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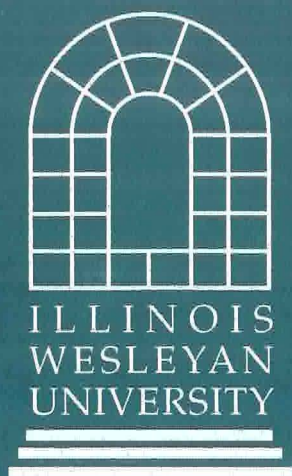
Complete 1991 Program

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IWU Student Research Conference Program

Second Annual ILLINOIS WESLEYAN STUDENT RESEARCH CONFERENCE

APRIL 27, 1991

SCHEDULE OF ACTIVITIES

12:00 - 3:00 P.M.	POSTER SESSION AND RECEPTION
3:05 - 4:30 P.M.	ORAL PRESENTATIONS
4:35 P.M.	PRESENTATION OF CERTIFICATES BY PRESIDENT MINOR MYERS, JR.

The Organizing Committee would like to thank:

Minor Myers, jr, President, IWU
Ellen Hurwitz, Provost and Dean of the Faculty
Teddy Amoloza, Assistant Professor of Sociology
Bruce Criley, Professor of Biology
Don Koehn, Professor of Philosophy
Sharie Metcalfe, Assistant Professor of Nursing
Benjamin Rhodes, Director of Development
Jerry Bidle, Director of Public Relations
Kris Frazier
Student Senate

STUDENT PARTICIPANTS

Debra Aschbrenner
Kathryn Balsman
Andy Benzinger
Julie A. Brookman
Melinda K. Foulk
Melissa L. Hance
Peggy Huang
Reona Jack
J. Alfred Kuh
Maureen Lyons
Milana Maletic
Melinda McFarlin
Vicki L. Mockaitis
Peggy O'Neill
Andrew Pacejka
Scott E. Preusen
Rhea E. Rosenlof
Kevin Short
Amy Noel Stiers
William M. Struthers
Amy Walters
Dawn Wright

Christopher Ballak
Douglas Becker
Jodi Block
Laura Campbell
Jacquie Graven
Libin Ho
Mark Israel
Kristin Jaeger
Sandra Lyn
Peter Malen
Donald McEwen IV
Scott Meade
Michael J. Monfils
Ed M. Pacchetti
Natawadee Prasertphon
Timothy A. Pritts
Dianne Rudy
Jeffrey Skibins
Jeffrey K. Stowell
Valerie Vecchio
Elizabeth C. Wise
Douglas H. Young

STUDENT ABSTRACTS

* Indicates Faculty Supervisor

FRAGILE X SYNDROME: A CASE STUDY IN BEHAVIORAL CHANGE

Debra Aschbrenner, Dept. of Psychology, IWU,
James Dougan*, Valeri Farmer-Dougan*

Fragile X syndrome is a chromosomal abnormality which is the second leading cause of mental retardation after Downs Syndrome. Symptoms include low cognitive ability, poor social skills, and impaired memory. There is no known treatment. The present case study examined a behavioral intervention technique (discrimination training with self-modeling) as a possible treatment for Fragile X symptoms. The subject was a male, 7 years of age, who had been diagnosed with Fragile X two years previously. Prior to intervention, the subject had suffered a six-month decline in cognitive ability and social skills. In particular, the subject had difficulty exhibiting the appropriate behavior at the appropriate time of day. The intervention consisted of presenting the subject with a picture book, each page of which had a photograph of the subject engaged in a particular activity. When viewed sequentially, the picture book served as a discriminative aid for determining which activities were appropriate at which times. Following intervention, the subject showed improvement on five independent behavioral measures. The results suggest that self-modeling may be an effective treatment for Fragile X syndrome.

SEASONAL AFFECTIVE DISORDER: A VALIDATION STUDY

Christopher M. Ballak, Dept. of Psychology, IWU
Wayne A. Dornan*, and Sharon Eggers*

Recently, Seasonal Affective Disorder (SAD), has been the focus of intense interest. SAD is a syndrome commonly associated with annually recurrent depressions characterized by hypersomnia, carbohydrate craving and overeating. Hance et al.(1991), recently completed an epidemiological study of the prevalence of SAD in the Bloomington-Normal area. In the Hance et al. study (presented at this conference) 364 people were randomly interviewed using the Seasonal Pattern Assessment Questionnaire (SPAQ) which was adapted for telephone interviews. In that study, they report a 4.6% prevalence rate of SAD in the general population; this is similar to other recently published reports. The purpose of this study is to provide a measure of external validation for the Hance et al. epidemiological study. Twenty subjects were chosen at random and interviewed in order to establish a detailed psychological profile. Each subject was assessed with: 1. An additional SPAQ, 2. The Hamilton Rating Scale for Depression-SAD Version (Rosenthal et al.), 3. The Structured Clinical Interview for the DSM-III/R (SCID-P, Spitzer et al.). These were administered by three trained interviewers. Four subjects met criteria for disorders diagnosed by the DSM-III/R. One female met criteria for Bipolar Disorder, Generalized Anxiety Disorder and Adjustment Disorder; she also met the criteria for SAD-winter pattern on both SPAQ administrations. A Spearman rank order correlation coefficient revealed a significant correlation between the Hamilton Depression Rating Scale total scores and the Seasonality scores of the SPAQ ($r=.596$; $P<.005$). Although extrapolation from this data is limited, the results of this external validation study suggest that there is a specific relationship between Seasonal Affective Disorder and Depression. Clearly, future studies are necessary in order to fully delineate Seasonal Affective Disorder in the general population.

AN ALTERNATIVE SET OF CONSTRAINTS - THE THEOREMS OF THE ALTERNATIVE

Kathryn L. Balsman, Dept. of Mathematics, IWU, Dr. Melvyn Jeter*

A typical Theorem of the Alternative shows that corresponding to any given system of linear constraints, system I, there is another associated system of linear constraints, system II, based on the same data, satisfying the property that one of the systems among I and II is feasible if and only if the other is infeasible. These theorems have direct applications in the derivations of optimality conditions. This project explores the Theorems of the Alternative as they are found in linear programming, projection theory, and linear complementarity. Farkas' Theorem, Gordan's Theorem, and Tucker's Theorem are considered in particular. In addition, this project investigates Pye and Webster's claim (1989) that each theorem can be easily proven using the geometric form of Gordan's Theorem of the Alternative with the proper subspaces.

MODERNIZATION AND DEVELOPMENT: A COMPARATIVE STUDY OF SOUTH KOREA AND BRAZIL

Douglas Becker, Dept. of Political Science, IWU, George Kieh*

In this paper, I tried to identify some of the problems caused by American economic aid to and investment in the Third World, in a comparative study of Korea and Brazil.

I open the paper with a review of the literature on modernization theory, with a special emphasis on Walt Whitman Rostow's Stages of Economic Growth. I look specifically at the assumptions made by American theorists and policymakers alike about the Third World. In this way, I hope to correlate the economic theories postulated in the academic institutions with the policies adopted by American political and economic leaders. I pay particular attention to the theories of the 1960s, due to the interest in Third World development in that decade.

I then review the literature opposing modernization theory. I pay particular attention to dependency theory, originating in Latin America. Andre Gunder Frank's call for economic autonomy and Cheryl Payer's concept of the "Debt Trap" is of considerable importance. I also analyze the impact of Raul Prebisch's theory and the Economic Commission on Latin America (ELCA). I do this because of the influence such theories have on my work.

A study of South Korea as a success of modernization theory is the next phase of my work. I analyze Korea both historically and theoretically. I pay close attention to aid extended to Korea just prior, as well as following, the Korean War. I then turn my attention to the debt accumulated by Korea in the process of economic industrialization, as well as the policies adopted by subsequent governments to spur economic growth.

A study of Brazil's economy then follows, with special attention paid to its debt problem. I analyze the nation's historic incorporation into the global political economy, emphasizing the dependent nature of the incorporation. I then look at the process by which Brazil accumulated its debt, with particular emphasis on the policies which developed into the "Brazilian Miracle." I then analyze the debt's effects on current Brazilian attempts to modernize.

Finally, I offer some prescriptions for avoiding the debt trap. I pay tribute to the work of the British economist E.F. Schumacher for his work Small is Beautiful, and suggest that this is a proper manner in which to analyze political-economic affairs. I suggest that the policies adopted by both Brazil and South Korea are bold, and unforeseen shocks to the economy may leave the nations helplessly under the burden of debt. Finally, I stress the inappropriateness of a global economic theory, and the need for country studies as the proper means to analyze future economic development.

EFFECTS OF STIMULUS PLACEMENT, SIZE, AND SIMILARITY ON RESPONSE COMPETITION

Andy Benzinger, Dept of Psychology, IWU, Dr. John Clavadetscher*

Selective attention occurs when a person limits processing to only some of the perceptually available information. This is contrasted with automaticity in which processing occurs without direct conscious control. A failure of selective attention can occur when subjects are asked to attend to one characteristic of a set of stimuli, but other characteristics of the set are nevertheless automatically processed. When automatic processing activates a response tendency that is in opposition to the correct response this is called response competition. Response competition may appear as an increase in both reaction times (RT) and intrusion errors, namely those of the competing response. The best example of this is the Stroop effect in which subjects have difficulty naming the color of ink used to print a different color name (e.g. blue ink spelling the word red). The spelled word's name competes with the color naming, resulting in a marked increase in RT and errors. Several studies have indicated that similar effects may be obtained with color-associated words, such as grass and sky, typeface variants, and digit counting.

Two general theories of attention have tried to explain response competition effects. First, some theories have claimed that attention is focused on tasks in an all-or-none fashion. Other theories have argued that attentional processing can vary or be graded in strength. The present study tried to vary the strength of response competition using a digit counting task. In digit counting, the subject's task is to name the number of digits when the digits themselves may be different than the correct answer (e.g., counting three 9's).

This study attempted to answer a number of specific questions about the nature of response competition. (1) Does the placement of correct digits within a set of non-correct digits affect RT for counting set size, and if so, what placement will maximize this effect? (2) Does the proportion of correct digits in a set cause a proportional decrease in RT of set size counting? (3) Is there a proportional increase in RT with increases in set size? (4) As the similarity increases between the digits which make up the set and the set size itself, will the RT for set size counting change?

Results of the present study are compared to previous studies of response competition and to the two competing general theories of attention.

