Hutton Honors College
Indiana University-Bloomington

Undergraduate Research Fair

Monday, March 26, 2007
7:00-9:00pm
Frangipani Room
Indiana Memorial Union
March 26, 2007

Welcome to the 2007 IU-B Undergraduate Research Fair, sponsored by the Hutton Honors College!

Outstanding students from a variety of disciplines and majors have been selected by Indiana University-Bloomington academic departments and their faculty to participate in today’s event. These students, working with dedicated faculty mentors, are engaged in research and creative activities that have enriched their own educational careers and that have contributed to the intellectual liveliness of the whole campus.

This annual Research Fair, coupled with the Undergraduate Research Symposium, is designed to showcase and celebrate the achievements of these talented and hard-working students and to provide an opportunity for them to share with others some of the fruits of their labors. This is also an occasion to salute the contributions made by faculty mentors. Part of the mission of the Hutton Honors College is to encourage and support undergraduate research and creative activity, and we do this through research and creative activity grants and thesis and capstone awards. We also urge our students to take advantage of the many opportunities available on campus to work closely with IU-B faculty on a variety of exciting projects.

We are grateful for these students’ participation in the 2007 Hutton Honors College Undergraduate Research Fair, and we congratulate them on their achievements.

Karen Hanson
Dean of the Hutton Honors College
Rudy Professor of Philosophy
Honors College
Undergraduate Research Fair
Coordinating Committee

Lynn Cochran
Assistant Dean
Hutton Honors College

Adam Malson
Academic Advisor
Hutton Honors College
Exhibits
**PSYCHOLOGY**

*Development of the Representation of Object Shape and Color in Infants*
Exhibitor: **Corrie E. Beck**—psychological and brain sciences, B.S., IUB, December 16, 2006
Faculty Mentor: Susan S. Jones

*Meaning Matters in Children’s Plural Productions*
Exhibitor: **Leah C. Dudderar**—psychology, sophomore,
Exhibitor: **Alexandra A. Lavallo**—psychology, sophomore
Faculty Mentor: Linda B. Smith
Graduate Mentor: Jennifer A. Zapf

*Do Toddlers Demonstrate An Agency Bias in Acquiring Language?*
Exhibitor: **Leah Fey**—psychology and linguistics, senior
Exhibitor: **Chloé Battle**—psychology, senior
Faculty Mentor: Linda B. Smith

*Neural Correlates of Expertise*
Exhibitor: **Alexander Foss**—BSOF piano performance, psychological and brain sciences, senior
Faculty Mentor: Karin H. James

*Associating Attention with Affect in the Still Face Paradigm*
Exhibitor: **Amanda Hyde**—psychology, junior
Faculty Mentor: John E. Bates

*The Role of Property: Property Correlations in the Development of Categorical Knowledge*
Exhibitor: **Seth Lemerman**—psychology and criminal justice, senior
Faculty Mentor: Linda B. Smith
Graduate Mentor: Adam A. Sheya

*The Role of Object Familiarity and Active Exploration in the Development of Preferred Views*
Exhibitor: **Melodie Rose**—psychology, senior
Exhibitor: **Michelle Jochim**—psychology, sophomore
Faculty Mentor: Linda B. Smith
Graduate Mentor: Alfredo Pereira
**SOCIOLOGY**

*Women’s Narratives of Self-Harm*
Exhibitor: **Julie M. Campbell**—sociology and gender studies, senior
Faculty Mentor: Elizabeth A. Armstrong

*Why Marriage? Why Not? American’s Support of and Opposition to Same-Sex Marriage*
Exhibitor: **Breinne M. Compton**—sociology, senior
Faculty Mentor: Elizabeth A. Armstrong

*Bloomington’s Punk Scene*
Exhibitor: **Sara Downey**—sociology, senior
Faculty Mentor: Elizabeth A. Armstrong

*Exterminating the Real Problem in Regards to Brazil’s Street Children*
Exhibitor: **Laura Fonseca**—international studies, senior
Faculty Mentor: James J. Biles

*Career Women as Mothers and Spouses? Interviewing College Students on Desirable Family Configurations*
Exhibitor: **Catherine Gould**—sociology, senior
Faculty Mentor: Elizabeth A. Armstrong

*Gucci, Prada, and Air Force Ones: A Study on the Association between Exposure to Hip-Hop Music and Materialistic Attitudes*
Exhibitor: **Jacob Halverson**—sociology and SPEA, senior
Faculty Mentor: Elizabeth A. Armstrong

*Generational Differences in the Transition to Adulthood*
Exhibitor: **Tracy Rank**—sociology and psychology, senior
Faculty Mentor: Elizabeth A. Armstrong
Faculty Mentor: William Corsaro
Graduate Mentor: Tanja Vuckovic

*The Iranian Revolution and the Algerian War of Independence*
Exhibitor: **Joseph Rosenberg**—sociology, senior
Faculty Mentor: Elizabeth A. Armstrong

*Seriously Enjoying Tabloids*
Exhibitor: **Jessica Sosa**—sociology, senior
Faculty Mentor: Elizabeth A. Armstrong
SCIENCE

GAS6 Dependent Recruitment of Tyro-3 Into Neuronal Lipid RAfts
Exhibitor: Jessica E. Brown—biochemistry, senior
Faculty Mentor: Anne Prieto

