Apr 22nd, 9:30 AM - 10:00 AM

Complete 1995 Program

SIXTH ANNUAL

IWU Student Research Conference Program

Illinois Wesleyan Student Research Conference

April 22, 1995

SCHEDULE OF ACTIVITIES

10:00 A.M. - 12:30 P.M.	POSTER SESSION
12: 30 P.M. - 2:00 P.M.	LUNCHEON
2: 00 P.M. - 4:00 P.M.	ORAL PRESENTATIONS
4:05 P.M. - 4:30 P.M.	PRESENTATION OF CERTIFICATES

The organizing committee would like to thank:

Minor Myers jr., President of IWU

Janet McNew, Provost and Dean of Faculty

Carl Teichman, Assistant to the President

Jennifer Contarino

Susan Neunreiter

Katherine Johnson

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Wayne Dornan and Given Harper

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Kristen Bleakley
Steven Bond
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Ginny Shull
Kristin Stankus
Kyra Steward
David Taylor
Gregory Tinkler
Steven Webster
Leanne Westerhold
Laura Wilson
Christopher Wolff
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STUDENT ABSTRACTS

* Indicates Faculty Supervisor

A POSSIBLE AGE-RELATED NEUROLOGICAL MECHANISM IN THE FORMATION OF PROBLEM-SOLVING SET

Catherine Blair and Johnna Shapiro*
Department of Psychology, IWU

One problem-solving set study by Ransopher and Thompson (1991) showed no main effect or marked difference of responses with age. However, these results are not surprising because the research design perhaps facilitated responses. The current study investigates problem-solving set using scrambled words or anagrams, and mean latency to solutions of the target anagrams will be the dependent variable. Two outcomes are possible. The inhibition-deficit view (Hasher and Zachs, 1988) suggests that older people may be less susceptible to the effects of problem-solving set because they would be less likely to be focused on just one solution set. Dempster (1992) suggests that these inhibitory processes are associated with the frontal lobes, which function less effectively as people age. Alternatively, the perseverative characteristics--abnormal repetition of a specific behavior (Stuss and Benson, 1984) seen in frontal lobe damaged patients (Delis, Squire, Bihrle, and Massman, 1992) may indicate that the lessened activity of the frontal lobes with age will cause the older people to be more susceptible to problem-solving set, since they will not be able to get out of the initial problem-solving set solutions to solve new problems.

This study attempts to determine which hypothesis is more accurate. Sixty undergraduates and 60 older people (over the age of 55) are tested on a completely randomized list of 150 anagrams, which are in sets of 6, 9, 12, and 15. Target anagrams that require a different solution are presented after each set and the latency is measured for these anagrams. Undergraduates are expected to form set, shown by progressively longer reaction times to target anagrams as the sets grow larger. No increase in reaction time to the targets is expected in older people if problem-solving set is not formed. However, if perseveration occurs in the older people, their reaction times to the targets are expected to be even longer than the undergraduates, especially as the set sizes become larger.

"NOT BY THOUGHT NOR BY ACTION WILL I LIE": THE EMERGENCE OF THE PUBLIC VOICE IN THE POETRY OF OLGA BERRGOLTTS

Kristen Bleakley and Dr. Marina Balina*,
Department of Foreign Languages, IWU

Using Mikhail Bakhtin's theory of public and private identity, this study analyzes the poetry of Olga Berrgoltts and traces the development of her poetic voice from private to public during World War II.

Olga Berrgoltts was among the first women in the early decades of Soviet Literature to achieve fame. She started her career in journalism, working as a travelling correspondent in Kazakhstan and then as a writer/editor in her home city of Leningrad during the 1930s. She was extremely active in the communist youth group Komsomol, and, like many others of her generation, followed closely and with great enthusiasm the political developments of the Soviet Union. Yet the Soviet dogma which dictated the social and cultural life of the nation was not the focus of Berrgoltts' poetry. Her verses were very lyrical and centered on personal thought and experience. This type of artistic expression was considered superfluous to a society which was not concerned with the individual, but rather with the large-scale identity of a nation and its development. Thus, it was not in that pre-war, public-oriented sphere that Berrgoltts achieved her notoriety.

It was not until the beginning of World War II and the 900-day blockade of Leningrad that Berrgoltts' individuality coincided with the experiences of millions and her private voice became public. As a native of Leningrad, Berrgoltts shared in the suffering and losses of others and was able to express these very intense, very private emotions in her verse. However, she was no longer expressing her experience alone, but the experience of many. This "life entering" (вживание), or sympathy of mutual experience, brought Berrgoltts' poetry and the needs of a nation together on one level. For the first time in her life, Berrgoltts' private identity merged with the public identity and her voice was adopted as the voice of a nation.

LONG-TERM EFFECTIVENESS OF COMBINED ALPRAZOLAM AND COGNITIVE-BEHAVIORAL THERAPIES IN PANIC DISORDER

Steven M. Bond, Department of Psychology, IWU and
Timothy J. Bruce*, Department of Psychiatry, UICOMP

Benzodiazepines, particularly alprazolam, have been shown to be effective in the treatment of panic disorder. However, difficult withdrawal and high relapse rates after successful discontinuation continue to be problems with this class of medication. Recent studies instituting cognitive-behavioral therapy as a treatment supplement to alprazolam taper have shown promising results at short-term follow-up. The present study investigated whether these procedures produce long-term (two- to four-year) improvement. Patients were stabilized on alprazolam and randomly assigned to either an alprazolam-only group or the same condition with twelve weeks of concurrent cognitive-behavioral therapy. Twenty patients who completed these treatments were assessed at two- to four-year follow-up. In addition to the discontinuation success rates, self-report and clinician-rated measures concerning panic attack frequency, disability intensity, agoraphobic avoidance, and anxiety severity were used to evaluate relapse. Preliminary analysis of clinician-rated assessments suggests that patients receiving combined therapy were clinically improved at long-term follow-up in comparable percentages to previously published data. Results and clinical implications for combined alprazolam and cognitive-behavioral therapy will be discussed at the conference.

Seemingly Anomalous Diffusion in Weakly Crosslinked Gels

Kimberly Branshaw, Yiping Zhu
and Narendra K. Jaggi*
Physics Department, Illinois Wesleyan University

Giant electromotility of a class of polyelectrolyte gels in ionic solutions has recently attracted much attention as a possible route to chemomechanical engines. Studies[1] conducted in the Laboratory for Materials Physics at IWU have demonstrated that electric field induced asymmetry in the diffusion coefficient is the fundamental mechanism responsible for electromotility in these materials. This led to experiments designed to characterize the zero field diffusion in complete detail.

These materials can absorb a large amount of water. They swell to a volume that can be up to 60 times their initial volume. During our experiments, we discovered what at first seemed to be a nonintuitive diffusion behavior. For the most weakly crosslinked material, the mass uptake was discovered to be non-monotonic in time! Initially, the amount of absorbed water increases with time, as expected. At long times however, the material starts shrinking by expelling water from within. This would be akin to a sponge squeezing itself!