THE EFFECTS OF INTRACEREBRAL INJECTIONS OF SUBSTANCE P FRAGMENTS (5-11) AND (1-7) INTO THE DORSAL MIDBRAIN CENTRAL GRAY ON LORDOSIS BEHAVIOR IN THE FEMALE RAT

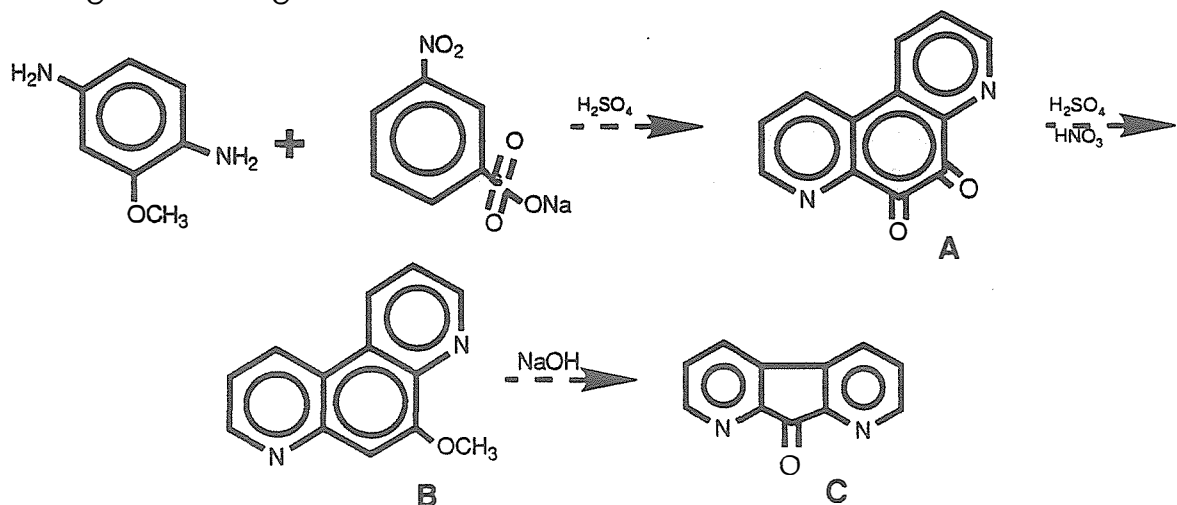
Jodi Block, Depts. of Biology/Psychology, IWU, Wayne Dornan *

Substance P (sP), a neuroactive peptide, has now been implicated in a wide range of behaviors. One in particular is female rat sexual behavior. Recently, it has been shown that bilateral injections of sP into the dorsal midbrain central gray (dMCG) of estrogen-primed female rats facilitates sexual behavior (lordosis). Uncertainty remains, however, concerning the mode of action of synaptically released sP. Indeed, most of our understanding of sP activity has revealed that its full structural sequence is not needed for biological activity. This has led to speculation that sP may be processed into one or more types of fragments before it can exert its behavioral effect. In view of these unusual properties, we must first develop a thorough understanding of the effects of sP fragments before we can fully appreciate the significance of this peptide on the expression of female sexual behavior. In a series of behavioral experiments, we assessed the effects of injecting two different fragments (sP 1-7 and sP 5-11) into the dMCG of ovariectomized, steroid primed, female rats. In the first experiment, sexual receptivity was measured following injection of sP 1-7, 5-11 or acidified saline directly into the dMCG of maximally receptive (estrogen and progesterone primed) females. At five and thirty minutes post injection, an assessment revealed that neither sP 5-11 nor 1-7 had an effect on sexual behavior when compared to saline injections (controls). In the second experiment, sP 5-11 or acidified saline were injected into the dMCG of estrogen primed female rats showing a minimal lordosis response, and the effects of these injections were compared to those of controls (saline). Again, no significant difference in sexual behavior was observed following injection of sP 5-11 or saline. In conclusion, our data suggests that the effect of sP on lordosis behavior following injection into the dMCG is not due to the activity of biologically active fragments.

STUDIES ON THE SYNTHESIS OF 1,8-DIAZAFLUOREN-9-ONE (DFO) (DFO)

Julie A. Brookman, Dept of Chemistry, I. W. U., Forrest J. Frank*

1,8-Diazafluoren-9-one (DFO, **C**) is a new reagent used in the detection of latent fingerprints. It reacts with the amino acids present in fingerprints to give a fluorescent product under ultraviolet light. It is an improvement over ninhydrin, which has been used in forensic science laboratories for years. The synthetic methodology to date provides only low yields of DFO. Therefore, a better method is needed to provide significant amounts for the study of the reaction product with amino acids. Thus, the three step synthesis of DFO was studied in order to improve the yields and simplify the procedure. Thin layer chromatography and infrared spectroscopy were used to characterize the products of each step. The product of the first step is 6-methoxy-4,7-phenanthroline (**A**), which has been successfully prepared several times through a Skraup synthesis. In step two, an oxidation reaction occurs to produce phanquone (**B**). This was more difficult to produce. The procedure was tried repeatedly with slight variations. The last step is to prepare DFO through a rearrangement reaction.



INCENTIVE AND BEHAVIORAL CONTRASTS: A COMPARATIVE ANALYSIS

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

This study has been designed to reconcile two divergent literatures; Crespi's 1942 study on incentive contrast and G.S. Reynolds' 1961 study on behavioral contrast. These two phenomena seem to be related, but have never been explicitly reconciled. Our hypothesis is that it should be possible to simultaneously obtain both results if looked at from the correct perspectives. Rats were initially trained with 16 food pellets in each arm of a radial arm maze. Then, the number of pellets was decreased to 4 in half of the arms. Our hypothesis is that the rats will run faster in the unshifted arms (behavioral contrast), and slower in the shifted arms (incentive contrast). The results of this study are reported here.

**SEVEN DIFFERENT EFFECTS ON INDICATION RATES
OF THE DEPARTMENT OF CHILDREN AND FAMILY SERVICES
FOR DEMOGRAPHICALLY SIMILAR COUNTIES IN ILLINOIS**

Melinda K. Foulk, Dept. of Sociology, IWU, James Sikora*

This pilot study examines child abuse and neglect by looking at one aspect of this complex public issue: the current state of advocacy in Illinois. The reader is familiarized with the field of child abuse/neglect, and the need for advocacy. After a general review of the literature, this paper explores the vital role of the Department of Children and Family Services (DCFS) and its participation in advocacy for abused and neglected children.

A sample of six demographically similar counties from the State of Illinois are selected for study. Although demographically similar, the counties have statistically significant differences between their indication rates -- those children found to be abused and neglected through investigation by DCFS. Current and respected theories in the fields of sociology, social work, and criminology are briefly examined to determine if they can explain these differences in indication rates. Although there is statistical significance and face validity indicated between some of the variables and indication rates, the small sample indicates further exploration.

Therefore, two final hypotheses are extensively examined. First, the influence of the organizational structure and cohesion of each individual DCFS office on its indication rate is investigated. Second, the effect of public visibility of each individual agency on indication rates is explored. Telephone interviews surveying these two hypotheses were completed by the directors of the six agencies. Of all the variables considered, the visibility of the DCFS office in the community is found to have the highest correlation to indication rates both statistically and on face validity.

These findings are discussed and recommendations are made for continued and an expanded study. It is hoped that this study will increase public knowledge of child abuse and neglect, and therefore help increase protection of the vulnerable child.

STUDENT ATTITUDES TOWARD THEIR ROLE AS PATIENT ADVOCATE

Jacquie Graven, School of Nursing, IWU, Charla Renner*

Patient advocacy is a role which has been identified as an important one for nurses. Numerous definitions, models, opinions and philosophical justification of advocacy as a nursing role are described in the literature. The importance of this role is obvious when considering the philosophical dimensions of advocacy. It has been suggested that the concept of advocacy may be the fundamental or theoretical foundation of nursing (Donahue, 1985; Gadow, 1980). Although the role has been discussed for many years there are few established guidelines for implementation and little research exists regarding the advocacy role.

The purpose of this descriptive study is to 1) identify opinions of students toward their role as patient advocate at different levels in their educational process, 2) compare these opinions with those of registered nurses previously surveyed (Renner, 1987).

A convenience sample of generic Illinois Wesleyan University baccalaureate nursing students (n=77) who were at the sophomore, junior and senior levels were surveyed; included in the sample were the 1990 graduates (n=25) for a sample of 102. Opinions toward advocacy were measured by the Nurse Advocate Opinion Scale (Renner, 1982). This instrument consists of 33 items about the advocacy role and were rated on a 5-point Likert-type scale. Validity of the instrument has been well established with reliability indicated by Cronbach's alpha of .75. Study participants were also asked to identify ways which would help improve their advocacy role development. The instrument was administered in a classroom setting to the sophomores, juniors and senior nursing students while the graduate nurses were surveyed by mail. The mailed response rate was 81% while the student participation rate was 99%.

Data analysis using descriptive statistics identified a number of items which were strongly agreed upon as well as items which had widely varied levels of agreement. Analysis of responses to the open ended question suggested teaching-learning methods for advocacy role development.

SEASONAL CHANGES IN AFFECTIVE STATES AND BEHAVIOR WITHIN A RANDOMLY SELECTED POPULATION OF BLOOMINGTON-NORMAL

Melissa L. Hance, Dept of Psychology, IWU,
Wayne Dornan*, Sharon Eggers*

Within the last 5 years the interest in Seasonal Affective Disorder (SAD), a syndrome characterized by atypical depressive symptoms such as hypersomnia, overeating and carbohydrate cravings, has increased dramatically. Despite this interest, however, the prevalence of SAD within the general population is unknown. Recent studies indicate that a significant portion of the general population experience varying degrees of seasonal changes in mood with SAD at the extreme end of the spectrum. In an attempt to obtain further information on the patterns of affective seasonal changes and to determine whether SAD exists and follows a similar seasonal specificity in a midwestern city, we evaluated the occurrence of seasonal mood changes in Bloomington-Normal, Illinois using a telephone version of the Seasonal Pattern Assessment Questionnaire (SPAQ). Subjects were selected at random from the telephone book and initial interviews were conducted over the phone by trained volunteers. A total of 364 people were interviewed using the SPAQ. We found that 94% of the subjects reported seasonal changes in mood and behavior. Of these 66% reported changes in mood with 5% experiencing extremely marked changes. Fifteen percent of the sample indicated that seasonal variations posed a problem. Of the 364 respondents 4.6% meet the criteria for SAD; a finding that can be extrapolated to describe approximately 4600 people in the Bloomington-Normal community. The seasonal pattern of "feeling worst" revealed a discrete wintertime pattern in January and February before abating, dramatically in March. Although, overall there was no significant difference between men and women in their seasonality scores, a separate analysis by age group revealed that younger women (18-30) had a significantly higher seasonality score than men. Our preliminary results indicate widespread prevalence of seasonal changes in mood and behavior. Moreover, our findings of a 4.6% prevalence rate of SAD is similar to a recently published epidemiological study. Collectively this suggests perhaps that the prevalence rate of SAD within similar climates is approximately 4-5%. Clearly further epidemiological studies are required to establish the public health significance of SAD.