MCAK Regulation at the Biochemical Level
Exhibitor: Jenna Devare—biochemistry, sophomore
Faculty Mentor: Claire E. Walczak

Catalytic Reduction of 4,4’-(2,2,2-Trichloroethane-1,1-diyl)bis(chlorobenzene) (DDT) with the use of electrochemically formed Cobalt (I) Salen
Exhibitor: Philip C. Gach—biochemistry, senior
Faculty Mentor: Dennis G. Peters

Studies of a Pyroelectric Crystal to Develop a Tabletop Neutron Source
Exhibitor: Gregory J Pauley—physics, freshman
Faculty Mentor: Richard J. Van Kooten

Receptor-Level Understanding of Neural Plasticity in the Adult Brain
Exhibitor: Michelle Sarin—biology and English, sophomore
Faculty Mentor: Preston E. Garraghty

The Dilemma of a Plant, a Pollinator, and a Parasite: The Evolution of Cooperation
Exhibitor: Samuel V. Scarpino—biology, senior
Faculty Mentor: Lynda Delph

Nonbreeding intrasexual aggression and dominance in relation to plumage status signaling in female Dark-eyed Juncos (Junco hyemalis)
Exhibitor: Elizabeth Schultz—biology, sophomore
Faculty Mentor: Ellen Ketterson
Graduate Mentor: Joel McGlothlin

Molecular Dynamical Studies of Protonated and Hydroxide Water Clusters
Exhibitor: Virginia E. Teige—chemistry, sophomore
Faculty Mentor: Srinivasan S. Iyengar
Abstracts
Psychology Exhibits
Development of the Representation of Object Shape and Color in Infants

Corrie E. Beck  
Bachelor of Science in Psychology with Departmental Honors  
Indiana University, Bloomington  
December 16, 2006

Susan S. Jones  
Professor of Psychology  
Department of Psychological & Brain Sciences  
Faculty mentor

Past research has shown that there are anatomically separate areas in the adult brain for processing color and form information. The present study seeks behavioral evidence for the development of separate color and shape processing areas in 6-month-old infants. Twenty-four infants aged 5.5 to 6.5 months were presented a clay object, the exemplar, for approximately 3 seconds before it was removed from sight. Immediately following the removal of the exemplar, the infants were shown two more objects, one identical to the exemplar (the target) and one that differed in either color or shape (the distracter). Preferential looking times were recorded to observe any differences in the infants’ observation of the objects. The data show female subjects looked significantly longer at the target than at the distracter object in color trials. Female infants did not show any differences in the shape condition, while male infants did not look systematically at test objects in either condition. These results suggest that 6-month-old female infants process color information more quickly than their male counterparts. However, when reaches toward test stimuli are recorded, both male and female infants are able to differentiate between test objects in the color condition. Additionally, shape information processing is not as developed in infants of both sexes at this age.
The English plural is about the number of individuals in a set of like kinds. Two-year-old children use the plural but do not do so in all obligatory contexts. We ask if the limitations on their use of the plural are in any way related to meaning.

The plural is used to label multiple instances of the same kind. Similarity of items may help children think about them as being in a set. Likewise, the English plural applies to any set larger than 1, but large set sizes in contrast to sets of 2 may help children think and talk about set size. Accordingly, in Experiment 1 plural productions were elicited from two-year-olds (n = 34) as they were shown arrays of two sets: a set of one (S Set) and a set of more than one (P set). The experimental manipulations were the size of the P set (two or four members) and the similarity of instances within the P set (identical versus same basic-level category). The results show children are using the meaning when producing the plural, generating the plural form more for sets of 4 rather than 2 and for sets of identical, rather than merely similar things.

The plural is about the number of discrete individuals in a set. Accordingly, Experiment 2 examined individuation. In an elicitation task, children were presented on each trial an S set and a P set. The crucial manipulation was the presentation of the P set, where the multiple items were either presented segregated in time and space (placed on the table one at a time spatially separated), segregated in space but not time (placed all at once on a table spatially separate from each other), segregated in time but not space (placed on a table one at a time into a mass), and not segregated in space or time (presented all at once as a mass). The two-year-old participants (n=28) were more likely to produce the plural when the items were segregated in space and not segregated in time – suggesting that both individuation (separate things) that form a coherent set (close together) are important factors. In addition, too much individuation, as evidence by the presentation of objects that are segregated in time and space, was not the most ideal condition for children’s plural productions. This is evidence for the idea that children are constructing the meaning of the plural and recognizing that in order to use the plural one must have more than one of the same kind of thing, two potentially conflicting ideas.

The results provide new evidence on children’s acquisition of the English plural, showing that children’s early productions are not just limited by the knowledge of the noun and its plural form but also is limited by the properties of the labeled sets in ways that are relevant to the underlying meaning of the plural.
In using language to describe ideas of *who does what to whom*, we use what linguists refer to as transitive sentences. That is, the verb requires the argument structure of Subject; Verb; Direct Object. The distinction between Subject and Direct Object is sometimes described in terms of the *thematic roles* of “Agent” and “Patient” (the “doer” of the action and the “done-to”). Subject, Verb, and Object are grammatical terms, and Agent and Patient are semantic. Many theories of language and language acquisition are concerned with the links between grammar and semantics. Thus, there is a semantic component – what is being communicated in terms of thematic roles – and a grammatical component, which is using transitive sentence structure to describe events involving someone doing an action to someone else.