A number of hypotheses, ranging from the cute to the bizarre (bugs feeding on these polymers) were experimentally tested. Our tentative explanation of this apparently nonintuitive behavior consists of a competition between an inward traditional diffusion of water and an outward diffusion of linearly polymerized but **uncrosslinked** material. The underlying diffusion coefficients are very strong functions of the concentration of water. This makes the solution of coupled diffusion equations nontrivial. We are trying to numerically solve a simplified version of this model. We hope to retain the essence of the problem and find non-monotonic solutions in qualitative agreement with our experiments.

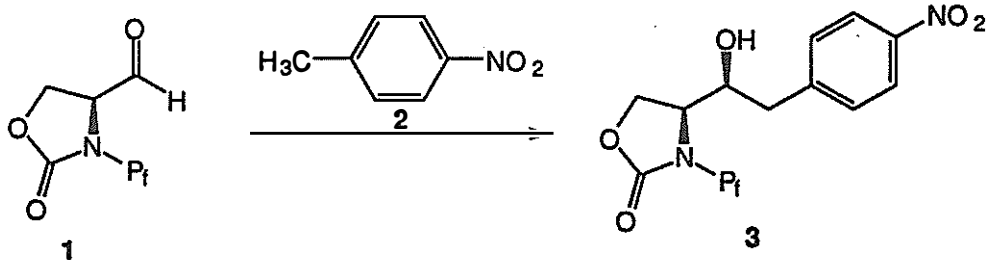
Acknowledgment: This research was supported in part by a grant (# NAG-8-258) from NASA under the NASA/JOVE program

ON THE ROAD TO (+)-OBAFLUORIN

Michael Busse and Dr. Jeff Frick*, Department of Chemistry, IWU

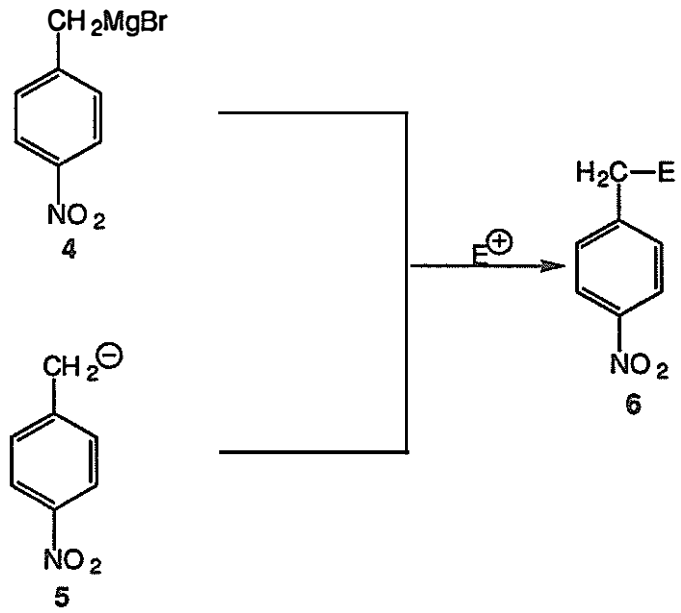
In the continuing search for different antibiotics, the ß-lactone antibiotic (+)-obafluorin has been isolated from strains of *Pseudomonas fluorescens* bacteria. In the process of our proposed novel synthesis of this compound, the following step (Equation 1) is required: addition of the anion of *p*-nitrotoluene **2** to the protected amino aldehyde derivative **1**.

Equation 1



Model studies involving the addition of nitrobenzyl magnesium-bromide (**4**) to benzaldehyde and the addition of the *p*-nitrotoluene anion (**5**) to select electrophiles (Equation 2) is being explored. The results of these experiments will be presented.

Equation 2



EMPIRICAL RELATIONSHIP OF JOB SATISFACTION TO SELF-ESTEEM AND THE HOME ENVIRONMENT

Jill Calcaterra and Teodora Amoloza*,
Department of Sociology and Anthropology, IWU

Identifying factors which affect job satisfaction leads to a variety of directions. This study examines the roles that self-esteem and the home environment play on one's level of job satisfaction. Previous research show that these two variables affect job satisfaction in complex ways. Research also shows that job satisfaction affects one's self-esteem.

For this study, a sample consisting of 136 males and females is selected from Bloomington-Normal, Illinois. The sample includes middle-aged, employed individuals with school-aged children. The data for the research was obtained through a Computer Assisted Telephone Interview.

Of the hypotheses explored, two were found to have significant results. First, the relationship of self-esteem on job satisfaction shows that the higher the level of one's self-esteem, the higher the level of job satisfaction as well. Secondly, when examining the relationship of home environment to job satisfaction, results again demonstrate that the happier one's home environment is, the higher the level of job satisfaction. Of the two relationships examined, a stronger relationship was found between self-esteem and job satisfaction.

These relationships are further examined and other variables that may further explain these results are introduced. Recommendations for future research are also discussed.

USING THE IOWA SCREENING BATTERY FOR MENTAL DECLINE AS A PREDICTOR OF FUNCTIONAL IMPAIRMENT

Laura L. Chapman[1] and Dr. Joseph S. Alper*[2]
[1]Department of Psychology, Illinois Wesleyan University
[2]Carle Clinic Association, Urbana, Illinois

Dementia is said to occur in at least 20% of the population aged 85 and older and is rising to almost epidemic proportions as the average age of the population in the United States continues to increase. Characteristically, dementia is manifested through memory impairment. These memory deficits along with other cognitive deficits together render the individual at least somewhat disabled in social and occupational functioning. While there are many neuropsychological batteries which measure cognitive abilities and functional impairment, there has been no thorough consideration of how a cognitive screening battery might predict an individual's functional status. This study examines the Iowa Screening Battery for Mental Decline (ISBMD) and its capabilities to act as a predictor of functional impairment. Functional impairment is being measured using the Activities of Daily Living Scale (ADL), the Instrumental Activities of Daily Living Scale (IADL), and the Functional Independence Measure (FIM). Subsequent statistical analyses will determine whether a significant correlation exists between the ISBMD and the ADL, IADL, and FIM scores. A stepwise linear discriminant function will then be performed in order to determine which, if any, sections of the ISBMD can more accurately predict different variables of functional impairment. The results of these statistical procedures will be presented at the conference.

APPLICATIONS OF B-SPLINES AND B-WAVELETS IN COMPUTER AIDED GEOMETRIC DESIGN

Laura Chik and Dr. Tian-Xiao He*
Department of Mathematics, IWU

In this talk we will discuss some recurrence relation of B-splines, construction of B-splines interpolants with highest possible approximation order, corresponding wavelet analysis, and their applications in computer-aided geometric design.

