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Research Journal**



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What's the Harm in Asking? Participant Reaction to Trauma History Questions Compared with Other Personal Questions
by Angela Binder 1

Moral Hazard as a Market Failure in the Private Provision of Social Insurance
by Jessica Brown 19

Exploring the Role of Histone Deacetylase 3 in DNA Methylation in *Neurospora crassa*
by Michelle Brown 33

Surface Modifications Used to Create a Universal Approach of Modeling Diodes
by Richard Fuller 43

The Great Flood of 1997: An Examination of Landowner Perceptions in the Applegate Valley
by Imelda Moise 57

Since General Canby Died: An Autoethnography of an Indian Family
by Angela Morrill 75

False Epistemologies: The Curious Case of *Helicobacter pylori* and Peptic Ulcer Disease
by Kelly Shaw 99

Dubious Development Projects and Their Ethnocidal Impacts on the Akha People of Northern Thailand
by Noppamas Suttinun 123

Myotonic Dystrophy: The Structure of Cug Repeats in Solution
by Brian Truong..... 151

Immigration Phenomenon in the Emerald City
by Edwin Vega..... 171

Other Research 187

What's the Harm in Asking? Participant Reaction to Trauma History Questions Compared with Other Personal Questions

by Angela Binder
Psychology

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Abstract

Previous empirical research has linked the disclosure of traumatic experiences through writing with increased positive cognitive processing and physiological well-being (Park & Blumberg, 2002). The benefits of disclosure seem to outweigh the costs in many cases. Other research suggests that not asking about trauma experiences may actually have negative consequences by perpetuating societal stigmas that serve to avoid discussion about trauma (Becker-Blease & Freyd, 2002). In the present study (N=275) the researchers compared participants' emotional reactions to trauma questions with their reactions to other possibly invasive questions through a self-report survey. Participants were also asked about how important they felt each question was to future research. This research addresses the costs/benefits of asking about trauma compared to other possibly invasive questions commonly examined in research.

Introduction

Institutional Review Boards (IRBs) are charged with ensuring the ethical treatment of human participants in psychological research, and studies that pose possible harm to participants deserve the scrutiny of IRBs (Colombo, 1995; Schreier & Stadler, 1992). How do IRBs reach the decision to approve research protocols? In areas of research that have little empirical data about participant reaction to them, IRB members must rely on intuitional judgment and individual belief systems (Becker-Blease & Freyd, 2004). While this judgment may be altruistic, finely-tuned, and valid, it also may be influenced by social bias and stigma. IRBs affect what researchers include in their studies; therefore it is especially important to base decisions about whether to approve research on empirical evidence of harm (Kassam-Adams & Newman, 2002; Becker-Blease & Freyd, 2004; Stanley, Sieber & Melton, 1987). IRBs often express concerns about risks to participants when the research involves asking about trauma.

A Brief Historical Summation Regarding Stigma Surrounding Trauma

Trauma—including, but not limited to, child abuse, incest, interpersonal violence, and combat—has a history of denial and an ebb and flow of cultural acceptance (Herman, 1997; McFarlane, 2000; Milburn & Conrad, 1996). Hysteria, a diagnosis given to women with physical manifestations of psychological malaise in the late 19th century, can be used to illustrate this ebb and flow of acceptance (Freyd, 1996; Herman, 1997). When Freud introduced a seduction theory (the sexual exploitation of a child by an adult) as the root of this diagnosis, the prevalence of abuse that was im-

plied was not well received by his contemporaries (Freyd, 1996; Herman, 1997; McFarlane, 2000). Some researchers have suggested that the pressures of colleagues and a public that did not accept this association, as well as the cultural climate of that time, heavily influenced the recantation of this finding (Freyd, 1996; Herman, 1997; McFarlane, 2000). Out of this denial of the pervasiveness of child sexual abuse, Freud developed the Oedipus and Electra complexes. In essence, these complexes redefined the occurrence of child sexual abuse (CSA) as an individual pathology brought on by a child's precocious nature and fantasy (Freyd, 1996; Herman, 1997). The professional scrutiny of trauma and its denial resurfaced after World War One. Military psychologists noticed some soldiers who exhibited behavior that mimicked hysteria (Herman, 1997). Tactics of denial included the suggestion of individual weaknesses in the character of those who displayed hysterical symptomology on return from combat (Herman, 1997; McFarlane, 2000).

Another phase of discovery and collusion in regards to trauma occurred in early 1970. Burgess and Holmstrom (1974) introduced the term *Rape Trauma Syndrome* in response to their observations of common symptomolgy among rape survivors. As discussion around the experiences of rape survivors began to become more open, rape and trauma reports were met with a cultural backlash of rape myths. The rape myths included the assumption that reported incidence of rape was exaggerated, and that victim behavior or character made him or her vulnerable (Burt, 1980; Lonsway & Fitzgerald, 1994). Rape myths also included the idea that those who were raped asked for and enjoyed it (Burt, 1980; Lonsway & Fitzgerald, 1994). IRBs and investigators are at risk of being unduly influenced by this pattern of denial and resulting misinformation.

When approaching the issue of participant reactions to research involving trauma, it is important to be wary of biases that may be created by social stigma.

Research and Participant Experience

Ethical research practices require careful consideration and awareness of participants' needs and well-being. It is important that researchers do no harm (American Psychological Association, 2002). Many studies look at possible harm to participants and show few problems (Boothroyd & Best, 2003; Carlson, Newman, Daniels, Armstrong, Roth & Loewonstein, 2003; DePrince & Freyd, in press; Griffin, Resick, Waldrop & Mechanic, 2003; Ruzek & Zatzick, 2000). In fact, studies often find that participants report the benefits of being involved in research (Boothroyd & Best, 2003; Carlson, Newman, Daniels, Armstrong, Roth & Loewonstein, 2003; DePrince & Freyd, in press; Griffin, Resick, Waldrop & Mechanic, 2003; Ruzek & Zatzick, 2000). Griffin, et al. (2003) did a follow-up study with a sample of survivors of acute physical/sexual assault and domestic violence to assess their traumatic experiences and symptoms. Participants filled questionnaires that measured their responses to being involved in the research. The study found that the trauma research was well tolerated, and that some participants reported the experience as positive and interesting. Likewise, DePrince and Freyd (in press) found that out of 481 randomly sampled college students who were asked about trauma, 85% responded positively to questions about their research experience and reported that the benefits outweigh the costs of participation in trauma research. The other 15% of participants reported neutral response to research involvement.)

Over the past 15 years, researchers have also shown that writing and talking about traumatic experiences helped create cognitive, psychological, and physiological benefits for individuals (Donnelly & Murray, 1991; Francis & Pennebaker, 1992; Park & Blumberg, 2002; Pennebaker, 1997; Pennebaker & Beall, 1986; Pennebaker & Francis, 1996). Donnelly and Murray (1991) studied the effects of exploring traumatic experiences through autobiographical essays and therapeutic interviews by comparing groups who wrote and talked about traumatic experiences with those who wrote and talked about non-traumatic events. They found that trauma-focused participants experienced positive emotional, cognitive and self-esteem changes, while such changes were not observed with the non-trauma participants. In a meta analysis of 44 studies Pennebaker (1997) found that participants who wrote about traumatic events reported a reduction in physician visits, strengthened immunity, increased GPA, less absenteeism from work, ease of physical symptoms, reduction in subjective distress, reduction of negative affect, and a reduction in depression.

Simply having a venue for disclosing trauma history may also benefit an individual survivor by validating and bearing witness to experiences that may have previously been invalidated (Becker-Blease & Freyd, 2004). Including trauma in studies can be generally beneficial to research. For example, the inclusion of trauma questions could minimize erroneously attributing psychological states to environmental variables. If a psychological measure exploring the origins of a client's anxiety excluded trauma questions, their anxiety could seem correlated to factors such as drug use or diet, when the experienced anxiety could in fact be symptomatic of early childhood abuse. Such inclusion of a participants' trauma history

can increase the overall soundness of some research.

The inclusion of trauma in pertinent research may also be beneficial socially. It may be one step toward discontinuing the denial and stigma surrounding trauma. It may also give a venue for increasing and encouraging disclosure of socially stigmatized trauma. By not asking, we may perpetuate the silence associated with it (Becker-Blease & Freyd, 2004).

Moving Forward

Considering the history of stigma and denial surrounding trauma, it is critical to distinguish between cultural bias and empirical evidence. Empirical evidence is important when approaching IRB and investigator concerns. In order to address one aspect of investigator and IRB concerns around trauma research, Becker-Blease and Freyd (2004) suggest comparing participant responses to personal questions that are less socially stigmatized—income, cigarette/alcohol consumption, ethnicity, and body weight—with responses to more socially stigmatized trauma questions—interpersonal violence, incest, emotional and psychological abuse. By implementing this suggestion, we hoped to provide data about whether personal items, often included in measures approved by IRBs, are more or less distressing than trauma questions that may be considered more invasive.

In this study, we asked University of Oregon students participating in a series of subject-pool prescreening surveys to report their levels of distress in response to personal questions and trauma history questions that were included in the prescreening packet. The participant response questions were based on Deprince & Freyd, 2003.) We also asked them to report levels of perceived importance

for researching personal questions and trauma questions, as well as how good particular research topics are to study. We predicted that there would be no significant difference in levels of distress reported between the topic types (“trauma” and “personal” questions). While the stigma surrounding some forms of trauma influences the perceived harmfulness of certain questions, we predicted that trauma questions would be perceived to be no more distressful to participants than other less stigmatized personal questions. We also predicted a linear trend in both importance and cost/benefit, with personal questions being least important and trauma questions being most important to psychological research. We expected that the subjects’ own experiences with trauma would positively influence the perceived and reported importance of its study and would also influence participants’ reported ratio of cost/benefit of trauma research compared to other research.

Method

Participants

The participants were University of Oregon students in a spring 2004 psychology subject-pool prescreening. Students were given the option of participating in prescreening in lieu of, or in addition to, required or extra-credit experiment involvement as part of their linguistic and psychology courses. Benefits to participants included research experience and the opportunity to qualify for additional studies in the psychology and linguistic departments. The total sample size was 275, with 192 female participants and 83 male participants. A majority of participants were Caucasian (214, or 77.8%), while 23 (8.4%) identified as Asian/Pacific Islander, 10 (3.6%) as African American, 3 (1.1%) as Native American, 2 (1%)

as Hispanic, and 23 (8.4%) were unknown. The age of participants ranged from 17 to 52 years ($M = 19.54$ years, $SD = 2.58$ years).

Materials

The prescreening packet of psychological inventories included a wide variety of measures. In addition to 20 demographic questions, participants completed measures such as the Dissociative Experiences Scale (Bernstein & Putnam, 1986), the Brief Betrayal Trauma Survey (Freyd & Goldberg, under review), and a variety of personality and social psychology inventories. Participants were specifically asked about GPA and SAT scores, ideal body image, emotional and psychological maltreatment, and forced sexual contact, which were the target items in our study. Last in the prescreening packet was the measure used in the present study (based on DePrince & Freyd, 2003, see appendix A).

Participants responded to a set of three questions for each of the four target areas in this study. The first question, which was reverse scored upon analysis, asked: "Was answering this question more or less distressing than other things you sometimes encounter in day-to-day life?" Responses were provided a 5-point Likert scale, with the following classifications: 1 = much more distressing, 2 = "somewhat more, 3 = neutral, 4 = somewhat less, and 5 = much less distressing. The next question asked: "How important do you believe it is for psychologists to ask about [Target Item] in order to study the impact [of it]?" Responses were provided on a 5-point Likert scale, with 1 = definitely not important, 2 = somewhat not important, 3 = neutral, 4 = somewhat important, and 5 = very important. The third question was: "Please consider both your experience answering the question about [Target Item] and your feelings about how important it is that we ask the question. How good of an idea

is it to include such a measure in psychology research?" Responses were provided on a 5-point Likert scale, where 1= very bad idea, 2= somewhat bad, 3= neutral, 4= somewhat good, and 5= very good idea. For each set of three questions, participants were asked about responses to four target items (two "personal" questions, and two "trauma" questions). These four target items were GPA and SAT scores, and ideal body image (the two "personal" questions), emotional and psychological maltreatment, and forced sexual contact (the two "trauma" questions), which were used as our comparative target items.

Procedure

The measures were completed in a large group setting. The packet took about one hour to complete. Participants read statements about informed consent and were made aware of the option of skipping any question that made them uncomfortable. Upon completion of the survey, participants received debriefing sheets as well as credit in their psychology or linguistics classes.

Results

A repeated measures ANCOVA revealed no significant differences ($p > .05$) in the amount of distress reported when answering questions about the four topic types—GPA and SAT scores, ideal body image, emotional and psychological maltreatment, and forced sexual contact. Means and standard deviations are presented in Table 1 (Appendix B).

Polynomial contrasts showed significant linear trends for both importance, $F(1, 250) = 14.15$, $p < .001$, and how good of an idea the research topic is to study, $F(1, 250) = 7.12$, $p < .001$, such that both importance and cost/benefit were reported as being the lowest for

GPA and SAT scores, followed by body image and then greatest for trauma questions—emotional and psychological maltreatment and forced sexual contact.

Discussion

The present study was an extension of a paper by Becker-Blease and Freyd (2004) that called for empirical data on participants' experiences with trauma research. In approaching this suggestion, we borrow from other research that has examined participant response to trauma questions by comparing response to trauma questions with response to other personal questions (Carlson et al., 2003; DePrince & Freyd, in press; Griffin et al., 2003; Ruzek, Zatzick, 2000). Upon analysis, our results showed that participants reported no significant differences between distress levels for personal questions and trauma questions.

We also found that there was a positive linear trend in importance as well as in how good the research topic was to study (or our cost/benefit question) with GPA, SAT scores, body image, and then trauma questions ranked consecutively. These results support our *a priori* hypothesis that participants perceive trauma experiences as being important to study and that they view the benefits as outweighing the costs. Our findings indicate that IRBs and researchers should consider approving and including trauma questions in pertinent research as readily as they might include other personal questions. We hope our results will help to alleviate the concerns of IRBs and social science investigators about the possible negative implications in asking trauma questions.

Previous studies found that writing and talking about traumatic experiences was beneficial cognitively, psychologically, and

physiologically (Donnelly & Murray, 1991; Francis & Pennebaker, 1991; Park & Blumberg, 2002; Pennebaker, 1997; Pennebaker & Beall, 1986; Pennebaker & Francis, 1996). While some of these studies involve in-depth writing and discussion conditions to observe the therapeutic effects, it may be possible that simply giving a medium for disclosure and asking about trauma may have individual therapeutic, and social value as well (Becker-Blease & Freyd, 2004; Pennebaker & Francis, 1996).

Asking about trauma in research highlights several important implications. The act of asking gives implicit permission for disclosure. It also validates an individual's trauma history, as well as showing that trauma is important to psychologists. Asking about and including trauma history in psychological research also makes a statement that, as psychologists, we choose to acknowledge trauma as a reality that affects our social structure, our culture's mental health status, and our collective physical well-being.

In the present study, we sought to address a suggestion put forth by Becker-Blease and Freyd (2004) for providing empirical data to IRBs and investigators concerned with the ethics of trauma research. As far as we know, many studies have addressed the harm in asking about trauma, but none have compared trauma questions to other less stigmatized personal questions in order to gauge relative distress levels. We hope that our findings will contribute to the data about the experiences of those participating in research and help to address IRB concerns around harm to participants in trauma research by asking about trauma. Becker-Blease and Freyd (2004) also observe that researchers may be hesitant to include trauma questions in studies because of a concern for possible obstacles posed by IRBs. With our results, along with other research designed

to offer empirical information to IRBs, we hope that researchers will be more likely to include important trauma information in pertinent studies.

This study had several important limitations. It would have been beneficial to use shorter packets than the large prescreening packets preceding our participant reaction measure. Some participants were unable to finish the packets, including our measure, because of prescreening time limits. Addressing time constraints also would have allowed an increase in the number of comparative questions we were able to ask. In order to represent a stronger comparative picture, it would have been ideal to include more items on the measure reflecting both trauma conditions (such as questions about physical abuse, rape, and combat experience), and other personal questions (such as income, drug use, and abortion history).

For future research, it may be advantageous to use a sample made up solely of trauma survivors. In the present study, we had participants who reported a spectrum of trauma history, but looking at a sample made up entirely of trauma survivors would aid in observing the effects of such research on specific individuals who may have the most to gain from it. A sample of this sort would also have the potential to provide research participants with varied trauma histories (ranging from childhood abuse to combat experiences, etc.), allowing a look into how participants with specific traumatic experiences respond to different types of trauma and personal questions.

Future research might also explore possible benefits in simply being asked about trauma and disclosing trauma history. Cognitive, psychological, and physiological benefits are linked to writing about trauma and other life issues (Becker-Blease & Freyd, 2004;

DePrince & Freyd, in press; Donnelly & Murray, 1991; Francis & Pennebaker, 1992; Park & Blumberg, 2002; Pennebaker & Beall, 1986; Pennebaker & Francis, 1996). It would be helpful to determine short-to-long term benefits of being asked about trauma history by following up research that involves asking about trauma, and comparing the findings to research that avoided asking about trauma with longitudinal reports on scholastic/work achievement, psychological and physical well-being, and number of visits to health care professionals. In doing this, we can compare results to those found in trauma/life experience writing studies.

Many aspects of our society are affected by a cultural history of denial and stigmatization of trauma, including the responses of investigators and IRBs. In order to begin addressing these issues and the biases that may arise in this cultural climate, we would benefit from examining underlying mechanisms of denial and stigma while continuing research that addresses these issues empirically. Our best defense against being influenced by cultural denial and stigma is to attempt to decipher fact from fiction. Addressing these issues empirically may be a step in the direction of cultural acceptance and a change in our view of trauma. We have lived in an ebb and flow of trauma acceptance, and when we deny trauma, or invalidate it, we risk invalidating those who are survivors. Research has shown that denial of trauma can often lead to an increased likelihood of future incidents and a decreased ability of victims to function cognitively, psychologically, and physiologically (Milburn & Conrad, 1996). The attempt to end this pattern of denial and stigma around trauma by approaching it empirically may help to lower the occurrences of trauma and to decrease the negative impact of trauma both for individual survivors and our culture.

Appendix A.

Please answer the following questions regarding your experience with some of the material that you have encountered in this packet. Your feedback is important to us, and to future research.

Question #1: In this survey packet we asked you to provide either your GPA or SAT scores.

a. Was answering this question more or less distressing than other things you sometimes encounter in day-to-day life?

1	2	3	4	5
Much More Distressing	Somewhat More	Neutral	Somewhat Less	Much Less Distressing

b. How important do you believe it is for psychologists to ask about GPA or SAT scores in order to study the impact of them?

1	2	3	4	5
Definitely Not Important	Somewhat Unimportant	Neutral	Somewhat Important	Very Important

c. Please consider both your experience answering the question about GPA or SAT scores, and your feelings about how important it is that we ask the question. How good of an idea it is to include such a measure in psychology research?

1	2	3	4	5
Very Bad Idea	Somewhat Bad	Neutral	Somewhat Good	Very Good Idea

Question #2: In this survey packet we asked you to rate your ideal body silhouette.

a. Was answering this question more or less distressing than other things you sometimes encounter in day-to-day life?

1	2	3	4	5
Much More Distressing	Somewhat More	Neutral	Somewhat Less	Much Less Distressing

b. How important do you believe it is for psychologists to ask about ideal bodies in order to study this?

1	2	3	4	5
Definitely Not Important	Somewhat Not Important	Neutral	Somewhat Important	Very Important

c. Please consider both your experience answering the question about ideal bodies, and your feelings about how important it is that we ask about it. How good of an idea is it to include ideal body questions in psychology research?

1	2	3	4	5
Very Bad Idea	Somewhat Bad	Neutral	Somewhat Good	Very Good Idea

Question #3: In this survey packet we asked about emotional and psychological maltreatment:

a. Was answering this question more or less distressing than other things you sometimes encounter in day-to-day life?

1	2	3	4	5
Much More Distressing	Somewhat More	Neutral	Somewhat Less	Much Less Distressing

b. How important do you believe it is for psychologists to ask about emotional and psychological maltreatment in order to study the impact of such experiences?

1	2	3	4	5
Definitely Not Important	Somewhat Not Important	Neutral	Somewhat Important	Very Important

c. Please consider both your experience answering the question about emotional and psychological maltreatment, and your feelings about how important it is that we ask the question. How good of an idea it is to include such a measure in psychology research?

1	2	3	4	5
Very Bad Idea	Somewhat Bad	Neutral	Somewhat Good	Very Good Idea

Question #4: In this survey packet we asked about being made to have sexual contact:

a. Was answering this question more or less distressing than other things you sometimes encounter in day-to-day life?

1	2	3	4	5
Much More Distressing	Somewhat More	Neutral	Somewhat Less	Much Less Distressing

b. How important do you believe it is for psychologists to ask about being made to have some form of sexual contact in order to study the impact of such experiences?

1	2	3	4	5
Definitely Not Important	Somewhat Not Important	Neutral	Somewhat Important	Very Important

c. Please consider both your experience answering the questions about being made to have some form of sexual contact, and your feelings about how important it is that we ask the question. How good of an idea it is to include such a measure in psychology research?