Some theories of acquisition assume that children start with semantic roles and map those to grammatical roles. This assumption makes sense intuitively. However, another reasonable idea is that it is from learning language itself that these constructs get built. Either way, finding out what young language learners understand about these roles is crucial to our study of language acquisition.

This study examines 2 to 4 year-olds’ ability to detect Agent and Patient roles in scenes. The scenes show various properties hypothesized to be relevant to agency (or subjecthood) and include both novel and familiar events. The preliminary results suggest an agency bias.
Using fMRI, this study compares neural activation to language, music, and random auditory patterns in musicians, non-musicians, and ballet dancers. Previous research suggests that music elicits activation from the language network in the brain, and that the recruitment of said language network is more pronounced in musicians than non-musicians. This seems to suggest that the so-called “language network” is actually a generalized expert auditory system involved in the processing of music, language, or any other auditory stimuli with which the listener has had extensive experience. Past research has not used matched language and music stimuli, rarely uses non-music auditory controls to language and music, and rarely uses matched non-musician controls, all of which are used in the current study. The current study also uses ballet dancers as a control group to the musicians: they undergo intense physical training that involves exposure to music without the formal study of music that musicians pursue. Results support the expertise hypothesis: neural activation to music and language overlapped in musicians more than it did in non-musicians suggesting the involvement of an expert network. Results also indicated distinct neural regions involved exclusively in the processing of language and the processing of music. Results from the ballet control group further elucidate the nature of the expert network.
Associating Attention with Affect in the Still Face Paradigm

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In early developmental theories, the infants’ communication behavior was viewed as an unorganized system, solely serving as an adaptive behavior allowing for survival. Infant communication was seen as nothing more than brief vocalizations to request nurturing responses from parents (Tronick, Als, Brazelton, 1979). Tronick and other researchers of his time focused on reversing this theory and showing that the infant was an active participant in dyadic communication and interaction.

Tronick (2003) created the still face task, consisting of 3 infant-mother face-to-face segments, to observe the infant’s unaided ability to initiate interactions and reduce stress in an anxious situation. The still-face portion of the task presents the infant with a non-responsive mother with a neutral expression in between two periods of interactive play. The mother’s still-face is believed stressful for the infant because it interrupts the natural flow of communication (Tronick, Als, & Brazelton, 1980). This creates a setting in which the infant is forced to self-regulate in a potentially anxious situation.

The main purpose of the still-face procedure is to study infant changes in affect and attention when the interaction between parent and infant is unbalanced (Adamson & Frick, 2003). Studies have found that babies who look at their parents proportionally more tend to show proportionally less negative affect throughout the task (e.g., Mayes & Carter, 1990).

Mischel’s hot/cool-system of willpower suggests self-regulation is a function of time attended to a tempting stimulus (Metcalfe & Mischel, 1999). Attending to the stimulus (using the “hot” or “go” system) evokes strong emotions, whereas avoiding the stimulus (using the “cold” or “know” system) reduces emotional arousal. Based on this theory, the current study predicts that infants who are attending less to their non-responsive mother will actually express less negative affect. Unlike previous studies that only consider attention toward mom’s face as “looking at mom,” we are also considering looks towards mom’s body. Therefore, we expect that infants will vocalize distress more when looking at mom’s body than her face or at other objects since she is presumed to be the salient stimuli.

In addition, this study also looks to elaborate on the immediate and delayed effects attention shifts may have on vocalized affect by coding in quarter second intervals and analyzing the data as a time series. While previous work strongly suggests that attention serves as a regulator of distress, this will be the first study attempting to show this relation in real time.
Perceptual properties (such as having wheels or eyes) and relational roles (such as sleeping or giving rides) are important in the early stages of category learning. They define higher order categories such as living things versus vehicles. Importantly, perceptual properties and roles form an interconnecting web; things with eyes have a mouth, sleep, and eat, while things with wheels have motors, give rides, and go on roads. Past research suggests that younger children use perceptual properties to group objects rather than roles. Accordingly, the system of knowledge of interest to this paper is property-property relationships. Previous research has demonstrated that young children as young as ten months will group objects that have similar properties (e.g. hands and feet). This research has focused on the viability of properties as the basis for grouping sets of diverse objects such as animals or vehicles. Categorical knowledge is not only about grouping objects but also about making inferences. There is a lack of direct evidence showing that two-year-olds can infer one property of an object (e.g. feet) after being shown another property (e.g. eyes) despite their general attention to property-property correlations. Understanding this question may ultimately help understand how children make property-role correlations, correlations not generally evident until three years of age. In sum, the purpose of this study is to find out directly whether young children, ages two and three, can infer one property from being given another. It would also be well to determine if dominant features provide a greater connection to property-property correlations. Once this question is answered, further research can delve into the question of a developmental threshold in which children go from needing multiple characteristics to needing only one in order to identify relationships successfully.