SOCIALIZATION OF EMOTION: THE ROLE OF PARENTAL DISCIPLINE IN INFANT ANGER EXPRESSION

Jennifer Cioni and Marcia Zumbahlen*, Department of Psychology, IWU

The current study sought to examine how anger changes with age and the factors that underlie that change (i.e., infant locomotor onset and emotion socialization). Participants included 20 white, middle-class mothers ages 18 to 44, as well as their first-born infants at 6 months (all prelocomotor) and again at 8 months of age (half remained prelocomotor). Videotaped home observations were coded for maternal affect, infant affect, and prohibition scenes. Two, 2-way analyses of variance and an analysis of covariance will be conducted. It is expected that maternal negative affect and infant negative affect will increase from 6 to 8 months, particularly in dyads with a locomotor infant. This should indicate the role of maternal affect in infant anger expression, expand current emotion research and provide directions for future work.

VISUAL ATTENTION DIFFERNCES ACROSS THE LIFESPAN: A STUDY IN INHIBITION

Emily H. Cointin and Johnna K. Shapiro*, Department of Psychology, IWU

In 1980, Treisman and Gelade proposed a two stage process of attention. According to the Feature Integration Theory, information is first processed automatically through feature extraction while integration of these features occurs later. Feature extraction is a parallel process and therefore automatic while feature integration is a serial process and thus requires attention. Because of the attentional nature of Treisman's theory, it has often been used as a paradigm for studies on attention and inhibition. The theory has also been used to highlight differences in cognitive abilities at various levels of development. In particular, it has been used to demonstrate developing attention in children as well as slowing cognitive abilities in older adults. Significantly, the frontal lobe, which has been linked to inhibition and attention, is the last area of the brain to develop and the first to decline in adults. However, no cross sectional study has been done in which children, teenagers, adults, and older individuals have been tested on a standardized task. The ages of the participants were chosen based on developmental stages of the frontal lobe. Six year olds, ten year olds, thirteen year olds, college age students and people over the age of 55 all received the visual attention task. Each participant was given an individually administered standardized intelligence test and a computer task. This computer task required the use of feature extraction, feature integration, or a combination of both. Average reaction times (RT) for each age group were calculated. It was expected that no change in RT slope would be found for screens requiring parallel searches (regardless of age or display size) while those requiring serial processing were expected to produce a bitonic function. It is predicted that young children will have the longest RT with a steady decrease in RT through college age students and a sharp increase with the older age participants.

THE STOCK MARKET AS A LEADING ECONOMIC INDICATOR: AN APPLICATION OF GRANGER CAUSALITY

Brad Comincioli and Robert Leekley*, Department of Economics, IWU

The stock market has traditionally been viewed as an indicator of economic activity. Movements in stock prices are believed to "lead" or forecast the direction of the economy at least to some extent. The basic argument is that stock prices reflect the expected earnings potential, or profitability, of corporations. And because profitability is directly linked to economic activity, fluctuations in stock prices are thought to lead the direction of the economy. Moreover, the fact that stock prices are included as one of the twelve components in the U.S. Index of Leading Economic Indicators suggests that the stock market is accepted to some degree as a forecast of economic activity.

The stock market as an indicator of future economic activity, however, does not go without controversy. Skeptics point to a variety of "false signals" that were given by the stock market as reasons to doubt its forecasting ability. The strong economic growth that followed the 1987 stock market crash is one example in which stock prices falsely led the direction of the economy.

The purpose of this paper is to focus on stock prices as a leading indicator of economic activity and to analyze the "causality" between the two variables. More specifically, time-series analysis and the methodology of "Granger causality" are used in this project to test "directional" relationships between stock prices and the economy. The notion of "Granger causality" attempts to answer whether one variable "drives" or "causes" the variation in the second variable. In other words, do stock prices "cause" what happens to the economy, or does the economy "cause" what happens to stock prices?

ERROR RECOGNITION IN CALCULUS PROBLEMS: WHAT CHARACTERIZES EXPERTISE?

Alisha M. Crawley and Lionel R. Shapiro*, Department of Psychology, IWU

Previous research in the area of expert-novice comparisons of mathematical problem solving has focused on the differences in categorization of and performance on math problems. These studies have led to the conclusion that while solving or categorizing problems, experts focus on deep processing and novices focus on surface structure. Other research dealing with true/false multiplication equations has shown that adults (considered experts in multiplication) can reject false answers before processing the equation. This study attempts to extend these findings by looking at the differences between experts and novices in the recognition of errors in true/false calculus verification expressions. The participants were professors (experts) and two groups of math students (novices). The experiment consisted of participants answering 76 true/false calculus expressions (equations or conditionals) at three levels of difficulty. Reaction time, accuracy, and level of confidence were recorded. Data was analyzed using a 3 x 3 x 2 x 2 (experience level by problem difficulty by problem type by truth value) ANOVA. Based on the previous studies, experts are expected to be able to process errors at a faster rate. This will provide further support for the hypothesis that experts are not only quantitatively better at task performance, but qualitatively different from novices in the type of processing they employ. Results and implications will be discussed.

An Example of Autonomous Art in Simple Deterministic Processes
Exotic Pattern Formation in Swelling Gels

Dana Deardorff, Kimberly Branshaw and Narendra K. Jaggi *
Physics Department, Illinois Wesleyan University

Last year, we discovered a rare and elegant coarsening mode in some gels that leads to intermediate structures that are complex and beautiful. They were discovered accidentally when a relatively large and thick cylindrical piece of the high density, crosslinked polymer was allowed to swell in water over an extended period. We have now developed an understanding of the underlying physics. Consequently, we are able to 'guide' a range of 'self organizing sculptures' whose aesthetic quality approaches art. Individual 'works' vary sufficiently so that the showing of a series of slides successfully elicits oohs and ahs from an audience. Yet, the series has unambiguous stylistic signatures that enable the identification of unique authorship, viz.. itself. This is by no means fundamentally novel. Every hiker and biker knows that natural processes can lead to beautiful structures. The joy in our work is of a slightly different variety. Our knowledge that these delicate, ornate sculptures with the majestic curves befitting Arabic calligraphy are swelling pieces of jello, gives us a sense of joy that is not quantifiable. We can guide the process just a bit so that successive patterns are sufficiently different to be interesting. But we can not predict the exact pattern that will emerge. This allows us to conduct a flirtatious dialogue with the work that is, for lack of a better word, fun.

Acknowledgment: This research was supported in part by a grant (# NAG-8-258) from NASA under the NASA/JOVE program
Note: The actual work is done by the team identified in the author list above. The abstract however was written by Narendra Jaggi who bears responsibility for it.

TESTOSTERONE LEVELS WITHIN AND BETWEEN CLUTCHES OF HOUSE WREN (*TROGLODYTES AEDON*) EGG YOLKS

Kimberly A. Fryzel, Kathy A. Lindstrom, and Dr. Given Harper*,
Department of Biology, IWU

It has recently been hypothesized that a correlation may exist between the competitive ability of offspring and the amount of maternal testosterone deposited in the egg yolk. If a female is able to influence the competitive ability of her offspring in this way, different levels of testosterone should be detected among eggs in a clutch. This study was undertaken to determine whether testosterone levels in egg yolk vary between eggs within and between clutches of the house wren (*Troglodytes aedon*). Female house wrens are double brooded (i.e. having two nests in a season) and lay one egg per day until their clutch is complete. During the summer of 1994, we collected 160 eggs from nest boxes and froze them. A preliminary testosterone extraction utilizing chloroform was performed on some of the collected eggs and the amount of testosterone was analyzed by HPLC (high-performance liquid chromatography) to determine the procedure's efficiency in extracting testosterone. A separate extraction procedure utilizing 30:70 petroleum ether/diethyl ether is currently being tested for its efficiency. Once a procedure has been found, testosterone will be extracted from the remaining eggs and testosterone levels will be measured by radioimmunoassay. Testosterone levels in each egg will then be compared in order to determine whether there is any correlation between maternal testosterone deposited in the yolk and the order in which eggs in a clutch were laid.

