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1993, 4th Annual JWP Conference

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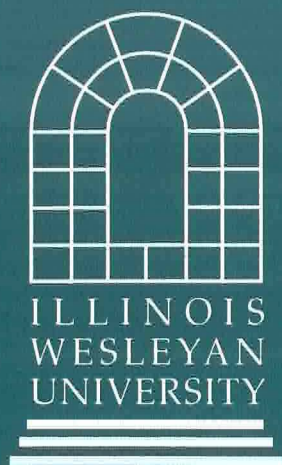
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IWU Student Research Conference Program

Fourth Annual ILLINOIS WESLEYAN STUDENT RESEARCH CONFERENCE

MAY 8, 1993

SCHEDULE OF ACTIVITIES

9:30 A.M. - 11:30 A.M.	POSTER SESSION AND RECEPTION
11:45 A.M.	GROUNDBREAKING CEREMONY FOR THE CENTER FOR NATURAL SCIENCE AND LEARNING
2:00 P.M. - 2:30 P.M.	POSTER SESSION
2:35 P.M. - 4:30 P.M.	ORAL PRESENTATIONS
4:35 P.M.	CONCLUDING REMARKS AND PRESENTATION OF CERTIFICATES BY DR. MINOR MYERS JR., PRESIDENT, ILLINOIS WESLEYAN

The Organizing Committee would like to thank:

Minor Myers, jr, President, IWU

Pamela Muirhead, Acting Dean of the Faculty

Bruce Criley, Professor and Chair of Biology

Wes Chapman, Assistant Professor of English

David Bailey, Director of Natural Science

Georganne Rundblad, Instructor of Sociology/Anthropology

Carl Teichman, Assistant to the President

Mary Ann Alderson, Executive Secretary - President

Jennifer Johns

Student Senate

Members of the Organizing Committee

Teddy Amoloza, Assistant Professor of Sociology

Wayne Dornan, Assistant Professor of Psychology

Gail Lima, Assistant Professor of Biology

Wendy Wolbach, Assistant Professor of Chemistry

STUDENT PARTICIPANTS

Sarah Bartz
John J. Beemsterboer
Jason L. Buberel
Jie Chen
Doug Drexler
S. B. Eyer
Niki Handlin
Rebecca Inch
Jennifer D. Johns
David Kang
Abhishek Kejriwal
Maureen Koneval
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Stephanie Jeter
George Kambouroglou
Esther Kang
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Mary Lynn Kopetz
Douglas M. Macomber
Melanie McDiarmid
Melissa L. Mitchell
Amy R. Parker
Jason Pequette
Christopher J. Raistrick
Tamara K. Ross
Kathryn E. Shanks
Angelica Ushatova
Amy M. Webb
Malynnda Wright
Biao Zhang

STUDENT ABSTRACTS

* Indicates Faculty Supervisor

THE STATE OF COMPUTER SCIENCE FACILITIES OF SCHOOLS ACROSS THE UNITED STATES THAT ARE COMPARABLE TO ILLINOIS WESLEYAN UNIVERSITY

Sarah Bartz, Dept. of Computer Science, IWU, Dr. Lisa Brown*

The purpose of this study is to compare Illinois Wesleyan's academic computer facilities with those at other comparable U.S. colleges and universities. This study also investigates factors affecting these facilities such as the methods other institutions use to deal with and plan for the constantly changing computer world. To obtain this information a survey was mailed to over 250 institutions across the U.S. that were considered comparable to IWU. These institutions include the Associated Colleges of the Midwest, the Oberlin Group, and some of the top colleges and universities in the U.S. as ranked in U.S. News and World Report's "America's Best Colleges". In order to facilitate a high return rate the survey was kept short and simple, letters were personalized whenever possible, a self-addressed and stamped return envelope was provided, and a copy of the results was promised to those who participated. Ninety-seven useable responses were received, which provided information such as: the number and type of computers and computer operating systems, the ability of students to remotely connect to the campus network, the facilities hours, the disciplines that use the facilities most, the number and type of staff, the reporting structure, the budget, the upgrading policy, and the education level of the director. These responses were then analyzed based on the size and budget of the school and compared with Illinois Wesleyan University.

EATING AWAY:
WOMEN'S RELATIONSHIP WITH FOOD IN LITERATURE

Sheila Bauer, Department of English
Illinois Wesleyan University, Dr. Barbara Bowman*

Eating disorders disrupt the lives of thousands of women each year. While treatment of these diseases is usually successful, prevention is not. The question, then, becomes why do women destroy themselves with food?

As usual, literature reflects reality and gives us several insights into the causes behind eating disorders. Three contemporary novels, The Edible Woman, by Margaret Atwood, Quartet in Autumn, by Barbara Pym, and The Fat Woman's Joke, by Fay Weldon, demonstrate the problematic relationships women often have with food and eating. While the manifestations of the disorders are very different, the causes behind them are quite similar in all three novels.

First, all three of these novels indicate major events, or times of conflict, where the women's eating disorders begin. After this conflict, all three of the protagonists fear a lack of control over the direction of their lives. Finally, all three women find their senses of self or their identities in their social structure changed or threatened in some way. This factor is the most significant in bringing on the eating disorders from which these women suffer.

Of the three women, one does not survive. Marcia, in Pym's Quartet in Autumn, starves herself to death. The other two women both overcome their disorders, but only after intense struggles with the issues of control and identity. Once each woman has reclaimed control over her life and re-established her own identity in her social structure, she begins to recreate her sense of self and only then can she resume normal eating habits.

PREDICTIVE CHARACTERISTICS OF CRISIS WORKERS: OFF THE BEATEN PATH

John J. Beemsterboer, Dept. of Psychology, IWU, DR. Robert Lusk*

Crisis intervention centers, such as PATH, provide an important and much needed service to their communities. However, PATH's current screening method admits a sizable number of trainees who are either not capable or simply cannot make it through training. A more sensitive screening process is needed. To accomplish this goal, the present study will compare successful trainees versus non-successful trainees using the following measures: the 16PF, the PAI, a Self-rating form, a Supervisor Rating form, a Questionnaire checklist, and Roleplay evaluations.

It is predicted that successful trainees will score higher on specific scales of the 16PF, Self-ratings, Supervisor Ratings, and Roleplay evaluations. It is further predicted that they will score lower on other specific scales of the 16PF and on the PAI.

CAUSES AND EFFECTS OF WELFARE DEPENDENCY

Chris Bisailon, Dept. of Economics, IWU, Mike Seeborg*

The effect of welfare on work incentives has been a hotly debated topic since its inception in 1935. My research project examines the work incentive effects of an important component of the welfare system, namely Aid to Families with Dependent Children. I have done this by analyzing data drawn from a massive database of 12,800 youths called the National Longitudinal Survey of Youth.

I primarily use two theories for my analysis, the neoclassical theory of labor supply and the welfare-disincentive theory promoted by Charles Murray. These two theories allow me to formulate and test a number of hypotheses regarding the determinants of welfare dependency. The empirical part of the paper has two purposes. The first is to identify attitudes and background characteristics that are related to welfare dependency. The second purpose is to determine how AFDC dependency in the early 1980's effects labor force participation, poverty, and net income in the late 1980's.

For the most part, the results of my study reinforced my research hypotheses. For example, individuals who were AFDC dependent in the early 1980's experienced economic difficulties in the late 1980's such as, a higher incidence of poverty, lower net incomes, and fewer hours of labor supplied. The study also identified factors which make one more likely to become welfare dependent.