The experiment will use two identical novel models, each with a set of four property features. One model will have those properties typically associated with an animal: eyes, feet, tail, and arms. The other model’s features include the properties of a vehicle: a steering wheel, four wheels on axels, motor, and (plane) wings. The child will be given two features: one animal and one vehicle feature. The model will then be presented with either one animal or vehicle feature. The child must choose which feature goes with the feature presented on the model. For example, the child will be shown plane wings and arms. Then the novel object with eyes will be presented, and the child will have to choose which feature goes with the eyes. The task will be repeated with different stimuli presented on the model and different stimuli to match. Two-year-olds should not be able to identify property-property relationships with just one property available (e.g. eyes or wings) but should if the object is fully detailed. Three-year-olds should be able to complete the task at a higher success rate. I hypothesize that two-year-olds not be able to understand the property-property relationships, and will pick features at random. Three-year-olds should be able to complete the study without trouble. The results should help us to learn that children under three cannot infer property-property relationships when only one property is presented. This can lead us to further questions involving richly detailed objects and then on to property-role and role-role relationships. This will bring about an increased knowledge of concepts at a younger age and strengthen cognitive development in the systems of perceptual and conceptual cues.
We are not passive perceivers, looking out into the world from a camera lens. We create our own opportunities for learning. Previous research has shown that adults show a specific pattern in terms of the object views they prefer to look at. Most of the time is spent exploring around planar views, such as the sides or the front of the object. Furthermore, actively viewing objects results in faster object recognition than just passively studying them (James et al. 2001). A posterior study in our lab regarding preferences in children ages 18 to 24 months found that when exploring known objects, 18 to 24 month olds preferred planar views of objects (Pereira et al., 2006) but not for novel objects.

In a longitudinal study, we have decided to explore preferred views for objects which will originally be presented as novel to the child of 15 to 18 months, but over the course of four weeks will develop into known objects. The subject was distracted while the headband camera was mounted on the child’s head. After the camera was secured, the child was presented with eight novel objects; four were shown passively and four were shown actively, and they were presented in a random order. Our hypothesis for the present experiment is that training on object familiarity could change the youngest children in this age period to exhibit a preference similar to older children. A camera worn on the forehead was used to record the child’s perspective.

Following the experiment, a program was used to code the data from the headband camera. The sessions show that, the majority of the time, the kids are not exploring the objects at all. Our results suggest that children who are engaging in active and passive play prefer non-planar views. Furthermore, our results show that the current age group has no preference towards planar views suggesting a fast developmental shift in the period 18 to 24 months. If this experiment was run with a slightly older age group, the older children should not show this pattern.
Women’s Narratives of Self-Harm

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This project is looking at self-injury. Higher rates of self-injury in recent years show that more research needs to be done on the subject. The literature on self-injury is either from a medical perspective or from sociologists who try to explain why people self-injure. Missing from existing literature are detailed descriptions of how people first learn about and then engage in self-injury. A better understanding of how people engage in self-injury may provide useful insights that will assist us in helping people stop. I am conducting in-depth interviews with 3-4 women who are currently self-injuring or have self-injured in the past.
In June of 2006, President Bush advocated for a Constitutional amendment defining “marriage in the United States as the union of a man and woman.” At the same time, other countries have started to recognize same-sex partnerships; marriage between two men or two women has become legal in countries such as Belgium, Canada, the Netherlands, and Spain. Americans are divided on the issue of same-sex marriage. Yet little research to date investigates how ordinary Americans justify their stance on same-sex marriage. This research project investigates these justifications through analysis of a sub-sample of 100 respondents from a nationally representative survey of over 700 American adults conducted in 2003 and 100 respondents from a follow-up survey of over 800 respondents conducted in 2006. The key questions explored are whether or not “gay and lesbian couples should be allowed to marry” and why Americans feel this way. In both the 2003 and 2006 date, slightly over half of the respondents analyzed opposed same-sex marriage and the other favored same-sex marriage. Individuals within the sample typically explain their views by invoking religion, equal rights, family and children, tradition, the purpose and definition of marriage, and the morality of same-sex marriage. Further, a goal of the paper is to determine whether or not individual opinions within the sample mirror public opinion of same-sex marriage.
Bloomington’s Punk Scene

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I have been studying Bloomington’s punk scene in great detail since August. To get a better understanding of punk in general, I have been reading a variety of articles and books, including Hebdige’s *Subculture: The Meaning of Style* and Edge’s *924 Gilman*. I have already conducted nine interviews with punks in Bloomington. I will soon be able to accurately compare Bloomington’s scene to others.

I decided to do this project since there is currently no academic work focusing on this part of Bloomington. The punk scene here seems so unique. It is centered around the community rather than around music. I have also learned that it is very important to those who are involved with it. It keeps some from moving away and is the reason some came here to begin with. I think anything that can do this is worth people knowing about.
Exterminating the Real Problem in Regards to Brazil’s Street Children

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*Senior*

James J. Biles
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The Candelaria Massacre of 1993 brought to the attention of the international community the street children of urban Brazil. Not only was there concern for the high number of children living in poverty, the murder of the six children as they slept on the church’s doorstep made violence against these children of greatest concern.

My research focuses on the creation of the “street child” and the efforts made in Brazil to accommodate the phenomenon. It views those labeled Brazil’s street children as the consequence of the economic and political climate in the country over the past two decades. It is a lack of understanding of the true causes for this crisis and the many misconceptions that follow that lead to a climate of violence towards street children.