THE EFFECT OF ECONOMIC LINKAGES BETWEEN NATIONS ON THE CO-MOVEMENT OF THEIR STOCK MARKETS

Niveditha Hasthak and Dr. Pam Lowry*, Department of Economics, IWU

This study seeks to determine the extent to which stock market co-movements between pairs of countries reflect the real economic linkages between the respective countries. There are many theoretical explanations as to why equity markets in different countries can be expected to move together. It is hypothesized that pairs of nations with greater economic linkages (in the form of bilateral trade flows, cross-border direct investment and bilateral capital flows) will have greater correlations in their stock market prices. The study uses multiple regression analysis on correlation coefficients between pairs of national stock indices. The correlation coefficients are used as a measure of the co-movement of stock prices between 2 markets. Some of the economic variables used to explain the correlations are the value of bilateral trade, cross border investment and interest rate differentials. The effect of the relative stage of the business cycle the nations are in, is also examined. Nine countries are included in the study.

THE EFFECTS OF ICV INJECTIONS OF AF64A AND STRESS ON THE ACQUISITION AND RETENTION OF A SPATIAL TASK IN MALE RATS

Lesley Hickman and Wayne A. Dornan*, Department of Psychology, IWU

Alzheimer's Disease (AD) is a neurodegenerative disorder which affects primarily the septal hippocampal pathway. AD is broadly characterized by a global and progressive deterioration of memory, cognition, and personality, with memory impairment being the most prominent feature of the early stages of the disease. Neuropathologically, it is manifested by the degeneration of the septohippocampal pathway, presumably due to the accumulation of beta amyloid (ßA) protein deposits. The degeneration results in a dramatic decline in acetylcholine (ACh) levels. Consequently, AD has been theorized to be a disease of the cholinergic system, and therefore treatment strategies have focused on ways to increase ACh levels in the brain. Currently, however, there is no adequate animal model of AD available on which to test experimental compounds. In our laboratory we have taken two approaches toward the development of an animal model of AD. One approach has focused on the toxicity of ßA. We have previously reported that bilateral injections on ßA into the hippocampus exacerbates excitotoxic damage to the hippocampal area caused by a subthreshold dose of ibotenic acid. More recently, we have shown similar effects of ßA in animals treated chronically with stress levels of glucocorticoids. Another approach is to mimic the degeneration of the acetylcholinergic fibers projecting to the hippocampus, and determine how the loss of these fibers affects memory and learning in the rat. A study by Hörtnegl et al (1993) demonstrated that glucocorticoids potentiate the neurotoxicity induced by injections of the relatively selective neurotoxin, AF64A. In the present study we will attempt to expand on these results, using a behavioral test (the Morris Water Maze- MWM) to determine the extent of changes in learning and memory. Rats received either corticosterone or sesame oil injections subcutaneously for a week prior to surgery. Rats were then injected bilaterally into the ventricles with either 1 nmol of AF64A per side or a control injection of the vehicle. After a two week recovery period, all animals were tested using the MWM task. There is a potential problem with using AF64A, due to the recent controversy regarding its selectivity to ACh. Therefore, we are doing a related study (also presented at this conference) using another selective ACh toxin called Saporin. The same behavioral tests will be performed, and the results of the tests will be compared and presented at the conference.

HABITAT FOR HUMANITY: A STUDY OF THE HOMEOWNING PROCESS

René Husak, Department of Sociology and Anthropology, IWU
Dr. Amoloza*

Habitat for Humanity, an international organization whose purpose is to eliminate inadequate and poverty housing, was founded by Millard Fuller in 1976. The McLean County affiliate of Habitat for Humanity, which is now ten years old, has helped more than twenty-six families in McLean County become homeowners. This project is part of a larger study which focused on the evaluation of the process of obtaining a home through Habitat for Humanity, and the families' experiences after they moved into the home. For this portion of the study, families responded to a variety of questions regarding their experiences with the process of obtaining their Habitat for Humanity home. All Habitat for Humanity families must put in 500 "sweat-equity" hours as part of the homeowning process. This is done by working on their own home, helping build someone else's, or by fundraising. While it is a large and sometimes difficult time commitment, all 26 McLean County families studied responded that they were made to feel welcome at the work sites and felt positively concerning their experiences putting in these 500 hours. Also, interestingly, the most common responses about the part of the families' experience with Habitat for Humanity they enjoyed the most were the new friendships made and being able to build their own home, which would probably not have been possible without this organization. The results from this evaluation will help the McLean County Habitat for Humanity affiliate operate more efficiently in the process of providing homes. This is important because other families are going through the process currently, and a 27-house Habitat for Humanity subdivision is underway in Bloomington.

THE EFFECT OF MARKET SIZE ON THE COMPETITIVE BALANCE OF MAJOR LEAGUE BASEBALL

Matthew Jontry and Dr. Margaret Chapman*, Department of Economics, IWU

The advent of free agency in Major League Baseball in 1976 and the gradual withdrawal of restrictions on this "freely competitive" labor market has resulted in dramatic increases of player salary levels. The purpose of this project is to test the contention made numerous times by league ownership that this escalation of salaries has a negative impact on the competitive balance of the sport. More specifically, it exploits the total revenue differential between clubs located in big media markets and those located in small media markets. Owners claim that small media market teams cannot possibly continue to finance player payrolls at their current levels. These small media market teams will therefore be unable to competitively bid on the top players available through free agency each year and only be able to attract inferior talent. As a result, the competitive balance of the league will suffer. A test of the owners' assessment of the problem took the form of three hypotheses. First, since the emergence of the most unrestricted free agency rules to date in 1985, there has been no significant improvement in the competitive balance of Major League Baseball. Second, because of a comparative advantage in annual total revenue generation, big market teams will spend more on their average annual player payrolls than the small market teams. Third, if big market teams are able to spend more than small market teams on labor, they will be able to attract better talent, resulting in more average wins per season than their small market counterparts. A revenue-sharing/salary-cap proposal is examined as a measure that would equalize the teams financially. Although a competitive balance problem and significant payroll differences were proven to exist, a direct relationship between revenue and success in terms of wins per season was not conclusively established.

