Colorado College, Colorado Springs, CO

## Introduction

**Leading Question:** What are the evolutionary and developmental aspects of sharing behavior? How and in what ways does sharing behavior evolve as an evolutionary phenomenon, developing during individuality?

**Theory and Prior Evidence**

- Prosocial preferences to friends
- Franssen (2016) have demonstrated preference for prosocial behaviors to others (Franssen & Ripstein, 2017)
- An increasing number of social and developmental behaviors appear during infancy through childhood.

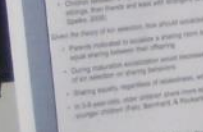
## Introduction & Role (2016)

- Sharing decisions are greatly impacted by the degree of relationship between the giver and the receiver
- IB = C
- IB = degree of relationship
- IB = reproductive benefit to the receiver is sharing with
- C = cost to the giver of a sharing act
- Sharing required by the degree of relationship in the recipient at 4.5 in year olds (Slovic, 2005)

## Theory of Kin Selection

Sharing behavior may benefit the giver's genes to be passed to future selection.

## Propensity of the offspring to the propensity of the parent



Children between 3-6 years of age showed more sharing when there was a social relationship between the giver and the receiver.

Given the theory of kin selection, how affect relationship affect sharing behavior?

Parents indicated to indicate a sharing system to increase social sharing between their offspring.

Given relationship, how affect relationship affect sharing behavior?

Sharing behavior is impacted by relationships, which increases the number of children on sharing behavior.

Sharing behavior is impacted by relationships, which increases the number of children on sharing behavior.

Sharing behavior is impacted by relationships, which increases the number of children on sharing behavior.

Sharing behavior is impacted by relationships, which increases the number of children on sharing behavior.

## Method

**Participants**

- 34-36 months (n=10) and 48-60 months (n=23)
- Recruited from the same centers and had identical parents from a study of the brain
- Gender and age were evenly distributed across subjects
- Compensation: 10 gift card to a local toy store

**Procedure**

- Participants were recruited to three trials randomized from different relationships: a sibling, a close friend and a stranger (20 trials randomly selected based on the total number of most participants taking part in each trial. The average 10 gift card to a local toy store)



Equal amount shared between 2 trials, and 1 trial in the 3 trials.

Share to close friend or degree number of children involved in the trial.

After random assignment to trials of the trials, the children were told to share the toys and used the following words to the participant.



Participants indicated the order to be kept from before in order.

After all trials, participants were invited to play a game with the toys while being videotaped.

## Results

**Figure 1**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows a positive correlation between age and the number of toys shared.

**Figure 2**

Relationship on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 3**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 4**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 5**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 6**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 7**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 8**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 9**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 10**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 11**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 12**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 13**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 14**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 15**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 16**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 17**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 18**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 19**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

**Figure 20**

Age (months) on the x-axis, and the number of toys shared on the y-axis. The graph shows that sharing is highest for siblings and lowest for strangers.

## Discussion

Sharing behavior is impacted by relationships, which increases the number of children on sharing behavior.

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# Community Perceptions of Post-Traumatic Stress Disorder in Northern Uganda

Charlotte Pfeffer & Kristi Erdal  
The Colorado College, Colorado Springs, CO



## Background History



The Lord's Resistance Army (LRA) led by Joseph Kony has waged a war in the Acholi region of northern Uganda since the late 1980's (Conrad et al., 2011). Over 20,000 people have been killed during the conflict and over 7,000,000 Ugandans have been displaced (Chalobwa & Chabwa, 2009). The LRA has abducted an estimated 62,000 to 75,000 children and adults from northern Uganda to serve as soldiers, porters, and wives (Pham et al., 2008). The LRA forces have resulted in 600,000 food rations at a rate of approximately \$0.40 (Pham et al., 2008).