**NEUROKININ K AND NEUROKININ P MODULATION OF MALE COPULATORY
BEHAVIOR AND THE EFFECT ON C-FOS IMMUNOREACTIVITY IN
THE MALE RAT BRAIN.**

Jason L. Buberel, Departments of Biology and Psychology, IWU. Dr. Wayne Dorman*

There is a body of accumulating evidence regarding male rat copulatory behavior that has implicated several key structures in the rat brain that modulate sexual behavior. These structures include the medial preoptic area, the medial amygdala, the bed nucleus of the stria terminalis, the midbrain tegmental area, and the accessory olfactory bulb. Lesion and electrical stimulation studies have shown that the above areas are integral in the expression of male sexual behavior. In addition to this, research on the role of neurokinins in the neurochemical mechanisms underlying these behaviors also indicate that several of the derivatives of the neurokinin P gene are both manufactured and released in the above areas. Among these products, neurokinin K has been demonstrated to produce a profound inhibition of all aspects of male sexual behavior. When injected into the lateral ventricles at a sufficient dose, neurokinin K is known to completely inhibit all expression of male sexual behavior. What has yet to be shown is how this neurokinin is altering neuronal activity patterns in the rat sexually dimorphic circuit outlined above. Another product of neurokinin P gene, neurokinin P, was also be used in this study. To date, intraventricular injections of neurokinin P have not been shown to produce any significant behavioral effects in the male despite its know stimulatory properties. To quantify these changes in neuronal activity following injections of these two peptide, *c-fos* immunocytochemistry was used as a technique for determining recent neuronal activity at the cellular level. In this experiment, we used *c-fos* immunocytochemistry to visualize changes in neuronal activity in the male rat sexual circuit induced by intraventricular injections of neurokinin K, neurokinin P or saline.

THE EFFECTS OF SESSION TIME AND SATIATION ON THE FORM OF THE VI RESPONSE FUNCTION.

Laura S. Campbell, Dept of Psychology, IWU
James D. Dougan.*

There has been considerable controversy over the empirical form of the function relating response rate to reinforcement rate on simple Variable Interval (VI) schedules. Traditional theories predict monotonic functions, while more recent economic and regulatory theories predict bitonic functions. Two experiments examined the effects of session time and satiation on the form of the VI response function. In Experiment 1, rats pressed bars for food on a series of VI schedules differing in reinforcement rate. All sessions were 10-minutes long, but occurred at either the start or at the end of a larger 30-minute session. Bitonic functions were found in both conditions, although response rates were generally higher when responding occurred at the end of the 30-minute block. In Experiment 2, rats experienced the same series of schedules during 10-minute sessions, but received pre-session feedings before half of the sessions. Again, bitonic functions were found under both conditions, although the functions were more strongly bitonic in the prefeeding condition. The present experiments support regulatory and economic theories over traditional theories because bitonic functions predominated.

A Lattice Gas Approach to the Structure and Dynamics of Electrorheological Fluids

Jie Chen and Garrett Davis, Department of Physics, IWU
Narendra K. Jaggi*

Electrorheological fluids consist of a colloidal suspension of dielectric particles in a continuous fluid of smaller dielectric constant. Molecular dynamics (MD) simulations of these fluids in an applied electric fields have recently been shown to produce percolated, columnar structures. No systematic attempt has been made so far to simultaneously include the effects of temperature (thermal disordering) and the viscous drag due to the continuous fluid. We propose a dipolar lattice gas model for electrorheological fluids and study the resulting structures and dynamics. We attempt to incorporate the effect of the viscosity of the continuous medium by a dynamic ansatz that determines the range over which individual particles can jump in a single simulation event. The temperature is simulated by assigning a probability of jumping to higher energy states in accordance with the Boltzman distribution. We study the equilibrium phases of the system as a function of temperature and find interesting new results.

We find that the structures are very similar to what is observed experimentally and in earlier MD simulations. Our new results from finite temperature simulations suggest that there is a gradual phase transformation from a liquid like phase at low electric field and high temperature to a solid like phase at high electric field and low temperature. The simplicity obtained by going to a lattice version will allow us to carry out these simulations even in three dimensions, where little is known about these systems.

[This work is supported by a NASA / JOVE grant to Illinois Wesleyan University Physics Department.]

PARENTAL INVESTMENT IN THE
HOUSE WREN (*Troglodytes aedon*)

Doug Drexler, Dept. of Biology, IWU,
John Cavitt (Illinois State University), and R. Given Harper*

The parental investment hypothesis of resource utilization (Trivers 1972) states that a parent will maximize his or her lifetime reproductive fitness by using the most energy and time efficient method available in the process of reproduction. According to the parental investment hypothesis, if the parents and offspring are subjected to food shortages, the feeding activity of both parents will be necessary to maximize their reproductive success. In contrast, in a polygynous avian species such as the House Wren (*Troglodytes aedon*), if food is abundant during the nestling stage, the male should increase his reproductive success by seeking out extra-pair copulations or acquiring another mate.

The parental investment hypothesis was tested in House Wrens by simultaneously manipulating the brood size (the number of offspring in a nest) and the food availability to simulate conditions of food shortage and surplus. House Wren broods were manipulated to one of five treatments by adding or subtracting nestlings from the brood, and by the addition of a supplemental food source. Nestwatches were conducted on the experimental nests to determine adult feeding behavior and to determine the extent to which supplemental food was utilized.

THE ECONOMIC AND POLITICAL FEASIBILITY OF AN AMERICAN INDUSTRIAL POLICY

Brian S. Driscoll, Dept. of Political Science, IWU, Dr. John Wenum*

Historically, industrial policy in the United States has been left to the private sector. However, due to the rise of Japan and the European Economic Community in the global marketplace, and their use of state-sponsored industrial policy, there are increasing calls from both the private sector and the government to initiate its own industrial policy. This policy would have to focus on increasing productivity and international competitiveness, reinvesting in education and infrastructure, cooperating with the private sector on Research and Development projects, and in the very long term help eliminate the budget and trade deficits. These policies, if implemented correctly, will strengthen the American economy in the long run, which makes the plan economically feasible. Political feasibility, though, presents its own problems that make such a program difficult to pass through Congress. This research will attempt to explain the costs and benefits of such policy, and show what the most economically and politically feasible industrial policy would entail.

A REVISED CHECKLIST OF MACROLICHENS
IN THE LAND BETWEEN THE LAKES NATIONAL RECREATION AREA
OF KENTUCKY AND TENNESSEE

S. B. Eyer, Department of Biology, IWU, J. P. Dey*

In 1970 H. C. Phillips of Austin Peay State University published a list of the macrolichens found in the Land Between the Lakes National Recreation Area, of Kentucky and Tennessee, in which he noted the presence of 20 genera and 82 species. In light of recent changes in macrolichen taxonomy, and the presence of additional species noted by J. P. Dey in 1988, a resurvey of the area was conducted. Specimens from Phillips' study obtained from the Austin Peay State University Herbarium, as well as specimens collected in 1988 and 1992, were examined. In particular, attempts were made during collection trips to collect at least one specimen of each type noted by Phillips. Specimens were identified using morphological and anatomical characters, as well as chemical spot tests and thin-layer chromatography. The total macrolichen census to date includes 36 genera and 115 species. Work continues on some of the specimens.

PHOTOCHEMISTRY OF NITROUS ACID IN BENZENE

Mark Gibson, Dept of Chemistry, IWU, Tim Rettich*

Nitrous acid is thought to have an important role in atmospheric pollution. It absorbs long wavelength ultraviolet light efficiently and undergoes photochemical reactions to produce hydroxyl radical, which contributes to smog formation and ozone depletion.

Photolysis of the aqueous nitrous acid/nitrite ion system at 366 nm results in the formation of hydroxyl radical and nitric oxide. The relative contributions of radicals from the molecular and ionic forms is unknown. This study is intended to concentrate upon the contribution of radicals from molecular nitrous acid.

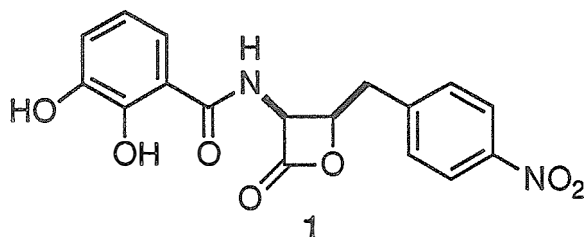
The photochemistry of nitrous acid is studied in benzene in order to eliminate the contribution from nitrite ion which is insoluble in benzene. An added benefit of benzene is its ability to scavenge the radicals, to form the products phenol and paranitrosophenol, which can be observed using UV-Vis spectroscopy. Without this scavenging reaction, direct observation of hydroxyl radical is difficult.

Thermal reaction of nitrous acid in benzene has been observed to occur at room temperature. The rate of this reaction is significant and must be accounted for in quantifying the photochemical reaction. The reaction solutions were cooled to 5°C to decrease the rate of thermal reaction.

Photolysis of nitrous acid in benzene with 366 nm mercury lamps has been shown to cause a loss of the reactant nitrous acid by disappearance of the characteristic peak absorbances in the ultraviolet spectrum. Also, peaks which may correspond to the products have been observed growing into the UV. These peaks occur at 300 nm which is where phenol and paranitrosophenol are known to absorb in the UV.