1	2	3	4	5
Very Bad Idea	Somewhat Bad	Neutral	Somewhat Good	Very Good Idea

Please answer the next two questions regarding your general experience with the material in this packet:

- 1. Which questions in this packet were most disturbing to you (if any)?
- 2. Which questions do you believe are most important for psychologists' to include in research?

Thank-you!

Appendix B.

Table 1. Means and Standard Deviations for Repeated Measures ANCOVA

	Distress	Importance	Cost/Benefit
GPA	2.45(1.15)	2.91(1.05)	3.15(.87)
Body Image	2.56(1.02)	3.86(.82)	3.77(.77)
Psychological Maltreatment	2.53(1.03)	4.37(.81)	4.23(.79)
Sexual Abuse	2.66(1.01)	4.24(.78)	4.12(.81)

Note. Standard Deviations are in parentheses.

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Moral Hazard as a Market Failure in the Private Provision of Social Insurance

by Jessica Brown
Economics

Faculty Mentor: Mark Thoma, Economics

Introduction

Demographic changes, specifically the large population of baby boomers reaching retirement age, has led to worries that the current Social Security System will be unable to support the resulting future financial obligations. Solutions to this problem range from minor changes in the current system to a possible cessation of social security. Some small changes, such as increasing the retirement age or raising the payroll tax, can cause dramatic improvements. Increasing the retirement age, for example, raises revenue going into the system by increasing the amount of time individuals pay into the system. That change consequently leads to a potential reduction in payouts because individuals also spend less time receiving social security. Increasing the payroll tax also increases revenue because each individual contributes a higher percentage of income to social security. Payouts, however, do not increase as the payroll tax increases; this disparity makes taxpayers less willing to use this method as a solution to the crisis.

Alternatively, privatization would involve individuals holding and having control over private retirement accounts. One main selling point of privatization is that it respects individual choice

and risk preferences. While the privatization of social security remains highly debated on economic and social grounds, my research focuses on the moral hazard that arises under the private provision of social security.

Moral hazard is an information asymmetry in which the presence of insurance induces the insured to reduce preventative activity that would otherwise directly lower the probability of a loss. A classic example of moral hazard entails bicycle insurance. Suppose an individual owns a bicycle. The individual can take certain, although costly, actions to prevent the bicycle from being stolen—buying a lock or parking in a safe area. All of the activities are costly, but they lower the probability that the bicycle will be stolen. With full insurance—meaning that if the bicycle is stolen, a new one is provided—the individual has less incentive to take the preventative actions. If the bicycle is stolen, the individual faces no direct costs apart from the hassle of replacement. The reduction in preventative activities leads to an increase in the likelihood that the bicycle will be stolen.

Economists and politicians fear that individuals will not adequately save for retirement if the government no longer provides social security. The fear arises from the moral hazard problem that occurs when individuals believe that the government will bail them out if they reach retirement penniless. The perceived bailout acts as full insurance against an individual's savings, reduces participation in preventative activities, and ultimately increases the likelihood that the individual will reach retirement without adequate savings. It is important to research what factors increase or decrease moral hazard so that policy decreasing the costs associated with excessive risk taking can be introduced.

In this investigation, I use the theoretical device of viewing privatized social security as a financial institution in which individuals must monitor behavior. This view moves the analysis of moral hazard into the realm of deposit insurance, but the analytical shift is a natural and needed one. First, there is little literature on moral hazard and private social insurance; by viewing social security this way, one can utilize the robust deposit insurance literature. Also, the moral hazard problem that occurs in deposit insurance is remarkably similar to that present within a privatized social security system. Currently, when depositors put money into the bank, up to \$100,000 is fully insured. This explicit deposit insurance was introduced in order to prevent bank runs and to protect depositors against losses associated with bank fragility. With the current system, however, money put in the bank is fully insured, meaning the depositor's money is guaranteed no matter what happens. The depositor faces a disincentive to monitor the bank closely to ensure that deposits are safe. This parallels social security with the implied government bailout playing the role of deposit insurance and individual private account holders acting as depositors. Consequently, individual account holders also face the disincentive to monitor the privatized social security system to insure that their savings are safe.

This research uses a safety net management model found in deposit insurance literature as a foundation for further research into a privatized social security system and the ensuing issues with moral hazard. In the model, the expected present value of safety net costs and benefits are modeled as a function of spending on crisis prevention and crisis management. This compares well to a privatized social security system with the implied government

bailout acting as the safety net. I will show that by introducing healthy externalities to the model, moral hazard decreases.

Literature Review

To date, there has been much controversy over the potential social security crisis. In 1996, Mitchell and Zeldes [2] offered a much needed framework for analysis, measuring the costs and benefits associated with the possible shift to a privatized social security system. They argued that the benefits of such a move would include less political involvement in retirement savings, as well as an increase in individual choice. On the other hand, they identified several disadvantages, including a decrease in national risk sharing, an increase in administrative costs, as well as some distributional problems. This paper addresses the information problem that has been a concern of most previous research regarding social security—and adverse selection. The information problem is due to the fact that the social security system does not have perfect information about an individual's life expectancy. The main worry, therefore, is that only individuals who think they will live a long time, longer than the average which determines the insurance premium, will opt for a privatized social security system because they are the ones that stand to benefit the most. Little research has been done on the information problem of moral hazard in a privatized social security system.

The goal of this research is to address this issue, but the search for literature on moral hazard had to be redirected. The deposit insurance literature offered the variety of comprehensive analyses needed for this research. Edward Kane, a leading authority on deposit insurance, has evaluated programs around the world. His

article, "Using Disaster Planning to Optimize Expenditures on Financial Safety Nets," [1] offered a benchmark model for safety net management. Specifically, he looked at individual monitoring and the indirect costs associated with moral hazard. He went on to show that around the globe, organizations tend to underinvest in crisis management and overinvest in crisis prevention. This occurs because governments are reluctant to acknowledge the moral hazard problem that arises with spending on crisis prevention as well as weaknesses present in the handling of a crisis. Although Kane's work was a benchmark for safety-net management, his model can be used to explore other moral hazard issues.

Methodology

When modeling social security in the context of deposit insurance, it is important to take note of several things. First, deposit insurance is an explicit system in which individuals deposit money into banks with the assurance that their money is protected. When individuals place money into a privatized social security system, it is assumed that the government will not allow individuals to fall below a certain level of poverty regardless of poor or risky investments. Such a situation illustrates the government bailout. It is also assumed that the government bailout, though implicit, is strong enough to be treated as explicit. The moral hazard problem that arises with deposit insurance occurs because, in the event of a crisis, individuals face no direct costs. Instead, their money is insured, and their incentive to monitor the financial institution decreases drastically, creating an opportunity for banks to take on excessive risk. Similar outcomes would occur with a privatized social security system. Individuals invest money into

the privatized social security system, which acts like the bank in the deposit insurance situation. It is assumed that an one's incentive to monitor the quality of investments is directly related to the costs one will face in the event of a crisis. As costs rise, so does the incentive to monitor.

When individuals reduce their monitoring, the system takes on excessive risk. Thus, as individuals monitor less, and the system takes on more risk, the probability of a crisis increases. A safety net management model found in the deposit insurance literature provides a valuable tool to analyze costs and benefits, and, particularly, explore how they relate to moral hazard and individual monitoring. Analysis using the model shows that spending on crisis prevention and health externalities will increase moral hazard, while spending on crisis management will decrease it.

Model

The model used here is based on Kane's safety net management model. The present value of the safety net, V_N , is determined by the net benefits, N_K (Benefits-Costs), discounted at an interest rate, r , over horizon T .

$$V_N = \sum_{k=0}^T N_K (1+r)^{-k} \quad (1)$$

The direct costs associated with safety net management involve the expenditures on crisis prevention, C_p , and crisis management, C_M . Expenditures on crisis prevention will likely include spending on regulation aimed at making sure the system does not take on excessive risk. Spending on crisis management involves planning and executing a baseline response to a failed system. Modifying

the model to include health externalities as an additional cost is reasonable because if a crisis occurs, those receiving social security will not only be poor, but their health will suffer. The impacts of these extra health costs will lie on the government and, ultimately, on taxpayers. Therefore, the model includes health costs, C_H , if a crisis occurs.

Individuals must monitor the system to insure that it does not take on excessive risk. Spending on prevention, management, and the reduction of health externalities, however, will alter an individual's decision to monitor. The incentive to decrease monitoring is the moral hazard in the model. Indirect costs associated with safety net management are the benefits indirectly surrendered, B_{IM}^k , because of this moral hazard. That is, when moral hazard exists, the equilibrium is sub-optimal, resulting in fewer benefits to agents, and this term captures the costs of the sub-optimality.

Benefits associated with safety net management are the direct benefits B^k , associated with the expenditures on crisis prevention, crisis management, and health externalities. Additionally, because expenditures replace some individual monitoring, there is an additional term, C_{IM}^k , representing the amount of individual monitoring the system displaces.

The present value of the safety net is now expanded to reflect both the direct and indirect costs and benefits, still discounted with interest rate r , over horizon T .

$$V_N = \sum_{k=0}^T (1+r)^{-k} \left[B^k(C_P, C_M, C_H) + C_{IM}^k - B^k(C_{IM}^k) - (C_P + C_M + C_H) \right] \quad (2)$$

Kane's model assumes individual monitoring, C_{IM}^k , depends upon the effects of different kinds of supervisory activity. Following that approach, benefits, B^k , are a function of C_p , C_M , and C_H . Direct benefits to the system increase with all spending, including spending on reducing health externalities. Costs resulting from the benefits indirectly surrendered due to moral hazard, B_{IM}^k , are a function of the amount of monitoring the system displaces, C_{IM}^k . As the system displaces monitoring, benefits associated with individual monitoring decrease.

(+) (-) (+)

$$C_{IM}^k = C_{IM}^k(C_p, C_M, C_H) \quad (3)$$

It is important to uncover how the function C_{IM}^k works. Again, C_{IM}^k represents the amount of monitoring the system displaces; individual monitoring decreases as C_{IM}^k increases. Displaced monitoring is a function of spending on prevention, management, and health externalities. First, spending on crisis prevention involves spending on gathering, analyzing, and reacting to information regarding changes in the system. That spending directly displaces the costs individuals face to do the same thing. Therefore as C_p increases, C_{IM}^k increases as well. Second, spending on crisis management involves spending on shutting down an insolvent system. According to Kane, individual monitoring increases with spending on crisis management; that assumption is adopted here as well. Third, spending on health externalities should decrease individual monitoring. Spending lessens the health costs individuals face, thus decreasing total costs to individuals during a crisis. The lower the costs an individual faces, the less incentive there is to monitor.

Therefore as spending on C_H increases, monitoring decreases and C_{IM}^k increases.

Assuming second order conditions are met, safety net managers act to optimize spending on each activity they control: C_P , C_M , and C_H . The model assumes that managers are fully informed. Therefore, to maximize the net present value of the safety net, which is the policy

goal, managers should spend until $\frac{\partial V_N}{\partial C_P}$, $\frac{\partial V_N}{\partial C_M}$, and $\frac{\partial V_N}{\partial C_H}$ are all equal to zero.

$$\frac{\partial V_N}{\partial C_P} = \sum_{k=0}^T (1+r)^{-k} \left[\frac{\partial B^k}{\partial C_P} + \left(1 - \frac{\partial B_{IM}^k}{\partial C_{IM}^k} \right) \left(\frac{\partial C_{IM}^k}{\partial C_P} - 1 \right) \right] \quad (4)$$

$$\frac{\partial V_N}{\partial C_M} = \sum_{k=0}^T (1+r)^{-k} \left[\frac{\partial B^k}{\partial C_M} + \left(1 - \frac{\partial B_{IM}^k}{\partial C_{IM}^k} \right) \left(\frac{\partial C_{IM}^k}{\partial C_M} - 1 \right) \right] \quad (5)$$

$$\frac{\partial V_N}{\partial C_H} = \sum_{k=0}^T (1+r)^{-k} \left[\frac{\partial B^k}{\partial C_H} + \left(1 - \frac{\partial B_{IM}^k}{\partial C_{IM}^k} \right) \left(\frac{\partial C_{IM}^k}{\partial C_H} - 1 \right) \right] \quad (6)$$

Solutions to the equations give the optimal values.

Results

Using the methodology introduced in the section above, the results from equations (4), (5), and (6) are analyzed to find the effects of adding the health externality to Kane's model. Specifically, this

analysis shows that adding health externalities to the proposed privatized social security system decreases the overall moral hazard problem.

Analysis

Equations (4), (5), and (6) separate costs and benefits into direct and indirect components. The direct components are the terms $\frac{\partial B^k}{\partial C_P}$, $\frac{\partial B^k}{\partial C_M}$, and $\frac{\partial B^k}{\partial C_H}$. These terms are all positive because the model assumes that spending on prevention, management, and health costs provide positive net benefits. Introducing a new element into the model, health externalities, and adding health related costs bring a new set of costs that an individual will face in the event of a crisis. Therefore, the overall costs associated with a crisis will increase. Those higher costs increase an individual's incentive to monitor, thus lowering moral hazard. Spending on health costs, however, lowers the cost that an individual will face in the event of a crisis, much like spending on crisis prevention and crisis management. This follows Kane's conclusion that the net direct benefits of spending on crisis prevention, crisis management, and health costs is positive, disregarding moral hazard.

The indirect components, those involving B_{IM}^k , or C_{IM}^k , capture the moral hazard associated with spending. Assuming that $1 - \left(\frac{\partial B_{IM}^k}{\partial C_{IM}^k} \right)$ is negative, it is possible to evaluate the indirect net marginal benefits of government spending on crisis prevention. Spending on crisis prevention directly displaces the costs individuals face to do the same thing, $\left(\frac{\partial C_{IM}^k}{\partial C_P} \right) > 0$, equation (3).

Therefore, from equation (4) Kane argues that the indirect net marginal benefits of spending on crisis prevention are negative. This follows from the fact that spending on crisis prevention decreases individual monitoring, increases the amount of monitoring the safety net displaces, and lowers the indirect benefits of individual monitoring. Following the same logic, Kane finds that indirect net marginal benefits of government expenditures on crisis management are positive.

It is important to look at the effect of adding health externalities to the mix. Equation (6) captures the marginal direct and indirect effects of spending on health costs. Keeping in mind that the net marginal direct benefits are positive, as with all spending, it is interesting to see what effects these health costs have on moral hazard. To see this, look at the indirect components. From equation (3), one can see that spending on health costs increases C_{IM}^k . This result occurs because spending on health costs decreases the costs an individual will face in the event of a crisis. The lowered costs decrease an individual's incentive to monitor, thus increasing C_{IM}^k . Following Kane's logic regarding spending on crisis prevention, the net indirect marginal benefit of spending on health costs is negative.

In conclusion, the net direct marginal benefits of all types of spending are positive. The net indirect marginal benefits of spending on crisis management are positive as well. The net indirect marginal benefits of spending on crisis prevention and health costs, however, are negative due to the moral hazard problems. Overall, the total effect of adding health externalities depends on a number of factors. First, adding health externalities increases the total costs an individual faces upon a crisis. Higher costs lead

to a higher incentive to monitor, decreasing moral hazard. Then, by introducing spending aimed at lowering these costs during a crisis, C_H , one can see that the net indirect marginal benefits of such spending are negative. Health related costs in a crisis are lowered with spending on C_H , which decreases an individual's incentive to monitor and increases moral hazard. Overall, health externalities decrease moral hazard, but the magnitude depends on the indirect effects of spending on health costs, C_H .

Discussion

The evidence in the sections above shows that the introduction of health externalities decreases moral hazard overall, but the extent of the decrease depends on spending to reduce health costs and the indirect effect that spending has on moral hazard. It is clear through the analysis of the model that spending on crisis prevention and health costs actually increases moral hazard.

Any policy aimed at reducing moral hazard under privatized social security must consider two things. First, if the goal is to reduce moral hazard, the model presented in this paper suggests that it is necessary to increase the cost that an individual will face in the event of a crisis. For example, a policy mandating that an individual must cover all expenses in the event of a crisis will induce the individual to monitor the system extensively, decreasing most of the moral hazard problem. In contrast, if a policy is implemented covering all costs an individual faces during a crisis, the individual will cease to monitor.

Second, and equally important, a policy must look at the direct costs an individual faces in a crisis. When individuals reach retirement, they no longer have the ability to generate income. If the

goal is to decrease moral hazard by increasing the costs an individual faces, an individual's age and ability to generate income need to be considered. The main goal of the social security program is to make sure there is not an elderly population in poverty. Although originally intended to be part of a three-legged support system, social security is often the primary source of income for those over the age of sixty-five. Therefore, increasing the costs individuals face in a crisis under the guise of decreasing moral hazard may actually lead to less desirable results.

In future research, I wish to examine possible policy recommendations aimed at decreasing the moral hazard problem under privatized social security, without generating excessive costs for those who can no longer generate income. A possible suggestion would be a deductible plan often found in health care and care insurance. Under such a plan, individuals would cover a certain percentage of the costs that occur in a crisis. If individuals collectively do not monitor the system, then they will end up having to cover some proportion of the costs associated with a crisis. The optimal level of costs should be high enough to leave an individual uncomfortable in the event of a crisis, enough so that they will be induced to monitor the system.

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Exploring the Role of Histone Deacetylase 3 in DNA Methylation in *Neurospora crassa*

by Michelle Brown
Biology

Faculty Mentor: Eric Selker, Biology
Graduate Student Mentor: Kristina Smith, Biology

Introduction

DNA methylation is thought to have important implications in developmental, cell, and cancer biology. It is hypothesized that DNA methylation is one modification involved in tumor formation. Aside from its deleterious effects, DNA methylation plays a normal role in murine X-chromosome inactivation, gene silencing, silencing of transposons and retrotransposons, and possibly formation of centromere and telomere heterochromatic structure. In *Neurospora crassa*, DNA methylation may form in response to deacetylation and methylation of various histone tail residues. The most important modified residue in *N. crassa* is thought to be lysine 9 of histone 3 since modification of this residue alone has genome-wide implications for DNA methylation in *Neurospora*. Tri-methylation of Lysine 9 of H3 by histone methyltransferase DIM5 is essential for genome-wide DNA methylation by DNA methyltransferase DIM2 (Tamaru et. al, 2003). Histone modifications thought to promote DNA methylation, such as histone hypoacetylation and methylation, have been linked to heterochromatin formation and gene silencing in a variety of organisms, including *Neurospora*. *N. crassa* is an

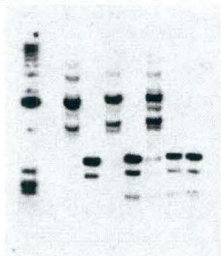
ideal organism in which to study DNA methylation because it is of haploid constitution, is easy to culture, and its DNA methylation is dispensable, unlike in mammals (Selker et. al., 2003).

This research focuses on the role of Histone Deacetylase 3 in DNA methylation *N. crassa*. HDA3 mutants are particularly difficult to study as the gene *hda-3* is thought to be essential because its yeast homolog *clr6* is essential in that organism. Previous research in the Selker lab also points towards this conclusion, with *hda-3* mutants producing 20% inviable white ascospores. These mutants have difficulty forming vegetative macroconidia under regular conditions (37 °C). These growth defects lend more evidence to the theory that *hda-3* is essential, implicating HDA3 as an important protein in *N. crassa*. *Neurospora*'s closest homolog to the *Saccharomyces cerevisiae* protein RPD3, HDA3, may have many characteristics of other RPD3 homologs, including complexing with DNA methyl-binding proteins (Nan et. al., 1998) and DNA methyltransferases (Dobosy and Selker, 2001). This would directly implicate HDA3 as a regulator of DNA methylation.

To study these issues, I will employ a null *hda-3^{RIP}* mutant. To form this mutant, Dr. Joe Dobosy transformed *N. crassa* his-3 strain 1673 with an ectopic copy of the *hda-3* allele targeted to the his-3 region. Correct transformation and recombination should yield a functional his-3, which can be used to select for the transformed strains. The presence of the ectopic *hda-3* in the *N. crassa* genome will pre-meiotically induce Repeat Induced Point Mutation (RIP), a mechanism in *N. crassa* that deaminates and methylates DNA to create C to T transition mutations in both the duplication and the original copy of repetitive genes. These point mutations yield a wide range of mutants, from leaky to lethal (Tamaru & Selker,

Figure 2: Regions that Lost Methylation

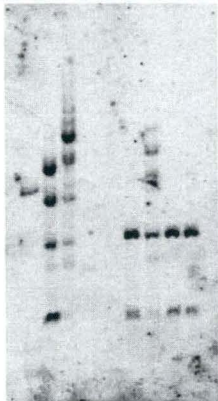
8A6 N150 1673 had-3 dim-2
ladder D S D S D S D S



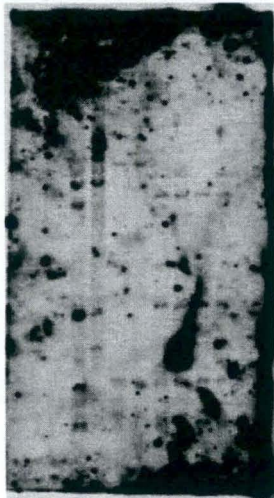
9E1 N150 1673 had-3 dim-2
ladder D S D S D S D S



ψ63 N150 1673 had-3 dim-2
ladder D S D S D S D S



Tad-1 N150 1673 had-3 dim-2
ladder D S D S D S D S



Materials and Methods

DNA methylation analysis was performed on *hda-3* Selker mutant strain 2666 using isochisomers and Southern blot probing for regions methylated during RIP. These regions include 8A6, ψ -63, 11E5, Tad-1, 8G3, 8F8, 8F10, 5B8, and 9E1 (Table 1). 2666 is an *hda-3* null RIP mutant created by Dr. Joe Dobosy. It was grown in Vogel's minimal liquid media without shaking at 37°C

for seven days. Even under these conditions, growth was poor. Conidiation did not occur, and mycelia were brown and gray instead of the wild type bright orange.