## Psychological and Social Consequences of the LRA WAR

Abducted children are often forced to commit serious crimes that can compromise them (Pham et al., 2008). Communities that tolerate war formerly abducted children who return with PTSD (Conrad et al., 2011). Mental disorders are commonly experienced due to a lack of understanding about the etiology, treatment, and prognosis (Jeyapal, Rao, & Basavar, 2012). Stigmatizing attitudes from the community can greatly impact social integration and prevent acceptance of the formerly abducted (Conrad, 2006). Aggression and stigmatizing behaviors on behalf of former soldiers who a victim of community fear, which in turn can be a barrier to community formation (Conrad, 2006). Medical assistance, integration of former LRA soldiers, peace and stability in northern Uganda may be jeopardized (Jeyapal et al., 2011).

## Hypotheses

There will be more community stigma towards former LRA soldiers with PTSD than those without PTSD.

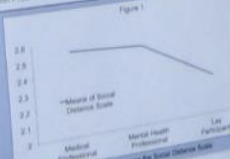


Figure 1: The mean participant scores on the Social Stigma Scale.

Conrad, S. J., & Basavar, S. (2009). The Lord's Resistance Army: A review of the conflict and its impact on the Acholi region of northern Uganda. *Journal of Interpersonal Violence, 24*(1), 1-15.

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Jeyapal, R., Rao, S., & Basavar, S. (2012). The impact of the Lord's Resistance Army on the Acholi region of northern Uganda. *Journal of Interpersonal Violence, 27*(1), 1-15.

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Conrad, S. J., & Basavar, S. (2009). The impact of the Lord's Resistance Army on the Acholi region of northern Uganda. *Journal of Interpersonal Violence, 24*(1), 1-15.

## Participants

Thirty medical students from Colorado College and 30 lay participants from the community in northern Uganda.

## Materials

Community Stigma Scale (Conrad, 2006)

## Method



Study location: Acholi region, northern Uganda.

Study design: Cross-sectional survey.

Study period: 2011-2012.

Study participants: 60 total.

Study measures: Community Stigma Scale.

Study results: Lay participants scored higher than medical professionals.

Study conclusions: Community stigma is a barrier to social integration.

Study implications: Need for community education.

Study limitations: Cross-sectional design.

Study strengths: Community-based research.

Study funding: Colorado College.

Study ethics: Approved by IRB.

Study contact: Charlotte Pfeffer.

Study keywords: PTSD, stigma, Uganda.

Study DOI: 10.1002/psd.10001

Study copyright: 2013, Charlotte Pfeffer.

Study permission: All rights reserved.

Study disclaimer: Not for medical advice.

Study disclaimer: Not for legal advice.

Study disclaimer: Not for financial advice.

## Social Behavior

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## Results

Lay participants scored higher than medical professionals on the Community Stigma Scale (Conrad, 2006).

## Discussion

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## Conclusion

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## Implications

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## Limitations

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## Strengths

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## Future Research

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## References

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## Appendix

Community Stigma Scale (Conrad, 2006)

## Notes

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## Footnotes

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## References

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## Appendix

Community Stigma Scale (Conrad, 2006)

## Notes

Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).

## Footnotes

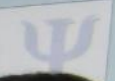
Community stigma is a barrier to social integration and prevents acceptance of the formerly abducted children who return with PTSD (Conrad et al., 2011).



RICHIA


# Effects of Processing Fluency on Readers' Judgments

Margaret Hild Schott and John Horner  
The Colorado College, Department of Psychology



**Theory**

Processing fluency is the subjective sense of ease with which a word is read (Dehaene, 2009). High-level fluency can lead to attributions of fluency to such qualities as intelligence, being, intelligence and intelligence. However, fluency is also a mere illusion. A relationship of automaticity, fluency, and intelligence is possible.