A POSSIBLE NEW SYNTHESIS OF (+)-OBAFLUORIN
A β -LACTONE ANTIBIOTIC
Niki Handlin and Jeffrey Frick*
Department of Chemistry
Illinois Wesleyan University, Bloomington, Illinois

Obafluorin (**1**), an antibiotic with a β -lactone ring is proposed to have the same stereochemistry as other β -lactam antibiotics such as the penicillin and cephalosporin families. The biological importance and synthetic challenge of such an antibiotic as obafluorin has increased the interest in synthesis of β -lactone antibiotics. Our research focuses on the synthesis of the title compound, (+)-obafluorin from (*L*)-serine, in an attempt to find an improved method of obtaining optically pure product.



THE EFFECTS OF THE HEMATOPHAGOUS MITE (*Dermanyssus hirundinis*)
ON NESTLING HOUSE WRENS (*Troglodytes aedon*).

Jennifer L. Hoyer, Biology Dept., IWU, Andrew Pacejka, ISU, R. Given Harper*.

The house wren (*Troglodytes aedon*) is a small, insectivorous, migratory passerine bird that nests in secondary tree cavities and nestboxes. Both hematophagous (blood-sucking) mites, *Dermanyssus hirundinis*, and predatory (non-blood-sucking) mites, *Androlalaps casalis*, have been observed in the nesting material of the house wren. However, no studies have investigated their effects on nestling house wrens. In other avian species such ectoparasites have had adverse effects on nestlings, including low nestling mass, premature fledging (i.e. nest leaving) dates, and low nestling survival.

The purpose of my study was to determine the effects of *Dermanyssus hirundinis* on the mass at fledging and survival of nestling house wrens. The study was conducted from 1990-1992 in a population of house wrens that bred in nestboxes (N=910) near Bloomington, IL. Mites were extracted from the nesting material in the nestboxes from May-August of each year, and were then counted. These data were then correlated to nestling mass and the date of fledging. The results of this study will be presented at the research conference.

THE ANIMAL TALE AS A REFLECTION OF SOCIETY IN THE NOVEL RABBITS AND BOA CONSTRICTORS BY FAZIL ISKANDER

Rebecca Inch, Dept. of Foreign Languages, IWU, Marina Balina*

My research has centered on discovering the tradition and innovation in the development of the genre of an animal tale in Russian literature as a form for the criticism of society.

In Russia, the animal tale has deep roots. Starting in medieval times, wandering clowns (skomoroxs) performed animal tales to show their criticism of the regimes by using the form of the folklore animal tale. The well known form of the folklore animal tale was enriched by animal fables that were introduced to the Russian reader from France and Germany in the 18th and 19th centuries that led to the development of the genre of the Russian animal fable combining the features of the Russian folklore and the achievements of foreign literature. Ivan Krylov was one of the first Russian writers to use the new form of the animal fable as a satirical form of the criticism of the society.

Using the Russian tradition of the animal tale and the animal fable as a form of social criticism, Fazil Iskander in the book Rabbits and Boa Constrictors introduces the reader to the real Soviet society through two animal groups--the Rabbits and the Boa Constrictors. The animals create examples of two societies that function similarly, with one being weaker (the Rabbits) the other being stronger (the Boa Constrictors). But Iskander also shows society is typological in tyrannical situations. The Rabbits and the Boa Constrictors both have dictators as rulers in their societies that use fear to keep the animals from rebelling. Iskander demonstrates that fear is the leading factor that keeps dictators in power.

Every oppressed society suggests different forms of rebellion. Ponderer and Sharpie are the two main characters, both of which are Rabbits. Ponderer seeks to change the system so that the individual is not destroyed. Sharpie, who also starts as a rebel of the system, is later corrupted by the system and then used as a tool of the government to undermine Ponderer's efforts.

The novel is full of parallels with contemporary Soviet system. Metaphorical images are very transparent and can be easily deciphered.

HOLOCAUST LITERATURE

Stephanie Jeter, Department of Foreign Languages, IWU, Marina Balina*

The question of whether the Holocaust actually occurred is still being debated in the context that as an event becomes more distant, its actualities appear unreal, and the number of witnesses decreases every year. In the fast-paced and self-focused life of the twentieth century, people tend to forget or prefer not to think about past atrocities.

Works of literature that depict the horrors of the Holocaust are of special importance because they serve as constant reminders of World War II, and are intended by the authors to prevent a reoccurrence of such disasters. Among this rich variety of literature dedicated to the topic of the Holocaust, the Holocaust poetry assumes a special place. The poetry that was written during the Holocaust occurred under the most horrifying circumstances; it was written in concentration and in labor camps. This paper will suggest that this poetry can be considered not only as works of literature but also as historical documents.

Holocaust poetry suggests unique evidence of historical documentation and poetic expression. The poets of the Holocaust were mostly amateurs; in many cases, their poetic expression was their first and last chance to communicate with this world in this form and at the same time leave evidence of their physical presence in this world.

SUPPLY, DEMAND, AND COMPETITION ON SIMPLE INTERVAL SCHEDULES

Jennifer D. Johns, Dept. of Psychology, IWU, Dr. James D. Dougan*

Recent studies have shown that the law of supply and demand describes behavior on simple Variable Interval (VI) schedules. When the quantity of reinforcement supplied is large, rats will "pay" less for the reinforcer than when the quantity supplied is small. Two studies examined the effects of social context on the economic behavior of rats on VI schedules. Rats responded on a series of VI schedules differing in reinforcement rate. During half of the sessions, a second rat was placed in the chamber, behind a plexiglass screen. As predicted by economic theory, there was an inverse relationship between quantity of reinforcer supplied and the obtained behavioral cost of reinforcement. In addition, the presence of a "competitor" rat altered the relationship between supply and cost.

DETERMINATION OF EFFECTIVE TEMPERATURE AND SPECTRAL CLASS OF G AND K STARS FROM SYNTHETIC SPECTRA

George Kambouroglou, Dept. of Physics, IWU, H. L. Detweiler*

The intention of this study is to develop a model for determining the effective temperature, T_{eff} , and hence, the spectral class of stars by means of examining the line ratios of a given set of *synthetic* spectra. Line ratios measurements have been restricted to the wavelength region of 3900 Angstroms to 4600 Angstroms, since many significant spectral features are observable throughout this range. The available synthetic spectra temperature range is between 4000 K and 6000 K. It is observed that next to H and K, the strongest line in the blue region is the resonance line of calcium at 4226 Angstroms; it is a sensitive indicator of temperature as are other ratios, including the ratio Fe 4325 Angstroms to 4226 Angstroms.

AN ANIMAL MODEL OF ALZHEIMER'S DISEASE I : BEHAVIORAL AND HISTOLOGICAL ASSESSMENT FOLLOWING INTRAHIPPOCAMPAL INJECTIONS OF A B-AMYLOID 25-35 IN THE RAT

David Kang, Dept of Psychology, IWU, Dr. Wayne A. Dornan*

Perhaps no other pathology has caused more interest in the neuroscientific community in recent years than Alzheimer's disease (AD). Alzheimer's disease is a neurodegenerative disease and the major cause of dementia in North America. Moreover, it is presently the 4th major cause of death in the U.S. The total annual cost to the nation for the care of AD patients is estimated at 90 billion, including medical and nursing home care, social services, and early death. More importantly, for victims and their loved one, the dementias are devastating. Thus AD represents a formidable challenge for the research community. While the mechanism of neuronal atrophy in AD is unknown, pathologically AD is characterized by extracellular deposition of neuritic plaques (NP) and a generation of neurofibrillary tangles typically found in the cerebral cortex, hippocampus and basal forebrain. Accumulating evidence suggests that the major constituent of NP, a beta-amyloid protein composed of 39-42 amino acids, possesses neurotoxic properties. Presently, nothing is known regarding the effects of intracerebral injections of beta-amyloid on memory. In this study the effects of a variety of doses of beta-amyloid on spatial memory were assessed following bilateral injections into the hippocampus. Memory deficits (working and reference) were assessed in a 8-arm radial arm maze. Preliminary results indicate that there is a clear disruption of learning in the experimental animals. These results, along with a preliminary analysis of the cytoarchitecture of hippocampal and basal forebrain neurons will be presented.