Results

The amino acid sequence of the *N. crassa* HDA3 protein proves to be highly homologous to many eukaryotic strains (Figure 1), indicating that it is a very old strain. Former research has found homologs in the prokaryotes and archaea as well, indicating that ancestral organisms found the molecule useful even before the divergence of the kingdoms. Joe's *hda-3^{RIP}* strain 2666 was used to determine DNA methylation changes in various regions of the *N. crassa* genome. These digests were compared to those of

Figure 3: Regions with No Change in DNA Methylation

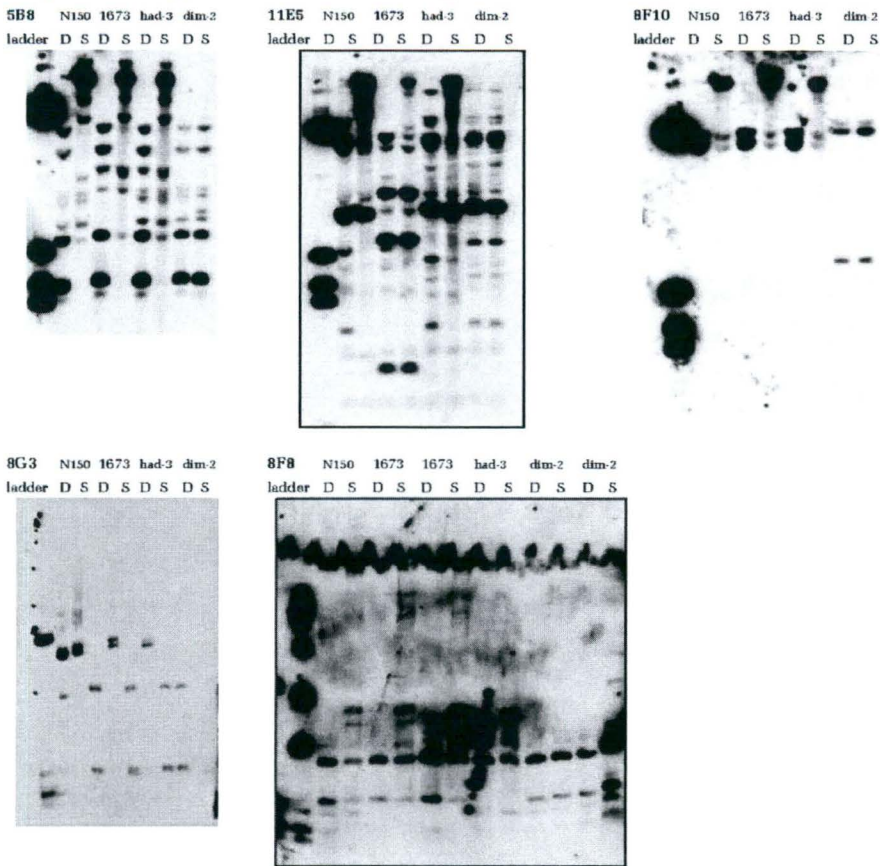


Table 1

hda-3RIP DNA Methylation Summary					
Region of Interest	Loss of DNA Methylation	Comments	# Repeats in Genome	Normal % Methylation	Linkage Group
8A6	Partial	Transposon (Dh Minos)	12	~90	V
9E1	Partial	RIP-mutated repeat 5s rDNA and RIPed	4	~90	-----
63	Partial	Transposon	-----	-----	-----
Tad1	Full	Retrotransposon/telomere	-----	-----	-----
8F5	No loss	Helicase homolog/centromeres	~30	~50	-----
8F10	No loss	-----	1	~50	III
5B8	No loss	Hs Trigger	~5	>90	II
11E5	No loss	RIP-mutated repeat	~8	~60	IV
8C3	No loss	NH-like trasposase	~9	>90	II

strain 1877, a *dim-2* null allele, and our control for complete demethylation, strain 1673, the parental wild type of *hda-3* mutant strain 2666, and N150, another nonparental wild type strain.

Probing for 8A6 revealed a slight loss of DNA methylation in the *hda-3* mutant seen by the presence of the 600 bp fragment in the Sau3AI digest (Fig.2). The DpnII lane of N150 is not present due to a leak in that lane during gel electrophoresis. 9E1 also showed slight loss of methylation as indicated by the light band around 400 bp. This band is not present in either of the wild type strains but is strong in the DpnII digest as well as in both lanes of the *dim-2* mutant. ψ-63 had slight loss of methylation, as indicated by the smallest band

in the Sau3AI lane being darker than in wild type. This darkening is indicative of DNA methylation loss, as it is present and strong in the *dim-2* digests. The lighter large bands in the ψ-63 Sau lane are a good indicator that our darker small band is not darker simply due to stronger probing. Wild type 1673 is not present in this gel because it lacks the ψ-63 region. Although the Tad-1 gel contains a lot of

background, the strength and size of the visible larger fragments indicate *hda-3^{RIP}* has had complete loss of methylation in Tad-1. 5B8, 11E5, 8F10, 8F8, and 8G3 did not lose DNA methylation in the *hda-3* mutant (Figure 3). Table 1 summarizes the pattern of DNA methylation in the 2666 *hda3RIP* mutant.

Discussion

Although there is no correlation between where these regions are in the genome, what they are, and whether or not their DNA methylation is regulated by HDA3, one could be found if more regions were analyzed. Since HDA3 seems to be a global deacetylase, it probably acts on a wide range of regions. It is interesting to note that two transposons (8A6 and ψ 63) partially lost DNA methylation when *hda-3* was knocked out (Figure 2). Tad-1, a retrotransposon, had a complete loss of DNA methylation. Transposons and retrotransposons are viral relics possibly silenced by DNA methylation to prevent their continued proliferation from the host genome. The RIPed mutated repeat 9E1 also had partial loss of methylation. This indicates HDA3 may be necessary for maintaining DNA methylation and silencing of the RIP mutated fragments. Loss of methylation in RIPed regions could lead to aberrant expression of this mutated region, producing dysfunctional and harmful RNA or protein byproducts.

Regions where methylation is not affected include a transposase (8G3), an enzyme that aids transposons in cutting themselves out of the genome and reinserting elsewhere in the genome (Figure 3). We could theorize that this region may be highly regulated by a number of histone deacetylases because its silencing is crucial for the viability of the organism.

Dr. Dobosy thought 5E6 region might have a loss of methylation, although he notes the stains on the gel indicate this pattern may be attributed to restriction fragment length polymorphisms rather than changes in DNA methylation. Dobosy's find of partial loss of methylation in *am^{RIP8}* is useful in that TSA is found to have the same effect on this region. Since TSA is a direct inhibitor of HDA activity, we conclude that HDAs, including HDA3, do act in this region, and their effect on DNA methylation is directly correlated with their ability to deacetylate neighboring histone lysine residues.

To elucidate a mechanism for HDA regulation of DNA methylation, it is important to determine which HDAs affect different lysine residues on various histones; how they modify them; what regions of DNA interact with these modified residues; and finally, what changes in methylation occur in *hda* mutants in these regions. Regions of DNA without changes in DNA methylation in *hda-3^{RIP}* strains may be regulated by HDA3, but DNA methylation loss is prevented by histone acetyltransferase (HAT) reacylation. Without analyzing histone modifications, it is difficult to determine all of the regions a HDA may be regulating. To determine the regions HAD may be regulating, ChIP should be conducted to determine what regions of the chromosome HDA3 targets. ChIP should be followed by a microarray analysis of what regions of DNA the HAD3 bound histones bind to.

Finally, the mechanism of HDAC3 protein should be elucidated by determining with what proteins it complexes. Specifically, we would like to know if HDAC3 protein binds DIM-5 protein, thus directly linking histone deacetylation with histone methylation. This could be found with affinity purification of HDAC3 and a Western blot. Using an antibody specific to DIM-5, as well as the

antibody for the Histidine 6 or FLAG tagged HDA3 protein, it can be determined whether or not DIM-5 is in complex with HDA3 by “pulling down” each protein and whether or not the other co-precipitates.

Epigenetic DNA methylation studies have wide reaching applications in understanding development, from gene imprinting and dosage compensation to tumor formation and carcinogenesis. This study will provide new data regarding links between histone modification and formation of silent heterochromatin. It should help fill in the most critical gaps in current understanding of the epigenetic regulation of gene transcription, specifically, the role of histone deacetylases in this regulation.

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Surface Modifications Used to Create a Universal Approach of Modeling Diodes

by **Richard Fuller**
Chemistry

Faculty Mentor: Mark Lonergan, Chemistry
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Abstract

To better understand and test current theories of charge transfer across inorganic semiconductor | conjugated polymer interfaces, the work in the Lonergan Labs has shown a correlation between the capacitance-voltage (C-V) and the current-voltage (I-V) characteristics of n-InP | poly (pyrrole) interfaces. Analytical expressions explaining the barrier height have been determined using a novel approach to evaluate the barrier height and model for tunable diodes. The most common anomalies are discrepancies between the interfacial potential barrier heights determined by various techniques. In the past, device behavior is not always reproducible. But, using a thin polyimide film of $\sim +3.0 \mu\text{m}$ can consistently reproduce the past data needed to further expand upon “Moore’s Laws.” Through this use of chemical surface modifications to control electron transfer at inorganic semiconductor interfaces (IS), a general platform for testing electronic processes at these (IS) interfaces will help to re-engineer conventional microelectronic devices.

Introduction

Developing a pattern upon the face of a substrate (silicon wafer) using polyimide for the construction of a diode has value for sev-

eral reasons. First, once a system for patterning the polyimide film is developed, the procedure is simple and reproducible. Second, once this surface or pattern is developed, the polyimide film is inert to the further chemical reactions involving the manufacture of the diode. Currently the procedure for creating a diode involves the use of Tefzel, an inert material used to define the area on the face of the substrate for a diode. The procedure for patterning is as follows: "Position in metal drilling holder and drill a hole through the cover slip and Tefzel." [Ref #2] This procedure is crude and can result in some uncertainty. One goal is to limit this source of uncertainty.

Statement of purpose

One way to overcome the uncertainty of procedures using Tefzel is to design and develop a diode created by a process that starts with wet chemical etching, a process that will take the place of the procedure involving Tefzel. The first task is to define the area upon a substrate using Wet Etch Polyimide (PI-2545). Using a protocol

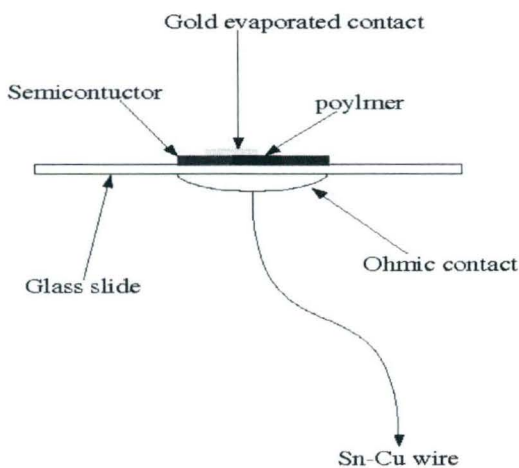


Figure 1, Model of proposed diode.

developed in cooperation with Ben Anger [Ref # 1], this patterning is reproducible and consistent. Next, it is necessary to assemble a diode, as shown in figure1, using a semiconductor with an area of 2mm defined by the polyimide.

The long-term goal of the research is to re-engi-

neer the device structure so that we can do the following types of experiments: (i) to understand charge depletion and charge transport at inorganic semiconductor (IS) interfaces; (ii) to evaluate the efficacy of inhomogeneity models in explaining classic anomalies; [Ref # 3] (iii) to understand the potential, limitations, and interpretation of current structure developmental procedures in the re-engineering of nanostructured interfaces.

Well-defined nanostructured interfaces need to be fabricated using wet chemical lithography to define the area for the n-InP / polypyrrole interface. Two significant limitations and assumptions are inherent in this research. First, once the area is defined, the polyimide interferes with the electron transfer across the interface. The second limitation focuses on whether it is possible to re-engineer the top contact (gold grid) of the IS interface with a reproducible and controlled procedure.

This work will limit a structural uncertainty while developing a model on a well-defined nanostructure interface. The work, there-

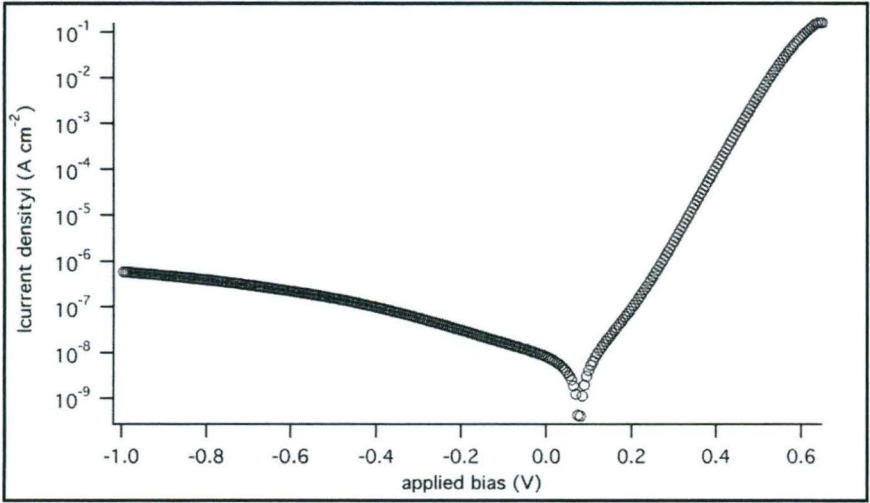


Figure 2, sample current voltage curve.

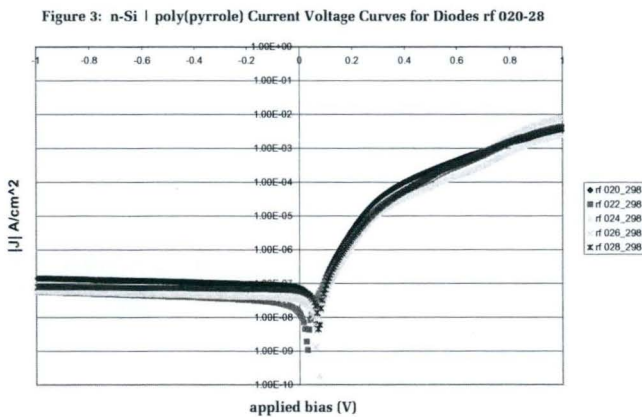
fore, will test general theories of electron transfer rather than try to control electronic process at the inorganic semiconductor interface due to needed surface modifications [Ref # 3-11].

Once the device (IS interface) is engineered and assembled it will be tested by applying a bias (V) to produce an IV curve (current voltage curve) as in fig. 2. This non-symmetric curve shows good current in the positive (+) direction and little current in the negative (-) direction. Thus, the current flow is restricted to one direction as per the definition of a diode [Terminology # 1].

Results

The first diode, rf 020, was completed on June 28, 2004. It was constructed from an n-Si | poly (pyrrole) interface without a poly-imide defined area and using the traditional 4mm tefzel method. The purpose of this procedure was to show that a diode could be constructed with a quality factor consistent with prior data.

These data show that the (I-V) curves for the structures rf 020-28 are consistent with the data for a Schottky diode. Figure 3 shows an absolute current density ($|J|$)-applied bias (V) plot near room temp (298K) for the diodes rf 020-28.



Experiment

The design of the n-InP | poly (pyrrole) diode shown in figure 1 uses a physical mask consisting of Polyimide and a glass cover slip between two layers of Tefzel film, which controls the contact area of the poly (pyrrole) in the semiconductor, $A = .0314\text{cm}^2$.

To complete a poly (imide) conduction test, a thin film ($\sim 2.0\text{ }\mu\text{m}$) must be spin coated on the surface of the semiconductor. This will create the n-InP | poly (imide) interface using the polyimide

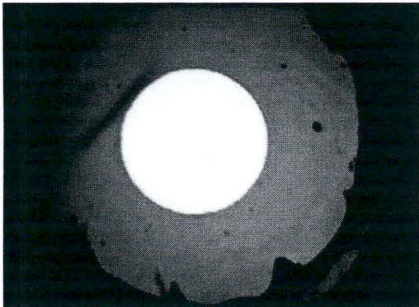


Figure 4: Image showing clear contact area.

as a barrier layer between the n-InP and the 4mm gold top contact. The purpose of this test is to show that the polyimide is inert and that there is no electron transfer across the n-InP | poly (imide) interface, as seen in Figure 5.

An impedance analysis (C-V) of the samples rf 062a shows the polyimide behaves as a capacitor. In figure 6 the plot of the $|Z|$ absolute impedance vs. frequency shows a linear progression in the negative direction as the frequency increases the impedance decreases. As per a log, log plot:

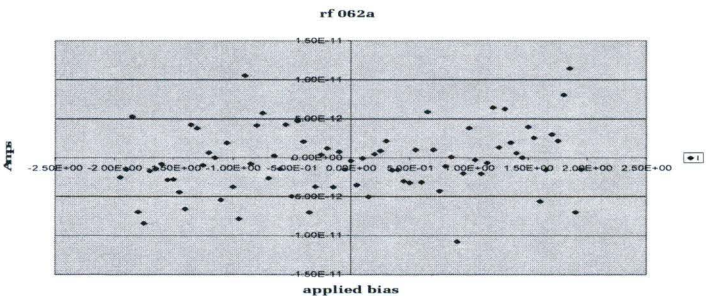


Figure 5: Scatterplot of applied bias.

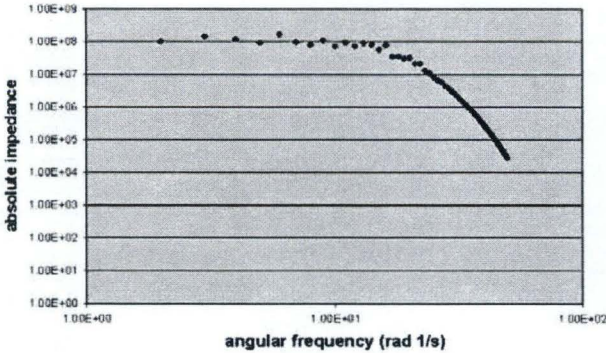


Figure 6: Impedance as a function of angular frequency.

Figure 6 shows that it is possible to extract a value for the slope of the tangent line of $|Z|$ vs. angular frequency. The result, (-1) , is consistent with the data for a

capacitor.

Impedance analysis (C-V) of the sample rf 062a_298 shows the

$$|Z| = \frac{1}{\omega * c}, |Z| = (\text{impedance}), \omega = \text{frequency},$$
$$\log|Z| = \log\left(\frac{1}{\omega * c}\right) \Leftrightarrow \log|Z| = \log \omega^{-1} + \log c^{-1} \Leftrightarrow$$
$$\log|Z| = (-1 \log \omega) + (-1 \log c).$$

Using $y = mx + b$, $y = \log|Z|$, $b = -1 \log c$, $x = \log \omega$, $\forall \text{slope} = -1$.

polyimide behaves as a capacitor. In Figure 7, the phase angle of theta vs. frequency = $270 \sim (-90)$, thus showing that the impedance is strongly capacitive in nature.

Using a poly (imide) film to define the area for the diode as in Figure 1, newly constructed diodes can be used to test established data. With this new surface modification, the uncertainty of past models may be limited leading to a correction of anomalies regarding barrier height extraction.