**Prise Evidence**

Dehaene (2009)

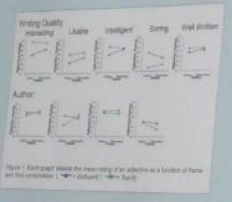
- People read words with a higher fluency of higher intelligence
- Dehaene (2009)
- People who are better at reading are also better at reading
- People who are better at reading are also better at reading

**Hypotheses**

- People who are better at reading are also better at reading
- People who are better at reading are also better at reading
- People who are better at reading are also better at reading

**Summary of Passage Presentation**

Participants read and judged the author of writing quality.



**Method**

**Materials: Reading Packet**

1. Reading packet
2. Reading packet
3. Reading packet

**Procedure**

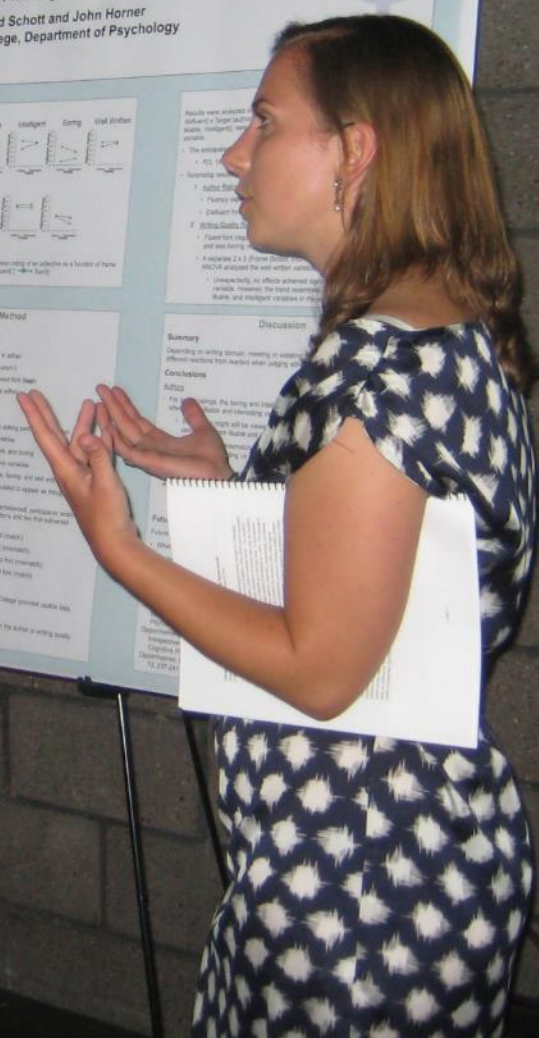
1. Participants read and judged the author of writing quality.
2. Participants read and judged the author of writing quality.
3. Participants read and judged the author of writing quality.

**Discussion**

Processing fluency is a subjective sense of ease with which a word is read. High-level fluency can lead to attributions of fluency to such qualities as intelligence, being, intelligence and intelligence. However, fluency is also a mere illusion. A relationship of automaticity, fluency, and intelligence is possible.

**Summary**

Participants read and judged the author of writing quality.













CSURF 2012  
Colorado College  
Allison Lurie

## Gender and Gender Stereotypy in the Classroom

Allison Lurie and Patricia L. Waters  
The Colorado College, Colorado Springs, CO



**Introduction**

Gender differences between males and females exist in many areas of life, including in the classroom. Research has shown that gender differences exist in the way that students interact with their professors and in the way that they are perceived by their professors. This research was designed to explore these differences in the classroom setting.

**Method**

Participants were 100 students (50 males and 50 females) who were enrolled in a psychology course at Colorado College. They were randomly assigned to either a male or female professor's class. The study was conducted over the course of one semester.

**Results**

Participants in the male professor's class were more likely to participate in class discussions and to ask questions than participants in the female professor's class. This difference was significant,  $F(1, 98) = 4.52, p < .05, \eta^2 = .04$ .

**Discussion**

These findings suggest that gender differences exist in the classroom setting. Male students are more likely to participate in class discussions and to ask questions than female students. This difference was significant,  $F(1, 98) = 4.52, p < .05, \eta^2 = .04$ .