AN ANIMALS MODEL OF ALZHEIMER'S DISEASE III:
CHARACTERIZATION OF NEURONAL DEGENERATION USING THE
TECHNIQUE OF IMMUNOCYTOCHEMISTRY FOR
GLIAL FIBRILLARY ACIDIC PROTEIN

Esther Kang, Dept of Natural Science, IWU, Dr. Wayne A. Dornan

Alzheimer's disease (AD) currently affects an estimated 4 million Americans. Manifested initially by mild forgetfulness, this devastating disease eventually erodes all cognitive abilities. Neuropathologically AD is characterized by neuritic plaques (NP) and intracellular neurofibrillary tangles (NFT). Although the etiology of AD is unknown, NP deposition has been suggested to play a fundamental role. Recently, the major component of NP has been identified as a B-amyloid protein that exists in an insoluble state. This pathology is invariably accompanied by the proliferation of adjacent glial cells in response to neuronal degeneration. In particular, postmortem studies of AD patients show a marked increase in the level of glial fibrillary acidic protein (GFAP) due to astrogliosis. Moreover, recent development of immunocytochemical techniques which stain specific proteins, have shown strong correlation between the degree of dementia in AD patients with the degree of intensity of GFAP staining. These results strongly suggest that immunocytochemistry for GFAP is a reliable tool in measuring neurodegeneration in AD patients.

In a study that is being conducted concurrently (see David Kang's abstract), intrahippocampal injections of Beta-Amyloid (25-35) or Ibotenic Acid have been used to induce a potential animal model of AD. In this study GFAP immunocytochemistry will be employed to assess the degree of neuronal degeneration in these animals. The result of this assessment will be presented at the conference.

GENERAL UNIVERSITY REQUIREMENTS FOR GRADUATION

Abhishek Kejriwal, Dept of Computer Science, IWU, Lisa Brown*

The objective of my research project was to write a computer program in Turbo Pascal which would determine how many general university requirements a student has completed and what requirements he or she needs to complete in order to graduate. There are six degrees offered at Illinois Wesleyan University. They are: BA (Bachelor of Arts); BS (Bachelor of Science); BFA (Bachelor of Fine Arts); BSN (Bachelor of Science in Nursing); BM (Bachelor of Music) and BME (Bachelor of Music Education). There is a different set of criteria to be met for the completion of each of these degrees. The program processes student records and generates the appropriate check form.

Coding this problem and generating the output were extremely difficult because there are several classes, sub-classes, permutations and combinations possible to satisfy a requirement. Just to give a flavor of the complexity I will give an example. As stated earlier there are six degrees, each with different requirements. One of them is the BA. Humanities is one of thirteen requirements a student has to meet to complete the BA degree. To meet the Humanities requirement the student must complete three courses from at least two of the following areas: Literature, Philosophy and Humanities. There are seven successful ways to meet this requirement. A couple of these are two courses in Literature and one in Philosophy or two in Literature and one in Humanities and so on. Further, there are about 29 courses in Literature, 23 courses in Philosophy and 5 courses in Humanities that qualify. In addition to this, the program has to check whether the course is valid. For a course to be valid, the course grade should not be Credit, No Credit, Withdrawn, Pass, Fail, Incomplete or Dropped and it should have a unit value of 0.7 or more. If the parts in the problem were mapped in a tree format there would be an incredible number of branches in the end. Ultimately there was the question of testing. To be sure that a program is working correctly one must perform a number of test runs. Some computer scientists describe testing as the most important part of the program. It was necessary to type in the records of students and generate results and then match the output to the results computed manually. Several such records had to be entered and any errors generated had to be ironed out. After a considerable amount of test data the package was finally generating outputs which exactly matched the results of outputs generated manually.

This program will be used in the Registrar's office at Illinois Wesleyan University starting this summer. After each semester the staff at the registrar's office will simply update the already existing data-base by adding any new students or adding courses to the records of the existing students. Copies of the form generated by the program after processing the checks will be sent to each student's advisor. Previously this entire process was accomplished manually and was extremely time consuming. With the help of this program the advisors will know at a glance where their advisees stand in terms of completing graduation requirements.

THE EFFECT OF WATER QUALITY ON MACROPHYTE BIOMASS IN SMALL, NORTHERN ILLINOIS IMPOUNDMENTS

Jeremy J. Kirchman, Dept of Biology, IWU, Given Harper*

To further understand the relationship between rooted macrophyte plants and nutrient regulation in lentic ecosystems, four man-made lakes at Max McGraw Wildlife Foundation, Kane County, Illinois were sampled from May to August, 1992 for submersed macrophytes. The total estimated plant biomass of each lake was then compared with levels of nutrients (nitrate, alkalinity, ammonia, and orthophosphate), turbidity and pH measured in the water column. Linear regression analysis showed no significant relationship between macrophyte biomass and levels of nutrients or physical parameters. The most plausible explanation for the lack of relationship observed is that macrophytes obtain their nutrients from lake sediments and not from the water column. A possible relationship was observed between macrophyte biomass and turbidity, which may have been due to biomass cycling from macrophytes to suspended (light scattering) algae.

THE SYSTEMATIC RELATIONSHIP OF HIPPOSIDEROS
COMMERSIONI MATUNGENSIS TO OTHER
SPECIES OF RHINOLOPHOIDAE

Maureen Koneval, Dept. of Biology, IWU, Dr. Thomas Griffiths*

The hyoid morphology of Hipposideros commersoni matungensis was dissected and compared to the morphology of other bats in the family Rhinolophidae. Several significant differences in morphology were found: a modified stylohyal, fused to the auditory bulla; retention of an omohyoid; loss of the stylohyoid; addition of a new muscle, possibly from the stylopharyngeus; insertion of the jugulohyoid onto the thyrohyal; and insertion of the ceratohyoid onto only the stylohyal. Cladistic analysis suggests that of all bats examined, H. commersoni and H. armiger are most closely related. This result is unexpected because the ranges of the two species are geographically distant: H. commersoni is an African bat, whereas H. armiger is from East Asia.

"AN EYE-OPENING EXHIBITION"

Mary Lynn Kopetz, Departments of History and Graphic Design
Sherilyn McElroy, Faculty Advisor

A gala modern art exhibition in Munich, Germany opened July 19, 1937, which brought together more than 650 important avant-garde paintings and sculptures. However, this massive exhibition compiled by the National Socialist Party, Entartete Kunst ("Degenerate Art", the name under which the work was categorized) was not intended to introduce the public to the virtues of modern art, but was arranged purposefully to inflame them against the works. Works by modern artists were treated not as evidence of individual creativity but as representative of something undesirable--the monstrous offspring of insanity and ineptitude.

The preconceived notion of the nature of art was like a bandage over the Nazis' eyes. They did not want to see that artistic reality can be something other than a realistic representation of an object in physical space. And what the modern artists were describing on their canvases were expressive, subjective concerns--ones that required an evaluation other than a quick glance. They sought to extract the idea, the inner essence, something beyond a realistic surface appearance. They proposed a new perspective and discerned a new reality.

In my project, a series of educational posters, I employ visual design vocabulary and ideology to reflect this theme--the ability to see and experience in a new way. Visual elements I have selected purposefully encourage the viewer to take a closer look and literally see new things. Sometimes it is necessary to find a new perspective in order to see the bigger picture. The Nazis hoped to convince society of the degeneracy of the innovation of modern art, but I hope ultimately to affirm the artists' discovery of their new reality. And I challenge the viewer to reflectively examine my results at the conference.

FRACTAL PROGRAMMING IN LOGO

Mariya Kutwal, Dept. of Computer Science, IWU, Dr. Susan Anderson-Freed*

The programming language Logo was created specifically to help in teaching children mathematics. Because it is simple and easy to learn, the basic concepts of geometry can quickly be grasped. As a result, Logo has not been used as extensively in programming as some other languages. However, it has been underestimated. Despite its inherent simplicity, Logo is powerful enough for advanced programming.

Fractals are a set of curves that cannot easily be explained using the concepts of Euclidean geometry. Formally, a fractal is a curve whose Hausdorff-Besicovitch dimension is strictly greater than its Euclidean dimension.

This project involved translating fractal equations into Logo and comparing fractal programming in Logo to fractal programming in C.