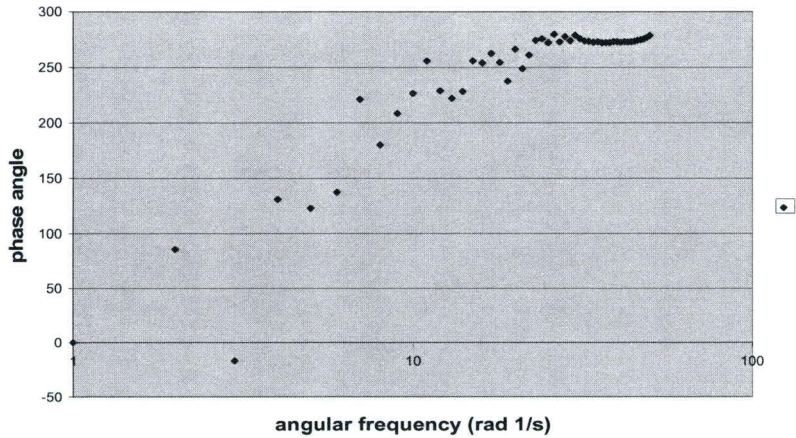


Figure 7: Impedence analysis

Data

Using these n-InP | poly (pyrrole) structures to test current electron transfer theories resulted in two sets of data. First, in figure 8, the data shows the current voltage (I-V) curves for the rf 070b diode

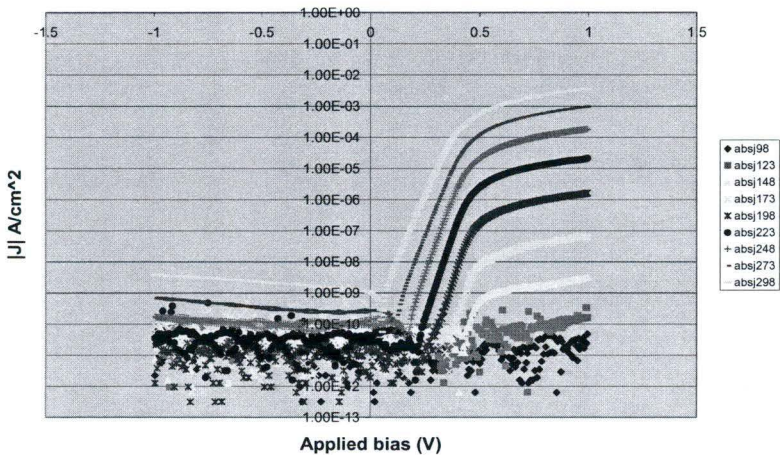


Figure 8: Current Voltage Curves for rf070b Diode

to be consistent with the data from the previous studies of this interface [Ref # 12] and with a good quality factor ~ 1.016435 . This data shows that the poly (imide) being used to define the area for the diode is not affecting the current voltage (I-V) measurements for this interface area. The current voltage (I-V) plots extract curves that visually explain the behavior of the diode. These parameters are often voltage independent and are defined within the diode equation:

$$J = J_0 \exp\left(\frac{\beta V_{app}}{n}\right) \left[1 - \exp(-\beta V_{app})\right], \text{ where } \beta = \frac{q}{kT}$$

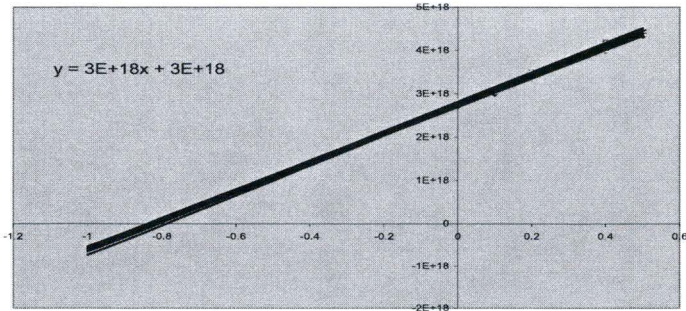
From the (I-V) curve the quality factor is derived from the slope and intercept of the tangent line to the data $\ln J$ vs. V_{app} curve (Figure 8). Also, a graph of (capacitance)⁻² vs. applied bias (V) shows the current storage plots to extract the barrier height (Φ_b) of the inorganic semiconductor interface.

The second set uses capacitance-voltage (C-V), current storage for rf 070_298 n-InP | poly (pyrrole) structures. To determine the zero-bias barrier height (Φ_b) of the n-InP | poly (pyrrole) interfaces, tests relied on reverse-biased capacitance measurements and the Mott-Schottky analysis. The data in figure 9 tabulated together calculate, V_I to extract the barrier height given by the equation:

$$\Phi_b = |V_I| + |V_n| + \frac{kT}{q}.$$

V_I represents the equation for the slope of the line extracted by the plot of angular frequency vs. $|Z|$, absolute impedance and phase angle. This value is the extraction of the value where the trend line = 0 on the x-axis.

Figure 9: $1/C^2$ vs. Bias for T298



$$V_n = \frac{kT}{q} * \ln\left(\frac{N_c}{N_d}\right)$$

$$N_c = \frac{1}{4} \left(\frac{2m^* kT}{\Pi(\hbar)^2} \right)^{\frac{3}{2}}$$

$$N_d = \frac{1}{q\mu\rho}$$

$$\rho = \frac{V}{I} * W * CF\Omega cm.$$

From the data extracted in Figure 9, $y = 3E + 18x + 3E + 18$ solving for the variable x exposes the variable for the barrier height calculations. $\therefore V_f \approx .841, \frac{-kT}{q} = 0.0254 @ 298K, V_n = .0254 \ln\left(\frac{N_c}{N_d}\right)$

$$\Rightarrow \left[\frac{1}{4} \left(\frac{2 * 7.015E - 32Kg * 1.38E - 23 \frac{J}{K} * 298K}{\pi \left(\frac{6.63E - 34J \bullet s}{\pi} \right)^2} \right)^{\frac{3}{2}} \right]$$

$$N_c = 5.47E + 17cm^{-3}$$

$$N_d = 4.6E + 15$$

$$V_n = .0254 \ln \left(\frac{5.47E + 17cm^{-3}}{4.6E + 15} \right) \Rightarrow V_n = 0.12707$$

$$\Phi_b = |V_I| + |V_n| + \frac{kT}{q}$$

$\Phi_b = |-0.841| + |0.12707| + 0.0254 \Rightarrow$ The barrier height for rf 070 is 0.96686V, a value inconsistent with the previously determined data for these structures [Ref # 12] and raising a problem. The change in barrier height is problematic of the capacitance generated by the use of the poly (imide). Therefore, there is a need to develop a model to explain this effect. One possible solution uses a dual-parallel capacitor.

Using the model represented in Figure 10, the capacitance of the whole can be calculated by calculating the capacitance of a parallel capacitor.

$$\frac{1}{C_T} = \frac{1}{C_{PP}} + \frac{1}{C_{PI}} \Leftrightarrow C_T = \frac{C_{PP} * C_{PI}}{C_{PP} + C_{PI}} \Leftrightarrow C_T = \left[\left(\frac{C_{PP}}{A_{PP}} \right) + \left(\frac{C_{PI}}{A_{PI}} \right) \right]$$

The results show that by using a thicker poly (imide) film to define the area for the diode, one can increase the impedance of the C_{PI} side of the dual-parallel capacitor, thus reducing the capacitance to almost ~ 0 , as a function of applied bias (V). This allows the capacitance of the polyimide film creating

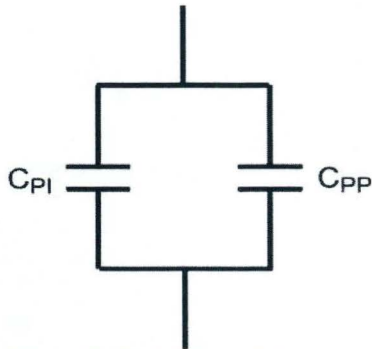


Figure 10: Model of parallel capacitor

the n-InP | poly(pyrrole) interface to be seen as a Mott-Schottky diode.

The plot of the data for rf 080-096 shows a linear trend. As the thickness of the polyimide film increases, the barrier height decreases, thus showing that the model proposed in figure 10 holds true for these diodes. The data shows that poly (imide) can be used to define the area for a diode, but the film thickness must be greater than $\sim 3.0\mu\text{m}$, as the diodes rf 080-96a.

Conclusion

The conjugated polymer poly (pyrrole) interfaced to the inorganic semiconductor n-InP with an area of 0.0314cm^{-2} defined

Figure 11: Barrier height vs. film thickness

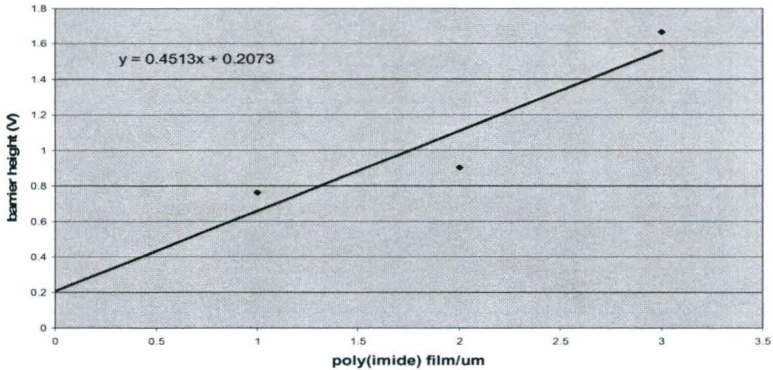


Figure 12: rf 080-096a

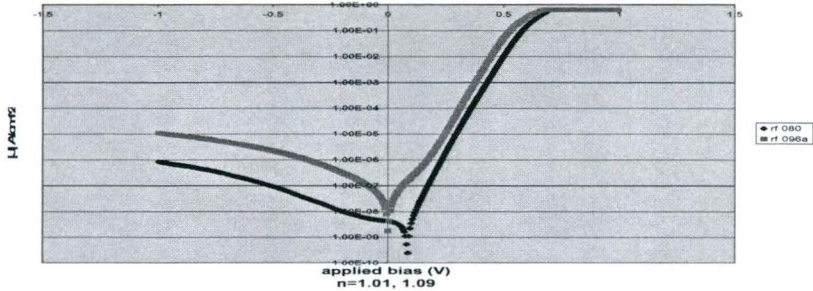
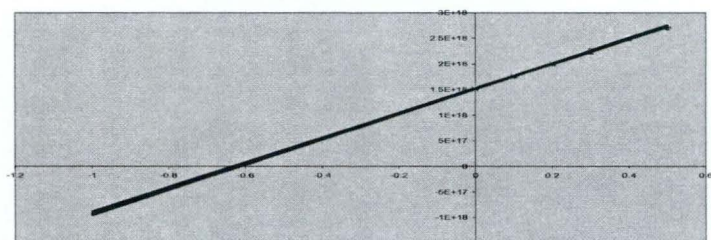


Figure 13: $1/C^2$ vs. Bias for T298
Barrier Height = 0.7623 V



by poly (imide) provides a Schottky-type diode with rectification characteristics ($\Phi_b = 0.8eV$ and $n = 1.02$) that compare well with those previously studied n-InP | poly (pyrrole) interfaces [Ref # 12]. This result will allow further surface modifications including the replacement of the gold grid in figure 1 with sputtered gold, which is one aspect of future directions for this research.

Terminology

1. Diode- An electronic device that restricts current flow to one direction.
2. Substrate-The body or base layer of a diode onto which other layers are deposited to form the diode. This substrate is usually silicon.
3. Etching- To cut into the surface of substrate by the action of a chemical reaction.
4. Semiconductor- A material “Substrate”, typically crystalline, which allows current to flow under certain circumstances, common semiconductors are silicon and are used to design diodes.
5. IS interfaces- inorganic semiconductors
6. Inhomogeneity- the barrier height is not homogeneous.
7. Anomalies- abnormal
8. Lithography- the chemical transfer of patterns from one surface to another.

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The Great Flood of 1997: An Examination of Landowner Perceptions in the Applegate Valley

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Abstract

This study was aimed at understanding landowners' responses and experiences during the extreme flood of 1997. Specifically, it focused on perceptions and considerations of how landowners' views might have affected their behavior and responses both during and after the flood. The Applegate Valley provided an excellent opportunity to examine the interactions between land use and humans as the exposure to the threat of this flood event caused area residents to search for ways to buffer its harmful effects by building such structures as levees and retention walls. An unusually heavy mountain snow pack pounded by days of warm, torrential rain caused the Applegate and Rogue Rivers to overflow their banks and wrought devastation on both Jackson and Josephine counties. While floods are, of course, essentially natural events, this study showed that floods tend to be exacerbated by human environmental management and social structures. Research methods included document analysis, newspaper accounts, participant observation, field trip, and non-representative qualitative face-to-face interviews with three landowners. Results showed that landowners were skeptical of flood preventing structures. They believed that flooding was an unavoidable, natural phenomenon that will always occur on

a regular basis, as it is part of the cycle of a river. Considering that humans have been a part of the Applegate Watershed for thousands of years, the increased understanding of landowner perceptions in the Applegate Valley will provide important information in understanding the Applegate River's current state, as well as its potential future.

Introduction

Floods may be the most destructive of all natural disasters because they are the most common, cause the greatest number of deaths, and result in the most damage (Miller 1997). Flooding of rivers and streams is the most frequent type of flooding recorded around the globe, most often stemming from long periods of rain or from rain combined with melting snow and ice. River floods inundate the largest areas of land and destroy more lives and property than any other form of flooding (International Federation of Red Cross and Red Crescent Societies 1999).

From 1965 through 1989, flooding and flood related events accounted for 77 percent of all United States Presidential Disaster Declarations (L. R. Johnston Associates 1992). This is not surprising considering the fact that flooding is common in all 50 states, although the frequency and type of flood varies considerably from state to state (White, 1942). Hundreds of riverine floods, great and small, occur annually in the United States, resulting in drastic and widespread detriment to lives, property, and the environment (L. R. Johnston and Associates 1992). An estimated 2,300 deaths and \$27.7 billion to \$277 billion in combined property and crop losses were recorded over the past two decades in the U.S. as a consequence of flooding (Mileti 1999).

Curiously, most areas flooded since 1965 have had some form of flood control works (Ericksen 1996). In spite of efforts to control them, floods and related losses continue to occur. There is a paradox in our growing susceptibility to flood losses at a time of increased technological capacity to control and manipulate our river systems. Our ecological dominance over nature has conferred great benefits on society by preventing losses and increasing the resource base (Ericksen 1996). However, researchers have identified this paradox in other countries and for other hazards (White, ed., 1974; Burton, Kates and White, 1978).

Geographers have long held that to understand this paradox researchers must examine in ecological perspective the impacts of natural events, such as floods, on society and society's responses to those impacts (Barrows, 1923; White, 1945; Burton, et al., 1968; Kates, 1970; and Burton, et al., 1978). This sort of examination requires that researchers analyze both physical and social processes in order to gain understanding of not only the physical impact on social systems, but also the social adjustments to the impacts and their influence on the patterns of loss (Ericksen 1996). All too often, however, individuals' perceptions are ignored when analyzing natural hazards (Wong *et al*, 2000). Therefore, this study has two main focuses:

1. Elucidating landowners' responses to an extreme flooding event they experienced in 1997.
2. Examining landowners' perceptions and how their views might affect their behavior and responses during and after the flood.

Specifically, this study sought answers to the following questions:

1. How do landowners perceive the adjustments such as

- levees, flood control dams that are made to both the physical and human systems in order to reduce the hazard effects?
2. How do these adjustments increase or decrease the flood hazard?
 3. What effects do such adjustments have on the river channel?

Study Area

The Applegate River Valley is located in Jackson and Josephine counties on the northeastern flank of the Siskiyou Mountains in southwestern Oregon. The watershed, bounded by Jackson and Josephine counties, encompasses an area of approximately 493,000-acres (770-square-miles). Applegate Sub-basin includes lands in Jackson County, Oregon (approximately 410 square miles), Josephine County, Oregon (approximately 270 square miles), and Siskiyou County, California (approximately 90 square miles). The Applegate Valley is estimated to have 12,650 people, based on disaggregated census data (Preister, 2000). The watershed is an extensive river drainage system with headwaters in the Siskiyou Mountains and joins the Rogue River near the city of Grants Pass, Oregon. The topography of the basin is rugged, and includes high mountains, steep slopes ranging in elevation from 850 feet to 7,418 feet above sea level, dense networks of streams, and gentle valley floors. Figure 1 shows the location of the Applegate Sub-basin within the Rogue Basin and in Oregon. Figure 2 shows the rural communities and primary tributaries, in the Applegate Sub-basin.

Various stages of conifer and hardwood timber provide diverse wildlife habitat. The valley floor contains grassland, oak savannahs, chaparral, and riparian vegetation. Agriculture and

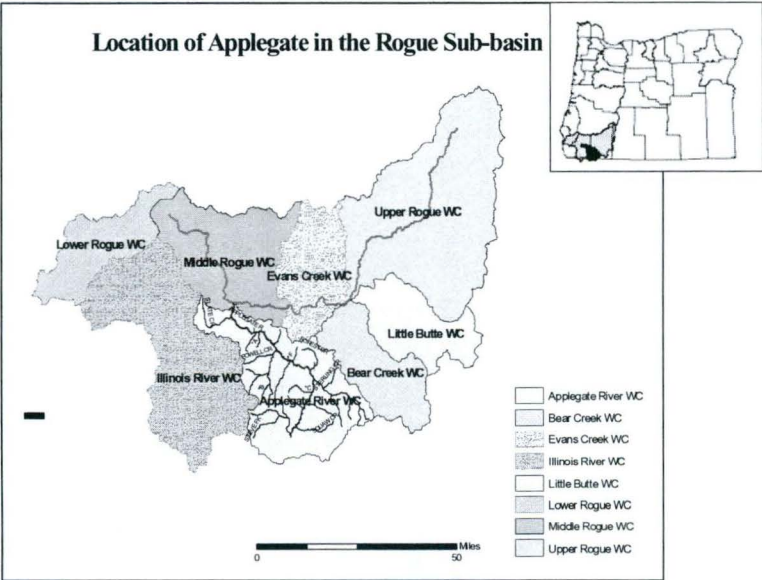


Figure 1. Applegate watershed located in Jackson and Josephine Counties of Southern, Oregon. (Source: Army Corps of Engineers.)

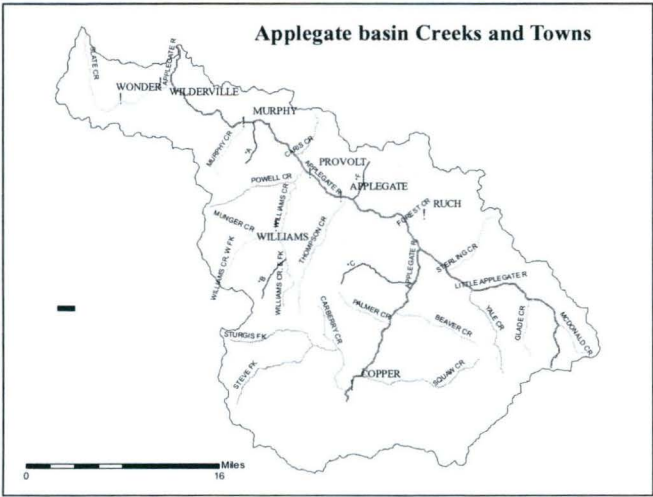


Figure 2: Applegate Basin

private forestland are the predominant land uses on the valley floor. Wine grape acreage is increasing annually.

The dam at the head of the Applegate system near the California border was completed in 1980. The dam has modified natural flow regimes relative to the creation and maintenance of fish habitat. Regulated water releases have modified the cleansing effects of flood flows on spawning gravels, riparian vegetation, and debris-filled, off-channel fish-protection sites. While cutting off some historical fish habitat, the dam has several beneficial impacts on both the human and salmonid populations. The dam controls flood flows, cools summer water temperatures, assures flow during normally low flow years, and is a boon for human recreation and agriculture. Water withdrawals are used for hay and pasture irrigation, livestock watering, and watering of gardens and lawns. In earlier days, extensive mining was done in the Applegate Basin. Today most of the mining is recreational.

Significance of Study

The Applegate Watershed, encompassing 312.48 square miles with 6,473 residents (see Figure 1) provides an excellent opportunity to examine the interactions between land use and humans. The exposure to the threat of an extreme flood event of 1997 might have caused the residents of this area to search out ways of buffering its harmful effects such as with flood abatement or flood diversion. An increased understanding of landowner perceptions in the Applegate Valley is of significant importance in understanding the Applegate River's current state, as well as its potential future, because the Applegate River has had some engineering modifications such as the flood control dam completed in 1980 and some levees. The

character of the floodplain has also changed to accommodate agriculture and urbanization.

Studies such as the current one are of interest to the Applegate Watershed Council, the Applegate Partnership, and local landowners who are continuously working towards the promotion of ecosystem health and natural diversity across the entire watershed.

Related Literature and Studies

The theoretical footing of this paper is set in a body of literature within natural hazards studies concerned with scientific endeavors that provide systematic analyses of the physical mechanism of natural hazards (Frazier 1979; Foster 1980; Smith 1992). It has become patently clear that no one can control every element of nature in order to eliminate risks (Wong *et al*, 2000). Indeed, human factors are just as much a cause of natural hazards as are extreme geophysical processes (Hewitt 1983; Tobin and Montz 1997). The effect of the flood hazard at any time depends on the size of flood event and state of human activity, including the types of adjustments adopted on the floodplain. For instance, an event that does not overflow the stop bank may nevertheless cause indirect losses due to low emergency actions that are disruptive of normal social and economic activities (Ericksen, 1986).

Previous studies have focused on the behavior of individuals before, during, and after hazardous events (Burton and Kates 1964; Kates 1971). A new perspective has emerged that views hazards as basic elements of environments and as constructed features of human systems, rather than extreme, unpredictable events (Wong *et al*, 2000). In that way, people can either attempt to stop natural hazards from occurring (prevention) or recognize that they will

happen and modify their lifestyles to deal with those events. Therefore, when hazards and natural disasters are viewed as integral parts of the environment and human systems, they become essential tests of individual and societal adaptation and sustainability (Mileti 1980). The perceptions of individuals, however, are frequently ignored when analyzing natural hazards (Wong *et al*, 2000).