OLFACTORY CUES ON RATS RESPONDING ON A SIMPLE VARIABLE INTERVAL SCHEDULE

Colleen M. Kennedy and James D. Dougan*,
Department of Psychology, IWU

Biological variables need to be examined in operant conditioning studies. Optimal foraging theory (Lea, 1982) and behavior systems theory (Timberlake & Lucas, 1989) support the effectiveness of representing natural foraging in the laboratory, with operant conditioning in particular. In the present study, six rats were exposed to three scent conditions (fox, none, perfume) while bar pressing on a variable interval 60s schedule. Responding was expected to decrease during the fox scent condition because the fox is a natural predator for rats. The results indicated no significant difference between the three scent conditions. Further research should look into using other biological variables and also investigate the use of different scents.

TOWARDS AN UNDERSTANDING OF ALZHEIMER'S DISEASE II: THE VULNERABILITY HYPOTHESIS: DO GLUCOCORTICOIDS INCREASE CHOLINERGIC SUSCEPTIBILITY TO NEURAL TOXINS?

Heather A. Lang, Edmund C. Schweitzer and Wayne A. Dornan*,
Department of Psychology, IWU.

Alzheimer's disease (AD) is a neurodegenerative disorder, currently affecting over 4 million Americans, with 100,000 new cases reported each year. AD is broadly characterized by a global and progressive deterioration of memory, cognition, and personality. The most evident clinical symptom of AD is memory loss. Studies in humans and rats report a significant correlation between this memory loss and a decline in cholinergic markers, such as choline acetyltransferase (ChAT) levels in the cerebral cortex and hippocampus. Therefore, one approach towad developing an animal model of AD is to induce lesions in the hippocampus. This was attempted in a number of studies, including one by Chrobak, Hanin, Schmechel, and Walsh (1988), in which lesioning of the hippocampus produced acetylcholine deficits, as measured by lower ChAT levels, which in turn produced behavioral deficits. Recently, it has been found that high concentrations of cortisol are linked to neuronal loss in AD. This postulate is a result of accumulating evidence suggesting that hypercortisolemia and a decreased negative feedback inhibition of cortisol secretion frequently accompany AD. In a recent study by Hortnagl, Berger, Havelec, and Hornykiewicz (1993) they reported that, when injected bilaterally into the lateral ventricles, the neurotoxin ethylcholine aziridinium (AF64A) induced specific reduction of ChAT activity throughout the hippocampus. In that same study, Hortnagl investigated the role of glucocorticoids in the cholinergic degeneration brought about by bilateral intracerebroventricular injections of AF64A (1 nmol/ventricle). They reported that chronic glucocorticoid administration seven days before surgery potentiates the susceptibility of cholinergic neurons to AF64A-induced deterioration. Though Hortnagl and colleagues explored the neurophysiological effects of glucocorticoid-potentiated AF64A toxicity, they did not explore the behavioral implications of these injections. Therefore, in the current study we investigated the effects of intracerebroventricular injections of AF64A on spatial learning in male rats chronically treated with glucocorticoids. Four groups were compared: group one, AF64A plus sesame oil; group two, AF64A plus corticosterone; group three, saline plus sesame oil; and group four, saline plus corticosterone. These groups were subjected to a visual discrimination task involving both a fixed and a floating platform in the Morris water maze. To assess the effects of the above injections, several parameters were measured: path length, swim speed, session latency, and choice errors. The results of this study will be presented at the conference.

INTERNATIONAL COMPETITIVENESS: A STUDY OF THE DETERMINANTS OF COMPETITIVENESS

Christopher H. Lewis and Pam Lowry*, Department of Economics, IWU

There has been a growing concern, particularly in the United States, over international competitiveness of nations in recent years because of the changing world economy. One major problem faced when studying international competitiveness is its very definition. This study attempts to analyze the determinants of international competitiveness defined as the rising standard of living without encountering balance of payment difficulties. This study employs a time series analysis of six OECD nations in an attempt to determine which components most influence a nation's international competitiveness. It conclude with some implications and areas for future research.

THE EFFECTS OF CIRCADIAN ENTRAINMENT ON OPERANT CONDITIONING

Karen Lionello and James Dougan*, Department of Psychology, IWU

The matching law has been a prevalent theory in behavior analysis for the past 30 years. According to the matching law, responding in an operant conditioning chamber should be a monotonic function of reinforcement rate. However, several studies have predicted bitonic functions. One reason for this discrepancy may be due to circadian entrainment. There is evidence that rats are sensitive to circadian rhythms (body rhythms such as the need for sleep and food are effected by the time of day and the amount of light available) and that rats are capable of entraining to two feeding times per day. The present experiment attempted to discover what role circadian rhythms might have in shaping the variable interval response function. Rats were exposed to either day-time or night-time sessions under four different reinforcement schedules. Although significant differences were found between reinforcement schedules, there were no significant effects of session time. This may be due to the sensitivity of circadian rhythms in an experimental setting. Further research will examine more closely the role of rhythms in behavior analysis.

THE SCOPE OF PRACTICE OF RURAL NURSE PRACTITIONERS IN CENTRAL ILLINOIS

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In today's atmosphere of escalating health care costs, limited access to health care, and changes in the health care delivery systems, it is necessary to evaluate the roles and responsibilities of non-physician health care providers. The advanced Nurse Practitioner is one such health care professional who currently provides vital services to the public. However, utilization of Nurse Practitioners has been limited within Illinois. The purpose of this study was to: 1), examine current perceived roles of rural Central Illinois Nurse Practitioners and 2), determine perceived practice-related changes and trends for the future.

Qualitative data was collected from three nurse practitioners in Central Illinois. Semi-structured audiotaped interviews were transcribed verbatim. Transcripts were analyzed using a constant-comparative approach outlined by Strauss & Corbin (1990). Data was subjected to three stages of analysis that resulted in saturated themes. Initially, individual statements and phrases were extracted and coded followed by reorganization of the codes into relevant categories. Finally, each category was compared with all the other codes and thematic patterns emerged.

Five stages of career evolution emerged from the data. including, 1) Foundational Experiences; 2), Transition; 3), The Beginning Practice; 4), Current Practice; and 5), Future Practice. In addition, each Nurse Practitioner evaluated her experience as a Practitioner which resulted in career satisfaction based on a foundation in nursing.

Nurse Practitioners perceive little change now and in the future related to practice parameters such as providing health education, maintenance of health in persons with chronic and acute illness, and health promotion focussing on the physical and emotional aspects of wellness. However, they are seeking legal validation for their practice in the areas of prescriptive authority, direct third-party reimbursement and recognition via state nurse practice laws. With renewed understanding of the roles of the Nurse Practitioner, health care providers will be able to collaborate and form coalitions that will aid in the accessibility to quality health care.