HIGH SPEED RAIL: TRANSPORTATION SOLUTION FOR THE FUTURE

Douglas M. Macomber, Dept of Economics, IWU, Margaret Chapman*

High speed rail was first introduced by the Japanese in 1964. Since that time many countries including France, Germany, Spain, Italy, and Sweden have developed their own high speed rail systems. The United States has lagged behind in high speed train technology, but now it is faced with serious transportation problems. Road and interstate construction and repair can not keep pace with traffic demand. Airports have become synonymous with congestion. America has reached a crossroads in the decision of how to break the gridlock that grips our country.

This study will examine the possibility of high speed rail transportation within a 300 mile radius of Chicago. Chicago has long been the hub of railroad transportation. The city could also serve as a center for profitable high speed rail. It has all the characteristics that make high speed rail attractive such as large population, large population of cities within said radius, congestion of other transportation modes, and good condition of existing rail lines.

This study emphasizes the routes that have the greatest potential for high speed rail implementation. Specifically, the corridors are Chicago to Milwaukee to Minneapolis-St. Paul, Chicago to St. Louis, and Chicago to Detroit. Finally, this study culminates in a comparison of high speed rail to air and highway travel.

AN ANIMAL MODEL OF ALZHEIMER'S DISEASE II:
ASSESSMENT OF THE AGGREGATIONAL PROPERTIES OF
BETA-AMYLOID (25-35) ON LEARNING FOLLOWING INTRAHIPPOCAMPAL
INJECTIONS OF LONG EVANS MALE RATS

Alex McCampbell, Department of Psychology and Biology, IWU, Dr. Wayne Dornan*

Alzheimer's Disease is a neurodegenerative disorder that is behaviorally typified by dementia, memory loss, and learning impairment. Presently, Alzheimer's Disease is the fourth major cause of death in the United States. Although the cause of Alzheimer's remains unknown, there is widespread agreement that the cortex and hippocampus seem to be selectively targeted. For example, neurons in the hippocampus degenerate and are lost in significant numbers as Alzheimer's progresses. On a neurohistological level, neuritic plaques and neurofibrillary tangles are often found in postmortem examination of Alzheimer's patient's brains. Recent research has implicated a protein called beta-amyloid as a core component of the neuritic plaques. One interesting aspect of beta-amyloid is that it has been reported to possess both neurotrophic and neurotoxic effects *in vivo* and *in vitro*. The neurotoxic effects appear to be potentiated by the high self-aggregational property of beta-amyloid. A study being run concurrently that will be reported at this conference (see David Kang's abstract) is investigating the role of beta-amyloid and its effects on learning performance in Long Evans male rats. The purpose of this investigation will be to extend the findings of the above study by comparing the behavioral effects of beta-amyloid (25-35) and non-incubated beta-amyloid (25-35). Animals received bilateral injections into the hippocampus of incubated beta-amyloid (25-35). The rats were assessed behaviorally using two valid measures of memory performance, the radial arm maze and the Morris water maze. The results of these tests will be presented at the conference.

ASSESSMENT PROFILES OF CHILDREN AND ADULTS IDENTIFIED AS LEARNING DISABLED

Melanie McDiarmid, Department of Psychology, IWU, Robert Lusk*

There are three major assessment profiles associated with learning disabled (LD) students and adults: the discrepancy between Verbal and Performance Intelligence Quotient (IQ), with Performance IQ greater than Verbal IQ; the Bannatyne pattern; and the ACID profile. The validity of these profiles was examined by using more reliable diagnostic criteria to avoid the methodological flaws present in other LD profile studies. Subjects were children and adults, ages 6-58, defined as having an Academic skills disorder according to the DSM-III-R (Diagnostic and statistical manual for mental disorders; American Psychiatric Association, 1987) criteria. The subjects' performances on the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1974) or the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981) were analyzed in order to determine the profiles' validity as characteristics of LD subjects.

STATE-DEPENDENT LEARNING DURING ALPRAZOLAM ASSISTED EXPOSURE: A PILOT STUDY OF SOCIAL PHOBIA.

Patrick B. Mc Grath, Dept. of Psychology, Illinois Wesleyan University, University of Illinois College of Medicine at Peoria, Dr. Timothy Bruce*, Dr. Robert Lusk*.

Social phobia is a newly defined disorder, and treatments for it typically involve pharmacotherapy or some form of in vivo exposure. When combining these therapies, there are three possible outcomes: No effect, an additive effect, or an interference effect. If additive, the pharmacotherapy will enhance the extinction of fear, and it will not increase the chance of relapse after drug discontinuation. If there is an interference effect, the pharmacotherapy will block extinction to the phobic situation, and there will be a relapse of anxiety when placed in the phobic situation in the no drug state. If this is a result, it may be due to state-dependent learning. This study tested to see what effect the combining of a placebo or alprazolam with guided exposure would have on subjective measures of anxiety for a socially phobic patient, and to see if state-dependent learning would be present in the alprazolam + exposure condition. Preliminary results suggest that there was state-dependent learning in the alprazolam + exposure condition and that fear extinction was greater in the placebo + exposure condition.

AGE-RELATED DIFFERENCES IN KNOWLEDGE REPRESENTATION: A TEST OF THE INHIBITION-DEFICIT HYPOTHESIS

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In recent years, several age differences in cognitive processing have been documented. Age-related deficits in the areas of selective attention, memory and reading comprehension have been demonstrated empirically. One explanation for these differences is the inhibition-deficit hypothesis, which states that problems in cognitive tasks arise from an inability to suppress irrelevant information. This "inhibition deficit" appears to develop with age. The older individual may then become distracted or pay attention to stimuli which are not helpful to the task at hand. This hypothesis has received support in several empirical studies of simple cognitive tasks such as attention and sentence completion (e.g., Hartman & Hasher, 1991, Hasher, Stoltzfus, Zacks & Rypma, 1991). The current study attempted to test this hypothesis in the area of knowledge representation, using a more complex cognitive task. An associative priming task was used to determine subjects' reactions to word pairs. This allowed an investigation of the structure of word knowledge as it exists in memory. Some of the word pairs were highly associated (ACORN-SQUIRREL), some weakly associated (BLENDER-KITCHEN) and some unrelated (CRADLE-LETTER). Words were presented very briefly, one after the other and the subjects were asked to decide whether the second member of the pair was a word or a non-word. This priming paradigm assumes that in highly associated pairs, the presence of the first word will decrease reaction time to the second word. This supposedly occurs through a spread of activation between the words in memory. If a lack of inhibition exists, activation would continue to spread unchecked and reaction time would be equally fast to highly and weakly related word pairs. According to the inhibition-deficit hypothesis, older subjects would show no differences in reaction time, while younger subjects should react faster to highly associated words. Preliminary findings will be presented and discussed.

Why Do Textbooks Ignore the Coulombically Damped Oscillator?

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The damped simple harmonic oscillator is the quintessential example used to introduce physics students to dissipative dynamics. Texts currently in use at leading institutions follow this time honored pedagogical tradition and always discuss the case where the damping force is proportional to the velocity of the particle. The case of a damping force that is constant in magnitude (Coulombic friction being a garden variety example) is simply ignored. We found this problem to be simple and yet quite interesting. In particular, it is easy enough to be discussed in introductory physics courses.

The basic result is that the amplitude of the oscillator decreases linearly, as opposed to the ubiquitous exponential decay that every textbook dutifully displays for the case of velocity dependent damping. We also performed experiments using mass on a spring on an airtrack where the air pressure was reduced so that the glider was lightly rubbing against the track. Video recording of the low frequency oscillations followed by analysis of the images gave us the time dependence of the amplitude. The linearly decreasing amplitude was in excellent agreement with the prediction of our model. By controlling the pressure, we could adjust the ratio of Coulombic and velocity dependent damping. It was possible to cross over from the linear regime at one extreme to the exponential regime at the other extreme. We intend to share these results with authors of college physics texts.