The Problem and its Background: The Flood Regime

Past research indicates that floods in coarse-grained braided rivers are frequent events, closely related to major rainstorms, or snowmelt cycles (Miall 1985). Like other large, coarse-grained braided rivers, the Applegate River in Southwestern Oregon has had a record of frequent large flood events. Thus, in any given year, there is a 5% chance of 33,000-35,000 cubic feet per second flood. Such a flood occurs, on average, every 20 years. From 1927-1997, flood events roughly equal to or greater than the 1997 flood (~30,000 cubic feet per second) occurs on average every 14.4 years (Applegate Watershed Council Report, 1999), generally between December and March.

On December 31, 1997, an unusually heavy mountain snow pack pounded by days of warm, torrential rain caused the Applegate and Rogue Rivers to overflow their banks and devastate Jackson and Josephine counties. This New Year's flood was one of the worst flooding disasters on these two rivers in over two decades. The flood came on the heels of two months of very wet weather that had saturated local soils. The dramatic events unfolded quickly. By January 2, for example, Bear Creek had one-eighth the flow of the day before when officials estimated its flow at 16,100 cubic feet per second. This level broke a record set during the storm of December

14, 1962, when the creek flowed at approximately 14,500 cubic feet per second (Mail Tribune, 1997).

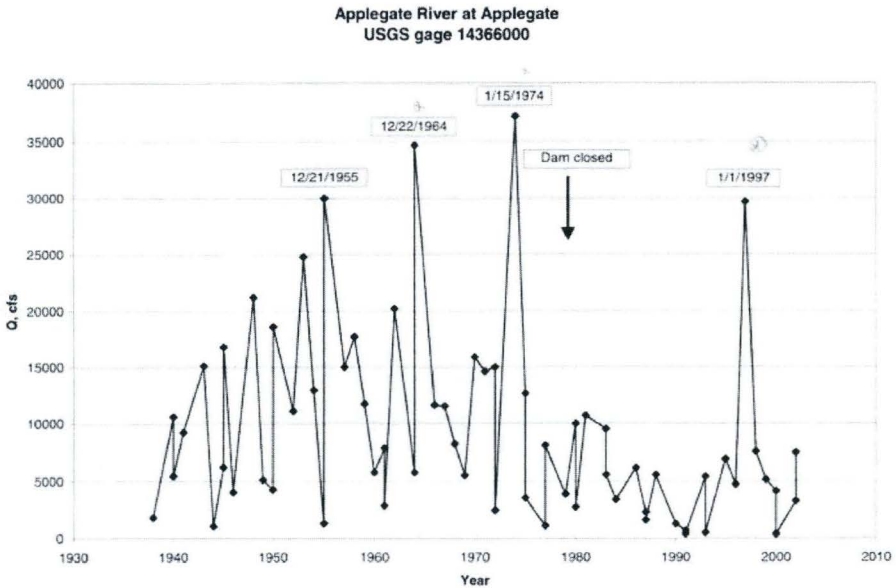


Figure 3: Flood History of the Applegate Valley

Flood Impact Damages and Public Reactions in the Applegate Valley

The 1997 flood is considered notable in the Applegate River Basin's flood history, and the flood significantly impacted the Applegate River Basin (Maiyo, 1999). Before the water receded, it caused tremendous damage to both property and businesses. A local newspaper published in Jackson County (Mail Tribune News, 1997) reported that more than 600 people were evacuated in Jackson County and another 300 in Josephine County that Christmas week of 1996. Both the Rogue and Illinois Valleys were isolated because main roads, including Interstate 5, were temporarily closed by high

water or mudslides. The flood ripped out bridges along the Rogue, Applegate and Illinois Rivers, destroyed homes and stranded countless residents throughout the region. In Jackson County alone, the New Year's Flood caused \$16 million in damages to housing, \$12 million in damages to businesses, \$9 million in damages to agriculture, and \$13 million in damages to local government in costs and losses (Initial County Damage Assessment Report, 1997).

Other damages within the Applegate River Watershed included major adjustments in stream channels, failure of culverts and bridges, and landslides and debris flows that delivered large quantities of sediment and wood to streams (Maiyo, 1999). Floodwaters scoured streams of trees in the channel and floodplain, particularly along Steve and Sturgis Forks, Squaw and Elliott Creeks and Little Applegate River (Maiyo, 1999). (See Fig. 3.) Fortunately, no casualties were reported.

Methods

Landowners' perceptions of and responses to the 1997 flood were elicited by means of non-representative qualitative face-to-face interviews, walks through the owner's land, and document analysis of newspaper accounts. Three landowners were selected from a list of eight possible interviewees with the help of a member from the Applegate Watershed Council. Two of these participants live along the main stem of the Applegate, and the third lives along the little Applegate River. The questions asked had a historical component related to how much the river had changed. Four themes were systematically linked to this broad idea:

1. Implications of Living in Flood Prone Areas
2. Riparian Vegetation Changes

3. Water Quality and Fish habitat issues

4. River Changes

In order to standardize responses given by respondents and to facilitate subsequent data analysis, most questions were closed ended and were recorded using a digital recorder. The investigator also noted all cues that might reveal landowners' preparedness to combat flood losses. Two of the respondents were female and one male.

Prior to the interviews, I made a trip to the valley to attend a meeting with Watershed Council employees as a participant observer, as well as to look for cues, both physical and social, associated with the 1997 floods. During the visit, local Watershed Council officials informed me about the magnitude and impact of the flood and the rehabilitation work carried out afterwards. Other literature and newspaper articles provided information that helped to answer the questions noted above. The literature provided general background information on the social and physical dynamics in the study area as well as the academic framework for the study.

Results

Implications of Living in Flood Prone Areas

The responses to the question about implications of living in flood prone areas were surprising. There are at least three perspectives that might have profound implications for designing flood management strategies in the Applegate Valley which are described below.

1. Lack of Confidence in Large Engineering Structures

All the respondents stated that flood management in the Applegate Valley has historically been dominated by an

engineering approach to flood control. The dominant sentiment by respondents was that flooding is unavoidable. This view is contrary to that of the Army Corps of Engineers, one of the principal agencies in charge of building flood control dikes, dams, and levees to regulate floodwaters. From respondent accounts, some of the structures that were supposed to contain floodwater did not withstand the 1997 flood. The repeated incidence of culvert and bridge collapses weakened some respondents' confidence in some of these engineering structures. For many of these landowners, flood-preventing structures do not prove to be an effective way of reducing flood risk.

The respondents seemed to be prepared to live with floods and called for better understanding and collective action by landowners. For example, one respondent said, "We need to find harmony in living close to nature because eventually rivers flood" (Dorothy, 2005).

2. Rehabilitation and Reconstruction

Disaster rehabilitation and construction work started immediately after the flood receded (Maiyo, 1999). Rehabilitation was targeted at short-term activities to restore vital life support systems to their minimum operating standards. Reconstruction focused on long-term measures to mitigate flood effects and prevent future disasters. Two landowners surveyed had part of their properties damaged, and the Army Corps of Engineer has since put in retention walls and a levee for them.

3. Functional Adjustment Approaches

Undoubtedly, living with floods has become a reality for many people living in flood prone areas in the United States. The respondents in this study conceived flood hazard as a perpetual

phenomenon that caught them in a cycle of disaster- damage- repair -disaster. Experience with flooding seems to have resulted in these landowners becoming accustomed to the impacts of recurring floods. One landowner was born in the Applegate Valley and has experienced many floods, while the other two only experienced the 1997 flood. All the landowners interviewed gradually developed various functional adjustments to combat flood hazards. For example one respondent stated that he now has a flashlight that operates by cranking, and that he now stock canned foods, battery radios, and kerosene pumps.

Riparian Vegetation Changes

The respondents repeatedly told stories of how there used to be fewer trees along the river and how blackberries used to dominate most parts of the river. Since the 1997 flood, however, they have started to see riparian vegetation and plants growing again along the river channel. When asked to explain what they thought was causing this re-growth of trees along the river, all the landowners linked it to the 1997 floods. Respondents associated the re-growth of trees partly to a natural phenomenon and partly to some state and local Watershed Council efforts in stream restoration.

River Changes

Responses to questions about river changes echoed response to the questions about riparian vegetation changes. All the landowners declared that changes in the river channel occurred after the flood of 1997. Two landowners attributed the changes in the river channel to direct and indirect human management activities. For example, one respondent claimed that it was not only natural but essential to a healthy ecosystem for water to transport soil across the landscape

and down the river. Land uses in the watershed, however, exposed more bare earth to erosion that created such an abundance of available sediments during the flood that they were too much for the river to move. She attributed some of the direct and indirect causes to roads built alongside the stream, logging and past removal of trees within the channel and riparian zone, and the presence of road culverts that restricted flow of wood from tributaries into the main channel, thus altering the stream's sediment load. The importance of that insight cannot be over stated. Stream channels are formed, maintained and altered by the water and sediment the carry.

These responses reflect the massive transformation that the Applegate River underwent after the New Year's Eve flood in 1997. Indeed, two landowners recalled how water came down the river and its tributaries, ripping out trees, claiming several acres of adjacent farmland, and re-depositing tons of river rock in ways that changed the course and configuration of the river. Today, as one walks along the river, one notices huge logs lying in the flood plain on gravel beds. These large pieces of wood debris, if left in the river, provide homes for small mammals. Birds, such as the winter wren, and fish such as trout and salmon also use the large wood debris for their offspring can grow in the deep pools beneath the mass of wood.

Water Quality and Fish Habitat issues

Responses to the question about water quality and fish habitat seemed to vary depending on what activities were happening upstream from each landowner's property. The dam up stream, the logging, and gravel mining seemed to be major concerns. Some claimed that logging and mining were the root causes of the

turbidity in the river, while the dam caused temperature variation in the stream. For example, one respondent noted that the “logging industry is only interested in what’s good for the money. The silt washing down into the river from logging makes the river muddy that could possibly kill fish.” Another interviewee referred to septic tanks built closer to the river as a threat to water quality. On the little Applegate, interestingly enough, irrigation was not seen to be a threat to water quality as only small-scale farmers use water along this river.

Discussion

As the Applegate experience illustrates, flood hazard is defined as the interaction between two systems: the physical flood event and human use of the floodplain. Clearly, then, the flood event is not in itself the *flood hazard*. Its potential for hazard is not realized until related to people and their works. Thus, flood hazard potential defined mainly in terms of human casualties, property damages, and social disruption depends not only on characteristics of the flood event, but also on characteristics of human activity on the floodplain.

In the Applegate Valley, human activity in the floodplain included adjustments to the physical and human systems in order to reduce the hazards effect. These adjustments form part of the human activity system that continues to define the flood hazard in this area. After the 1997 flood, landowners claimed that adjustments increased the flood hazard and its effects. For example, landowners claimed that retention walls actually augment the flood impact by holding back floodwater. In contrast to the claims that stop banks or levees in the Applegate seemed to increase the hazard, land use

management decreased it.

Conclusion

This study revealed the collective values of these landowners in the Applegate Valley. Contrary to expectations, landowners were quite skeptical of large flood prevention engineering structures. Although only a handful of people participated as interviewees for this study, their comments were instructive. Further, those comments suggest the potential usefulness of conducting a new study with a larger sample of participants.

The dominant sentiment of respondents was that flooding is unavoidable. It is a natural phenomenon that will always occur on a regular basis, and it is part of the cycle of a river. In other words, rivers will always flood. No matter what protection techniques are used, floods will always cause damage, but extending support networks and applying hazard resistant designs could mitigate flood hazards. Clearly, people seem to have empowered themselves by increasing their ability to live with floods.

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Since General Canby Died: An Autoethnography of an Indian Family

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I do not remember when I knew that I was Indian. I can think back and clearly remember the sick feeling I had in elementary school when it became time to celebrate Thanksgiving. Earlier than that, I must have known the difference between my mother's brown skin, eyes and hair and the whiteness of my father's sisters, brothers and my cousins. I can see in family pictures taken in the 1960s that she had the same slim dresses, the same smoothly coiffed hair, yet she looks different than the Irish-American women and men sitting on the couch in the informal family portraits. It was not until my mother left my father and moved back to Portland that the difference between white and Indian became an important boundary to understand and for me to find a place within. I remember an intense conversation with my mother when I was in fifth grade. She told me about the Modoc War, and I remember that we both cried. The difference between me and my mother and why she was unquestionably authentically Indian, while I was not, was partly a question of blood quantum; because she has enough documented "Indian blood," she is an enrolled member of the Klamath Tribes, while I am not. Still, I was a part of her and a part of our Indian family. Although we were and continue to be racially diverse, being

Indian was prioritized; I believed that it was our shared Indian identity that made us an Indian family.

I loved to read and looked for answers in books. But books were often about Indians in the “olden days.” For example, I read books by Scott O’Dell, who won a Newberry Award for *Sing Down the Moon* describing a Navajo girl kidnapped away from her family in the 1800s. *Julie of the Wolves* by Jean Craighead George was my favorite. This book by a white woman is about a modern Inuit girl who lives with a pack of wolves to escape modernity and the breakdown of her family. It was not easy to find a contemporary story about being Indian that did not idealize Indians before contact with Europeans or suggest that Indians would be happier if they were more “traditional.”

In the early 1970s, my mom was involved with Indian activism in Portland, Oregon. She brought my two sisters and me to Indian basketball tournaments and weekly drumming and dancing at the Bow and Arrow Club at St. Andrews Church. The increasingly high profile of Indian social and political activists helped to create what some researchers have called a “cultural renaissance,”¹ and our single-parent, mixed-race Indian family was a part of it.

On the windowsill of our kitchen there was a bright orange bumper sticker someone had bought at a powwow. On it was a famous picture of my ancestor and the words “Captain Jack Lives.” The bumper sticker was a symbol of pride in our family, our ancestors and our survival, but the picture itself is tragic. It is the picture of a strong man, his long hair cut short, wearing prison stripes. He had been convicted of killing General Canby during the Modoc War of 1872-73 and was about to be executed.

I knew I was descended from a famous man, and his picture

looked at me from the kitchen window, but I did not understand what had happened. I wanted to know how I was Indian, who my family was, and what had happened to us. My mother took us to the library often, and she checked out every book she could find about the Modocs. I read the ethnographies and ethnohistories, but the books ended with the Modoc War, and they did not answer my questions about my family and what it meant to be Indian or Modoc. I learned that Modocs lived in earth houses and not tipis; I learned that Modocs were considered warlike and did not want to live on a reservation with the Klamaths. I learned that, "On Good Friday, April 11, 1873, Captain Jack and Ellen's Man George shot General Canby to death while engaged in a Peace Commission session."² Although they were at war, and many Indians had died at the hands of civilians and soldiers, only the shooting of General Canby was judged to be a murder. The books stated the same historical facts in their own words:

A small number of Lost River Modocs, led by Captain Jack, resisted being moved to the Klamath Reservation and fifty-three Modocs were able to resist one thousand army troops, Indian and white volunteers who acted as scouts. Five Modocs died in battle. 165 of the whites died.³

Eventually the Modocs were betrayed, caught, and four of the men were executed. The others were moved to an Oklahoma reservation and not allowed back into Oregon until 1935. But I did not learn anything to help me understand my urban Indian modern day family.

Instead of telling me about my family or even my own place as an Indian, the tone of the books--with their sad assumption that the

“real” Indians were gone--contributed to my sense of displacement and lack of authenticity as an Indian person. I did not see my family or myself represented in these books; there was a death, and then there was an absence. The story of my family and our survival was missing. I am lucky that my mother is a storyteller and funny. I learned most of what I know about myself as an Indian person and member of my family from her. The descriptions of Indians were often stereotypical and racist. I was looking for insight, and I hoped that I would find it. When I became an Ethnic Studies major, I realized that it was up to me to write the story that I wanted to read, and it was possible for me to do the scholarship that would answer my questions that the ethnohistories and ethnographies I had read could not answer, no matter how expert they claimed to be.

The Politics of Autoethnography & the Purpose of the Project

This is not a memoir or an autobiography because those terms are apolitical. An autoethnography takes an ideological position in opposition to ethnographies and makes visible their political impact. In her book, *Imperial Eyes: Travel Writing and Transculturation*, Mary Louise Pratt describes an ethnography as “a means by which Europeans represent to themselves their (usually subjugated) others.”⁴ Autoethnographies, she writes, are “instances in which colonized subjects undertake to represent themselves in ways that engage with the colonizer’s own terms.” Although an autoethnography is oppositional, it is not telling the truth; it is not the real story; it is a story that is still embedded in ideologies, but for a different political purpose. Jose Estaban Munoz and Stuart Hall take that idea even further:

Autoethnography is not interested in searching

for some lost and essential experience, because it understands the relationship that subjects have with their own pasts as complicated yet necessary fictions. Stuart Hall provides a formulation that addresses this complicated relationship between one's identity and one's past: 'Autoethnography resists essentialism, it isn't the truth, it is disrupting the idea of a truth, of a history that is complete.'⁵

No one can know the whole truth about my family or any other family. Rather, this project is one that seeks to challenge. It is important to have more stories that disrupt the idea that the time of the Modoc people is a "time to remember." The time of the Modocs is now.

Yet experiences similar to my own as a child are repeated today in my son's education and understanding of what it means to be Indian, and Modoc and "part-Indian." My five-year-old son recently went on a field trip to the Natural History Museum at the University of Oregon where different tribes of Oregon are primarily represented through artifacts. The artifacts are interesting, yet it is difficult to discuss what it means to be Modoc today when your son is almost certain he is not really Modoc since what he sees described as "Indian" houses, clothes and tools do not look like our apartment or his grandfather's new potato peeler or the latest Spiderman sandals he wears on his feet. I can and do tell him, "You are Indian, your family is Indian." He says he knows, but there is the contrast between what I say and what is represented to him. The contradictions between rhetoric and reality and the construction of identity within our colonized society are in full swing within the psyche of my five year old son. What my son learns is not just knowledge without racial implications. It is specifically about

Indian people who are represented by twig homes and stone tools and generalized at the same time.

Racialized people are always in dialogue with ethnographic texts that have represented us to others and to ourselves. The ways we have accepted or resisted those texts and their often racist and essentialist ideologies, both as individuals and within our communities, is part of our cultural knowledge. Therefore, it is important to write autoethnographies because they contest the idea of being an expert. I am not telling this story to transmit expertise. I am a scholar, an Indian woman, a mixed-race person, but I am not an expert. When I complete my research, it will not be because there is no more to know, but because I will have written all of the story that I choose to write. I recently read, "History is made by historians."⁶ I do not want to make history; I want to complicate the idea that there can be a complete story or the end of a story. There are so many stories and experiences that are not a part of the discourse of ethnic studies or Native American studies. There are many 20th century experiences that we share with others and that help me to answer questions I have always asked. What is Indian? Who is Indian? Who gets to decide? What is Indian Country and what are the boundaries? Is there something really true and essentially Indian? Can an Indian be part white?

The Ball Family

I have a copy of my family tree that traces my family from Kientpaush's daughter Fanny, who married Joseph Ball, down through my grandfather. We are the Ball Family. That is how I describe myself to people in the Indian community when they want to know what tribe I am, where I am from, whom I know. I can tell

people that I am a Ball, and they will say that they know my cousin, my aunt, my mother or my uncle. My family has lived in Portland since World War Two, when my grandfather and grandmother and their infant daughter moved from Chiloquin, Oregon to Portland. It was a time when many Indian people left rural areas and reservations for cities.

What I can say about my family is incomplete. Historical trauma has affected generations of my family. I know that I am here because my family survived what I call the American Holocaust. My mother survived her abusive and poor childhood. Her father and mother survived boarding schools, racism and the termination of the Klamath Tribes. Their parents survived hard years of Indian boarding schools and abuse that is mostly lost to history except those parts that have been passed down through our family.

When I was growing up, I worried that I was not Indian enough. I thought if I didn't say I was Indian, no one would know. My mother assured me that I did look Indian, and in fact, I looked Modoc. She said that I had "fox eyes," and that everyone in our family has the same shape eyes. My eyes were special and marked me as Modoc and as belonging. I want my son, Leroy, with his brown eyes and blond curls to know that he is indigenous. He is a part of my family, a part of our history and our future, and he is here because we survived. I want my son to know that he is Modoc. He has my eyes.

Urban Indians are Real Indians

In his thesis, *Walk Across the Bridge...an' You'll Find Your People*, Nicolas Rosenthal writes of the movement of Indians to Portland from reservations and their experiences. Rosenthal

connects the travel of Indians at this time to their historic migrations and also writes that the roots they put down during the war years put them into position to take advantage of opportunities in the postwar years. He expresses the idea that urban Indian communities disrupt the reservation identities that have supported our communities culturally, but also limited the diversity of our experiences.⁷

When the American Indian Movement occupied Wounded Knee, my family was politicized and became known in the urban community by working in the different organizations that served our community such as the Urban Indian Council, the first Native American preschool in the country, E-Kosh-Kosh, and the Indian Health Center. My Aunt Evelyn worked for National Indian Child Welfare Association [NICWA] as a fundraiser and grant writer. My mother and father helped the elders in Pi Nee Was with their yearly powwow. I felt lucky to be a Ball because it meant I could not disappear into whiteness. I was proud of my family's participation in the community, even though I was unsure of my own status. As long as I was part of my family, I was Indian.