Recognized globally as having one of the most progressive children’s rights laws, Brazil continues to struggle to with enforcing this legislation. A combination of government offices and non-governmental organizations are working in the urban areas of Brazil in an attempt to improve the lives of street children. Although many of these provide temporary relief, few of them promote a lasting and plainly visible change. The issue of street children roots much deeper than a lacking public education system or corruption, it is an issue of poverty and inequality.

Until Brazil is able to improve the standard of living of the favelados and close the gap between the social classes, the amount of children spending the majority of their time in the streets will remain significantly high and the acts of violence taken against them will continue.
Career Women as Mothers and Spouses?

Interviewing College Students on Desirable Family Configurations

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This research study involves uncovering undergraduates’ views of desirable family configurations. The study compiled interviews and surveys from 5 male and 5 female college seniors. Interviews consisted of participants reading five vignettes describing different married couples. The vignettes differ in ways each couple balance work and family. Interviewees’ responses to the vignettes, other interview questions, and the survey will be coded in order to determine if any trends in the responses appear in their orientations toward marriage and work.

Current college seniors’ views surrounding marriage and family need to be explored. Because of the level of education and the employment opportunities open to today’s college seniors, they will take the place of the current middle class. They have the potential to create new trends in work family relationships or stick to a more traditional approach to marriage. How college students plan to approach marriage and how they view career women will leave a lasting effect on societal norms surrounding marriage, career, and family.
Gucci, Prada, and Air Force Ones: A Study on the Association between Exposure to Hip-Hop Music and Materialistic Attitudes

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Sociology and SPEA
Senior

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This study is concerned with whether or not an association exists between listening to hip-hop music and having values that could be characterized as materialistic. In order to research this question, I devised a short survey and collected data from over 300 students. The tested population is comprised of males and females mostly between the ages of 18 and 24. The survey was administered online via a commercial website. Thus, all respondents used the internet in order to take the survey. The survey was comprised of three sections: a) Demographic information, b) a section to determine the subject’s exposure to hip-hop music, and c) a section to gauge to what extent the subject agrees with materialism and consumerism. With this data, I aim to demonstrate whether or not an association exists. Additionally, I will be able to demonstrate the extent to which factors such as race, gender, and social class (among others) shape the association, if there proves to be one.

Although hip-hop music and the culture surrounding it originally rose out of the ghettos as the voice for those disenfranchised and impoverished, it has become increasingly materialistic as it has grown in success and popularity. Perhaps driven by the material culture craze of the 1980’s, many hip-hop practitioners have become agents of material desire (Price, 71. 2006). I propose that this element of hip-hop music results in an association between people listening to hip-hop music and also possessing materialistic values. This association would be the result of one, or both, of two factors. People who have greater exposure to hip-hop may have more materialistic values because the values broadcasted by hip-hop music influence the audience as they listen to the music or watch the music videos. Or, perhaps people who have materialistic values are attracted to the hip-hop music because of the values it broadcasts, and that’s why they have greater exposure to it. While this study will not be able to discern the causation of this association, it will be able to demonstrate if an association exists.
Generational Differences in the Transition to Adulthood

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“The thing that impresses me the most about America is the way parents obey their children.”—King Edward VIII

For most of us, college graduation is supposed to be an event that defines our independence. As graduates we should be approaching new chapters in our lives, heading into the work force, and finally be ready to stand on our own. Instead, many of the echo baby boomer generation graduate from college only to move back home with mom and dad. However, the move back home for these echo baby boomers seems contradictory to their personality characteristics.

To answer my hypothesis I have conducted nine in-depth interviews. Three different generations were used for comparisons: baby boomers (born in the years 1946-1966), Gen X (born in the years 1967-1980) and Echo Baby Boomers Generation (born in the years 1981-1988). The data has been collected from my hometown area, so the results are consistent with a white upper middle class and similar background.

Thus far my findings are not yet complete however my argument is as follows. Although many sociologists try to make a large statement that describes the differences amongst each different generation, the bottom line is that there really are no big differences in the generations themselves. In Darwin’s theory of adaptation, he states that in order for an organism to survive that organism must adapt to its environment. When it comes down to it I believe that generations have not changed they are just adapting to their environment and technological advancements. Therefore, sociologists may see different outcomes amongst the different generations. However, this is not because we were raised differently by our parents or because we depend more on our guardians, it is simply because we are adjusting to the world around us in order to survive. This may mean the opposite of what previous research has stated. In the end it might even mean that the Echo’s might even have more drive or even have to push harder to become successful. The reasoning behind this is because the environment around us is changing very quickly and as Darwin would say ‘only the strong will survive’.
The Iranian Revolution and the Algerian War of Independence

Joseph Rosenberg
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Adjunct Assistant Professor in Gender Studies
Faculty Mentor

Revolutions often occur when citizens are dissatisfied with the government in power. By comparing the Algerian War of Independence and the Iranian Revolution of 1979, I will advance the study of two revolutions from Arabic countries. Specifically, I am interested in observing how revolutions unfold, what causes them to occur, the various types of revolutions, the process of revolution, etc. I chose the aforementioned revolutions because they are both extremely rich in detail and helped contribute to the emergence of a concept known as militant Arab nationalism. Also, both revolutions occurred within a 30-year time frame permitting an appropriate historical comparison of Islam as a modern political force. Finally, the Algerian and Iranian Revolutions are still applicable today and can be used for understanding and implementing foreign policy in the Middle East.