**Conclusions / Implications**

These findings suggest that gender differences exist in the classroom setting. Male students are more likely to participate in class discussions and to ask questions than female students. This difference was significant,  $F(1, 98) = 4.52, p < .05, \eta^2 = .04$ .

**Limitations**

The study was limited to a single semester and a single course. Future research should explore these differences in other courses and over a longer period of time.

**Future Directions**

Future research should explore these differences in other courses and over a longer period of time.

**Selected References**

... ..

Variable	Male	Female
Participation	1.2	0.8
Questions	1.5	1.0
Engagement	1.8	1.2



own flesh and blood  
 battle • Play fat and loose • Pomp and Circumstance  
 Salad days • Seen change • Seen better days

**Bridging Theory and Evidence to Illuminate Future Directions in Mindfulness-Based Cognitive Therapy**  
 Amrit Calhoun and Tricia Waters  
 The Colorado College, Colorado Springs



**Causes of Chronic Depression**  
 (Lewinsohn et al., 2006)  
 • Interrelated perpetuation (inactivity, or a prolonged period of inactivity) leads to increased vulnerability to relapse.  
 • Negative feedback loops: inactivity leads to negative thinking, which leads to further inactivity.  
 • Mindfulness-based approaches aim to break this cycle by encouraging active engagement with the environment and positive cognitive restructuring.

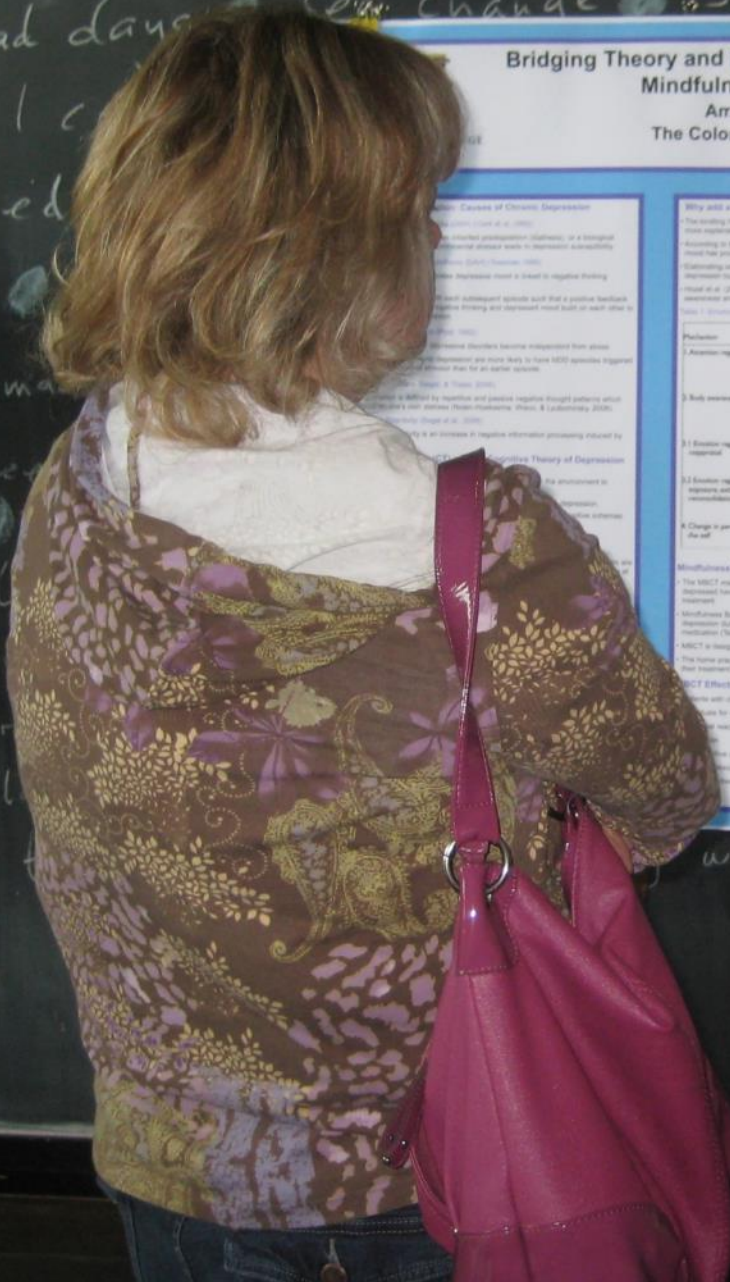
**Why add a mindfulness component to CT to prevent depression?**  
 • The existing literature suggests the DTR for early relapse of depression, but the underlying mechanism of chronic depression is unclear.  
 • According to the DTR to prevent chronic depression, it is important to be aware of and regulate negative thinking patterns or negative reactivity.  
 • Mindfulness-based approaches aim to break this cycle by encouraging active engagement with the environment and positive cognitive restructuring.  
 • Mindfulness-based approaches aim to break this cycle by encouraging active engagement with the environment and positive cognitive restructuring.