HUMAN BEHAVIORAL ECONOMICS: THE LAW OF SUPPLY AND DEMAND AS A DESCRIPTION OF BEHAVIOR DURING A VIDEO GAME

Amy R. Parker, Dept of Psychology, IWU
James D. Dougan*

Recently, a number of authors have suggested that there is a conceptual similarity between the behavior of animals in operant conditioning experiments and the economic behavior of humans in the marketplace. One result of this discovery has been the rapid development of Behavioral Economics, a cross disciplinary field which uses the methods and laboratory equipment of animal psychology to test the predictions of traditional economic theory. Both psychologists and economists have benefitted from this venture: psychologists have gained a variety of new theoretical approaches, while economists have gained a laboratory methodology capable of testing previously untestable principles. One limitation of behavioral economics, however, is that the majority of the experiments have used animals in an isolated laboratory environment. This may limit the applicability of behavioral economics because such isolated environments are very different from normal human environments. The present experiment sought a "middle ground" by testing principles of behavioral economics in humans in a controlled laboratory setting but using a piece of apparatus - the video game - which is a common item in modern culture. Five students played a video game in which success or failure was largely determined by underlying reinforcement schedules. Preliminary results suggest that the subjects responded according to the law of supply and demand. That is, the number of responses made per earned game point was inversely related to the number of points available in the session. This replicates findings by Dougan (1992) in a similar study which used pigeons as subjects.

A NOVEL TECHNIQUE FOR STUDYING THE SHEAR ELASTIC RESPONSE OF WEAK SOLIDS

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Traditionally, the shear elastic properties of solids have been measured using mechanical instrumentation, i.e. springs and balances. Commercially available instruments are designed to study engineering materials (steel for example) and are not useful for investigating weak solids, such as gels and electrorheological fluids. We have developed a simple, inexpensive, and precise technique to measure the shear elastic modulus of weak solids using electromagnetic and optical tools. This technique can easily be adapted to measure the viscosity of a liquid also. A Helmholtz pair was used to produce a torque on a permanent magnet mounted on the smaller of two concentric cylinders, coupled by the material to be studied. The torque was controlled precisely and measured accurately in terms of the current flowing through the coils of the Helmholtz pair. An optical lever was employed to measure the angular displacement of the inner cylinder as a function of the applied shear stress. The instrument has been validated by making measurements on lemon jello, and agarose gels of varying concentrations. The technique has also been applied to the study of electric field induced "freezing" of electrorheological fluids, a subject of enormous contemporary interest.

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Physics Department]

THE EFFECTS OF UNILATERAL INJECTIONS OF NEUROPEPTIDE K (NPK) INTO THE DORSAL MIDBRAIN CENTRAL GRAY (DMCG) ON THE EXPRESSION OF FEMALE RAT SEXUAL BEHAVIOR

Jason Pequette, Department of Psychology, IWU, Dr. Wayne Dornan*

Previous studies have reported that the dorsal midbrain central gray (dMCG) is essential for the expression of female rat sexual behavior. Lesions of this area will inhibit sexual receptivity (lordosis) while stimulation will facilitate receptivity. Accumulating evidence indicates that neuropeptides, synthesized in the ventromedial nucleus of the hypothalamus and transported to the dMCG, play a role in the neural regulation of sexual behavior in the female rat. For example, one neuropeptide, substance P, a member of the tachykinin family, facilitates lordosis when injected into the dMCG. Recently, another neuropeptide and product of the substance P gene has been implicated in rat sexual behavior. This neuropeptide is called neuropeptide K (NPK). NPK has been reported to have an inhibitory effect on the expression of male rat sexual behavior following direct injection into the brain. Presently, the role of NPK in the regulation of female sexual behavior is unknown. Therefore, in a pilot study we assessed the effects of NPK on female rat sexual behavior following injections into the dMCG. [Nle¹⁰]-Neurokinin A (4-10) (1000ng/0.5µl), an NPK agonist, or Saline (0.5µl) was injected unilaterally into the dMCG in ovariectomized estrogen- progesterone- treated female rats. The effect of these injections on sexual receptivity and proceptivity were then assessed. The results of this experiment will be presented at the conference.

FACTORS INFLUENCING VARIATION IN SUSCEPTIBILITY OF PRAIRIE PLANTS TO AN EARLY SUMMER FROST IN EAST-CENTRAL MINNESOTA

Bette L. Purnell, Dept. of Biology, IWU, Dr. Given Harper*

Temperature fluctuations are considered the most critical factor in determining plant survival because temperature directly affects physiological activity needed for growth, reproduction and survival. If temperatures fall below a certain critical level, which is species-specific, plant tissues can experience visible physical damage such as blanching of green portions of leaves resulting from a breakdown in chlorophyll pigments, or experiencing white or dark brown regions on plant tissues due to increased tannin and resin levels. Understanding the effects and severity of frost damage has economic importance because agricultural crops experience damage from unseasonably late frosts, decreasing overall crop yield. Studying the damage caused by frost also has evolutionary significance in better understanding mechanisms of plant succession. The problem researchers face is that little information is known concerning the effects of frost in the field because of the unpredictability of frost events. Thus, prior research has been restricted to laboratory effects on plant growth and physiology.

In this study I examined the damage caused by an early summer frost on plant species at Cedar Creek Natural History Area, in east-central Minnesota. The degree of frost damage on prairie plants was recorded using a scale of frost damage based on visual criteria. Possible causes of variation in frost susceptibility were examined. The degree of frost damage was independent of plant type (grass or forb), life cycle (annual, perennial, or biennial), successional status (early or late), and species origin (native or introduced). No significant correlations were noted between plant height and either mean or average frost damage. The mean biomass allocated above and below ground, and to leaves, stems and roots were not correlated to the mean or maximum frost damage. However, plants that allocated a greater proportion of biomass to leaves were more severely damaged than plants that allocated less biomass to leaves.

FLUORESCENCE SPECTROSCOPY OF 1,8-DIAZAFLUOREN-9-ONE ANALOGS FOR FINGERPRINT DETECTION

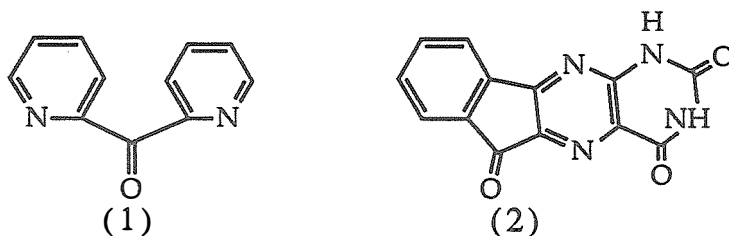
Christopher J. Raistrick, Dept. of Chemistry, IWU, Forrest Frank*

When clear fingerprints are found at a crime scene, they surpass all other physical evidence in their ability to identify the person who left them. Latent fingerprints, the type most commonly found at the scene of a crime, pose the greatest difficulty in developing and raising the print. Latent prints are usually the result of perspiration combined with small amounts of amino acids and other various body chemicals. The most effective method used to develop latent prints involves reacting the amino acids with a developing agent and detecting the resulting compound by its fluorescence in a certain wavelength of light. The latent fingerprint then becomes visible for identification.

Two analogs of 1,8-diazafluoren-9-one have been tested as amino acid detection agents in fingerprints. These analogs are di-2-pyridyl ketone (1), and 2,4,6-trioxo-1,2,3,4-tetrahydro-6H-indeno[2,1-g]pteridine (2). The method thus far has been to detect alanine, a basic amino acid, on papers as a preliminary test of the compounds usefulness as amino acid detection agents on solid surfaces. When the compounds react with the amino acids, they are then exposed to 365 nm light in order to induce fluorescence.

Di-2-pyridyl ketone (KP), when reacted with alanine, fluoresced on filter paper, but the KP/alanine product did not fluoresce on other papers. This was due to the bleaching agents in papers. KP is useful as an amino acid detection agent in solution, but it does not have any practical applications on paper.

2,4,6-trioxo-1,2,3,4-tetrahydro-6H-indeno[2,1-g]pteridine (NP), when reacted with alanine, fluoresced on all papers with varying intensities. The fluorescence studies so far have used an impure sample of NP, but the fluorescence was still significant. NP has been synthesized and recrystallized successfully. The purity of this NP has been verified by thin layer chromatography studies. Further studies on the NP/alanine product are continuing.