MOLECULAR BIOLOGY OF HUMAN PROSTATE CANCER

Libin Ho, Department of Biology, IWU

Work done at Case Western Reserve University, Dr. Sherron Helms*

In 1990 prostate cancer was the second leading cause of death of American males. My project involves the investigation of one aspect of the molecular biology of human prostate cancer which was to determine and characterize any changes in gene copy number and gene structure, and in gene expression that occur during short-term culture of human prostate tissue.

Genomic DNAs were extracted from tumorous tissue samples from 8 patients with prostate carcinoma or prostatic hyperplasia, then purified and quantified for Southern blot DNA analysis. The gene copy number and gene structure in fresh frozen tissue samples were compared with that in portions of the samples grown in culture for varying periods. Polyadenylated RNAs(mRNA) were selected from the cellular RNA from the tissue samples for Northern blot RNA analysis, which allows us to compare the pattern of gene expression in the fresh frozen tissue samples with that in cultured samples.

Two genes-c-myc and HUK have been examined in the samples. An increase in gene copy number of c-myc with increasing time in culture was observed in one of two patients with prostate carcinoma; this could either reflect the amplification of c-myc gene induced by culture conditions or could demonstrate that the c-myc gene is amplified in the epithelial cells prior to cultivation and the apparent increase in copy number is simply a result of the increase in the number of epithelial cells during culture. The samples were reprobbed with HUK gene and no amplification of this gene was detected with increasing time in culture. It suggests that the amplification may be specific for the c-myc gene and that there is no amplification of an unrelated gene on another chromosome.

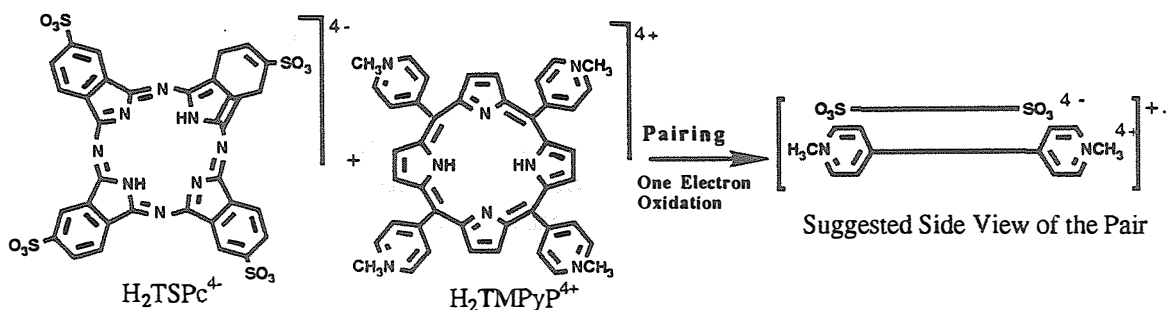
Three messages were examined in RNA samples from the same patients. In one patient with prostatic hyperplasia, the expression of EGFR was not detected in the samples from the first three days, then it started to increase at Day 5 and reached a peak at Day 7, but it was not detected in the Day 11 sample. When the mRNA from these samples were probed with cytokeratin 19, no messages were detected in Day 0, 3, and 11 samples. It could have been that cytokeratin 19 is not expressed at an abundance which can be detected on this amount of RNA, or it may be that the mRNA was lost in the reprobing process(unlikely).

The changes noted in gene copy number seem to support the idea that these changes result from the culture selection of a subgroup of cells with a specific pattern of genes. It is difficult to interpret Northern blot results because of the problems in quantification and degradation which are not encountered in Southern blot analysis. In addition, the yields of RNA have been very low. There is insufficient RNA for Northern blot analysis on many samples. No conclusive explanation can be given for the current observations.

OXIDATION OF ELECTROSTATICALLY PAIRED PORPHYRIN AND PHTHALOCYANINE

Libin Ho, Department of Chemistry, IWU, John Goodwin*

The primary donor in the photosynthetic reaction center of bacteria is formed by two bacteriochlorophyll *b* molecules known as the special pair. Our synthetic model system for the special pair consists of electrostatically paired porphyrin and phthalocyanine molecules. The goals of current work are to confirm the single electron oxidation and to characterize the radical species formed in the oxidation process. We have prepared the free base salts tetra-(N-methyl-4-pyridyl)porphyrin hexafluorophosphate $\text{H}_2\text{TMPyP}(\text{PF}_6)_4$ and tetraphenyl-phosphonium tetrasulfatophthalocyanine $(\text{Ph}_4\text{P})_4\text{H}_2\text{TSPc}$ which are soluble in propylene carbonate. An electrostatically paired cofacial complex is expected to form between these two free-base molecules. This free-base derivative is also expected to undergo one-electron oxidation.

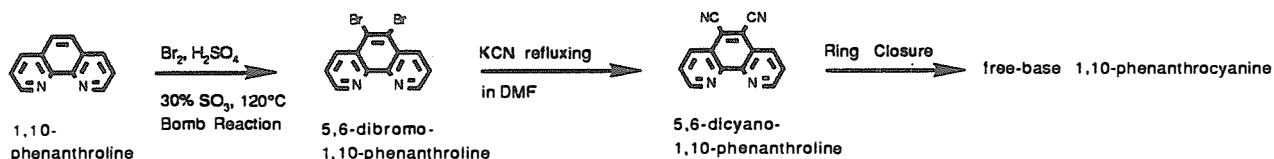


Using rigorously dry solvent allowed $\text{H}_2\text{TMPyP}^{4+}$ and $\text{H}_2\text{TSPc}^{4-}$ molecules to form a complex. The stoichiometry of the complex was determined to be 1:1 and the pair formation constant, K_1 , was estimated to be $1.36 \pm .01 \times 10^8$. The dependence of K_1 on ionic strength was studied at various concentrations of tetra-*n*-butylammonium tetrafluoroborate Bu_4NBF_4 . With increasing ionic strength K_1 decreases. This dependence is expected to obey the Debye-Hückel limiting law. Phthalocyanine and the complex were oxidized at 0.425 and 0.320 V vs SCE (aq), respectively. From the evaluation of the measured potential difference between paired and unpaired phthalocyanine, the equilibrium constant for the formation of the singly oxidized pair was determined to be 2.0×10^6 .

SYNTHESIS OF PHENANTHROCYNANINES

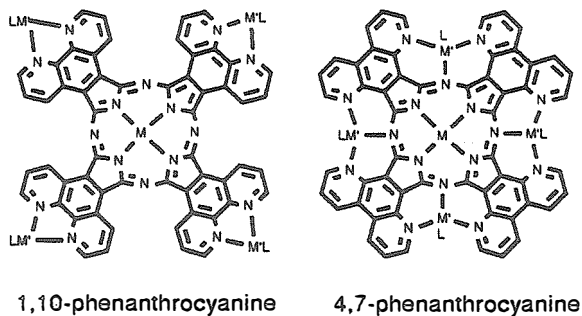
Peggy Huang, Dept. of Chemistry, IWU, John Goodwin*

The focus of this study is on the synthesis of phenanthrocyanines, a new class of multinuclear phthalocyanine derivatives. The anticipated structure of the pentanuclear metal derivatives of 1,10-phenanthrocyanine and 4,7-phenanthrocyanine are shown. The identical coordination environment of each of the four metals, M' , suggests that these complexes may show a simultaneous four-electron transfer at M' . The following is the synthetic scheme for 1,10-phenanthrocyanine :



4,7-Phenanthrocyanine will be synthesized by the same method as shown above.

The dibromo derivatives of 1,10- and 4,7-phenanthrolines were synthesized previously by J. Mlochowski, and the results were reproduced. Currently, the analysis of products from the reaction of 5,6-dibromo-1,10-phenanthroline with KCN in *N,N*-dimethylformamide is in progress.



TOWARD A MORE COMPREHENSIVE EXPLANATION OF DECLINING BLACK MALE YOUTH EMPLOYMENT

Mark Israel, Dept. of Economics, IWU, Michael Seeborg*

Over the last twenty years, the employment to population ratio of black male youths has been declining rapidly, while that of other youth groups has been relatively stable. Many potential causes of this situation have been advanced, but no consensus has been reached. This paper attempts to combine several of these seemingly conflicting explanations into a comprehensive explanation of falling black male youth employment. The potential causes to be considered are: declining manufacturing, increasing returns from crime, generosity of the welfare system, falling educational attainment, the minimum wage, and the development of urban "underclasses". These are combined into an overall theoretical framework in which declining manufacturing, and increases in welfare and crime income lower one's net wage from work and raise one's reservation wage. This leads immediately to decreased participation in the labor force and over time to reduced incentive to attend school and the formation of underclasses which stress dysfunctional behavior over employment or schooling. The minimum wage is included as an additional factor affecting employment outside of this basic framework, *ceteris paribus*, a higher minimum wage should lead to lower youth employment. To test this theoretical framework, a two stage regression model is used. In the first stage, E/P is regressed against all potential causes; in the second underclass formation and declining educational attainment are regressed against manufacturing, welfare and crime to show the indirect effect of these three variables over time through underclass formation and declining educational attainment. All data for this is taken from Census publications, FBI Uniform Crime Reports, and Department of Health and Human Services publications from 1968 to 1987 and is aggregated across the nation. The basic findings of the paper are that declining manufacturing leads directly to lower black male employment relative to other groups, while returns to welfare and crime lead indirectly to lower black male youth employment through underclass formation.