Red Stars, White Folks and Don't It Make My Brown Eyes Blue

Indian people are racially documented for reasons tied to their place within the United States. To obtain services as an Indian woman, a low-income single parent, and student, I copy my mother's card that states her belonging to the Klamath Tribes. She is number seventy-five. We belong to tribes through sometimes complicated means. Blood quantum is a means that seems simple. It asks and answers the question, "How much Indian blood can you claim?"

In her book, *Blood Politics*, Circe Sturm describes the federal

government's relationship to the identity politics of Indian peoples through blood quantum:

The federal government through the Bureau of Indian Affairs (BIA) continues to use blood quantum as both a metaphor and measure of "Indian" identity to manage tribal enrollments and determine eligibility for social services. Native Americans who wish to receive benefits such as health care, housing, and food commodities must meet a biological standard, usually set at one-quarter or more Indian blood, and must also present a certificate degree of Indian blood (CDIB) authenticated by their tribe and the BIA.⁸

Those standards follow Indian people into cities, into their marriages with people of other ethnicities and provide problems of identity with which people of non-Indian ethnicity do not have to cope.

My mother's tribal card states she is one-quarter Klamath; therefore I am one-eighth. This simplicity, however, is complicated by the fact that one can be documented only in one tribe, although many Indian peoples belong to a variety of Indian tribes. My grandmother, Lillian Dunham, was from Oklahoma and was both Cherokee and Seminole according to family lore. She is listed on a federal document as one-quarter Cherokee. The Seminole gets lost in the necessity of belonging only to one tribe. Some folks who are "more Indian" in one tribe have told me that they are able to enroll in a different tribe. They chose to do so based on the tribal "per capita," the amount of money tribal members receive from agreements with the government based on loss of land and other treaty rights. One woman told me that her sister's three children, with the same parents, are enrolled in three separate tribes.

These experiences raise questions. What does this mean to identity and racial formation? How can people effectively prove Indian authenticity when they do not have the required blood quantum in one tribe? What if one's tribe does not have federal recognition? One is simply out of luck from an official perspective, but there are other means of accepting one's self-proclaimed Indianness among Indian peoples. Craig Womack writes that someone is Indian if other Indians accept that person as Indian. A related, but slightly different perspective is captured by a statement attributed to Sherman Alexie that captures a wry truth: "You are Indian if you have ever wished that you were not." There are many reasons for that sentiment also, but they are difficult to outline, and Indian people wish to keep them private. Beyond the negative stereotypes, wanting not to be Indian is a shared experience of Indian peoples because of the way our history has been presented to us in school, through the media, as well as through laws and in courts. Our stories are often sad stories, and there is not widespread recognition of the trauma our ancestors suffered, and we their descendents continue to suffer individually and collectively.

In contrast to those who identify themselves as Indian, some of my family members found it more comfortable to identify as white, which raises other questions. Circe Sturm talks about the specific community of Cherokees who are the subject of her ethnographic research when she asks, "Who is Cherokee, who is Indian, how do we know, and who gets to decide?"⁹ The question depends on how a person is perceived racially, whether the person can pass for white, what relationships they have to their family as well as their communities. Besides blood ancestry, Sturm describes five other ways that Cherokees are identified, but these can be used for

pan-Indian identification as well: "Phenotype, social behavior, language, religious knowledge and participation, and community residence and participation."¹⁰ These ways can also be limiting. Are Indian people who were raised in mostly white communities white? What about discourse around colonization? What of those whose skin color allowed them to pass? How had racism informed the choice people made? What about essentialism in defining what is Indian? If there is a right way to perform indigeneity then what happens to those who perform it badly? In that case, it is best to have constant possession of one's CDIB card.

Russell Thornton's essay "The Demography of Colonialism and 'Old' and 'New' Native Americans" describes the effects of colonization on Native American populations. He writes that the history of genocide and population recovery "continues to have profound effects upon Native Americans and how they define themselves on both the group and the individual level."¹¹ Although groups intermarried before colonization, after the forced removal of tribes to reservations, many tribes were forced to share the land, and those groups intermarried despite being identified by the government as members of one tribe instead of several different tribes. For example, my mother belongs to the Klamath Tribes, which are the Klamath, Modoc and Yahooskin tribes, but they are all identified under the tribal name of Klamath.

Because of the movement of Indian peoples to urban areas and the resulting intermarriage with non-Indians, many Indians do not have the requisite blood quantum to be enrolled in tribes. The idea persists that real Indians live on reservations, speak tribal languages, and learn authentic Indian ways at the knees of elders. Thornton writes, "Traditional cultural distinctiveness may be

replaced by mere social membership.”¹² Mere social membership, I think, is what Thornton would consider my urban Indian, pan-Indian upbringing in Portland, Oregon, with our drumming and songs, gifts of turquoise, and dancing with shawls decorated with the patterns of tribes far from the ones to which we belonged, or said we belonged, or to which we officially belonged. I like to think that there is room for social membership that is not “mere social membership” but that is critical to the mental and spiritual health of Indians. By building communities where we are not separated by tribal affiliations and reservations, we have an opportunity to be with one another in ways that are less regimented by cultural expectations of one another and may even help one another with our postcolonial identity formation. It is not a black and white or Indian and non-Indian world; our communities are already multiracial and intertribal.

Indian Nations and Complications of Mixed Race Identity

In many ways, Indian Nations came to be created because of whites and the demands of white supremacy. The concept of tribes has been fixed and accepted by many Indian people as if Indians had been living in clearly marked tribal communities for millennia before contact with Europeans. While there are tribal histories and stories as well as linguistic differences between tribes, contact with Europeans necessitated the development of some form of categorizing Indians in order that the Europeans could control and contain the Indians, deal away their land rights with treaties, and reassure the settlers that the Indians would not be a threat to the settlers’ new homes. The formation of sovereign Indian nations is a layered and messy history in many cases and one that leaves

those Indians without federal recognition in the margins of Indian identity. Which comes first, the requisite blood quantum or a federally recognized tribe?

In her book, *Ties That Bind: The Story of an Afro-Cherokee Family in Slavery and Freedom*, Tiya Miles describes the response of Cherokees to colonization as strengthening the borders of their Cherokee Nation, complete with a constitution and laws, a governing body and, like their white counterparts in the larger Nation, slavery. Yet their mimicking of the larger U.S. nation did not protect them from removal, nor from the ravages of the Dawes Act and subsequent allotment that weakened kinship ties and the wealth of tribal members, while it reinscribed and supported racist hierarchies.

Indians embrace the concept of sovereignty because it gives access to power, the ability to protect treaty rights and mechanisms to fight inequities and oppression in a court of law. Sovereignty holds the promise of self-rule. However, these powers are based on the shaky structure of white supremacy, and Indian dependence on white supremacy is mostly unacknowledged. Lakota writer and scholar Elizabeth Cook-Lynn applauds the United States and its right to be a nation because she asserts the same for herself and her tribe.¹³ In the mimicking of the U.S., there is access to mainstream institutions, and that can mean improved living conditions, better health care and so on for tribal members. However, Indian people such as Cook-Lynn hold up the flag of their sovereign nation, but the rhetoric excludes many Indians—Indian people who are not federally recognized, urban Indians without a land base, and Indians without enough documented blood quantum in one tribe to be counted as a member. Cook-Lynn also promotes an ideology

of tribal sovereignty and nationalism that is dependent on the colonizer's laws and terms, while seeming to resist them. Tribal nations under this ideology remain a subset and dependent on the Nation, whiteness, and racial hierarchies. Embracing a broader view of Indian country, one that accepts tribes and tribal affiliations but avoids looking to the colonizer to make the rules by which we define ourselves, may be a healing act for Indian communities, although one which lies far in our future, if at all.

Mixed Bloods are Mixed Up

In Native American discourse, there is the idea of a continuum of Indianness, measured by blood and by connection to a place, such as a reservation. The more "mixed-blood" one has, the more devious, violent, or "white" traits one displays, rather than the "Indian" ones that are culturally marked. Speaking quietly and being modest in dress and habits are two such traits that come to mind. A less constricting trait is the famous Indian sense of humor. There are also the negative traits, such as alcoholism and laziness.

These so-called "Indian" behaviors are reinforced in literature, film, and academic scholarship. In her book, *Indians in the Making*, historian Alexandra Harmon explores the instability of Indian identity for the varieties of Indians living around Puget Sound. She describes the way whites perceived Indians as competent or incompetent based on their blood quantum. In one example, Harmon writes, "Puyallup superintendent H.H. Johnson, pointing to two 'full-bloods' who were wealthy businessmen, declared that lack of 'white blood' did not make an Indian incompetent."¹⁴ In this example, the superintendent must "declare" that at least two full-blood Indian men could escape their biologically determined

destiny. In many ways, popular culture and Indian peoples have internalized and then perpetuated these racist stereotypes. For example, in the film documentary, *Incident at Oglala*, the “traditionals” resist the violence of the corrupt tribal Chairman Dick Wilson and his thugs, the Goon Squad, who are described as “mixed blood.”¹⁵ The issue of blood quantum is politically charged. To be mixed-blood is to be a part of the violence against “traditional” Indians in this film and be complicit in the corruption and violence associated with colonization and oppression.

In one way, it is important to be able to perform Indianness in recognizable ways so that people can establish themselves inside Indian communities. This is true especially in urban areas where tribal affiliations and relationships are not as important as pan-Indian activities such as powwows and informal gatherings. But the cultural markers are limiting and perpetuate the stereotypes belonging to ideas of Indian blood. My son loves to attend powwows and would like to learn to dance traditionally and wear regalia. There is no reason why he should not do so. His cousin has the same blood quantum, and she has an outfit and dances with her mother at powwows. I worry for him, appearing in regalia, his blond curls bouncing as he dances, and I am ashamed that I have any reticence in providing him with this experience. Yet it is not the same as swim lessons, and I have to find my place in our community before I can help him carve out his own place, which is, like it or not, established because of our shared Indian blood and heritage.

Indian people have been constricted by these ideas of blood quantum and Indian performance. My mother is not “full-blood,” and during her youth she told me people often guessed at her

ethnicity. Once at E-Kosh-Kosh, the Indian preschool she helped start in Portland during the seventies, she was asked to speak at the Portland Women's Club. Several women came by the preschool while my mom was working with kids making medallions. My mother and the children were wearing the medallions, and my mom had her hair braided to keep it out of the paste. However, on the day she was scheduled to speak she arrived without braids or any "Indian" jewelry, and her appearance did not impress the women who expressed their disappointment and asked her, "Where are your braids?" The women finally asked my mom if she would at least carry a basket on to the stage. Finally one of the women who had dressed up especially for their Indian speaker gave up her beaded medallion, and they let my mother speak. Although this incident was humiliating, my mother told me the story to describe the racism of white expectations and how "real Indians" are supposed to look and act.

Indian people internalize the racism they experience, and we cannot know when our Indianness is going to be too evident or not evident enough. Perhaps internalized racism is the reason some Indian people may also perpetuate stereotypes even when they seem to be critiquing them. Devon Mihesuah, a Native American scholar, has observed:

Some of the greatest stressors that Indigenous women face have to do with their appearances and with not knowing their tribe's history and culture and, therefore, their identities as Natives. Identity conflicts among Native females are critical and ongoing psychological problems, especially for multi-heritage women.¹⁶

The assumption Mihesuah makes that one's identity as Native directly relates to the knowledge one has of tribe or culture is

limiting. It fails to address the diversity of Indian identities in Indian country or the effects of colonization on tribes and Indian people whose relationships to those tribes are impacted by geography, racism, political issues and legalities such as federal recognition. The assumption that women who are “multi-heritage” or mixed-race are more susceptible to “ongoing psychological problems” makes non-Indian blood a dangerous threat to a person’s health. This assumption continues to perpetuate the idea that Indianness is constructed through blood and essentialized ideas of cultural identity. No one expects whites to stay fixed historically or culturally, but for Indians to develop a diversity of identities or even embrace modernity is a threat to both indigeneity and mental health.

Pushing the Borders of Indian Country

Issues of diaspora, identity, and trauma are tied together in this autoethnography. There is the story of myself, my family, and my tribe, which is Klamath-Modoc, but I am also Cherokee. My grandmother was from Oklahoma, and her grandfather was Pappy Bengé Oceola. She was one-quarter Cherokee. My mother is one quarter Klamath-Modoc. I have a ragged blood quantum, one that does not allow me tribal membership as a Klamath-Modoc woman or offer it to my child. I balance resentment at not being able to register in the tribe with which I have been taught to identify with anger about being taught of the privilege of the blood quantum from a grandfather who abused and then abandoned his wife and children. However, I have considered applying for tribal membership as a Cherokee. One-sixteenth Cherokee is a respectable blood quantum. The Cherokee only require that you prove you are a descendent.

But I have never been to Oklahoma, and I am not familiar with the land.

Indigeneity is tied to the land. And there lies another problem for this urban Indian woman. I was born in Portland, Oregon. I grew up in North Portland and attended Jefferson High School where pictures of my uncles sat in the trophy case under the words, "School of Champions, School of Pride." However, I remember the first time I visited Chiloquin, Oregon. My uncle had been elected tribal chairman, and we were going down to visit his family. I wanted to move there. I felt at home. The air and the hills all seemed familiar and other family members echoed my feelings. In some way, this was home too, although I had never been there before. In *The Cultural Landscape of the Klamath, Modoc and Yahooskin Peoples*,¹⁷ tribal anthropologist John Allison writes of "Urban Maklaks" based in Portland. The book is a reference with interviews with tribal members and pictures of sacred places of which I have no knowledge. It is also an argument for a land base for the Klamath Tribes; they have not had a land base since Termination of the Tribes in 1957. Allison writes, "Most of the Urban Maklaks would prefer to be in their homeland, but the lack of a land base, and the limited economic opportunities make it impossible at this time."¹⁸ I have known only Portland, but I dream of having a reservation, of having a place that I belong to that is managed by the tribe and sacred to us, whether we live there or not, whether our children are born there, or our parents buried there.

I still look to books to help me to understand the ideologies of identity that I have accepted and internalized. As a scholar, I am interested in how "truths" were constructed and how they served and continue to serve Indian people and myself. Even if I do not

find the answers, I think it is possible to do scholarship that will help future scholars and Indian communities sort out the racism, the socially constructed ideologies and perhaps construct ways of identifying as Indian that accepts a diversity of experiences, blood quantum, tribal and non-tribal affiliations. One of the most important issues that needs to be addressed is the trauma that our communities suffer by not having the American Holocaust widely and openly recognized in academia as well as in popular culture. The erasing of Indian experience and trauma perpetuates the trauma and makes it difficult for us in our communities to share healing when we are so concerned as Indians with who gets to be included in that category.

Daily, Indian people are faced with the results of colonization through ethnographic representations as well as ongoing practices of racism. It is difficult to find a balance between acknowledging cultural loss as a result of genocidal practices and colonization and knowing that we are Indian, however that expresses itself in our consciousness. It is a difficult balance, and even in my family, I receive mixed messages. My mother and father reinforce my identity and do not seek to change or question it. I am a queer woman, a single mother, a student and an indigenous person. I feel loved by my immediate family and supported as I am.

My uncles seem to believe that they are more Modoc, more authentic than my mother, her sister, my cousins, and me. Our children are implicated in that contested space. When there is a family gathering there are often tensions or open disagreements about family issues, and it is not always clear who has my uncles' approval and support. It is difficult to accept this dynamic in our family, except it has so often been repeated in my relationships

within Indian country that I almost expect it and believe that much of the tension around identity and the performance of indigeneity in my family is a result of the extreme abuse suffered by my mother and her siblings, as well as their parents and grandparents. My mother has worked hard to heal from the trauma she suffered in her abusive family, and I credit that with her emotional health and ability to nurture and support us.

Although my childhood lacked so-called traditional Klamath-Modoc teachings, I learned what it meant to be Indian in my family, even if that knowledge did not establish an identity that was stable and uncontested. For me being Indian was urban-based and intertribal, a pan-Indian understanding of belonging to a community. I learned a Nez Perce lullaby, Ink Pa Ta, from my Katsah, Violet Allman. I attended ceremonies and powwows that were intertribal. My mother's beautiful star quilts are a Lakota pattern taught to her by one of her oldest friends who is Lakota, and I have since learned is a practice that came out of Indian boarding schools.¹⁹ My family, my aunts and uncles and cousins lived nearby and often one of the aunts or uncles would take all of us out to the park, the movies or swimming. The people with whom my aunts and uncles played softball and basketball on inter-tribal teams became family. We are connected to the land, both in Chiloquin and in Portland.

My sisters and I joke, "You can take the girl out of North Portland, but you can't take North Portland out of the girl." Perhaps it is possible, as Rosenthal claims, to reclaim indigenous land informally. It is more difficult to reclaim areas of authenticity as defined by federal and tribal governments, as well as less formally within Indian communities. Despite issues of authenticity, blood quantum and mixed-race identity, those of us who remain proudly

indigenous live our lives as Indians, as honestly as we can and wherever we are geographically, despite ongoing historical trauma. We who survive and are still here live in Indian Country and know its borders.

Notes

- ¹ Daystar Rosalie Jones, "No Home But the Heart," *Keepers of the Morning Star: An Anthology of Native Women's Theater* Eds. Jaye T. Darby, Stephanie Fitzgerald (Los Angeles: American Indian Studies Center, 2003). 78.
- ² Frances S. Landrum, *Guardhouse, Gallows and Graves: The Trial and Execution of Indian Prisoners of the Modoc Indian War by the U.S. Army 1873* (Klamath Falls: Klamath County Museum, 1988).
- ³ Walter H. Palmberg, *Copper Paladin: A Modoc Tragedy* (Bryn Mawr: Dorrance & Company, Inc., 1982).
- ⁴ Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992).
- ⁵ Jose Esteban Munoz, *Disidentifications: Queers of Color and the Performance of Politics* (Minneapolis: University of Minnesota Press, 1999). 82.
- ⁶ Tiya Miles, *Ties That Bind: The Story of an Afro-Cherokee Family in Slavery and Freedom* (Berkeley: University of California Press, 2005). The quote is from Miles but Hayden White's *Metahistory* outlines the "ideological considerations" involved in "the historian's attempt to explain the historical field and to construct a verbal model of its processes in a narrative." White, Hayden, *Metahistory: The Historical Imagination in Nineteenth-Century Europe* (Baltimore: The Johns Hopkins University Press, 1973). 26.
- ⁷ Rosenthal, 16,17.
- ⁸ Circe Sturm, *Blood Politics: Race, Culture, and Identity in the Cherokee Nation of Oklahoma* (Berkeley: University of California Press, 2002). 2.
- ⁹ Sturm, 203.
- ¹⁰ Sturm, 140.
- ¹¹ Russell Thornton, "The Demography of Colonialism and 'Old' and 'New' Native Americans," *Studying Native America: Problems and Prospects* Ed. Russell Thornton (Madison: University of Wisconsin Press, 1998). 25.
- ¹² Thornton, 31.
- ¹³ Elizabeth Cook-Lynn, *Anti-Indianism in Modern America: A Voice from Tatekaya's Earth* (Urbana: University of Illinois Press, 2001).
- ¹⁴ Harmon, 164.

- ¹⁵ *Incident at Oglala*, Dir. Michael Apted. Lions Gate Home Entertainment 2004, DVD.
- ¹⁶ Devon Abbott Mihesuah, *Indigenous American Women: Decolonization, Empowerment, Activism*, (Lincoln: University of Nebraska Press, 2003) 81.
- ¹⁷ Allison, *The Cultural Landscape of the Klamath, Modoc and Yahooskin Peoples: Spirit, Nature, History* (Chiloquin, The Klamath Tribes, 1994).
- ¹⁸ Allison, 1.
- ¹⁹ Professor Brian Klopotek, History of Native American Education, Lecture, University of Oregon, Winter Term 2005.

False Epistemologies: The Curious Case of *Helicobacter pylori* and Peptic Ulcer Disease

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If a theory is falsified, it is proven false; if it is 'falsified', it may well still be true. If we follow up this sort of 'falsification' by the actual 'elimination' of a theory, we may well end up by eliminating a true, and accepting a false, theory (a possibility which is thoroughly abhorrent to the old-fashioned justificationist).

Imre Lakatos

The Methodology of Scientific Research Programmes

The above quote by Lakatos predates the historical documentation of an incidence in the history of science in which the truth was passed over and the false was upheld. Lakatos predicted the occurrence of a false epistemology: an instance in which controversy raged over two facts, and the “false” fact was accepted by the scientific community while the “true” fact was denied importance. False epistemologies pose a problem for the continuation of the theoretical and technical growth of the sciences. Scientists often accept as unproblematic the facts and theories they use without understanding the history of how those facts and

theories were constructed or having in depth information about the empirical foundations supporting those facts and theories. As Bruno Latour (1987) has pointed out, the history of how and why certain facts and theories are accepted becomes silenced; they become black boxes with inputs and outputs. Black boxes may be used without knowing how or why the system inside of them works or understanding the history that produced them. If this occurs, whatever assumptions were built into the system are built into future research as well.