CARBON AT THE PERMIAN-TRIASSIC BOUNDARY

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Wolbach et al. (1985, 1989) discovered an increased abundance of elemental carbon with the soot morphology across the Cretaceous-Tertiary (K-T) boundary. This evidence suggested major wildfires and was consistent with the theory that a giant meteorite impacted with Earth 65 million years ago, causing a world-wide mass extinction event and triggering wildfires at the end of the Cretaceous. Although the K-T boundary has been studied extensively to explain the extinction of the dinosaurs and other species alive at that time, the largest mass extinction event occurred at the Permian-Triassic (P-Tr) boundary 245 million years ago. The procedures developed by Wolbach et al. have been used to isolate elemental and organic carbon in thirty-six samples from the Carnic Alps in Austria, across the P-Tr boundary. Determination of the abundance of both carbon types and their isotopic analysis could provide evidence indicating a possible cause for this mass extinction event and/or environmental changes occurring at this time.

EFFECT OF TEMPERATURE ON GROWTH OF THE ZEBRA MUSSEL, *DREISSENA POLYMORPHA*

Tamara K. Ross, Dept. of Biology, IWU, Gail Lima*

Dreissena polymorpha (Pallas), zebra mussels, are recent invaders of North American freshwater systems. They have a high reproductive rate and settle in high densities which can clog water intake valves and pipes. Many studies investigating the use of heat as a control measure have examined the effects of high temperatures on zebra mussel mortality. Much less is known about the effect of temperature on the actual growth rate and development of zebra mussels. This study examined the growth rates of zebra mussels at 10°C, 20°C, and 25°C over two four-week periods in the laboratory. Mussels were placed in culture dishes (five similarly sized mussels per dish) and fed 100 ml of the algae *Chlorella pyrenoidosa* (Chick) daily at a concentration of 4.13×10^5 cells/ml. Shell length and shell height measurements were taken three times during the experiment. Although shell length is the measurement typically used in growth studies, it has not been documented whether shell length is a better growth indicator than shell height. Both shell length and shell height are currently being compared with tissue weight to see which is a more accurate measure of growth. The results of this analysis will then be used to determine what effect temperature has on the growth of the mussels. The findings of this study will be important because factors which reduce growth influence the longterm success of the zebra mussels and therefore should be useful as possible control methods. Also, scientists working with zebra mussels in the laboratory will find the results of this study useful in determining the best conditions in which to raise zebra mussels.

THE EFFECTS OF PREDICTIVENESS OF A REINFORCER ON SIMPLE INTERVAL DEMAND FUNCTIONS

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Several previous studies have suggested that behavior experiments can be viewed as economic systems, with animals responding according to the law of supply and demand. The law of supply and demand predicts that as the price of a commodity increases, the quantity consumed in the marketplace decreases. In Dougan (1992), results demonstrated an inverse relationship between the obtained behavioral cost and the quantity of reinforcement supplied while responding on simple variable schedules. The present research examines the extent to which the results of the Dougan (1992) study were due to unpredictability of reinforcers. Reinforcers are said to be predictable when one or more stimuli reliably signal reinforcer availability. Using a 3 X 4 within subject design, rats responded on three separate predictiveness conditions and four reinforcement rates. The three predictiveness conditions were; variable interval (VI) schedule, fixed interval (FI) schedule, and a fixed interval schedule with a signal light (FI + S) that was presented five seconds prior to the availability of the reinforcer. The four rates of reinforcement were; 30 s, 60 s, 120 s, and 240 s. Proceeding from a variable interval schedule, to a fixed interval schedule and finally to a fixed interval schedule with a signal light, the predictability of a reinforcer increases because more stimuli reliably signal the availability of the reinforcer. It is expected that responses per reinforcer will decrease, and the demand curves will be flatter in conditions providing greater predictiveness.

THE PHOTOCHEMISTRY OF NITROUS ACID AND NITRITE ION

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Research is currently underway to elucidate the photochemical decomposition mechanism of nitrous acid and nitrite ion in aqueous and non-aqueous media. The quantum yield of the disappearance of nitrous acid and nitrite ion, as a function of pH and nitrous acid/nitrite ion concentration ratios, was examined. Spectroscopic studies have been done with nitrite ion in various aprotic organic solvents. Similar work has been started with molecular nitrous acid that was produced in aqueous solution and then extracted into organic solvents. These organic solvents were employed in order to study the quantum yield with respect to NO_2^- and HONO without the complications of the acid dissociation equilibrium seen in aqueous solutions. Other work includes the product analysis of hydroxyl radical scavenging reactions.

EATING DISORDER PATHOLOGY AND ITS RELATION TO DEPRESSION AND SELF-ESTEEM IN COLLEGE STUDENTS

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Research on eating disorders has mainly focused on clinical populations and adolescents. In this study, a nonclinical sample comprised of female college students was studied. The relationship between eating disorder symptomatology and the variables of depression and self-esteem were examined using the following measures: (1) The Eating Disorders Inventory-2; (2) The Beck Depression Inventory; and (3) The Multidimensional Self-Esteem Inventory. A total of 56 subjects were used in this study. It was hypothesized that those subjects who scored higher overall on the EDI-2 would exhibit higher levels of depression and lower levels of self-esteem. It was also hypothesized that those subjects who scored high on specific subscales of the EDI-2 would exhibit higher levels of depression and lower levels of self-esteem. Primary analyses were performed on these hypotheses and secondary analyses explored other differences that were found to be significant. The results of this study will help determine if psychological attributes of clinically diagnosed patients also apply to nonclinical subjects who exhibit subclinical characteristics of eating disorders.

THE HYMN "PROMETHEUS" BY GOETHE.

Angelica Ushatova, Dept. of Foreign Languages, IWU, Julie Prandi*

This paper will explore disagreements over the interpretation of Goethe's poem *Prometheus* and offer a way of understanding the poem that is consonant with Goethe's world view. The hymn *Prometheus* fell within a seminal epoch in German literature, the literary movement *Sturm und Drang*, a precursor of European Romanticism. Goethe belonged to and profoundly affected this period, which exalted nature, feeling, and human individualism and sought to overthrow the Enlightenment cult of Rationalism. The image of Prometheus was popular among the writers of *Sturm und Drang*. Young Goethe calls the story of Prometheus his "beloved fixed idea". In his autobiography *Poetry and Truth*, Goethe, commenting on this idea, says that although one can attach philosophical or religious implications to the Prometheus myth, it really belongs to the realm of poetry. He thinks that it is a beautiful thought to have human beings created, not by the supreme ruler of the world, but by a lesser figure.

Symbolism of the poem allows various interpretations. At the time of Goethe the hymn *Prometheus* was involved in the so called *Spinozadispute* and was regarded as the proclamation of Pantheism. The Zeus figure evokes a chain of images. The supreme God can represent the princes, and in this case the poem acquires social-revolutionary meaning. Goethe's strict father, who preferred reverence over love, can also stand for Zeus. The hymn then plays an important role in the development of Goethe's personality. If we view Zeus as the Christian God, then Prometheus' open defiance is an attack upon Christianity. The *Prometheus* ode depicts also the confrontation between Zeus and his son. Prometheus refuses all cooperation with the gods, presenting himself as an equal to them. He isolates himself in order to create. The bright, youthful, loving creator of mankind symbolises primarily the creative power of the artist, sufficient to himself, needing no help from the gods. But what is Goethe's own point of view on this subject matter?

When the twenty-five-year-old Goethe wrote the poem *Prometheus*, it was probably an expression of unreconcilable conflict between the individual and the divine. But in his maturity Goethe came to view it differently, as only one side of a polarized human nature, that of self-concentration and protest against authority. The other side, equally as important to Goethe, finds expression in his hymn *Ganymed*, which he put side by side with *Prometheus* in later editions of his poems. Whereas Prometheus protests against the divine order, Ganymed exemplifies the movement towards unification with the divine through nature. As Goethe wrote in his autobiography *Poetry and Truth*: "The spirit of contradiction and the taste for paradox are latent in us all."

POLITICAL AND MACRO-ECONOMIC DETERMINANTS OF FDI IN MEXICO

Yuet Wei Wan, Dept of Economics, IWU, Pam Lowry*

Mexico is one of the largest recipients of foreign direct investment (FDI) from the developed nations. This study models the influence of macro-economic and political factors on FDI in Mexico. The important macro-economic variables include the growth rate of the economy, inflation and relative labor costs. The government of Mexico's debt level and the trade balance are proxies for political and economic stability. Finally the effects of government policies that either encourage or discourage FDI in Mexico are modeled. It is hypothesized that a high growth rate, relatively low labor costs, stability and certain policy incentives encourage FDI. First, a base model that does not include Mexican government policies is estimated. Then the "policy variables" are included into the model for comparison. The data are time-series data. The model is estimated using the ordinary least squares (OLS) regression method.