The Algerian revolution, which occurred from 1954-1962, was a colonial war that ousted French authority in order to achieve political independence. On the other hand, Iran was officially a sovereign nation, but used the tactics of revolution to shift its governmental structure from a constitutional monarchy to an Islamic republic. While the countries achieved different results through their respective revolutions, I believe that the Islamic religion was an underlying theme contributing to the success of both movements. Moreover, I will like to compare and contrast specific characteristics of the individuals who were responsible for leading the successful independence movements. In fact, I suspect that there will be some striking similarities behind the people responsible for these revolutions. Change of this magnitude does not occur overnight and therefore it is necessary to explain each step the revolution thoroughly in order to draw proper conclusions. Finally, I will compare and contrast the social classes who were the driving forces behind each revolution.
Tabloids may not seem like an essential part of life or culture but maybe they are worth more to people than meets the eye. My project focuses on tabloids and women’s feelings about them. For this project I am using common sociological techniques to uncover if a college woman’s feeling towards tabloids is related to her social status on campus. Last semester I researched ideas on celebrity, identity, power, and cultural capital. I hypothesize that women with positives feelings or attitudes towards tabloids will use that knowledge to gain power and social status on campus. Women not interested in tabloids will not use the information found in tabloids and will have a lower social status.

In order to test this hypothesis, I have conducted several group interviews throughout the Bloomington campus. Along with group interviews, participants were asked to complete a short survey so I could collect both demographic information and personal ideas about tabloids. This semester my data collection is complete and I have begun to explore the findings of my research with the group interviews.

Tabloids are more than a hobby. They provide women with images and ideas of what is popular and fashionable. Tabloids also give insight into what other people do in their private lives and in various social situations. Although most people feel tabloid information is not credible, it does appear in the evening news and channels such as CNN. Academia is saturated with research that analyzes films, books, and even pornography, but ignores tabloids. My research will show that tabloids, like many other elements in society, are used for the purpose of social gain and power. They serve as a form of cultural capital. Like wealth or knowledge of art, tabloid knowledge is used to wield images of culture and display power over others who are less knowledgeable or worthy.
Abstracts
Science Exhibits
Gas6 Dependent Recruitment of Tyro-3 into Neuronal Lipid Rafts

Jessica E. Brown  
*Biochemistry*  
*Senior*

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Cholesterol and sphingolipid rich lipid rafts are located in the cell membrane and provide a supportive scaffold for many proteins. Not only do these cholesterol rich bodies support proteins such as receptor protein tyrosine kinases (RPTKs), they also play a functional role in the signaling pathway of these receptors by recruiting signaling molecules and positioning the molecules to interact with the receptor. RPTKs are transmembrane receptors found in all multicellular organisms. When deregulated, this family of receptors causes oncogenesis or tumor growth. Tyro-3 is a member of the RPTK family and is highly expressed in the hippocampus regions of rat embryonic brains. The Tyro-3 ligand Gas6 binds to the extracellular region of the Tyro-3 receptor and promotes a conformational change which leads to dimerization and cross-phosphorylation of the receptor on its tyrosine residues. Gas6 binding of Tyro-3 activates the Akt and the Map signaling pathways as well as downstream signaling events such as cell proliferation. Ultracentrifugation techniques using an OptiPrep sucrose gradient separated cellular components into fractions. Immunoblotting techniques and cholesterol assays revealed that the Tyro-3 receptor partitions into the lipid raft fraction and that this partitioning is mediated by Gas6 activation. The presence of the activated form of the receptor in lipid rafts suggests that Gas6 induced phosphorylation causes the Tyro-3 receptor to localize in lipid rafts to initiate its signaling cascade. Understanding the initial events governing the signaling pathway of Tyro-3 give a more complete picture of how this receptor functions. It is important to advance our knowledge of cell communication in general as many pharmacological advancements of disease treatment are reliant on the elucidation of underlying molecular pathways.
During mitosis, the accurate segregation of chromosomes is essential for preventing cellular defects. Microtubules (MTs) and their associated proteins are responsible for the movement of chromosomes in the mitotic spindle. By inducing MTs to switch from a state of growth (polymerization) to shrinkage (depolymerization), mitotic centromere-associated kinesin (MCAK) is required for this process. Inhibition of MCAK in cells results in defects in mitotic spindle assembly as well as improper attachment of chromosomes to the microtubules in the spindle. Mechanistically, MCAK binds to the end of the MT, induces a conformational change causing the MT to depolymerize, and releases tubulin heterodimer through ATP hydrolysis. Previous work has shown that MCAK is regulated by Aurora B kinase, which is required for proper attachments of chromosomes to the spindle microtubules. However, the molecular mechanism by which Aurora B regulates MCAK has not been fully elucidated. Our lab showed that phosphorylation of MCAK by Aurora B inhibits MCAK depolymerization activity. In the present study, we plan to address which part of the catalytic cycle has been affected. To this end, I have purified Aurora B kinase and the MCAK proteins. I will first test whether Aurora B phosphorylation of MCAK affects its ability to bind to the MT, and if so whether the pattern of binding changes. In the future I will explore other aspects of MCAK activity such as its ATPase activity and its ability to bind to tubulin dimer. Together these studies will elucidate mechanistically how this regulation occurs in vitro so that we may better understand how this interaction is regulated in vivo.
Catalytic Reduction of 4,4′-(2,2,2-Trichloroethane-1,1-diyl)bis(chlorobenzene) (DDT) with the use of electrochemically formed Cobalt (I) Salen