**ALCOHOL ADVERTISING:
FREEDOM OF SPEECH v. SOCIAL RESPONSIBILITY**

Reona Jack, Dept. of Business Admin., IWU, Jack Fields*

This informational study presents the controversy surrounding alcohol advertising. In light of the problem of alcoholism in this country and increasing social pressure for strict regulation, this research examines the advertiser's rights. By looking at alcohol as a convenience product in a mature market, one can see the importance of brand advertising in this particular market. Much of the reason why no regulation on alcohol advertising has been imposed can be attributed to the fact that no conclusive evidence has proven that alcohol advertising actually induces young people to begin drinking. This study includes interviews with adolescent alcoholics who share their views about the imagery associated with these advertisements and the effect it had on their decision to drink. Also, in terms of the First Amendment rights of commercial speech, this study includes case law that traces the relevant Supreme Court decisions, beginning with the denial of any First Amendment protection for commercial speech and ending with what some refer to as the "pro-business" guidelines that are in effect today.

**DADDY DOESN'T LIVE HERE ANYMORE:
A STUDY OF THE DETERMINANTS OF FEMALE-HEADED MINORITY FAMILIES**

Kristin Jaeger, Dept. of Economics, IWU, Michael Seeborg*

The last three decades have seen a marked change in the structure of black families. In 1960, 72% of black women aged 15-44 had been married at least once; today that figure is only 48%. At the same time there has been an increase in the fraction of black children born to unmarried mothers from 23% to 60%. These facts are some of the first indications of an alarming trend toward more female-headed minority families, a trend which seems to be less distinct in the white population.

This study will use both a literature review and an empirical analysis to examine the economic determinants of family structure in metropolitan areas. The focus will be on those factors which may cause high incidences of female-headed minority families in certain cities. Factors to be examined include the Marriageable Male Pool Index (the number of men employed per 100 women) as developed by Wilson and Neckerman, unemployment rates, level of welfare support available, and industrial structure. Special attention will also be given to the effect of family structure on family income.

The cross sectional model proposed will use data from the 1980 Census for approximately 100 selected metropolitan areas. The primary method of analysis to be used to test hypotheses concerning the determinants of change was multiple regression. The results of these analyses will be presented.

A QUANTITATIVE ANALYSIS OF THE RELATIONSHIP BETWEEN RESPONSE RATE AND REINFORCEMENT RATE

J. Alfred Kuh, Department of Psychology, IWU, James Dougan*

Traditional reinforcement theories have predicted a positive monotonic relationship between response rate and reinforcement rate. That is, response rates should rise as a function of increased reinforcement rate. More recently, several theories based on economic and regulatory models have predicted bitonic functions. That is, response rates should first rise, and then fall, as a function of increased reinforcement rates. Several studies have found the predicted bitonic relationship. Unfortunately, many of these studies purporting to demonstrate bitonicity can be criticized because of various confounding variables. For example, in studies which vary reinforcement rate, a decreased rate of response at high reinforcement rates may be an artifact of satiation or of a shorter time available to respond. The present study attempts to replicate and extend the earlier studies by demonstrating bitonicity while controlling for confounding variables, in particular for satiation effects. Subjects were 10 rats: Each was exposed to a Variable Interval (VI) 15s and a VI30s schedule. Half of the subjects ran a 10-minute session, and half responded on a 30-minute session. We expect an inverse relationship between response rate and reinforcement rate in the 30-minute sessions, but a direct relationship during the 10-minute sessions.

TIME HORIZON AND TEMPORAL SHAPING

Sandra Lyn, Dept. of Psychology, IWU, James Dougan*

Previous experiments (Timberlake, Gawley and Lucas, 1987) have suggested that rats are unable to anticipate future food if it is delayed by 16 minutes or more. The present experiment investigated whether this interval could be lengthened by gradually incrementing the length of delay. Ten rats chose between an immediate progressive ratio schedule and a delayed continuous reinforcement schedule. The experiment had two groups. In one group, the continuous reinforcement schedule was initially presented 5 seconds after the progressive ratio schedule, then each successive day the delay was incremented by 30%. For the other group, the control group, the delay was a constant thirty minutes. We predict that a gradual increment of time will enable the rat to anticipate food over longer intervals.

THE RECONCILIATION BETWEEN RATIONALISM AND EMPIRICISM

Maureen Lyons, Dept. of Sociology, IWU, Chris Prendergast*

Immanuel Kant formulated his ethical theory based on categories of thought, which he believed were programmed by nature into the consciousness of every rational being. A major implication of this type of formulation is that moral laws hold universally for all rational beings. Emile Durkheim, wishing to retain the rationalism of Kant granted that all rational beings possess categories of thought. However, Durkheim was also an empiricist, which is usually thought to be a conflicting claim with rationalism. The categories of thought, for Durkheim, were constructed, not by nature, but by society, and, thus, could vary from society to society. Hence, Kant's universalistic ethical theory was transformed by Durkheim into an ethical theory with relativistic implications. Durkheim's ultimate goal in asserting that categories of thought were constructed by society, and not the individual, was to reconcile rationalism and empiricism. However, Durkheim's belief that society (not the nature of human reason) is the source for the categories of thought, is a clear indication that Durkheim was not willing to grant enough rationality to the individual as is necessary for his theory to be a rationalist theory. Thus, Durkheim fails in his quest to reconcile rationalism and empiricism.

THE EFFECTS OF INTRACEREBRAL INJECTIONS OF NEUROPEPTIDE K INTO THE MEDIAL PREOPTIC AREA ON SEXUAL BEHAVIOR IN THE MALE RAT

Peter Malen, Depts. of Biology/Psychology, IWU, Wayne Dornan *

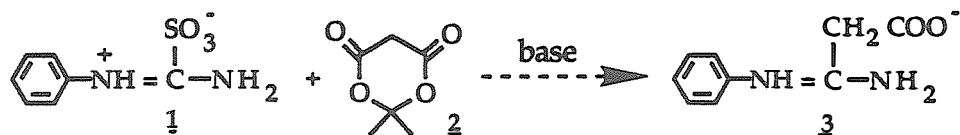
The first mammalian neuropeptide to be characterized was substance P (sP), and it is now recognized that sP is a member of a structurally related family of peptides, the tachykinins. Extensive studies have demonstrated that sP and some related tachykinin peptides play key roles as neurotransmitters and neuromodulators. The synthesis of different members of the tachykinin family is in part due to the modifications of three sP-encoding preprotachykinin (PPT) mRNA's that are derived from a single sP gene. At least four tachykinin peptides can be synthesized as a result of modifications of the sP gene including sP, neurokinin A, neuropeptide γ , and neuropeptide K (NPK). Whereas the behavioral significance of sP has been extensively studied, there has been very little examination of the behavioral significance of NPK. This is especially true of the examination of male reproductive behavior. Dornan and Malsbury (1989) reported that bilateral injections of sP into the Medial Preoptic Area (MPOA) facilitated male rat sexual behavior. High concentrations of PPT mRNA's are found within the MPOA, and as previously mentioned, NPK is derived from PPT mRNA's. At present, however, it is not known whether NPK plays a role in the neural regulation of male copulatory behavior. In the following experiment, we examined the role of NPK within the MPOA in the regulation of male rat copulatory behavior. Sexually experienced adult male Long-Evans rats were used. Chronic cannulae implants were stereotactically placed 2 mm above the MPOA, and following 7-12 days of recovery, the animals were behaviorally tested to obtain a baseline measure of copulatory behavior. One week following baseline testing, the animals were randomly placed into 4 groups and were subsequently bilaterally injected with .5 μ l solutions of either saline, 10 ng NPK, 100 ng NPK or 1 μ g NPK and the effects of these injections on copulatory behavior were determined. Following testing, brains were histologically analyzed to confirm the placements of the cannulae. Although histological analysis is not yet complete, our data indicate that injections of 10 ng and 100 ng NPK have no effect on copulatory behavior. In contrast, 1 μ g injections of NPK completely abolished copulation in 50% of the animals. Although the complete role of tachykinins in the regulation of copulatory behavior has yet to be elucidated, it seems that sP and NPK, two tachykinins synthesized from the sP gene, exert opposite effects in the regulation of male copulatory behavior.

REACTIONS OF THIOUREA-S,S,S-TRIOXIDES

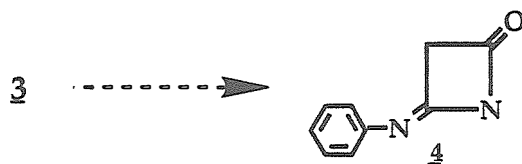
WITH β -DIKETO ENOLATES

Milana Maletic, Dept. of Chemistry, IWU, Judith J. Bischoff*

Aminoiminomethanesulfonic acid derivatives are susceptible to nucleophilic attack by amino acids to form stable guanidino acids. Thus N-phenylaminoiminomethanesulfonic acid, PAIMSO (1), and other thiourea-S,S,S-trioxides should also undergo nucleophilic addition reactions with enolates (e.g. Meldrum's acid (2) and diethylmalonate). This would provide a convenient route to the synthesis of N-substituted amidino acetic acids (3). These compounds are of particular interest because homologous amidino carboxylic acids have been shown to have antifungal activity.



Furthermore, it may be possible to effect intramolecular ring closure of 3 to form a β -lactam (4), which is the active functionality in penicillin and cephalosporin antibiotics.

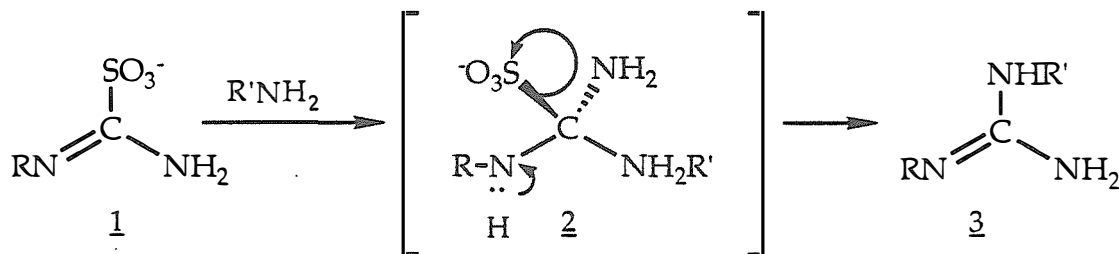


We have attempted the nucleophilic addition reaction of Meldrum's acid and diethylmalonate with PAIMSO under a variety of conditions.