THE EFFECTS OF SAPORIN-IGG INJECTIONS INTO THE MEDIAL SEPTAL AREA AND THE NUCLEUS BASALIS ON THE COMPLETION OF THE MORRIS' WATER MAZE

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Alzheimer's disease currently afflicts approximately 4 million people in the United States, with 100,000 new cases being reported each year. This disorder is typified by several cognitive deficits, including memory loss. In our laboratory we have taken several approaches to the generation of a suitable animal model with which to study this disease. Previous work has focused on exploring a possible synergistic effect between a neurotoxic protein (beta amyloid) found in AD patients and stress. As post mortem examination of AD patients' brains has revealed a significant decrease in the number of cholinergic neurons, another approach we have taken is to look at the correlation between the depletion of certain cholinergic markers in animals and the resulting behavioral deficits. Two regions of specific interest are the medial septal area (MSA) and the nucleus basalis magnocellularis (NBM). These regions are important because they are the major source of cholinergic neurons in the brain, they are selectively targeted during aging and AD, and there have been many reports of their importance in learning and memory tasks. Earlier work has been done using the compound AF64A to selectively lesion cholinergic neurons, however, recent reports have brought into question the specificity of AF64A. Within the last few years a new chemical, saporin-IgG, has been introduced. The saporin-IgG complex (SIG) relies on the technique of immunolesioning, and initial reports show that it generates both very specific and complete lesions of cholinergic neurons. Therefore, for this study, rats have been injected with either the saporin-IgG complex or just the vehicle into either the medial septal area, or the nucleus basalis. One of the difficulties being reported while using SIG is the large percentage of animals that show signs of sickness and loss of motor skill after receiving intraventricular injections. This injection site is important, however, as it provides the most complete depletion of cholinergic markers in the brain. In order to avoid the deleterious effects on the animals health and still acquire the increase cholinergic depletion, one group of animals received injections into both the MSA and the NBM. The animals' behavior was assessed using a standard Morris' Water Maze task. After being trained for six days on a non-cued task, a probe trial was administered and the time spent in each quadrant was recorded.

THE DUALISM IN MUSIC EDUCATION PHILOSOPHY

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A music education based on "aesthetic" education has been used as a primary justification and motivation for music teachers for most of this century. In 1970, Bennett Reimer presented a comprehensive document which outlined the aesthetic philosophy of music education in his book, *Philosophy of Music Education*. Dr. Reimer's philosophy sets up the concepts of absolutism (meaning placed in the music itself) and referentialism (meaning placed outside of the music) as opposite ends of a continuum. Dr. Reimer advocates the absolute expressionism philosophy. He states, "While Referentialism insists that you must go outside the work, Absolute Expressionism insists that meaning and value are internal; they are functions of the artistic qualities themselves and how they are organized. But the artistic/cultural influences surrounding a work of art may indeed be strongly involved in the experience the work gives..." The quality and necessity of a music education, based on Dr. Reimer's philosophy, has been severely challenged due to his emphasis on the musical "product" rather than the musical "process." While the popular and most widely accepted philosophy has been the aesthetic view, a different approach to music education has challenged the aesthetic philosophy. In 1994, David Elliott, a professor of music education at the University of Toronto, stated the bold opposition to the aesthetic concept in his book, *Music Matters*. Dr. Elliott proposes that "a musical product is more than a piece of music...or a 'work' in the aesthetic sense. What we are presented with is the outcome of a particular kind of intentional human activity. Fundamentally, music is something that people do." Dr. Elliott traces the history of the Romantic Revolution and the major changes of Western philosophy from the Enlightenment to the "romantic" (aesthetic) age. In doing so, he shows that music has not always been viewed as an intangible, mystic subject. Rather, music was a flexible and "do-able" societal component before 1800. As Western philosophy adopted the aesthetic viewpoint, the listener searched for a more "holistic" meaning in music. Dr. Elliott's philosophy opposes the aesthetic view in order to bring music into a more engaging and tangible activity for our society. In doing so, he proposes that the justification of a music program will be much more concrete and realistic. My research investigates the major voices of the profession and the philosophical trends of the past decade. In this study, a questionnaire will sample the music education majors at Illinois Wesleyan University to determine the philosophic trends. As the questions will address the areas of music as expression and experience, as well as music teaching, the questionnaire will serve to reveal the subject's philosophical position in the field of music education.

NEST PREDATION ON HOUSE WRENS

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Predation is the strongest selection pressure placed on most avian species. Birds can potentially manipulate several variables, such as nest-site selection, brood size, and clutch size, in an attempt to decrease the frequency of predation and increase their fitness. The main focus of this study is to determine the effect of habitat edges (i.e. edge effects) on nest predation in a population of House Wrens (*Troglodytes aedon*) which breeds in nest boxes. Although the House Wren is not an endangered species, the patterns of edge effects are increasingly important in the conservation of bird species whose populations are threatened by habitat fragmentation. This study includes data on nest predation involving 585 nest boxes from 1983-1994. Our results showed no significant edge effect, but we did find a significant variation in the effect of the type of edge (abrupt vs. tapering vs. riverine). We also found the major predators were raccoons (*Procyon lotor*) and other House Wrens. Predation by other House Wrens was significantly higher along abrupt edges than tapered and riverine edges. While raccoon predation was significantly higher along riverine edges than abrupt and tapered edges. We also found that predation rates did not significantly differ between brood sizes, clutch sizes, and upland vs. floodplain habitats. A possible reason we found no significant edge effect is that the study area may be too small, and, in effect, the whole study area is subject to the edge effect. This conclusion would mean that a larger forest than our 108 ha. study area would be needed to reduce the edge effect on woodland avian species. Since edge type is significant, as long as the edge transition was gradual between the forest and the other habitat, predation rates would likely be diminished.

DETERMINATION OF ORGANOCHLORINE PESTICIDE LEVELS IN MIGRATORY SONGBIRDS.

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During the last decade populations of Neotropical migratory songbirds have declined, possibly due to their acquisition of organochlorine pesticides. Such chemicals are widely used in Central and South America where Neotropical migrants may be exposed to them for three-quarters of their lives. Baseline levels of organochlorine chemicals in songbirds were quantified using gas chromatography with electron capture detection. Organocholorine chemicals were present in almost all of the Neotropical migratory songbirds that we surveyed. Recent studies of the wildlife have documented that such chemicals (eg. 4,4' DDE, Dieldrin, Heptachlor Epoxide) may serve as endocrine system disruptors and reduce reproductive success. The results from our study may have important implications in the conservation of Neotropical migratory songbirds.

COMPUTER-AIDED BUDGET PROJECTION METHODOLOGY FOR ILLINOIS WESLEYAN UNIVERSITY FINANCIAL PLANNING

Stephanie Pannier and Susan Anderson-Freed*, Department of Computer Science, and
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This project transposes the current budget projection methodology to an amended model which determines policies for financial assistance on a case by case basis within each academic class. Student financial aid packages were downloaded from the university's AS400 system and evaluated utilizing the spreadsheet software Quattro Pro version 6.0 to determine the gross need of loan and job funds and gift assistance for each student to remain at Illinois Wesleyan University. The accuracy of the model was tested by comparison to actual data received for the projected year and was found to be significant. By improving the accuracy of the original budget projection methodology, the university can allocate financial resources more effectively, and as a result yield an accumulation of funds which can be reallocated to improve the university.