THE IMPACT OF SECLUSION TIMEOUT ON BEHAVIOR PROBLEMS IN THREE CONDUCT DISORDERED BOYS

Amy M. Webb, Dept of Psychology, IWU, Robert Lusk*

This study will assess the effectiveness of seclusion timeout (STO) on the behavior of three conduct disordered boys who attend Hammitt School, a school that serves children with handicapping conditions, such as behavior disorders, emotional disorders, and specific learning disabilities. The three boys are between the ages of 10 and 12. Data collected by teachers about STO, other disciplinary procedures, and other behaviors and statements will be analyzed. Also, a weekly summary of STO uses, kept by the director of the school, will be analyzed. A single subject design using a paired sample T-test will be used to analyze this data. The expected results are that there will be a significant increase in the use of other disciplinary procedures on the day following STO use as compared to the day before, that there will be a significant increase in the number of positive behaviors and positive statements on the day following STO use compared to the day before, and that there will be a significant decrease in the number of negative behaviors and negative statements on the day following STO use compared to the day before. This study is significant in that it applies to seclusion timeout used in alternative schools, whereas most of the literature reviewed by this experimenter concerned seclusion on psychiatric units and timeout used by parents and teachers in regular schools.

THE EFFECT OF UNILATERAL INJECTIONS OF NKK INTO THE MEDIAL PREOPTIC AREA ON THE EXPRESSION OF FEMALE RAT SEXUAL BEHAVIOR.

Harinie Wijeweera, Dept. of Psychology, IWU, Dr.Wayne Dornan.*

The Medial Preoptic Area (MPOA) has been implicated in the neural circuit governing sexual receptivity (lordosis) in the female rat. Electrical stimulation of the MPOA inhibits the expression of lordosis behavior while lesions facilitate the expression of lordosis behavior. As a result the MPOA is believed to have a tonic inhibition on the expression of sexual behavior in the female rat. The neurotransmitter/neuropeptide that mediates the tonic inhibition of the expression of female sexual behavior at the level of the MPOA is presently unknown. One neuropeptide that has received increasing attention is Neurokinin P (NKP). NKP is known to facilitate the expression of lordosis behavior in ovariectomized estrogen primed female rats, when injected into the dorsal Midbrain Central Gray. In contrast to NKP, recent studies indicate Neurokinin K (NKK), a member of the same family of neurokinins may be involved in the tonic inhibition of male rat sexual behavior. Therefore the purpose of this pilot study is to assess the effects on sexual receptivity following unilateral injections of NKK into the MPOA. 1000ng/0.5ul of [Nle 10]-NKA(4-10) an NKK agonist and 0.5ul saline was injected into ovariectomized female rats treated with estrogen and progesterone and their proceptivity and receptivity were assessed. The results of this study will be presented at the conference.

FACTORS AFFECTING COMMUNICATION BETWEEN EMERGENCY DEPARTMENT NURSES

Malynnnda Wright, School of Nursing, IWU
Dr. Donna Hartweg, PhD.*

Although much nursing research has focused on communication between nurses and patients, few studies have investigated the factors which affect communication of essential patient information between nurses. In an emergency department or trauma center, communication of essential patient information is vital to effective, immediate intervention. Preliminary observations in an emergency department and review of literature suggested that factors related to the individual nurse and organization may affect the communication of essential information concerning patients.

The purpose of this exploratory study was to describe the nature of communication and identify the personal and organizational emergency departmental factors affecting communication of fundamental patient assessment data between a triage nurse and a primary nurse. One Central Illinois hospital was selected as the site for the investigation because of its classification as a Level I Trauma Center and its dedication to research. Staff members who were registered nurses and employed in the emergency department were invited to participate in the study.

Participant observation was utilized as the method of data collection. Observation periods included both weekdays and weekends of all shifts to obtain a mixture of trauma levels and staff. Theoretical sampling was used to select 32 interactions between nurses. The investigator first observed the exchange of information between the triage nurse and the primary nurse then recorded the observations. Cases observed included five emergent (level one), 13 urgent (level two), and 14 nonurgent (level three). Each dyad was correlated in relation to Benner's scale of nursing expertise to identify potential individual factors affecting communication abilities. Data was collected on organizational factors: staffing adequacy, shift, and presence of other medical personnel. When time and situation permitted, nurses were asked to rate the effectiveness of the communication on a Likert-type scale developed for the study.

Through content analysis of questionnaires, observational data, and field notations, the investigator will identify those variables which affect the communication within the emergency department. From such analysis, questions will be raised for further research.

BUMS

A Musical Comedy in Three Acts

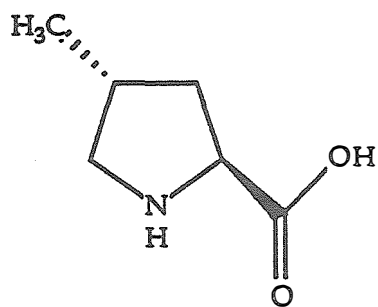
Christopher Scott Wyatt, Dept. of Music., IWU, Dr. David Vayo*
and Professor Linda Farquharson*

Bums is a musical about four vagrants living in Chicago during the depression. The musical takes place in the year 1934, two days before Christmas. The first scene begins in an old run-down hotel on the south-side of Chicago that the four bums call their home. They are discovered by Officer Friedlich, a very stern German police officer, who kicks them out in the cold. The following day, the four bums split up to beg for money. Fred, the lead character, is approached by Mrs. Carol, a very friendly and wealthy widow, who gives him a Christmas gift of five dollars. As Mrs. Carol is leaving, Fred notices a stray dog shivering in the cold. He proceeds to care for it and keep it warm. At this very moment, Officer Friedlich and a chauffeur show up and accuse Fred of dognapping. He is then taken to Jail and locked up. Lawrence, a monstrous jail mate, threatens to pulverize Fred. Just as Lawrence takes hold of Freds' shirt, Mrs. Carol, and the other three bums arrive to bail Fred out. Mrs. Carol discovers that her dog, Penelope, was lost by her chauffeur and that Fred retrieved it. As a result, she rewards Fred and the other three bums with fifty dollars.

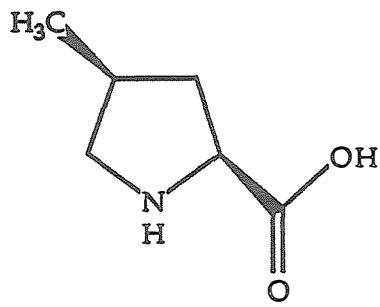
This project teaches a young musician to be well rounded in almost every realm of music. As a result, it requires research in composition, which includes learning and understanding orchestration techniques, style traits, and ever computer technology. It is a musical, therefore, it also requires understanding in libretto and or script writing. Such large scale works need a leader or a conductor, therefore, further development in this area of musicianship had to take place as well. The comedy and humor is based on shows such as the "*Honeymooners*," and old "*Bugs Bunny*" cartoons. The musical style contains characteristics of both Jazz and Classical music.

SYNTHESIS of *trans*-4-METHYL-L-PROLINE
Biao Zhang, Dept. of Chemistry, IWU, Jeffrey Frick*

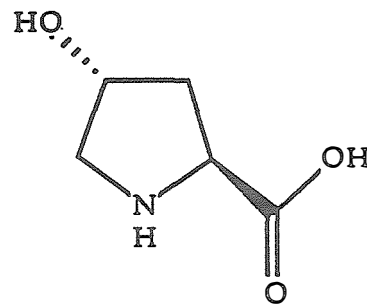
In connection with our long term goal of synthesizing enopeptin A, a novel antitumor and antibiotic depsipeptide, we require *trans*-4-methyl-L-proline as one of the most crucial precursors. Synthesis of 4-methyl-L-proline usually results in a mixture of *trans*-4- (1) and *cis*-4-methyl-L-proline (2) isomers. Previous methods do not provide a satisfying synthetic route with high ratio of the *trans* isomer. Our current research employs *trans*-4-hydroxy-L-proline (3), a relatively inexpensive and commercially available chemical, as the starting material. We expect to synthesize the target molecule with a net retention of configuration.



1



2



3