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DDT is a pesticide that was widely used during the 1970s and is currently used in some countries of the world. This chemical was banned in the United States in 1972 because of the adverse affects it has on the environment. Several articles have dealt with the direct reduction of DDT but the field of catalytic reduction of DDT has not been studied much. This research studies the catalytic reduction of DDT along with 2 of its reductants DDD (4,4′-(2,2-dichloroethane-1,1-diyl) bis(chlorobenzene) and DDE (4,4′-(2,2-dichloroethene-1,1-diyl)bis(chlorobenzene) in dimethylformamide (DMF) containing 0.10 M tetramethylammonium tetrafluoroborate (TMABF₄) using cobalt (II) salen as the catalyst.

In this project I have utilized cyclic voltammetry to characterize the electrochemical behavior of the cobalt(I) catalyst as well as DDT and many of its reduced forms. Cyclic voltammetry showed that, when DDT is added to a cobalt(II) salen solution, an enhanced cathodic current for the cobalt(II) salen–cobalt(I) salen redox couple is observed, and the anodic peak for oxidation of cobalt(I) salen disappears. Similar experiments were done with DDD, DDE, DDMU (4,4′-(2-chloroethene-1,1-diyl)bis(chlorobenzene)), and DDNU (ethane-1,1-diyl)-bis(chlorobenzene); these all showed a far weaker interaction with cobalt(I) salen.

Controlled-potential electrolyses were then performed on DDT, DDD, and DDE with cobalt(I) salen present in a Klein cell held at –0.70 V to establish the products of the electrochemical reduction of these reactants. For example, bulk electrolysis of a cobalt(II) salen–DDT mixture yielded, in order of abundance, DDMU, DDNU, 1-chloro-4-(2-chloro-1-phenylvinyl)benzene (an isomer of DDNU), DDE, and DDD. All products in my research were identified through the use of gas chromatography–mass spectroscopy and through a comparison of the retention times with known standards. Percent yields were obtained with the aid of an electroinactive internal standard (hexadecane). We verified the formation of a cobalt(III)–substrate intermediate, which is part of our reduction mechanism, through the use of HPLC-ESI MS.
Studies of Pyroelectric Crystal to Develop a Tabletop Neutron Source

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It is proposed to demonstrate tabletop fusion and hence develop a compact neutron source from an existing commercial product. In contrast to the now discredited "cold fusion", the process used is accepted widely by the research community, and is not intended to be used for the generation of energy. Using an interesting phenomenon called "pyroelectricity" that causes a special crystal to produce a surprisingly intense electric field when heated, the commercial device amplifies this electric field with a tungsten tip and uses it to accelerate electrons. The electrons gain enough velocity before hitting a target to produce X-rays via bremsstrahlung. Results of the characterization of this device will be presented. Its suitability to be converted such that ions instead of electrons are accelerated toward a target enriched with deuterium where fusion occurs with the subsequent production of neutrons will be investigated. The neutrons will be characterized and used to further study particle interactions by Indiana University undergraduate students.
Receptor-Level Understanding of Neural Plasticity in the Adult Brain

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As our understanding of the developing adult brain has progressed, we have come to understand how truly complex it is. Neural plasticity is a theory which has gained wide acceptance over the last few decades and refers to the concept that the adult brain can change. This plasticity ranges from shifts in dendritic arborization and synaptogenesis to changes in receptive fields. It has been found that reorganization after nerve injury generally proceeds in two phases: the initial “unmasking” stage and the later, more protracted stage which involves neurons regaining responsiveness in deprived cortex. The immediate “unmasking” phase results from the use of disinhibition or latent inputs. This hypothesis is further supported by the reported decrease in GABA A, an inhibitory neural transmitter, in the deprived cortex. GABA B binding is also observed in decreased amounts at about one month after transection.

While this first stage of “unmasking” occurs in some areas of cortex, the majority of the region reorganizes during the second stage by mechanisms that are still unclear. It is observed that unlike the “unmasking” stage, the initiation of this longer stage of reorganization is assumed to be N-methyl-D-aspartate (NMDA)-receptor mediated because blockage of such receptors inhibits reorganization. Furthermore, NMDA receptors are not involved in the maintenance of reorganization. Additionally, a significant increase in AMPA, an excitatory amino acid receptor, binding was observed about one month after injury. Because NMDA is not implicated in the maintenance of the reorganization after injury, it is possible then that the increased levels of AMPA are responsible for the increased efficacy of synapses. One possible explanation for the mechanism of this prolonged reorganization is that it follows homeostatic plasticity and explains the observed increase in AMPA receptors. However, another lingering problem is the exact role of GABAB receptors because they are observed on both pre- and post-synaptic neurons, and it is unknown whether the receptor levels change on the pre- or the post-synaptic neurons and how that change affects the other type of neuron.