Phenomenon	Example instruction	Self-regulatory and attentional mechanisms
1. Attention regulation	Noticing negative or self-critical thoughts, feelings, or sensations in the mind.	Attentional performance, executive functioning, and self-regulation.
2. Body awareness	Focus is usually on object of attention, such as the breath, but also on the body as a whole.	Body awareness, interoception, and self-regulation.
3. Emotion regulation	Observing and allowing emotions to be as they are, without reacting to them.	Emotion regulation, self-regulation, and self-compassion.
4. Change in perspective on the self	Observing the self as an object of attention, rather than as the subject of experience.	Self-regulation, self-compassion, and self-identity.

**Mindfulness-Based Cognitive Therapy (MBCT) Effectiveness**  
 • The MBCT maintenance treatment is more effective than antidepressant medication for preventing relapse in people with a history of depression (Teasdale et al., 2002).  
 • Mindfulness-Based Cognitive Therapy (MBCT) is designed as a group with treatment.  
 • The home practice component can be used to support the group treatment and help participants maintain their own practice.

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# Comparative Neuromorphology of Florida Manatee, Giraffe, African Elephant, and Human Cerebellar Cortex

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**Abstract**  
Although the cerebellum has been thoroughly investigated particularly in terms of brain structure, system types, and their connectivity, little is known about its comparative and evolutionary relationships across species. The present study provides the first documentation of cerebellar cytoarchitecture across four species: (1) Florida manatee (*Trichechus senegalensis*), (2) giraffe (*Giraffa camelopardalis*), (3) African elephant (*Loxodonta africana*), and (4) human (*Homo sapiens*). Cerebellar tissue was stained with a Golgi-stained cytochrome oxidase (CO) histochemical method and processed for immunohistochemical analysis of cytochrome oxidase (CO) histochemistry. The resulting CO-stained sections were processed for immunohistochemical analysis of cytochrome oxidase (CO) histochemistry. The resulting CO-stained sections were processed for immunohistochemical analysis of cytochrome oxidase (CO) histochemistry. The resulting CO-stained sections were processed for immunohistochemical analysis of cytochrome oxidase (CO) histochemistry.

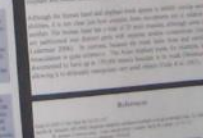
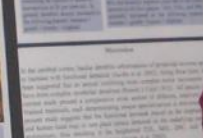
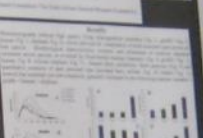
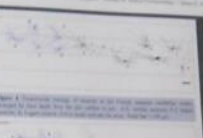


### Introduction

The cerebellum is crucially involved in the motor coordination, balance, and motor learning systems (Blakemore, 1987). Although the evolutionary importance of cerebellum has been widely documented in primates and canines (Baron & Barak, 2002; Wang et al., 2004), little is known about the neuroanatomical organization of the cerebellum in the first or second mammalian orders (rodents, ungulates, and birds) (Baron & Barak, 2002; Wang et al., 2004). The present study is the first to examine the neuroanatomical organization of the cerebellum in the first or second mammalian orders (rodents, ungulates, and birds) (Baron & Barak, 2002; Wang et al., 2004).