EXAMINING THE ROLE OF AGITATION AND AGGRESSION IN PERCEIVED CAREGIVER BURDEN

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Recent research efforts in the area of dementia have revealed that the affected patients are not the only people impacted by the disorder. There are hidden victims who, more often than not, go unnoticed. These people are the caregivers, often family members, of a dementia patient. More and more attention is being focused on caregiver burden because it has been found that caring for a dementia patient can lead to medical or psychological problems in the caregiver. The purpose of this study is to determine if a positive correlation exists between the caregiver's perceived burden and the patients degree of agitation and aggression. The results will be important in helping the neuropsychologist develop appropriate interventions with the dementia patient and his/her caregiver.

DEFINING THE RECOGNITION OF K^{bm3} AND L^d BY THE ALLOREACTIVE 2C T CELL

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In immunology, alloreactivity occurs when a single receptor, such as a T cell receptor, normally specific for a single molecule, recognizes more than one distinct molecule. The purpose of this project is to elucidate one of the possible mechanisms behind alloreactivity. A better understanding of allorecognition may help clarify the process of positive selection of T cell receptors during fetal development, in which the body eliminates T cells bearing receptors for its own molecules that could later lead to autoimmune diseases.

In this project we studied the alloreactive 2C T cell receptor (TCR), which recognizes products of two different alleles of the class I major histocompatibility complex, a cluster of genes that codes for the class I MHC cell surface proteins. Other studies have documented that the two alleles code for molecules that differ chemically from each other. Our data support other studies that suggest the presence of a different peptide bound in the class I MHC binding groove of each protein. This implies that the T cell receptor can recognize two MHC/peptide complexes that are very different from one another. We investigated this dual specificity using plasmid constructs (genetically altered pieces of DNA), which were transfected into murine (mouse) cells that expressed the protein with the intended mutation intact. While this project is still in progress, we have already completed the plasmid constructs, transfected the murine cells, and demonstrated the presence of different peptides for each of the two MHC molecules. We have also defined the conditions to be used for future chromium release assays to determine the effects of each mutation on recognition by the 2C T cells. It is expected that the T cell receptor must recognize separate epitopes (i.e. contact points) on each complex to allow for this dual specificity.

REINFORCER DEMAND ELASTICITY UNDER DIRECT COMPETITION BETWEEN RATS

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Economic theory shows that cost is an inverse function of the quantity of a commodity. This has also been shown in studies of behavioral economics (Dougan, 1992). According to the law of supply and demand, competition should drive prices up more rapidly. Previous studies have failed to find an effect of competition; however, the competition was indirect in those studies (Johns & Dougan, 1994). In the present experiment, twelve female rats actively competed in pairs for reinforcers, on each of four fixed interval (FI) schedules: FI 30 s, FI 60 s, FI 120 s, and FI 240 s. A modified operant chamber was used and the animals were separated by a wire barrier. For each schedule, the animals were tested both with and without competition from another rat. The non-competition days served as controls. As expected by the law of supply and demand, the competition condition increased the slope of the relationship between obtained cost and reinforcer quantity. The results have a variety of implications for schedule behavior in general and behavioral economics in particular.

THE EFFECTS OF HIGH SCHOOL MATHEMATICS AND SCIENCE CLASSES ON WAGES

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The popular press is full of claims that as the world becomes a more technological place, mathematical and scientific knowledge is becoming a necessity, not an extra selling point. There are projections that by the year 2000, almost all jobs will be technical in nature. However, these claims and projections are seldom backed by empirical research. Therefore, this project attempts to fill that gap. If mathematical and scientific knowledge is really essential to the workplace, then people with that knowledge should earn more. Thus, I test if there is a positive correlation between taking an abundance of mathematics and science classes in high school and wages later in life.

I use the Human Capital Model as my theoretical framework. An individual's human capital consists of their acquired productive skills, talents, ability, and knowledge. Human capitalists believe that schooling enhances productivity, which in turn increases wages. My research analyzes two samples taken from the National Longitudinal Survey of Youth. The first is a group of individuals that had completed exactly twelve years of education. The second group of respondents had exactly sixteen years of education.

My results show that the human capital factors of previous work experience and age positively affect wages. Further, demographic variables such as having children present in the home or being male also increase wages. My results fail to show that high school mathematics and science classes are more beneficial than other classes. None of my variables that measured the number of classes are significant. The final steps of my research will include looking at the differences between my two samples and examining why my results were not as expected.

DIVISION OF LABOR AND THE ECONOMIC DETERMINANTS OF DIVORCE

Ginny Shull and Dr. Michael Seeborg*, Department of Economics, IWU

The theme of the 1992 National Republican Convention rang out with such phrases as the "traditional family" and "family values," and many conservatives asserted that a return to these molds of the established institutions of marriage and family would be the solution to the societal ills America now faces. Using Gary S. Becker's neo-classical theory on the family, this study researches the economic causes of divorce and hypothesizes that, from an economic standpoint, the "traditional family" is more likely to remain intact than a household with a non-traditional family structure. A sample of married couples were drawn from the National Longitudinal Survey of Youth (NLSY), and logistic regressions and descriptive statistics were utilized to measure and explore the economic variables affecting the dissolution of marriages in terms of Becker's theory. Although support was not found for Becker's theory, several economic determinants of divorce were revealed.

TWO METHODS FOR FINDING NUMERICAL BOUNDARY QUADRATURES OF MULTIVARIATE INTEGRATION

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There are many instances in which the value of an integral cannot be evaluated directly. We have to be satisfied with finding approximate values for these integrals by using numerical quadratures. The information about the function that we can use to form a numerical quadrature is often limited to points on the boundary of the integral domain. This project studies two methods of constructing a numerical quadrature of multivariate integration for the function values at nodes on the boundary of the integral domain.

The first method for obtaining a boundary quadrature for multivariate integration is the algebraic method. In this method we can construct a boundary quadrature with the highest possible algebraic accuracy degree and the fewest possible nodes of multivariate integration over some symmetric domain.

The second method that is used to construct a boundary quadrature is an analytic procedure. In this method we construct a boundary quadrature of the highest possible algebraic accuracy degree by using a lowering dimensionality expansion for multiple integrals over any domain with a piecewise smooth boundary. We are also able to give the best possible estimates for the remainders of the lowering dimensionality expansion.

HABITAT FOR HUMANITY: AN EVALUATION OF PARTICIPANTS' FEELINGS ABOUT HOME OWNERSHIP

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Habitat for Humanity officially began in 1976 and was founded by Millard Fuller. It is an international social service organization whose main goal is to eliminate inadequate and poverty housing. This goal is achieved by helping low income families acquire their own home through sweat-equity and with the help of volunteer Habitat workers.

The purpose of this portion of the study is to evaluate the Habitat for Humanity project from the perspective of the families who participated. This segment specifically addresses the families' feelings about their experiences after moving into their home.

All twenty-six families in the McLean County area who have been homeowners anywhere from a few months to about ten years were interviewed. Statistical findings indicate that the families feel significantly better about living in their own home. Many other positive aspects about Habitat for Humanity were found such as: higher educational aspirations (for themselves and their children), an increase in overall happiness of their children and an improved outlook on their life.