The project on which I am working aims to further elucidate the specific neural mechanism for reorganization after transecting a nerve, specifically, which AMPA phenotypes are increasing and the role of GABAA during reorganization during the nerve crush. We performed three nerve crushes on squirrel monkeys, then sacrificed them at varying periods after the injury. After median nerve transection, reorganization was observed, but after radial nerve transection, a silent cortex was observed. Finally, following a median nerve crush, peripheral re-innervation takes place along with median nerve regeneration. We used immunohistochemistry to visualize various receptors, particularly, GABAA, GABAB and AMPA receptors. The brains were extracted, sliced, and stained with chromium reagents. The StereoInvestigator program to perform cell counts and using luminance readings to determine the density of receptors in varying cell types.
The Dilemma of a Plant, a Pollinator, and a Parasite: The Evolution of Cooperation

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Mutualistic interactions and their evolutionary stability have been a conundrum in science theory since Darwin hypothesized that “Natural selection cannot possibly produce any modification in any one species exclusively for the good of another species.” Nevertheless, ecological examples of mutualisms are prevalent. Previous research, centered on the evolutionary stability of mutualisms, presented an iterated adaptation of the Prisoner’s Dilemma game. This game has the potential to act as an intermediary relating the ecology of distinct cooperation systems. A modified version of this game was incorporated, in conjunction with empirical data on floral scent, to examine the relationship between a plant (*Silene latifolia*), a pollinator (*Hadena bicruris*) and a parasite (*Microbotryum violaceum*- anther-smut fungus).

*Silene latifolia* and *H. bicruris* interact in a nursery pollinator mutualism. This interaction provides the opportunity to examine the evolutionary stability of complex plant-pollinator relationships using the Prisoner’s Dilemma game. In this system, differences in floral volatile cues (scent) play an integral role in both pollinator attraction and oviposition cues. Because *S. latifolia* scent profiles are altered by anther-smut infection, floral-volatile signaling is potentially a key factor in this three-way relationship. By extrapolating fungal infection to be a frequency-dependant mechanism hindering *H. bicruris* larval development, an adapted version of the Prisoners Dilemma game demonstrates this interaction as an ESS. Additional models relating fruit abortion and nursery pollination mutualism stability support this conclusion.
Nonbreeding intrasexual aggression and dominance in relation to plumage status signaling in female Dark-eyed Juncos (Junco hyemalis)

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Dark-eyed Juncos (Junco hyemalis) are known to establish social hierarchies within flocks during the nonbreeding season (Balph, 1979). Because juncos establish these flocks, it is easier to assess dominance between individuals. Research focusing on Dark-eyed Juncos has shown that a positive correlation could exist between physical characteristics such as the amount of white in their tail (tail white) and age and social dominance (Ketterson, 1977). Both male and female juncos have tail white, although the males have significantly more. In males, tail white is a known indicator of dominance and mate preference, while the same cannot be said about females (Wolf, 2004). It has been hypothesized that tail white expression in females reflects a genetic correlation combined with no selection against it (Lynch & Walsh, 1998), or that tail white benefits the female in another context, such as dominance interactions (West-Eberhard, 1983).

We designed an experiment that would test the relationship between tail white and dominance in female juncos. In this experiment, we studied 32 females from a captive population in an outdoor aviary to determine the potential relationship. We first took initial measurements on the mass, age, length of wing chord, tail, and tarsus in order place the birds into four evenly matched flocks. We also assessed percent tail white for each of the birds by using computer imaging analysis.

After we collected the initial measurements, we allowed the flocks one week to recover from the stress due to human handling and a change in environment. After the birds were allowed to settle in their flocks, four pairs of females were observed per week for four weeks. For the observations, each female was placed into a separate cage with food (seed and lanyon were added ad libitum) and water for 24 hours. After this 24 hour period, we removed the food for three hours. Three hours later, we moved the separate females into their respective dyads and placed a dish with approximately 10 mealworms into a cage. We then waited five minutes to adjust for elevated stress levels due to human handling. Dominance was then assessed for 15 minutes every 30 seconds using a method previously described in Balph (1977). Dominant females typically won a series of interactions either by chasing the other bird or physically attacking or displacing it (Jawor et. al., 2005). From an analysis of the data, no association was found between tail white and dominance in females. Hypotheses are proposed to explain the lack of relationship.

Literature Cited:
Molecular Dynamical Studies of Protonated and Hydroxide Water Clusters

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The structure, dynamics, and spectroscopy of protonated and hydroxide ion water clusters are of fundamental importance in chemistry, biochemistry, and atmospheric science. Extensive studies of these systems, focusing on the OH-(H2O)6 cluster and the H3O+(H2O)21 cluster were performed. In the hydroxide study a four-coordinated, pentavalent form of the hydroxide ion was found to be most stable, which defies chemical intuition. However, ab initio dynamics studies at different temperatures indicate an averaging phenomenon which allows the four-coordinated structures to be stable only at extremely low temperatures. Consequently, a temperature dependent vibrational spectrum is predicted along with an analysis of the conditions under which such a system can be isolated through gas-phase vibrational spectroscopy experiments.

We have also noted temperature directed averaging of vibrational spectra in protonated water clusters. The effects of messenger argon atoms (which are used in experimental studies of this system) on the vibrational spectrum have also been analyzed.
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