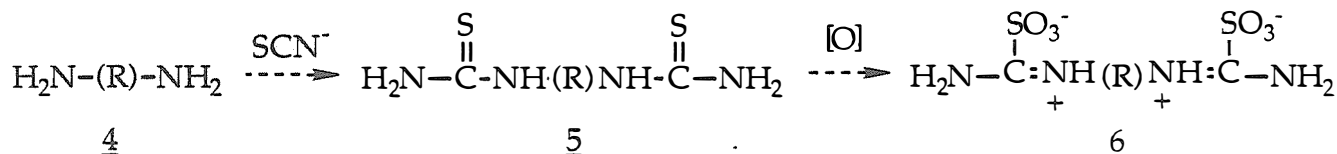
SYNTHESIS OF ALIPHATIC BIS(THIOUREAS)

Donald G. McEwen, IV; I.W.U., Biology, Department of Chemistry, Judith J. Bischoff*

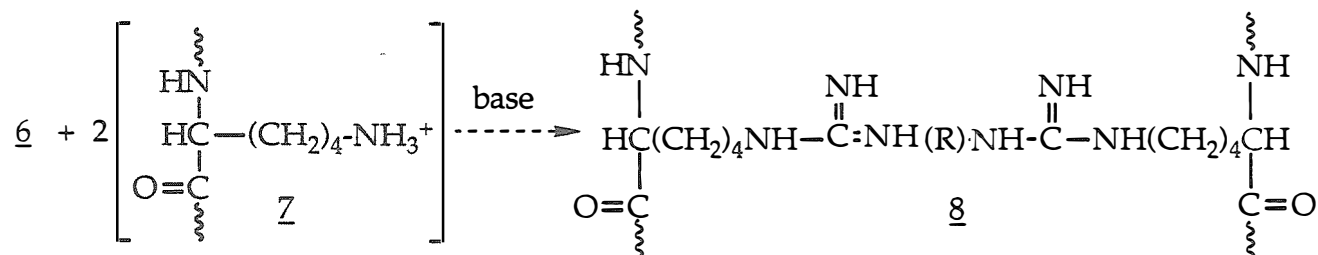
Oxidation of monofunctional thioureas to the corresponding thiourea-S,S,S-trioxides has been previously studied. Both Miller and Bischoff have shown that guanidino acids can be readily synthesized from thiourea oxides (1) and nucleophilic amino acids. The resulting reaction is hypothesized to take place via a tetrahedral intermediate (2), which then collapses to form the guanidino acid (3) and SO_3^{2-} .



The successful oxidation of the monofunctional thioureas to the corresponding thiourea-S,S,S-trioxides suggests that the oxidation of N,N'-bis(thioureas) (5) to the corresponding bis(thiourea) oxides (6) should also be feasible.



Consequently, these homobifunctional molecules may then be vulnerable to nucleophilic attack at two sites, resulting in a molecular "bridge" spanning the two nucleophiles. If the two attacking nucleophiles are side chains of amino acid residues--such as lysine or cysteine--within a protein (7), the protein(s) would then be cross-linked (8).



To this end we have attempted the synthesis of bifunctional thioureas by several methods.

A MORPHOLOGICAL AND CHEMICAL STUDY OF THE LICHEN GENUS *HYPOGYMNNIA* IN NORTH AMERICA

Melinda McFarlin, Dept. of Biology, IWU, Jonathan Dey*

The lichen genus *Hypogymnia* is widely distributed throughout the world, in such places as Europe, Asia, Africa, Australia, New Zealand, Japan, and North America. Currently, there are twenty-two recognized species of *Hypogymnia* in North America, of which seven are newly described species within the past eighteen years. In addition, one species of *Hypogymnia* was newly reported in North America. *Hypogymnia* has not been thoroughly investigated. There are at least four new species from western North America, tentatively recognized by Lawrence Pike, which have not yet been described. Furthermore, a complete key to the *Hypogymnia* species of North America has yet to be constructed.

My morphological and chemical study of the genus *Hypogymnia* was performed on a sample of North American specimens collected from the western United States, southern Canada, the Great Lakes region, and the eastern United States. The morphological characteristics of each lichen specimen were examined. Characteristics such as type of branching pattern, the presence or absence of soredia and isidia, and the coloration of the medulla are useful in distinguishing between different species of *Hypogymnia*. Chemical studies included preliminary spot test screening of the cortex and medulla of the lichen specimen, followed by a thin layer chromatographic study to attempt to identify the chemicals present in each specimen, and to evaluate the chemical variation within each species.

In this study, specimens of sixteen of the twenty-two described species of *Hypogymnia* have been examined, as well as specimens of the four new, undescribed species (on loan from the U.S. National Herbarium at the Smithsonian Institution). Patterns of morphological variation and chemical variation are being identified for each species for the purpose of comparison. To date, previously unreported, additional chemical variation has been detected in *Hypogymnia imshaugii*. A key to the North American species of *Hypogymnia* is under preparation.

A PERSONAL COMPUTER PROGRAM FOR RECORDING MALE RAT COPULATORY BEHAVIOR

Scott Meade, Depts. of Business and Psychology, IWU, Wayne Dorman *

In 1988, Gregory M. Holmes *et al.*, published a paper describing a somewhat versatile version of an event-recording program on an IBM-PC. Their program was a modification of an earlier one devised by Rakerd *et al.* Event-recording programs on personal computers are designed to be as simple as and more flexible than the traditional event-recorder.

Though the Holmes program is versatile, limitations remain. We have created our program, CADA (Computer Aided Data Acquisition), to overcome these limitations. Unlike earlier programs, CADA is menu driven. The program is simple to use as the user need not remember any command lines. Our program also displays the test states in real time, with continuous timer display updating and instantaneous updates of frequency values as a key is pressed. CADA allows the observation of up to four subjects simultaneously.

One of the most time saving and useful features of CADA is data exportation. Once data is collected with the program, it can be exported, without modification, into SPSS or any other statistical package for analysis. Other event-recording programs require researchers to manually enter the data into statistical packages, reading from a printout.

Future plans are to create options which allow easy creation of custom variables and keyboard layout to record any type of event sequence. Our goal is to improve the versatility while maintaining simplicity. We then plan to disseminate CADA to others in the research community who would benefit from its use.

CADA was written in BASIC for the IBM-PC. Both William Struthers and Pete Malen used the program to gather data for use in their studies of male rat copulatory behavior. The versatility of CADA will be demonstrated at this conference.

THE RELEVANCE OF PIAGETIAN THEORY TO THE ELEMENTARY MATHEMATICS CURRICULUM

Vicki L. Mockaitis, Dept. of Psychology, IWU, James Dougan*

Piaget characterized children into stages based on cognitive levels of development. In the second grade, children are at the level of concrete operational thought, meaning that they think in terms of real objects rather than reason abstractly. Given second grade development and the abstraction of math, programs such as "Math Their Way" which incorporates "hands-on" materials and Piaget's rationale indicate that primary school children would be better able to understand math concepts which are presented in a concrete manner. Thus, the main purpose of this analysis is to determine the effectiveness of the Piagetian-based "Math Their Way" curriculum as compared to the traditional math approach in teaching an introductory math concept.

To compare both styles of teaching, a class of second graders was divided into two equal groups of thirteen children each. On two separate occasions, each group was exposed to a total of two lessons: one traditionally taught and one taught using "Math Their Way" manipulatives. The lessons were followed with a short written quiz to assess the data between the two teaching styles.

Contrary to my proposed findings, outcomes revealed that the second graders receiving the traditional techniques performed significantly better than those who had received the "hand-on" presentation. Several variables possibly contribute to these results, indicating that more research needs to address the subject.

EFFECTS OF ANESTHETIC, TEMPERATURE, AND PRESSURE ON VASOMOTOR ACTIVITY OF THE MICROCIRCULATORY NETWORK OF *Nereis* sp.

Michael J. Monfils, Dept. of Biology, IWU, J. Robert Hippensteele*

The marine clam-worm (*Nereis* sp.) has a closed circulatory system which exhibits vasomotion. Vasomotion is a periodic contraction and relaxation of muscle cells in the walls of metarterioles, small arteriolar blood vessels which lead into a capillary bed. The resulting changes in blood vessel diameter cause a decrease and increase, respectively, in blood flow rate. Observations were made on the microvascular beds of parapodia, lateral leg-like extensions of the worm's body wall. The parapodia of animals anesthetized in a magnesium chloride solution were transilluminated and observed microscopically. Subsequent to finding an appropriate blood vessel to study, recordings of vasomotor periods were taken at consecutive time intervals after removal from the anesthetic solution. This would determine the extent to which the anesthetic agent interfered with normal vasomotor activity. The vasomotor periods are composed of the time interval during which the blood vessel had a small diameter, a constriction, followed by the time interval during which the vessel had a large diameter, a dilation. The resulting data show that the anesthetic had no significant effect on the constriction or dilation periods. Because the parapodia were transilluminated using a heat producing light source, the animals' temperatures rose slightly while under observation. In order to determine the extent to which this mild heating could alter normal vasomotor responses, a study of the temperature effects on vasomotion was performed. Recordings of the vasomotor periods were taken at one degree temperature intervals within the range of fifteen to twenty-four degrees Celsius. The data show no significant temperature-induced changes in the vasomotor periods. Lastly, because these animals are found at various depths under the surface of the water, the effects of ambient pressure were studied. The worms were put in a glass bottle in which the pressure was varied from atmospheric pressure, up to 800 mm. Hg. above atmospheric pressure, and back down to atmospheric pressure. Recordings of the vasomotor periods were taken at pressure intervals of 100 mm. Hg. Resulting data do not show a significant change in the vasomotor periods. An additional worm was observed at 200 mm. Hg. pressure intervals, but a fifteen minute exposure to each of the pressures was required before recording the data. This design allows more time for the pressure to affect the vascular activity. These recordings were made in the range between atmospheric pressure and 800 mm. Hg. also. Collected data suggest that the dilation period decreases with increasing pressure, and the constriction period is not affected.