There is danger in science progressing this way. Scientists who accept without question the facts and theories handed down to them without any knowledge of how problems were solved may then base their research upon erroneous foundations. They may be convinced of a reality that does not exist. Everything built upon such a foundation is also false, and fallacies may be missed for a considerable amount of time.

This paper examines one instance of a false epistemology within the field of medical science pertaining to peptic ulcer disease (PUD) and *Helicobacter pylori*, identified in the latter part of the 20th century as the primary cause of type B gastritis and most forms of stomach and duodenal ulcers. Until that time, the medical community misunderstood the role of *H. Pylori*, even though it was first identified in 1875 in association with ulcers. Instead, physicians attributed ulcers and gastritis to acid-production in the stomach and focused treatments on eliminating acid and other gastric juices. Researchers were hard pressed to explain exactly why the over-secretion of acid occurred, or why some people seemed to be affected by ulcers while others were not. But without an understanding of the role of bacteria in breaking down

the mucus lining of the stomach, researchers' theories focusing on acid-production were the best theories of the disease they could produce.

During the 20th century, thousands of people died every year as a result of internal bleeding, stomach perforations, and cancer associated with PUD. Relapse rates for patients sometimes exceeded 50% of those treated for the disease. Additionally, peptic ulcer disease was one of the most common conditions known. Considering the prevalence and tenacity of PUD, one might have thought that new ideas and treatments for the disease came forth constantly, but the stability of ideas and methods for treating ulcers before the 1990s suggest another story. No cure was forthcoming, and it was not until the 1960's that new drug therapies began to be developed using the acid based etiology of the disease. Sunesson (1993) has argued that controversies in medicine tend to arise when significant pressure is applied to the profession to "do something" about an illness. The antacid therapies in use by physicians for the majority of the 20th century accounted for this 'something' that had to be done, even if it failed to cure patients of their afflictions. The frame of the disease was actually reaffirmed by the failure of the therapies because the standing etiology of the disease implied that reoccurrences would be common.

Today medical students are taught about *H. pylori* and associated bacteria as a standard part of medical training and an accepted part of medical science. Barry Marshall and J. Robin Warren were largely responsible for this shift, but their research alone does not explain how and why a bacterial etiology for PUD was accepted when it was and not much earlier. As Marshall discovered when performing his initial background research, stomach bacteria had been the

focus of research for over one hundred years, and much of that research centered on the potential pathological role of spirochetes in developing ulcers. Despite these past studies, when Marshall and Warren began their research, they thought that they were alone in their beliefs that certain bacteria lived in the stomach and that such bacteria could cause ulcerations and other pathologies. This was confirmed for them as they attempted to publish their findings and found an unsympathetic medical community. Their training, and that of their colleagues, left no room for spirochetes of the stomach.

Doctors' belief that ulcers were the result of the over-production of digestive fluids within the digestive tract was based on how medical science conceived the physiology of the stomach and its role in digestion. Within the stomach, hydrochloric acid and gastrin cooperate to break down foods to prepare them for absorption in the intestines. This same acid would break down the stomach except for its mucus lining. The mucus is an alkaline that, along with other alkalines produced by the pancreas and other organs, counteracts the acid and prevents damage to the internal organs. Since ulcers are perforations in the stomach lining where the mucus layer has been degraded, many concluded that perforations resulted from either overproduction of acid or an underproduction of mucus allowing the protective coating to be worn away.

These beliefs guided doctors in their treatments of peptic ulcers. The easiest way to treat an ulcer given doctors' understanding of the disease was to add alkaline agents to the patient's systems, neutralizing acid in the stomach and preventing it from doing further harm to the stomach wall. Thus, antacids have been used for hundreds of years to treat ulcer patients. A more advanced take on

this same principle are the H2 receptor blockers, such as Tagament ®, on the market today. These medications aim to prevent acid production.

If these methods failed to cure the patient or the patient relapsed a number of times, surgical means of ulcer prevention would have been pursued. This would result in a vagotomy, which would cut the vagus nerves. The vagus nerves provide sensory information to the ear and the tongue and provide motor functions for the esophagus and for parts of the abdomen as well. Their role in digestion is to stimulate both the chemical processes necessary for digestion (i.e. acid production) and to begin the churning action in the stomach that helps break up food. The gurgling sound the stomach makes after someone smells food is the result of the vagus nerves preparing the stomach for the digestion of food. By cutting these nerves, doctors hoped to preclude the production of acid that they believed resulted in ulcers.

In the case of PUD, stress became one of the primary factors thought to cause ulcers. Stress-based models of PUD predate all other theories of the disease. Dr. William Beaumont was the first to show that emotional stress could affect the gastric secretions of the stomach when he noticed such changes in his human subject, Alexis St Martin, whose stomach had been left permanently open after suffering a gunshot wound (Talley 1995). In 1824, Beaumont attempted to prove that these gastric secretions contained hydrochloric acid, and his findings were later confirmed by Heinrich Bidder and Carl Schmidt in 1852. In 1842, Golding Bird began to believe that abnormal secretion of these acids might be responsible for some stomach diseases when he noticed the presence of acid in the vomit of his patients. In 1868, A. Kussmaul began to prescribe

bismuth subnitrate, a known antacid, to sufferers of gastric pain, further perpetuating the stress and acid based frames of PUD. The stress-based paradigm, however, did not go unchallenged. The earliest research into a bacterial etiology of PUD was carried out by the German G. Bottcher and his French collaborator M. Letulle. They were able to demonstrate as early as 1875 that bacteria existed in the margins of ulcers (Bottcher 1875; Kidd and Modlin 1998). Both Botcher and Letulle believed that these bacteria played an essential role in the pathogenesis of ulcers. In 1888, Letulle used the *Staphylococcus pyrogenes* bacteria previously identified by the bacteriologist Alexander Ogston to inject guinea pigs in hopes that they would develop ulcers. His experiment was a success. Unfortunately he was unable to control the experiment sufficiently to show how the bacteria caused ulcerations (Letulle 1888; Kidd and Modlin 1998).

The timing of the work by Bottcher and Letulle could not have been better for the introduction of a bacterial etiology for diseases of the stomach. In 1876, one year after Bottcher's initial publication, Robert Koch demonstrated that bacteria were responsible for anthrax. After the work of Koch and his rival Louis Pasteur, viruses and bacteria were widely accepted for their pathogenic role, and many diseases were combated using immunization. Koch formulated four postulates that would continue to guide bacteriologists late into the 21st century. These postulates stated that 1) all infectious diseases are caused by microorganisms; 2) the microorganism must be obtainable in a pure culture; 3) it must be possible for the microorganism to reproduce in an animal; 4) it must be possible to recover the microorganism from the animal to create a vaccine from it.

Further research into stomach bacteria was carried out by J. W. Jaworski, Professor of Medicine at the Jagiellonian University of Cracow in Poland. In 1889, he published findings of spiral bacteria in gastric sediments that he called *Vibrio rugula*. Jaworski thought that the organisms might play some role in pathologies, but thought that their incidence would be rare. Similarly, in 1892, the Italian Giulio Bizzozzero was able to demonstrate bacteria infecting the gland lumen of dogs. Bizzozzero was the first person to show that bacteria actually lived under the mucus lining of the stomach. In 1906, Krienitz reported that he saw similar spiral shaped organisms in human biopsies in association with cancers of the stomach (Sarner and Babyatsky 1996).

H. Salomon was the first to attempt to show that bacteria could be used to infect animals. In 1896, using bacteria obtained from the gastric mucosa of dogs, Salomon tried to infect dogs, cats, and other animals with the bacteria. He was unsuccessful in every case except that of white mice, in which he was able to use the bacteria to infect the parietal cells. Kasai and Kobayashi (1919) repeated Salomon's experiments with greater success. They were able to infect cats, dogs, rats, and several other animals. Kasai and Kobayashi subsequently demonstrated the presence of ulcers in rabbits that had been infected, becoming perhaps the first to fulfill Koch's postulates. To Kasai and Kobayashi's benefit, their early 1919 publication was thorough enough to include illustrations of the bacteria with which they worked. These illustrations clearly show the spiral shape and flagella of *H. pylori* and show that Kasai and Kobayashi were dealing with the bacteria known today to cause PUD.

Several important advances occurred during the early part of the

twentieth century that affected how the physicians and researchers viewed the physiology and pathology of the stomach. Some of that work indirectly affected how PUD was framed during most of the century. In 1904, I.P. Pavlov received the Nobel Prize for his research on digestive processes and the role of the vagal nerves in regulating secretions of the stomach. Pavlov's research may have helped reinforce the stress-based models of PUD by showing how psychological conditions could affect the production of digestive juices. In his experiments, he was able to show that dogs would begin producing saliva and digestive acids at the ring of a bell when the sound became associated with feeding. Eventually no food was required; the sound of the bell was sufficient to produce the digestive juices that Pavlov was trying to study. While this discovery on his part was unintentional, it was important because it showed that psychological conditions could affect physiology. Specifically it showed that the mental state of the individual could affect the secretion of gastric acids. Since it was thought that ulcers were probably the result of the over-secretion of gastric juices, Pavlov's findings made it feasible to forge a connection between the mental and emotional state of a patient and the resulting physiological condition. In 1907, I. Boas and P. Cohnheim began to argue against the bacterial foundations of PUD. Boas found that the spiral shapes Jaworski had seen were common in most gastric sediments. Further research by Boas and Cohnheim showed how to alter normal cells chemically to make them take similar spiral shapes, meaning that such cells could be normally occurring in the stomach as the result of the digestive process. This was a double blow to bacterial-based etiologies for stomach diseases, as previous evidence supporting the possibility of stomach bacteria was deflated, while further evidence

suggested that the stomach's own acid was responsible for altering some cells. By 1910, K. Schwartz was piping the dictum "no acid no ulcer" that dominated how both researchers and physicians understood and treated ulcers of the stomach and duodenum (Sarnet and Babyatsky 1996; Schwartz 1910).

L. R. Dragstedt's 1917 study showed the limits of this dictum and could have shifted research interests back towards bacteria. Dragstedt was interested in studying how gastric juices affected the rate of healing in ulcers. He chemically induced ulcers in dogs and performed surgical operations on them to give them Pavlov pouches so as to monitor the amount of digestive fluid present in their stomachs. He found two important things. First, to his surprise, he was unable to find a relationship between the amount of digestive fluid secreted and the rate of healing. Second, during histological examinations of the dogs, Dragstedt noted that bacteria had infected the margins of the ulcers, even though the ulcers had been stimulated chemically. The bacteria he saw were the same as those reported in humans, and he concluded that they probably came from the alimentary tract. Had the ulcers not been chemically induced, it is possible that Dragstedt would have attributed greater importance to his finding. The importance of both of his findings, however, went unnoticed by the greater medical community.

In 1938, J.L. Doenges observed the presence of spiral bacteria in the stomachs of Rhesus monkeys and in human autopsies. His findings prompted Freedberg and Barron to study the presence of bacteria in human stomachs. Taking samples of gastric tissue from 35 patients, 19 with stomach cancer, 14 with ulcers of the duodenum, and 2 with stomach ulcers, Freedberg and Barron (1940) examined these for evidence of bacteria living in human gastric mucosa. Altogether

they found spirochetes in 37.1 % of the samples, but noted that they were more common in individuals with ulcers than those without ulcers. In total, 52.3 % of individuals with ulcers showed signs of bacteria, while only 14.2% of individuals without ulcers had the bacteria. They concluded that such organisms were not natural to the stomach, and following their article F.D. Gorham noted in his discussion that further research was necessary to understand the role of bacteria in diseases of the stomach. Specifically Gorham called for investigations of potential bacteria that could live in the acid environment of the stomach (Freedberg and Barron 1940).

Advances toward an etiological role for bacteria in diseases of the stomach, however, did not last. In 1954, E.D. Palmer published a report of gastric biopsies he had gathered using a vacuum tube from one thousand patients. These patients were all in various states of gastric health, including those who had ulcers and carcinomas and those who did not. He took 180 additional biopsies from individuals already in his study. In no case did he find any bacteria present. His conclusion was that previous researchers who had demonstrated bacteria through biopsies and through autopsies had in fact demonstrated commensals of the mouth that had contaminated their materials. Thus, he was able to counter much of the research that had been put forward advancing a bacterial etiology for PUD. Palmer's method of obtaining the samples using a vacuum tube may have led to his inability to demonstrate the presence of bacteria, as the vacuum may not have been strong enough to pick up lit microorganisms from the stomach wall. After his publication, however, the stomach was viewed as sterile, and over-secretion of digestive juices continued to be considered the primary factor leading to PUD.

Between the time Palmer published his findings and J. Robin Warren and Barry Marshall re-discovered the bacteria *Helicobacter pylori*, little research was carried out concerning the presence of bacteria in the stomach. The controversy that had existed, to the extent that there had been one, no longer attracted the attention of researchers. Medical texts taught each new generation of doctors to treat a peptic ulcer as though it were caused by the over-secretion of acid in the stomach. New research into treatments was based upon this framework and eventually produced a series of drugs that were H2 receptor blockers designed to prevent the secretion of acid in the stomach. The first of these drugs, Tagament ®--produced by Smith, Kline, and French--became the most prescribed medicine on the planet.

Researchers around the world independently discovered that bacteria caused PUD. Most notable of these was the discovery of *H. pylori* in The Royal Perth Hospital in Australia by Barry Marshall and J. Robin Warren (see Marshall 1988; 1989; 2002; Warren 2002).

The modern discovery of *H. pylori* began on June 11, 1979, when J. Robin Warren noticed an unusual blue line in the biopsy of a patient suffering from chronic gastritis. After magnifying the line, he saw small bacilli close to the epithelial cells of the stomach. Excited about his finding, he showed the biopsy to one of his colleagues, Dr. Len Matz, who, despite Warren's enthusiasm, could not see the small bacteria. Based upon his observations, Warren thought that the bacteria might actually be causing the damage to the mucus lining of the stomach. He began to look for more of the bacteria, taking more biopsies and using Warthin-Starry silver stains to see the bacteria. To his surprise the bacteria he had seen were quite common in these biopsies. So began Warren's preoccupation

with stomach bacteria.

Warren had the problem of finding clinicians to help him study the bacteria. Most believed that the bacteria were secondary to the inflammation and wondered why the bacteria had not been seen earlier (Warren 2002; 154). Only later did Warren realize that these bacteria had been studied for over 100 years and that their association with chronic gastritis had been noted much earlier (see Bottcher 1875; Kidd and Modlin 1998). In the meantime, Warren needed someone to help him get more biopsies and to perform more studies on the bacteria and their association with chronic gastritis. In 1981, he met a young trainee named Barry Marshall who was in the process of trying to find a small research project to aid him in his internship. At first, according to Warren (2002), Marshall was not convinced by the biopsies or by Warren's hypothesis that bacterial infections were causing gastritis and peptic ulcer disease. Marshall agreed, however, to look into biopsies from 25 patients taken from sections of the stomach that looked normal based upon endoscopic inspection. Simultaneously, Marshall began to culture the bacteria that he found in these biopsies.

The problem that Marshall encountered at this point was the wide range of symptoms experienced by people infected with the bacteria. Though most patients had dyspepsia, other symptoms ranged from ulcers to no symptoms at all. This made it difficult to associate the bacteria with any specific pathology (Marshall 1988). While his findings were inconclusive, they were enough to convince Marshall to continue working on the problem. Marshall and Warren began a 100-patient clinical study to further understand the bacteria.

Initially, no one was sure what the bacteria were or from

where they had come. Warren suspected that the organisms were *Campylobacter* like organisms (CLO), based upon previous studies of these bacteria in relation to intestinal pathology. Warren and Marshall developed three main ideas about the possible origin of the bacteria. The first was that they were commensals of the mouth, as other spirochetes were known to be. Chicken was also thought to be a potential source, as it was known that *Campylobacter jejuni* was passed through chicken and infected the intestines. Finally, they thought that it might be possible for the bacteria to colonize the stomach after patients had ingested antacids, H₂ receptor antagonists, or other medications that might reduce the acidity of the stomach (Marshall 1988).

Marshall began to do background research on the bacteria and on *Campylobacters*. To his amazement, he found historical references that included electron micrographs of CLO on gastric epithelial cells (Marshall 2002; Ito 1967). He was able to reconstruct the trail leading backward in time to Vial and Orrego (1960), E.D. Palmer (1954), Freedberg and Barron (1940), Doenges (1938), Salomon (1896) and Bizzozero (1892). Discovery of the bacteria itself was not much of an accomplishment after all. What was important was the means of associating the bacteria with gastritis so as to prove a pathological role. Earlier researchers had attempted to make that connection, but lacking the techniques available to modern scientific medicine, no one had been able to prove that the bacteria was not a post-mortem contamination.

Culturing the bacteria proved to be more difficult than initially anticipated. Since Marshall and Warren suspected the bacteria was a *Campylobacter*, they used the same methods for culturing new samples. *Campylobacter* cultures were retained for only three days if they did not show growth. Complicating the matter, the cultures

themselves were being cared for by lab technicians who were otherwise working on fecal samples, resulting in the disposal of the samples after only two days (Marshall 2002). Culturing the bacteria under these circumstances was impossible because *Helicobacters* required longer incubation times, and as a result the process was set back six months. Luck fortunately intervened in April 1982. After accidentally leaving a sample for five days over the long Easter holiday, the cultures showed considerable growth. After realizing that longer incubation times were required, Marshall and Warren successfully cultured bacteria from nearly every infected biopsy. They decided to name the bacteria *Campylobacter pyloridis*, a name which was eventually changed to *C. pylori* and finally to *Helicobacter pylori* in 1989 (Romaniuk et al. 1987; Goodwin et al. 1989).

In the 100-patient study, *Helicobacters* were present in all 13 of the patients who had duodenal ulcers. Altogether, 65% of the patients had bacterial infections. The bacteria was present in 26 of the 30 ulcer cases. In the four remaining cases of ulcers without the presences of bacteria, Marshall attributed ulceration to the use of non-steroidal anti-inflammatory drugs (NSAIDs), which were known to cause ulceration in patients who used these drugs excessively. This meant that non-drug induced cases of ulcers occurred only in the presence of *Helicobacters*. Statistically this one-to-one association between *H. pylori* and stomach ulcers provided a strong correlation. After the bacteria had been cultured and a synthesis of the 100-patient study obtained, Marshall and Warren decided to publish their findings. They each sent letters to The Lancet in January 1983, but it was not until June of that year that their findings were published (Warren 1983; Marshall 1983).

The fight was not over for Warren and Marshall, however, as they still needed to fulfill Koch's third and fourth postulates to prove the infectious nature of the bacteria. Fulfilling Koch's postulates required that the bacteria itself be used to infect an animal and have that animal develop the disease associated with the bacterial agent. When Marshall and Warren sent their letters to The Lancet in 1983, they still had not shown that the bacteria could infect people, and that infection could cause gastritis. Instead, they had shown only a strong correlation between the presence of the bacteria and the existence of ulcers. Without being able to directly infect an animal with the bacteria they would be unable to show that the bacteria were not commensals of the mouth that entered ulcers after the ulcers had already occurred. To remedy this, Marshall and his colleague Stuart Goodwin began attempting to infect pigs with the bacteria in 1984. The idea was simply to perform biopsies on the pigs and culture the bacteria from these biopsies. Unfortunately the experiments failed; the pigs did not demonstrate either gastritis or any sign of the bacteria.

Marshall began to treat patients successfully with antibiotics, curing their ulcers and freeing them of stomach bacteria at the same time. He began to refine the antibiotic combinations used to treat the bacteria and was able to define a 14-day treatment plan that worked despite the natural resistances of the bacteria to antibiotics. Eradication of the disease did not seem a problem at this point. Given continued difficulties with infecting pigs, and the fact that the pigs were getting larger and harder to handle, Marshall realized that he needed to show that the bacteria was infectious. He had difficulty publishing his findings in journals because of the lack of researchers studying bacteria of the stomach who could review

his articles and because of the general resistance of the medical community to his ideas (Marshall 2002). Realizing that he needed to act and knowing that he had eradicated the infection in many of his patients, Marshall decided to try and infect himself with the bacteria so as to induce gastritis and fulfill Koch's postulates. On June 12, 1984, Marshall ordered an endoscopy performed on himself to show that his stomach showed no sign of the bacteria. On the same day, he was able to culture the bacteria from a 66-year-old man who had dyspepsia but not an ulcer (Kidd and Modlin 1998). From this a broth of bacteria was made, which Marshall consumed. Seven days later he awoke early in the morning to vomit. He had successfully developed gastritis with hypochlorhydria. He then treated himself with antibiotics and eradicated his condition. He had fulfilled Koch's postulates (Marshall 2002).

By 1985, a bacterial cause for gastritis was documented and research had begun around on the globe on what was then known as *Campylobacter pylori*. Marshall and others were finding it easier to publish partially because of the momentum created by a greater numbers of researchers around the globe who were aware of the bacterial cause of PUD and who could critically review new research. There has since been an explosion of research into *H. pylori* and its role in PUD, with thousands of articles being published between Marshall's and Warren's first letters to The Lancet in 1983 and the year 2000. In 1994, the National Institute of Health released a consensus statement saying that sufficient evidence had been produced regarding *H. pylori* and the ability to cure PUD with eradication therapies that standard treatment of individuals expressing bacteria caused gastritis and associated conditions should include antibiotics in addition to antacids and

H2 receptor blockers.