The Case for High Returns:
A Study of the Pharmaceutical Industry

David Taylor and David Russell*, Department of Business Administration

This project analyzes the abnormal returns that the larger pharmaceutical firms generate by studying such variables as R&D expenditures, demographics, and market structure and their effect on the abnormal returns pharmaceutical firms generate for their stockholders. A company's abnormal return is the difference between the return on that company's common stock and the market return. The principal hypothesis is that investment in research and development, the aging population, and increasing generic market share, significantly affect the abnormal returns generated by pharmaceutical firms. This project will also examine how other aspects of the pharmaceutical industry distinguish it from other industries and how these characteristics may account for the abnormal returns that pharmaceutical firms generate for their shareholders.

AN ANIMAL MODEL OF ALZHEIMER'S: THE USE OF THE NEUROTOXIN AF64A IN COMBINATION WITH GLUCOCORTICOIDS TO DIFFERENTIATE THE IMPORTANCE OF CHOLINERGIC PATHWAYS IN LEARNING AND MEMORY.

Gregory P. Tinkler, and Dr. Wayne Dornan*, Department of Psychology, IWU.

There are approximately four million patients with Alzheimer's Disease (AD) in America today, with about 100,000 new cases being diagnosed every year. AD patients exhibit a prolonged loss of cognitive function, with learning and memory being among the first faculties to be affected. The pathological hallmarks of AD include senile plaques, comprised of the protein β-Amyloid. It is hypothesized that the aggregation of the β A protein into senile plaques in areas involved in learning and memory- such as the hippocampus- either causes the deficits seen in AD or acts synergistically to render the brain more vulnerable to insult. Previous efforts by our lab combining a neurotoxin with β A in the rat have demonstrated this, as well as β A in combination with the stress hormone corticosterone, which has been thought to exacerbate hippocampal damage in high levels. The deficits, however, have not been consistent. As an animal model of AD necessitates the dependability of these deficits, another possibility is being explored. The neurotransmitter system affected first and foremost in AD is the cholinergic system of the septohippocampal pathway. This is evidenced by a decrease of cholinergic markers such as choline acetyl transferase in AD brains. Much attention has been focused on the possibility of increasing the amounts of these cholinergic markers as a treatment for AD. The same premise has also been applied to the development of an animal model: a recent study by Hortnagl et al has demonstrated that intraventricular injections of a neurotoxic choline analog AF64A in combination with chronic glucocorticoid administration results in a decrease of cholinergic markers. This study, however, did no assessment to determine whether there were any resulting behavioral effects. We will attempt to expand on the Hortnagl study by assessing the effects on spatial learning in rats that have received injections of the neurotoxin AF64A and in combination with chronic stress. The Morris Water Maze will be used to test for behavioral deficits. The results of this study will be compared to another study at this conference which utilizes a highly selective cholinergic immunotoxin.

BRIGHT HOPES AND BLOODY REALITIES: THE DIPLOMATIC PRELUDE TO THE WINTER WAR

Steven Webster and Paul Bushnell*, Department of History, IWU

While the snows of Karelia were laced with the blood of thousands of innocents, few men stopped to ponder the origins of the war. But now, more than fifty years later, hindsight has uncovered the roots of the Russo-Finnish conflict of 1939-1940. This project deals with the diplomatic initiatives instigated by the Soviet Union in 1938 and continues to cover Russo-Finnish relations until their breakdown in November of 1939. In the midst of the political maelstrom of the late 1930's, naiveté and arrogance prevailed on both sides of the border. A thorough examination of diplomatic records and government documents reveals the extent of the negotiations and the inevitability of the conflict.

PREDICTORS OF RELAPSE AND LONG-TERM RECOVERY IN PANIC DISORDER

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Previous studies of panic disorder have examined predictors of relapse in the short-term. This study investigated predictors of relapse and *long-term* recovery in panic disorder treated with alprazolam or alprazolam plus cognitive behavior therapy (CBT). Relapse was defined as a return to medication or other panic disorder treatment after discontinuation. Logistic regression analysis was used to determine if any predictors of relapse versus long-term recovery were evident. The results and implications for future treatment will be discussed at the 6th Annual IWU Student Research Conference.

PHOTOCHEMISTRY OF THE NITRITE ION

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Nitrogen compounds contribute to many environmental problems such as acid rain, air pollution, groundwater contamination, and smog formation. When the atmosphere is heavily polluted with nitrites and aromatic hydrocarbons, these compounds can undergo some type of photochemical reaction. By attempting to understand how this reaction occurs, society comes closer to repairing the damage it has done and prevents further problems. This project studied the photochemistry of the nitrite ion in aqueous basic solution which served as a concentrated reaction model of smog formation. Both OH and NO radicals are produced during photolysis, but the two radicals recombine in the presence of pure water causing no net reaction. However, aromatic compounds present in the solution being photolyzed can act as scavengers reacting with either one or both radicals to produce different compounds. At present, two scavengers have been studied in the basic nitrite solution: benzene and phenol. Upon 24 hour photolysis, both solutions have darkened considerably with the benzene solution changing from clear to brown/orange and the phenol solution changing from yellow to dark brown. Thermal reactions for the same amount of time have yielded no such results. Methylene chloride preceeded by acidification has been used to extract the photolysate. UV-vis spectroscopy, FTIR, TLC, HPLC, and column chromatography have been used in the attempt to separate and characterize the products of both the benzene and the phenol photolysates. Products that are most likely to be present include p-nitrosophenol and phenol (from the benzene photolysate).

'TIL DEATH DO US PART: THE COMPOSITION AND PRODUCTION OF A CONTEMPORARY LYRIC OPERA

D. Christopher Wolff and David Vayo*, School of Music, IWU

'Til Death Do Us Part is a two-act lyric opera, with an original libretto, composed between 1991 and 1995. The work is written for seven principal vocal roles, several minor roles, a small chorus, and a pit orchestra of twenty-six musicians. The one hour, forty-five minute production consists of fifteen major arias and duets, three large choral pieces, five recitative sections, three incidental segments and a few purely instrumental compositions. The individual recitatives and arias are primarily influenced by contemporary concert music, but also reflect my interest in jazz and popular musical styles.

The composition of this piece allowed me to explore the dramatic and musical interpretation of text, large scale musical form, and the utilization of drama as a model of expression. I created recurring themes, motives, and harmonic progressions, in order to unify the work so it was complete in itself rather than a number of musically unrelated pieces held together only by the libretto. *'Til Death Do Us Part* has also provided me with multiple opportunities to interact with and learn from student and faculty performers. Working on such a large scale project has brought me to a greater understanding of orchestration, harmonic language, and melodic contour, as well as contemporary notation and performance techniques. I look forward to producing this opera, so that I can not only hear, evaluate, and learn from a performance of my work, but also share it with others. The work is scheduled for its premiere performance on Saturday, May 6, 1995, at 7:30 p.m., in Westbrook Auditorium, IWU.