**EVALUATING THE USE OF PHOTO-IDENTIFICATION TO VERIFY RESIGHTS
AND DETERMINE SITE FIDELITY OF BOTTLENOSE DOLPHINS,
TURSIOPS TRUNCATUS, IN BEAUFORT, NORTH CAROLINA**

Peggy O'Neill, Dept. of Biology, IWU, Gail Lima*

Research completed at Beaufort, North Carolina
with Keith Rittmaster and Victoria Thayer

Little is known about the residency and migration patterns, also known as site fidelity, of many species of cetaceans. Photographic identification of individual animals allows researchers to gain knowledge about their migration. The dorsal fin morphology of various species of dolphins can be used to identify individuals photographically. The shape of the dorsal fin, and its distinctive scrapes, notches and wound marks, can be used to identify individual bottlenose dolphins, *Tursiops truncatus*. In this study, photo-identification was used to investigate the site fidelity of individual bottlenose dolphins in the waters surrounding Beaufort, North Carolina. Photographs were taken with single lens reflex motor drive 35 mm cameras using a 70-200 mm lens. Black and white prints of the dorsal fins were made and used to identify and compare individual dolphins. The photographs were catalogued according to the date the dolphin was first seen and given the next number in sequence for ease of reference. The fins were then grouped, according to the location of their most predominant notches, into one of ten categories. The efficiency of this method for photo-identification was also evaluated. One hundred ninety-nine of the 435 fins photographed from January 1986 through August 1990 were catalogued and categorized. Only twenty dolphins were sighted more than once in the Beaufort area during this time. These twenty dolphins followed no discernable pattern of site fidelity. The photo-identification method used, that is categorization by notch location, greatly decreased the search time needed for verifying individual resights. More data needs to be obtained before significant conclusions can be made concerning the site fidelity of the bottlenose dolphins in the Beaufort area. The information gained in this study will facilitate future research in the area of photo-identification.

THE DEVELOPMENT OF STUDENT GOVERNMENT AT ILLINOIS WESLEYAN UNIVERSITY

Ed M. Pacchetti, Dept. of Political Science, IWU, John Wenum*

The first formal student government at Illinois Wesleyan, the Student Senate, was established in the year 1915. Since that year, the Student Senate has represented student opinion on a number of issues on the campus, local and national levels. Because the leadership of the Student Senate changes on an annual basis, my project centers on providing a long-range view of the role of student government in representing the students of Illinois Wesleyan. While I studied all 76 years of the existence of the Student Senate, I chose to concentrate much of my research on the activities of the Senate since the late 1950's. It was at this time that Student Senate was given nearly full autonomy power over the expenditure of the student activity fee, a practice formerly unheard of at most other universities throughout the country. This practice has proved successful and the Senate retains control over the activity fee, allowing the Senate a current annual budget of over \$170,000.

Although my primary focus is on the student government of Illinois Wesleyan, I offer some thoughts on the relationship between university administration and student government at Illinois Wesleyan and the effect that this has had on the over-all effectiveness of the Student Senate at Illinois Wesleyan. Also, I compare and contrast it with other forms of government used at the university, state and national levels. Through a comparison of our student government system with those systems used in other areas of the country, as well as the use of historical data, I will determine if the present form of student government is the best for use at Illinois Wesleyan.

**BIOLOGICAL CONTROL OF HEMATOPHAGOUS
· NEST ECTOPARASITES IN HOUSE WRENS
(TROGLODYTES AEDON)**

Andrew Pacejka, Dept. of Biology, IWU,
Andrew Neill* (ISU) and Given Harper*

Nestling House Wrens are commonly parasitized by blood sucking fowl mites (genus *Dermanyssus*). We observed male House Wrens bringing unhatched spider egg sacs (family Araneidae) to Wren nestboxes, and we also observed newly hatched spiders preying on mites. The purpose of this experiment was to determine the effects of the mites upon the nestling Wrens, and to determine the effectiveness of the spiders as a biological control of the mites.

In experimental nests, spider egg sacs were removed and replaced with nonviable ones. In sham control nests, spider egg sacs were removed and immediately replaced. Control Nests were left unmanipulated. Brood mass of nestling House Wrens was significantly less in broods infested with high, as opposed to low mite populations. However, there was a nonsignificant negative correlation of brood mass to increasing mite populations. Treatment had no effect on mite populations in nestboxes, although a small sample size for experimental treatments precludes any definite conclusions.

THE ANATOMY OF THE HYOID REGION OF *MOLOSSUS MOLOSSUS* AND ITS IMPLICATION IN SYSTEMATICS

Natawadee Prasertphon, Dept. of Biology, IWU, Thomas Griffiths*

The hyoid musculature and hyoid apparatus of a bat, *Molossus molossus* (Chiroptera: Molossidae) is dissected and described. A comparison is made with the hyoid structures of bats of the genera *Rhinopoma*, *Emballonura*, *Nycteris*, *Megaderma*, *Rhinolophus*, *Pteronotus*, *Phyllostomus*, and *Eptesicus*, which were previously described by my sponsor Griffiths and associates. In *Molossus*, the geniohyoid and sternohyoid insertions, as well as the hyoglossus origin, have lifted off the basihyal bone and jointly retain a direct attachment to the basihyal bone and jointly retain a direct attachment to the basihyal via a small tendon. The hyoglossus is split into three distinct bellies: the most superficial originates from the basihyal raphe, the second originates from the basihyal bone, and the third originates from a very reduced thyrohyal bone. A part of the mylohyoideus has broken away from the main muscle, retaining its insertion on the basihyal -- it is termed the mylohyoid profundus. The jugulohyoid muscle is absent, as is the stylohyoideus. The styloglossus muscle is split into two distinct bellies by the hyoglossus muscle. A cladistic analysis of these data gives preliminary support to Koopman's proposal in 1984 for a separation of the superfamilies Emballonuroidea and Rhinolophoidea from the superfamilies Phyllostomoidea and Vespertilionoidea. These data provide the first compelling support for Koopman's taxonomic group Yangochiroptera, comprising the superfamilies Phyllostomoidea and Vespertilionoidea.

**A SYSTEMATIC ANALYSIS OF THE ANATOMICAL PROJECTION FROM
THE VMH TO THE dMCG USING HRP HISTOCHEMISTRY:
COMPARISON BETWEEN MALE AND FEMALE RATS**

Scott E. Preusen, Depts. of Biology/Psychology, IWU, Wayne Dorman*

Anatomical as well as behavioral results indicate that the dorsal Midbrain Central Gray (dMCG) and the Ventral Medial Nucleus of the Hypothalamus (VMH) are the principle brain structures that function in mediating sexual behavior in the female rat. Recently, the medial portion of the Zona Incerta (mZI) has been implicated as an additional brain structure that regulates sexual receptivity (lordosis) in the female rat. When the mZI of the female rat was destroyed via intracerebral injections using the neurotoxin, ibotenic acid, Dornan, et. al. (1990) reported that lordosis behavior was shown to be attenuated. Presently, little is known about the role of the mZI in the expression of male rat sexual behavior, but several studies indicate that it plays no role. Anatomical studies, however, have revealed that neural connections exist between the mZI and the dMCG in both male and female rats. Collectively this information suggests that the neuronal pathways between the mZI and the dMCG would differ in strength between male and female rats. We addressed this possibility by using the retrograde tract tracing approach with Horseradish Peroxidase (HRP). A 12 % solution of HRP was injected bilaterally (volume, 5 ul/per side) into the dMCG. After a 3 day survival period, animals were sacrificed and their brains processed for HRP histochemistry using a modified method of Mesulam. The results of this comparison analysis will be reported.

STUDIES OF HUMAN PLACENTA: USE OF ^{31}P NUCLEAR MAGNETIC REASONANCE SPECTROSCOPY

Timothy A. Pritts, Dept. of Biology, IWU.
Research completed at the University of Illinois at Urbana-Champaign,
with M. Joan Dawson* and Jyothi Raman*, Dept. of Physiology and
Biophysics.

Nuclear magnetic resonance spectroscopy (NMRS) is a powerful tool for the study of the levels of metabolites in tissues. Phosphorus 31 (^{31}P) is especially suitable for NMRS studies of living systems. Phosphorus compounds present in living systems at sufficient concentrations to be detected by ^{31}P NMRS include ATP, inorganic phosphate, and membrane precursors and degradation products. Therefore, ^{31}P NMRS can be a valuable tool for assessing the energy state and levels of phosphorus metabolites in living tissues.

This project involved an examination of the effectiveness of different buffers in maintaining placental viability throughout superfusion and NMRS study. A comparison was made of the effectiveness of physiological salt solutions to that of enriched cell culture preparations. In the first part of this study, the ability of buffers to prevent sample acidosis was examined. It was concluded that each of the buffers studied is effective in preventing extensive tissue acidosis during NMRS examination. Currently, the buffers are being assessed according to sample ATP stability over time and glucose uptake over time.

Previous studies in our laboratory have indicated that specific changes in ^{31}P NMRS spectra of female reproductive tissues are observed in connection with the normal progression of pregnancy, with disorders of pregnancy, and with gynecologic diseases. This study has shown that physiological salt solutions are as effective as cell culture preparations in minimizing tissue acidosis. Physiological salt solutions have the advantage of being more economical than cell culture preparations. It is hoped that in the future, tissue studies using NMRS could become a cost-effective method of obtaining previously unavailable useful information which would aid the clinician.

THE GERMAN AUTOMOBILE INDUSTRY'S REACTION TO THE ANNOUNCEMENT OF GERMAN REUNIFICATION: AN EVENT STUDY

Rhea E. Rosenlof, Dept. of Business Admin., IWU, Mona Gardner*

This study explores the economic consequences of German Reunification through the analysis of the German automobile industry. Through the application of a "special event" methodology, this project examines the stock returns of three German automobile manufacturers - BMW, Daimler Benz, and Volkswagen - to discover if any abnormal returns were earned by shareholders which can be attributed to the announcement of Reunification. This study hypothesizes that there is a direct relationship between the amount of investment made in East Germany by each firm prior to the announcement of Reunification and the stock price reaction of each firm to the announcement.

The project details the political and economic environment in West and East Germany during the early months of 1990, examines the historical and financial background of each target company, and outlines the methodology employed. The results of the study and subsequent analysis explore what these abnormal returns could mean for the future of each firm and for the industry as a whole in a united German nation.

METAMORPHOSIS OF MARINE INVERTEBRATE LARVAE: EFFECTS OF SEDIMENT TREATMENTS AND NO. 6 FUEL OIL

Dianne Rudy, Dept. of Biology, IWU, Gail Lima*

Research was completed at the Woods Hole Oceanographic Institution
under the direction of Dr. Rudolf Scheltema

Many species of marine invertebrate larvae have the ability to detect particular environmental cues which are believed to stimulate larval metamorphosis into the adult form. Metamorphosis in response to bottom sediment was measured in two species of marine planktonic larvae, *Ilyanassa obsoleta*, a common mud-snail, and *Capitella*, sp. I, a polychaete worm. The control consisted of organic-rich sediment collected from Barnstable Harbor, Massachusetts. One sediment treatment, termed muffled sediment, consisted of the sediment control heated at a high temperature in a muffle oven to remove all organic matter. A sharp decrease in percent metamorphosis was observed in larvae exposed to the muffled sediment condition compared to the sediment control. Results confirmed that settlement involves more than physical contact with the sediment and suggest that the metamorphosis-stimulating factor is probably a water soluble substance.