### Materials & Methods

**Tissue processing.** The brains of three adult giraffes (G1, G2, G3) (see Appendix 1, A1, A2, and A3) and one manatee (M1) (see Appendix 1, B1) were frozen and sectioned coronally. These tissues were stained for the cytochrome oxidase (CO) histochemistry and processed for immunohistochemical analysis of cytochrome oxidase (CO) histochemistry. The resulting CO-stained sections were processed for immunohistochemical analysis of cytochrome oxidase (CO) histochemistry.



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# Community Perceptions of Post-Traumatic Stress Disorder in Northern Uganda

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### Participants

- Ethnic Acholi currently living in northern Uganda
- Medical professionals ( $n = 48$ )
- Mental health professionals ( $n = 20$ )
- Lay participants ( $n = 80$ )

### Materials

#### Independent Variables

- Story Vignette (LRA soldier vs. LRA victim)

#### LRA Soldier Vignette:

William is a 25-year-old man who is from Gulu. When he was 18 years old, he was taken from his home and forced to fight with the Lord's Resistance Army. While he was with the LRA, he was forced to kill and rape innocent people or he would be killed. He has just returned to his home in Gulu, but he is acting different now from before he fought with the LRA. He cannot sleep at night and is very anxious. He complains of having nightmares about fighting in the LRA. William does not spend time with many people now, even though he used to be very social as a boy.

#### Victim Vignette:

William is a 25-year-old man who is from Gulu. When he was 15 years old, his family was brutally killed by the Lord's Resistance Army and he watched it happen. William was severely injured and left to die, but he survived. Since then he has acted differently. He cannot sleep at night, and is very anxious. He complains of having nightmares about his family being killed. William does not spend time with many people now, even though he used to be very social as a boy.

#### Occupation (medical professional, mental health professional, lay)

#### Dependent Measures

- Social Distance: measured attitudes towards those with PTSD
- Skill Assessment: measured ability to act and behave in positive ways
- Dangerousness: measured attitudes towards a danger to himself or others
- The Dangerousness Scale was translated into English for analysis
- Covariates: Age, Gender, Language of Survey (Acholi or English)

### Method

### Social Distance

A 2 vignette (LRA, victim) professional, lay participant) 2008 was conducted.

Age, gender, and the language in which the survey was conducted were controlled.

There was a significant main effect of occupation.

- $F(2, 112) = 3.88, p = .05, \eta^2 = .07$

LSD post hoc test revealed that the lay participants had significantly higher Social Distance scores from the medical professionals (see Fig. 1).

Gender and Language were significant.

There was no significant main effect of age.

$F(2, 112) = .34, p = .05$

### Skill Assessment

A 2 vignette (LRA, victim) 30 professional, lay participant) 2008 was conducted.

There was no main effect of occupation.

Age, gender, and language were significant.

There was a significant main effect of age.

$F(2, 112) = 3.88, p = .05, \eta^2 = .07$

LSD post hoc test revealed that the lay participants had significantly higher Skill Assessment scores from the medical professionals (see Fig. 1).

Gender and Language were significant.

There was no significant main effect of age.

### Dangerousness

Because the Dangerousness Scale was not translated into English, it was omitted from the analysis.

The hypothesis was that medical professionals would have lower dangerousness scores towards LRA victims.

- Acholi people
- Enough time to talk to soldiers

The medical and mental health professionals were asked to rate people toward both vignettes.

Westernized biomedical model of PTSD (Angan & Yip, 2008)

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