The June 10, 1990, spill of 7,500 gallons of No. 6 fuel oil into Buzzard's Bay, Massachusetts, provided oil contaminated samples of salt marsh sediment. Both the sediment control and the muffled sediment were contaminated with the oil. The influence of oiled conditions on percent larval metamorphosis varied between species. *I. obsoleta* showed no significant change (ANOVA $\alpha = 0.01$) in the percent metamorphosis between the oiled and unoiled conditions. In *Capitella* sp. I, larval settlement rates of oiled sediment conditions were significantly lower than the control sediment. This trend in *Capitella* Sp. I could suggest a masking of the metamorphosis cue. However, the variability in results of both species support the need for further studies investigating the specific mechanisms of metamorphosis as well as the impacts of No. 6 fuel oil on the development of marine invertebrate larvae.

BILATERAL INJECTIONS OF SUBSTANCE K INTO THE MEDIAL PREOPTIC AREA HAVE NO EFFECT ON MALE RAT SEXUAL BEHAVIOR

Kevin Short, Dept. of Psychology, IWU, Wayne Dorman*

Substance K, a novel member of the tachykinin family of peptides, has been shown to be structurally similar to substance P. Furthermore, reports have shown that in some areas of the brain, substance K and substance P are co-synthesized and/or co-released. Thus, it is appropriate to test the effects of substance K in a specific brain area where substance P has been shown previously to exhibit some behavioral control, thus differentiating the respective roles of the two peptides in that area. The medial preoptic area (MPOA) was chosen because substance P has been shown to modify sexual behavior in the male rat when induced in this area.

Adult male Long-Evans rats with limited sexual experience were used. The rats were housed individually and were maintained in a controlled environment on a light/dark cycle of lights on at 6:00 and off at 21:00. Each male was anesthetized with sodium pentobarbital (50mg/kg) and received a pair of stereotaxically implanted 22-gauge stainless steel guide cannulae aimed at 1 mm above the MPOA. One week following surgery, males were randomly placed into four groups and were subsequently bilaterally injected with .5 ul solutions of either saline, 10, or 1000 ng substance K and the effects of these injections on copulatory behavior were determined. Following testing, brains were histologically analyzed to confirm the placements of the cannulae. Only animals that had confirmed bilateral placements located within the MPOA were used in the data analysis. The results of the nine animals which completed the entire procedure indicated that substance K had no effect on modifying mount, intromission, or ejaculatory behavior parameters. This suggests that the substance K innervation of the medial preoptic area play no role in the neuro-regulation of male rat copulatory behavior.

AN INVESTIGATION OF THE VALIDITY OF THE
BAT SPECIES *MYOTIS SODALIS* (CHIROPTERA
VESPERTILIONIDAE)

Jeffrey Skibins, Dept. of Biology, IWU, Thomas Griffiths*

In 1929, Miller and Allen, (Bull. U.S. Natl. Mus., 144: viii + 218 pp) named a new bat species, *Myotis sodalis* on the basis of examinations of museum specimens. Since then, investigations have suggested that the population of *Myotis sodalis* has decreased dramatically. This reduction in number has been significant enough to warrant Federal Endangered Species status. Alternatively, it is possible that *Myotis sodalis* never existed as a species. I believe that this taxon was incorrectly recognized and named. In order to test whether this is the case I will perform a computerized cluster analysis on skin and skull measurements obtained by Dr. Thomas Griffiths. These results may show that *Myotis sodalis* is not a separate species and thus does not warrant Federal protection.

HUMAN-BASED SOCIAL INTERACTION AS A PRIMARY REINFORCER FOR LONG-EVANS RATS

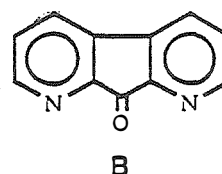
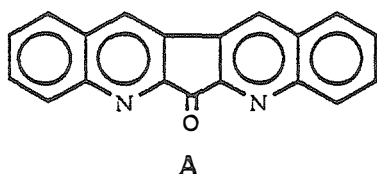
Amy Noel Stiers, Dept of Psychology, IWU, James Dougan*

Previous studies (Davis, 1988) have shown that social reinforcement is effective in shaping rats to bar press. The present study examines whether social handling can serve simultaneously as a reinforcing and an eliciting function in maze running behaviors. The subjects used were 14 (7 male and 7 female) Long-Evans rats, all of which were litter mates. Infant rats were either removed from the nest each day (handled) or left undisturbed (unhandled) for a postweaning period of 6 weeks. The rats were observed in a maze running procedure in which the experimenter was at one arm of the maze with food pellets and the other arm had just pellets. The rats were observed to see whether they preferred going to the arm the experimenter was at to receive social reinforcement. We predict that the handled rats will choose human-based social interaction more often than the unhandled rats. We predict human-based social interaction should be a stronger reinforcer than the non-human-based interaction for the handled rats.

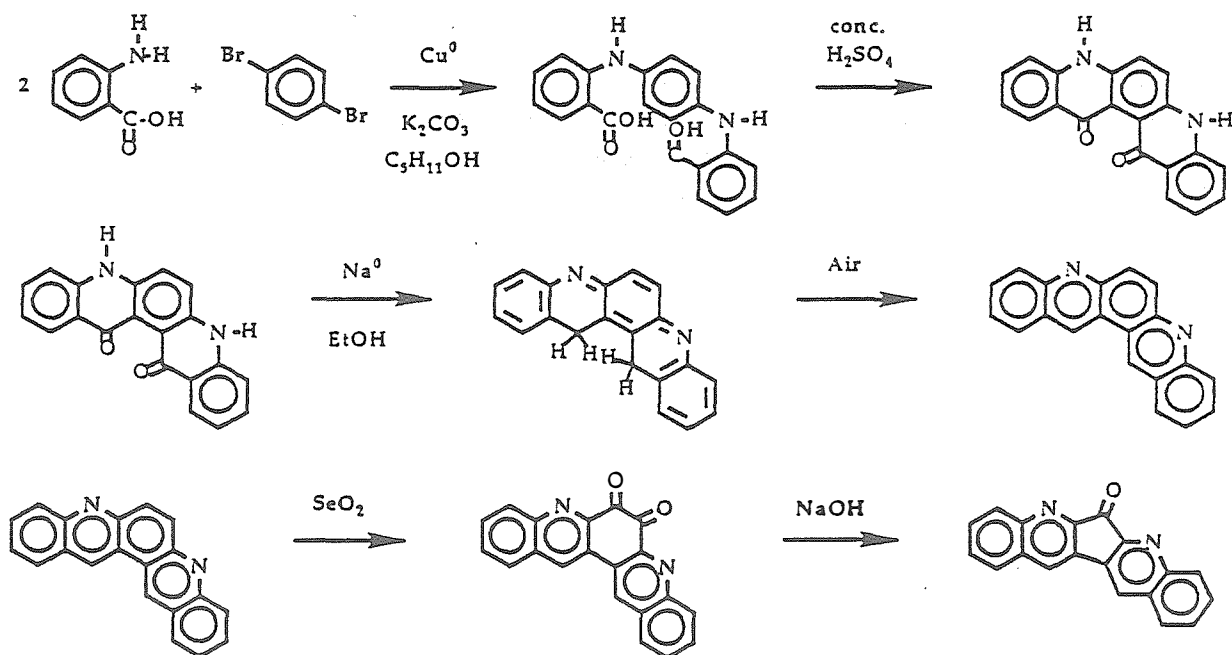
SYNTHESIS OF 1,8-DIAZADIBENZO[b,h]FLUOREN-9-ONE AS A
FINGERPRINT DETECTION AGENT

Jeffrey K. Stowell, Dept. of Chemistry, IWU, Forrest J. Frank*

The title compound (A) is being synthesized in an attempt to find an improved reagent to detect latent fingerprints. DFO (B, 1,8-diazafluoren-9-one) has recently been discovered to react with the amino acids present in fingerprints to produce a fluorescent product which makes detection of even smaller amounts of fingerprints than possible before. However, the fluorescence occurs in the yellow range of the spectrum where the background fluorescence of some papers obscures the fingerprint fluorescence. The title compound should react similarly to DFO but with the increased conjugation the fluorescence should be shifted toward the red, away from the background interference.



Scheme for the Preparation of 1,8-diazadibenzo[b,h]fluoren-9-one



THE EFFECTS OF REPEATED ADMINISTRATION OF VARYING DOSES OF MDMA ON THE EXPRESSION OF SEXUAL BEHAVIOR IN THE MALE RAT.

William M. Struthers, Dept. of Psychology, IWU, Wayne Dornan*

3,4 Metylenedioxymethamphetamine (MDMA, "Ecstasy") is a potent neurotoxin which preferentially produces 5-HT nerve terminal degeneration in the CNS in both rodents and primates. There are, at present, no published reports which have systematically examined the effects of acute or chronic treatment of MDMA on animal sexual behavior. A previous study measured the effects of repeated systemic administration of MDMA on a variety of parameters of male sexual behavior in sexually vigorous male rats. Subcutaneous injections of MDMA (40mg/kg) or saline (1ml/kg) were administered every 12 hours for 4 consecutive days. Neurochemical assessments of brain 5-HT and 5-HIAA depletion following repeated MDMA treatment were then conducted using reverse phase liquid chromatography. The results of this study revealed that repeated systemic administration of MDMA to sexually vigorous male rats produced a transient disruption in the expression of male copulatory behavior. In males that did display copulatory behavior, both the ejaculation latency and the post-ejaculatory latency were dramatically lengthened when compared to saline controls. Surprisingly, one week after the first behavioral test, copulatory behavior in MDMA treated rats appeared unaffected despite a marked depletion of 5-HT and 5-HIAA content in the striatum and hippocampus. In a follow up study, repeated systemic injections of different doses of MDMA (20mg/kg and 40mg/kg) or saline were administered to 11 sexually vigorous male Long Evans rats every 12 hours for 4 consecutive days. A variety of parameters of male sexual behavior were assessed 7 and 14 days following the first injections of MDMA or saline. It is expected that there will be a dose dependent relationship between increased doses of MDMA and an abolishment of male sexual behavior, with lower doses showing less of an inhibitory effect.

SEPARATE PERCEPTUAL PROCESSES UNDERLIE MORINAGA'S PARADOX OF DISPLACEMENT

Valerie Vecchio, Dept of Psychology, IWU, Dr. John Clavadetscher*

In Morinaga's paradox of displacement, judgments of length do not correspond to judgments of position. In Figure 1, the middle line of the Müller-Lyer-type figures appears shorter than those on the top and bottom, but its right endpoint appears displaced to the right. This experiment compared the effects of wing length change on judgments of length and position in Morinaga figures. It has been recently argued that both length and position judgments are due to the same perceptual mechanism. This implies that changes in wing length should have similar effects on these judgments. In the present experiment, the length of left and right wings and central test lines of the upper and lower patterns were varied in a 4 X 4 X 2 factorial design. Twenty-one subjects varied the length of the middle line to either match the length of the other two horizontal lines or align the endpoint positions.

The length results appear in Figure 2 and are consistent with results from similar Müller-Lyer studies. As wing length increased, the judged test line length first increased, then decreased. This inverted U-shaped graph has been reported previously in studies using similar Müller-Lyer figures.

In the second part of the study, subjects aligned the position of the right endpoints (see Figure 3). In this study, the judged position of the right endpoint of the test line did not show the same inverted U-shaped function as was found for the length study. In addition, changes in left wing length had a strong effect on length, but not position judgments. These indicated that the process underlying the length and position judgments differ.

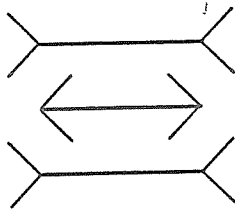


Figure 1

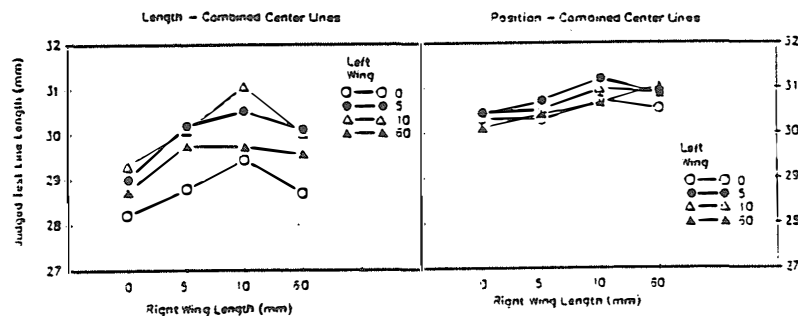


Figure 2

Figure 3

THE COMBINED INFLUENCE OF MUSIC AND VISUAL SCENES ON FEAR AND HUMOR PERCEPTION

Amy Walters, Psychology Dept., IWU, Dr. John Clavadetscher*

This study investigates the process by which perception of a visual stimulus is influenced by the perception of an accompanying musical selection. The subjects were chosen from among IWU students based on their self-report of either high or low levels of musical training. Subjects watched four video-taped scenes involving animals interacting, listened to four musical excerpts, and experienced the audio and visual portions paired in all combinations. After the presentation of each stimulus condition, subjects were asked to use a 1-10 scale to rate fear and humor evoked by the stimuli. The subjects also rated music-video compatibility. The results are shown in figures 1 and 2 below in which each data curve represents one visual scene. The music and visual stimuli appeared to combine their influences differently for fear and humor. The fear ratings of audio-visual pairings (figure 1) were strongly influenced by the subjects' impressions of the mood of the music, as indicated by the steep slope of each visual stimulus curve. Despite the widely disparate ratings of the visual stimuli in the video alone condition, the visual scenes had little influence over the fear rating, as indicated by the minimal separation between the curves.

A quite different pattern of results occurred for the humor ratings. The almost horizontal data points in figure 2 show that the differences in music had little effect on the ratings of pairings. However, the differences in the visual scenes had a large impact on humor ratings as shown by the substantial differences in the heights of the curves for visual conditions. The results are consistent with the idea that music evokes strong emotional responses while humor is more cognitively based.

There did not appear to be a significant difference between the responses of subjects who had considerable musical training and those who had little or no musical training except in the area of compatibility. Those with little musical training appeared to be more likely to see the pairings as compatible than those with more musical training.

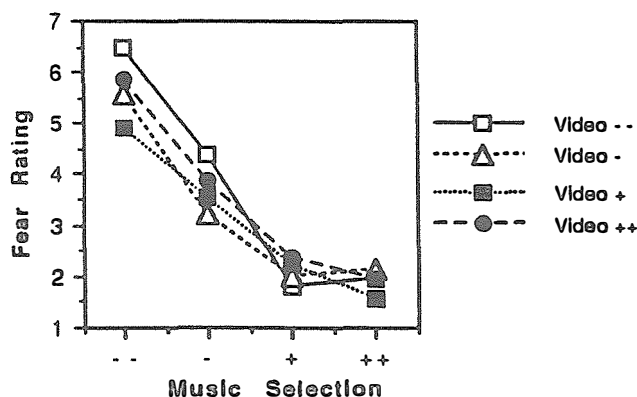


Figure 1. Fear ratings of video-music combinations.

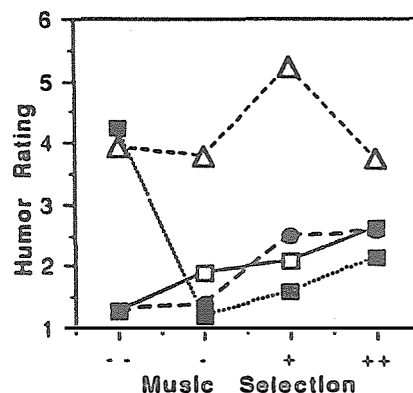


Figure 2. Humor ratings of video-music combinations.

THE AMERICAN NOVEL AND THE BOOK: WHAT'S TO LEARN AND WHY?

Elizabeth C. Wise, Dept. of English, IWU, Robert C. Bray*

New methods of teaching literature in English and Language Arts courses are continuously being sought and attempted with the hopes that students will better appreciate the language they speak, read, and write. The purpose of this study is to provide, in the form of a unit plan, a fresh way of teaching eighth grade students literature -- the book for its "bookness", the American novel for its "Americanness" -- while still presenting the fundamentals of literature (genre, characterization, plot, setting, etc.). Such a task entails providing historical and cultural overviews of both the book and the novel, being sure to distinguish between book and novel at all times. Eighth graders are the primary targets for two reasons: 1) Literature, as another facet of the English language, is being introduced in the eighth grade and 2) the desire to learn is still apparent in eighth graders and they think unconditionally because of that desire.

Three methods were used to gather information for this study: 1) Library research to determine the background of the book and the American novel, 2) individual novels were read to confirm the background study results, and 3) a survey of four eighth grade classes was conducted to determine student interest in the topic of the American novel and to gain insight on how best to approach the task of planning a unit suitable for the eighth grade intellect. The results of these methods will be presented.

INDICATORS OF CHILD SEXUAL ABUSE

Dawn Wright, Dept of Psychology, IWU, Sharon Eggers*

Behaviors and drawings of children were observed to determine indicators of child sexual abuse. Three sexually abused children and six non-abused children, ranging in age from 5 to 7 years old, were studied. These children attended Headstart in Bloomington and Hammitt School in Normal. Five of the children were male, four were female, seven were caucasian, and two were black. The Peabody Picture Vocabulary Test (PPVT) was administered in session one, the Draw-A-Man Test was administered in session two, and doll play was engaged in during session three. Nine behaviors were rated after each session on a scale of one, not at all present, to five, extremely present. These behaviors included anxiety/fear, sadness, time on task (%), aggression, social withdrawal, sexualized behavior, happiness, feelings of inferiority, and tension. After completing a F-ratio, no statistically significant results were found between the groups on any of the behaviors. In session one, seven of the children had significantly lower mental ages than chronological ages. The mental ages ranged from 4.75 to 5.5 years with an average difference of 1.33 years between the mental and chronological ages. The other two children were at the normal level. In session two, two children drew genitalia on their human figure drawings, but they were in the non-abused group. One of the children drew a penis and the other child drew a pair of breasts. In session three, there was a large difference, although not statistically significant according to the F-ratio, between the average ratings of sexualized behaviors displayed by each group. The non-abused group averaged a 1.5 on a 5 point scale while the abused group averaged a 4.67. This study shows that sexualized behaviors during doll play can be an indicator of child sexual abuse.

BEHAVIORAL ETHANOL TOLERANCE: FACILITATION BY PREDICTIVE CONTEXTUAL STIMULI

Douglas H. Young, Dept. of Psychology, IWU, James Dougan*

Siegel (1975) suggested that tolerance effects to addictive drugs (such as morphine) may be controlled in part by learned compensatory responses. He demonstrated that contextual stimuli present at the time of drug administration serve as Pavlovian conditioned stimuli (CSs) and eventually elicit a conditioned compensatory response (CR) opposite to the unconditioned response (UR) normally elicited by the drug. These compensatory CRs eventually cancel out the effect of the drug so that higher and higher drug doses are needed to maintain equivalent drug effects. This is the classic tolerance effect.

Following Rescorla's (1967) Information Theory, contextual stimuli should function as effective CSs only when they reliably predict drug administration, a prediction which has been confirmed with morphine tolerance in rats. The present experiment sought to extend Siegel's analysis to alcohol tolerance. Rats were trained to bar press for water reinforcers on variable interval (VI) schedules. When responding had stabilized, all rats received a series of intraperitoneal (ip) injections immediately prior to each VI session. In the PAIRED group, alcohol was injected consistently in the presence of one set of contextual stimuli, and sham saline injections were given in the presence of a different set of contextual stimuli. An UNPAIRED group received the same series of injections, but the contextual stimuli provided no information about the type of injection. Behavioral effects of alcohol were assessed by the amount of suppression of bar pressing following alcohol injections compared to bar pressing following sham injections. Tolerance was defined as a decrease in alcohol-induced response suppression over sessions. According to Siegel's hypothesis, tolerance should rapidly develop in the Paired group, but should occur slowly in the Unpaired group. Because behavioral studies of alcohol are often conducted in a constant environment over a long period of time, evidence of conditioned tolerance effects has important implications for the behavioral pharmacology of alcohol.