It is still not clear how or why exactly *H. pylori* was missed as long as it was. There are four main problems that require more research. First, methodological and technological constraints may have prevented early investigators from being able to isolate the bacteria in samples from living patients who expressed signs of PUD. Rebuttals like Palmer's (1954) against earlier research emphasized these problems by suggesting that bacteria were contaminations. Also, it was impossible for investigators like Kasa Kobayashi to show that the ulcers they believed were in association with the bacteria were not pre-existing conditions. Palmer's use of a vacuum tube to biopsy patients may have likewise been inefficient to detect the presence of bacteria in living patients. These constraints were no longer present when Marshall and Warren began investigating *H. pylori* and its association with PUD.

The second problem may have been how research was framed. The presence of bacteria in the stomach was noted multiple times by independent investigators, but often these same individuals failed to make the necessary connection between the bacteria and pathologies of the stomach. In some cases, such as that of Dragstedt, the existence of the bacteria was more of a curiosity than the subject of serious investigations. Had Dragstedt begun looking at the stomach of dogs with a frame of reference that might have applied more importance to the presence of bacteria, then he might have followed his findings in a different way, or interpreted his data in a different light.

Equally important were frames of the stomach and of peptic ulcer disease that contradicted a bacterial etiology. Palmer's empathetic 1954 assertion that the stomach was sterile precluded further research

into stomach bacteria because it essentially framed the histology of the stomach in such a way that it would be ludicrous to search for bacteria there. That microbiologists studying the stomach had noted the presence of bacteria meant little because they themselves were not directly interested in attributing a pathological role to the bacteria, or even in its study. If the researchers discovering bacteria in the stomach did not associate them with a pathological role then there would be no reason to investigate that association. Normal research concerning other pathological factors would have been carried on without reason for reference to published material on bacteria in the stomach. Therefore, although bacteria were found in association with the stomach, the meaning of that finding might not have been elucidated under these circumstances.

Further, the acid-based frame of the disease provided everything that medical science required except a cure, and the particular way that the disease was framed prevented a cure from being necessary. There are many chronic conditions today that continue to be treated in the same light as had PUD before the acceptance of *H. pylori*. Not all maladies are treatable in the same way that bacterial infections are, and unless a specific condition is thought to be related to some form of infectious agent, there is no reason for a medical professional to attempt to combat it in that way.

The third problem requiring closer examination brings us back to the therapies used to treat PUD. Since the frame of peptic ulcers and gastritis did not make it necessary to cure the disease, there was little reason to question the failings of medical science to do so. Better therapies were forthcoming, such as the H₂ receptor blockers, allowing for treatment of patients in new ways. These medicines represented breakthroughs in science because they made

possible and made use of manipulations of the chemical signals in the human body that are responsible for so many of biological functions. They represent a moment where the technical features of science were succeeding, even when the theoretical frame guiding that research was false or misleading.

Essentially, the theoretical understanding possessed by physicians and researchers persuaded them to interpret their empirical findings in such a way that they were self-validating regardless of their actual findings. Whether acid therapy treatments worked mattered little. More important was that the histology of the stomach dictated that certain precautions and measures be taken. Those measures included neutralizing some of the digestive fluids present in the stomach so as to reduce the amount of erosion these would cause to the internal stomach wall. Many patients were aided by these treatments, if only temporarily, and the physician could not be blamed for the stomach's lack of healing afterwards.

Finally, the lack of knowledge possessed by doctors and researchers about the history of PUD also played an important role in the continuation of this false epistemology. Had Warren and his colleagues been aware of prior research on bacteria living in the stomach, they might not have been so surprised when it showed up as a blue line in the biopsy of a patient. An understanding of how the controversy over a bacterial or physiological cause for PUD was resolved might have led other investigators to question their textbooks sooner. Additionally, publishing findings may have been easier as well had the medical community possessed a general awareness of the intricacies of the social history of the disease.

While all of these factors played a role in the social history of PUD, no one is more important than the others. They are interrelated

and played off of each other in dynamic ways. Lack of more advanced methodologies and technologies led to the acceptance of a frame of PUD that was acid based rather than bacteria based. The ability to treat the disease within that frame led to complacency and its continued acceptance. As better technologies and methods developed, the medical facts that had already been derived from previous research were no longer under question and thus failed to receive new attention. The black and white of medical textbooks gave little reason for doctors to delve into the social history of peptic ulcer disease or to question the findings of previous generations. Warren and Marshall do not serve as an exception to this rule because their research occurred only after an anomaly was identified and not as the result of pointed criticism of what they were being taught.

The example of PUD illustrates how interdependent the growth of knowledge can be on the surrounding epistemology and how deeply this epistemology is steeped in its own specific history. Given any other case in the history of science or medicine and a completely different set of factors may have revealed themselves. As an example of a false epistemology, the social history of PUD serves to illustrate how easily perceptions can become self-validating and maintained over long periods.

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Dubious Development Projects and Their Ethnocidal Impacts on the *Akha* People of Northern Thailand

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Abstract

The *Akha* have suffered civil wars in Burma and relocation by the Thai authorities, and they have been subjected to extensive poverty. They are stateless, and the majority of the *Akha* residing in Thailand do not have Thai citizenship, leaving them open to both political and economic persecution. This research documents the human rights abuse of the ethnic hill tribes in Thailand, specifically the *Akha*, and addresses the Thai immigration laws, which adversely affect them. Another important element of this research lies with the *Akha*'s loss of their cultural identity. Christian missionaries, who impose their values and teachings upon the *Akha*, have played a role in the destruction of *Akha* culture. The narratives of the *Akha*, who are considered to be a hill tribe minority by some, or stateless refugees by others, show how they have dealt with the issues of cultural survival and how their traditional practices have been violated or eliminated by authorities.

Introduction

Political conflicts surrounding human rights in Southeast Asia

have intensified since the end of the Cold War and continued on, especially since the time of the recent regional economic crisis in 1997. Conceptions of human rights in general are inevitably controversial, as they reach to the heart of a society's political and cultural identity.¹ This research explores various social and political issues that have arisen for the *Akha* as a result of Thailand's development policies and how they have affected, reduced, or altered the standards of rights presented in the Universal Declaration of Human Rights. It also addresses the thematic elements of genocide and ethnocide, according to the definitions set forth by the U.N. Convention on the Prevention and Punishment of the Crime of Genocide.

Human rights, as they are currently conceptualized, are based on a set of values. These values include respect for human rights in the widest sense such as the promotion of peace, human security; the meeting of human needs such as access to food, water, shelter, health care, and education; freedom from the threat of armed conflict and war; and legitimate systems of government that enable the informed participation of the people.²

Compared to its neighboring countries of Burma and Cambodia, whose governments have committed egregious human rights violations, Thailand is regarded by the international community as being a rather stable, democratic state. In fact, Thailand is considered to be the only democracy standing in the Burma-Indochina region because the government is democratically elected, and power is vested in both the government and the chambers of parliament. Thus, one may not consider Thailand and its government as actors in such atrocious acts of genocide.

According to its Ministry of Foreign Affairs, Thailand

recognizes the universality of human rights and adheres to the principles enshrined in the Universal Declaration of Human Rights.³ Additionally, since Thailand did not sign the 1951 Geneva Convention and Protocol Relating to the Status of Refugees, it does not have to comply with UN regulations regarding refugees or asylum seekers or to let people seek shelter in the country. However, Thailand has served as a refuge for both Indochinese refugees and mountain minorities of neighboring countries, such as Akha, Lahu, Lisu, Hmong, and Mien.⁴

In Thailand, the ethnic minority group called *Akha* is forced to adapt to a changing situation and confront new problems brought on by government development policies. The *Akha*, also known as *E-kaw*, are better known to Thais and Western tourists as being one of the Southeast Asian “hill-tribes.” Due to slight linguistic discrimination, a sense of superiority over the *Akha*, and the negative connotation that comes with the use of the term “tribe,” they will be referred to in this paper as an “ethnic minority” or “highlanders.”

There are at least eight ethnic minority groups living in the mountainous region of Thailand, but the *Akha* is the group that—even after government campaigns to “assimilate” or “integrate” —remains the most traditional or even the most backward. This makes them more susceptible to abuse. The *Akha* is considered to be one of several Southeast Asian indigenous groups who originally migrated from Tibet. Because of civil unrest, they have lived a migratory existence, before eventually settling in the Yunnan province of Southwest China. Today, the *Akha* live scattered among the hills in Burma, northern Thailand, and Laos.

Members of the *Akha* groups can be easily recognized by

their traditional headdress of beads, feathers, and dangling silver ornaments. They often appear in tourist guides or on travel channels to promote tourism by the Thai government and tour companies.⁵

Many of the *Akha* living in Thailand are not given citizenship



Figure 1: Akha woman.

or basic rights comparable to that of ethnic Thais, and the government policies support assimilation, often by force, rather than preserving and protecting their language, culture, and religion.⁶ According to the statistical figures provided by the Tribal Research Institute in 2004, the total number of ethnic highlanders is 562,139, or 1% of the population of Thailand; they are distributed in 20 provinces throughout the north.⁷ Currently,

the total population of the *Akha* is

about 500,000, with a population of less than 70,000 who settled in northern Thailand (see table below).

Table 1: Akha Population in Thailand			
Number of villages	271	Adult males	20,948
Number of households	11,178	Adult females	21,876
Number of families	12,909	Juvenile males	12,756
		Juvenile females	13,073
Total Population			68,653
Source: Tribal Research Institute, Chiang Mai Thailand.			

Other ethnic minority groups such as the Lahu, Lisu, Yao, Karen, and Hmong, have also migrated to this region because of political problems such as wars, economic, or other social pressures in their native lands. Such migrations began in the middle of the nineteenth century as a consequence of wars in Southern China, Burma and later, Vietnam. Given the lack of national identification papers, many mountain peoples become much more like refugees. This posed political, administrative, economic, and social problems for several different Thai governments over the last 50 years. Despite the ongoing problems with citizenship, land ownership and discrimination towards the highlanders, the general Thai public recognizes that they make important contributions to the region's economy, through tourism, cheap labor, and environmental knowledge.⁸

Explained one *Akha* elder in Phah Nom village in Mae Jan District, Chiang Rai Province, "we have no books or written language of our own creation, or social organization above the village level" or even the comfort of geographical unity since the *Akha* live scattered throughout the northern region. A great number have chosen to live closer to modern development and assimilate; yet most of the *Akha* are simply stateless⁹ in the countries they inhabit. Some *Akha* strive to follow the ways of their ancestors and live in harmony with nature. They have managed to succeed, until recently, when migration is no longer an option, and their survival now depends upon the benevolence of strangers, in this case, the Royal Thai Forest Department, the Royal Thai Army, and Border Patrol Police.

At present, the *Akha* are adapting to a changing situation and confronting new problems brought on by government development

policies. The Forest Department is reputed to have displaced the highlanders by moving into their villages and planting trees on the land while the highlanders are still using it. Professor Anan Ganjanapan of Region Center for Social Science and Sustainable Development (RCSD), Chiang Mai University stated that “the central Thai government formally claimed sole ownership of the forest in 1899, thus beginning the era of competition for control and management of forest land between poor villagers, both ethnic Thai and people of the highlands.” Up until the present day, the government viewed highlanders as a threat to national security because of the constant migration and their practice of shifting cultivation, especially to opium before the government’s eradication campaign in the 1950s. Further, the Thai government does not recognize any kind of customary laws granting villagers the rights to lands. Elders or even village headmen do not have authority beyond settling basic disputes among their subordinates.¹⁰

The shaping of development policy and administration of ethnic highlanders is influenced by external as well as internal concerns. On the one side, there has been international pressure to replace opium cultivation with the promotion of other cash crops among the ethnic minority living in the highlands. On the other side, the Thai government is concerned about the integrity of the nation-state and has enforced a strict policy in the highlands, in terms of population movement and control, land tenure, and the management of natural resources. Thus far, it can be concluded that government policies and development activities have had considerable impact on the highlanders’ lives, especially when the government has made little efforts to provide the *Akha* with education or training in their campaign to eradicate opium.¹¹

Sentiment Towards Highlanders

The Thai majority has long regarded the highland minorities as inferior people whose language, economics, socio-cultural customs, and religion are at a more primitive level. Highlanders, therefore, often have no sense of national belonging or national consciousness. Sontaya Manosaen, a border patrol official in Mae Jan district, confirms this attitude by stating that “[members of] hill tribes, in general are seen as separate, cohesive groups living on the edge of Thai society. They have no social values, [are] ignorant of the laws and norms of Thai society, and [are] even ungrateful at times when it comes to all the good things the Thai government has done for them.”¹² Even though the Thai public recognizes the highlanders’ contribution to the region’s economy, awareness of, and interest in highland minority people amongst the Thai population is minimal. Further, it seems that the gap between mountain peoples and Thai lowlanders is widening rather than narrowing.

As a result of this widening gap, incorporation policies formulated in 1967, such as the formal granting of Thai citizenship, have been constantly behind in their implementation. In some provincial districts, the proportion of the highlander population with Thai citizenship is as low as 10 percent.¹³ In 1988, the Thai government introduced “blue cards” intended to register as many highlanders as possible, but registering for and receiving the card did not include the granting of citizenship. In fact, those possessing “blue cards” are forbidden to move from their villages.

Citizenship

In 1992, the government issued a decree indicating that all those who had entered Thailand before February 28, 1986, would be able

to obtain Thai citizenship. As a result of this, another type of card was issued. This time, they were green cards with red borders; these cards do not give a right to obtain an official ID card. The granting of “real” ID cards indicating that holders are Thai citizens stagnated again under the Thaksin administration that took office in 2001. The problem for the many highlanders who have no ID cards (making up an average of 40% or more of 350,000 people who do not have citizenship) is their inability to possess vehicles, conduct business, access social services, or receive primary education. When traveling, these highlanders are often arrested as illegal aliens due to lack of proper Thai national identification cards, even though more than a half of the estimated number have lived in Thailand for several generations.

Akha from Ja Loh and Phah Nom villages are often stopped at check points when going into town. Those who do not possess



Figure 2: Checkpoint at Phah Nom village.

either the Thai national ID card or a highland ID card risk being fined or arrested as illegal aliens. Outside visitors also must show identification

to checkpoint officials, state the

purpose of their visit, and indicate with whom and how long they are staying in the village. This citizenship issue may be seen as a dilemma for the government because Thailand is a very homogenous

country whose populace speaks a national Thai language and shares a common culture. The enactment of the 1965 Nationality Act states that a person born in Thailand is automatically a Thai citizen, but the law covers only children whose parents are Thai nationals.¹⁴ Interpreting this, one should question the peculiarity behind such a law and wonder if a child can be granted Thai citizenship as long as his or her parents are Thai nationals, and the same is expected of the grandparents, great-grandparents, and prior generations. The denial of Thai citizenship prompts a question of whether or not it will ever be possible for any of the highland population who live migratory existences to obtain Thai citizenship.

According to Lt. Colonel Prajak Awai-yawanon, police superintendent of the Mae Fah Luang District in Chiang Rai Province, “having identification cards can also stimulate massive urbanization, which may eventually lead to the rise in crime rate, drug use, and competition for social services including education and health care.”¹⁵ However, those who do not have identification cards still have ways to find work in big cities, though risking arrest and exploitation by the sex industry. And, as poverty drives many girls and young women to go to cities in search of work and brighter future, some end up going voluntarily into prostitution.

The effective statelessness of many women from the highlands makes them particularly vulnerable to joining the large sex industry in Thailand because they are often unable to obtain jobs without an education. There have been numerous cases in which young girls and women are forced into the sex industry. David Feingold, a filmmaker who documented the sex trade in minority women in Thailand, Laos, and Burma, listed a number of problems that have led highland women to leave the countryside and migrate to

the sex trade: drug eradication programs with too little emphasis on alternative crops; population pressures; loss of land to other Thais; and conflict in neighboring Myanmar. But the greatest risk factor is the women's precarious legal status: minority groups have enormous difficulties obtaining Thai citizenship, and therefore, have few economic opportunities. Feingold is convinced that efforts to fight sex trafficking must focus on local issues, not just the universal terms of the United Nations' anti-trafficking protocols and the United States' laws to protect trafficking victims and punish transnational organized crime.¹⁶

Land Rights

Shifting cultivation represents another situation wherein people regularly move from site to site, clearing small tracts of land every few years, because prevailing ecological conditions will not support permanent forms of agriculture. Thin, infertile soil causes yields to decline sharply after a couple of years of cultivation, forcing highland farmers to move to another location, leaving their land to lie fallow before it can be cultivated again. In many parts of Thailand, the expansion of commercial logging and the growth of population have combined to exert excessive pressure on these resources, and, with them, cycles of population movement have become greatly modified.¹⁷

Most highland villagers have no legal rights regarding ownership of land. Several villages have been told over the years by the Thai Ministry of the Interior, Royal Thai Forest department, or military officials dealing with problems of national security that they would have to vacate their residence, regardless of the length of time villagers have occupied the sites. Over the years many

plans of resettlement have been carefully formulated and, in most cases, were very successful in expelling the residents. It seems that arguments for [forced] resettlement, such as national security, problems of deforestation, and watersheds spoiling, are valid only for minority peoples and not for others such as economically poor Thai farmers. At the same time, these government agencies have failed to indicate where the villagers might resettle or have selected to settle them on unproductive soil.

The “War On Drugs” Campaign

The Opium Act of 1959, enacted by member countries of the United Nations Office of Drugs and Crime (UNODC), banned the sale and the use of opium in Thailand, as requested in the United Nations and the United States. It took a very long time, nonetheless, before the ban of opium growing was implemented, as the interest of so many people of all layers of Thai society were involved. Officially, however, the mountain minority peoples were blamed, and it was cited as one reason, besides deforestation, to relocate them. It was also often incorrectly suggested that mountain peoples were growing opium mainly for sale and for their own consumption.

Upon taking office in February 2001, Prime Minister Thaksin Shinawatra declared the “prevention and suppression” of narcotic drugs as one of his top priorities by setting down guidelines for “concerted effort of the nation to overcome drugs. He pledged that the government would strictly enforce drug trafficking laws and remove legal and other barriers to drug treatment and rehabilitation.” The war on drugs campaign was initiated to eradicate the use

of illicit drugs such as *yaa baa*, or methamphetamine, the most popular amphetamine-type stimulant (ATS).¹⁸ *Yaa baa* pills are produced in neighboring Burma for the Thai market by the United Wa State Army (UWSA) and are rivals to both opium and heroin as the most profitable product in the narcotics trafficking business. The mountainous, minority-controlled border regions between Thailand and Burma have played a significant role in the recent emergence of the ATS trade. Long-established trading routes in the Golden Triangle area overlapping Thailand, Laos, and Burma now serve as an important trading hub for goods, including *yaa baa* pills. In Thailand, the use of methamphetamines has increased dramatically during the last four years. The Thai authorities claim that neighboring Myanmar is the source of these drugs but have been seemingly unable to restrict their entry into Thailand.¹⁹

The *Akha* have long been associated with opium, as growers, users, and distributors, who, until recently, dominated a portion of the Golden Triangle. After the suppression of opium poppy cultivation which began in the 1960s, the *Akha* have become both impoverished farmers and in many cases narcotic addicts. The Thai government has taken steps to eradicate opium cultivation and resettled the *Akha* into permanent villages. Most often, the settlement process was made against the will of the people. Some of the users were sent to detoxification centers where there have been accounts of people enduring beatings and forced confessions. The Thai media has misled the public into believing that the highlanders are responsible for drugs trafficking. Subsequently, when the government began fighting the war on drugs, the authorities shifted their focus towards ethnic minorities because of their known history and association with opium production and use. Many Thai and

ethnic minority alike faced arbitrary arrest where they were held without charges or trials and faced extrajudicial killings.

According to a speech by Dr. Surakiart Sathirathai, Minister of Thai Foreign Affairs, “laws were amended to treat drug addicts as patients not criminals. Hundred of thousands of them have turned themselves in for medical treatment.”²⁰ Despite his rhetorical commitment to humane responses to Thailand’s drug problems, Thaksin’s anti-drug campaign quickly evolved into a violent and murderous “war on drugs.” Beginning in February 2003, the Thaksin government instructed police and local officials that persons charged with drug offenses should be considered “security threats” and dealt with in a “ruthless” and “severe” manner.²¹ The results of the initial three-month phase of this campaign was some 2,275 extrajudicial killings, which the government blamed largely on gangs involved in the drug trade; inclusion of drugs suspects on poorly prepared government “blacklists;” intimidation of human rights defenders; violence, arbitrary arrest, and other breaches of due process by Thai police; and coerced or mandatory drug treatment.²²

Prime Minister Thaksin gave a green light to authorities to use violence against drug dealers, users, and any person caught with drugs in his or her possession. A number of human rights watchdogs, international and local non-governmental organizations (INGO/NGO), and several Thai senators criticized the government, saying that excessive violence hurts innocent victims. Deputy Prime Minister Chavalit Youngjaiyud, supporter of the campaign, rebutted by saying that “[I]t was designed to destroy the network of traffickers and peddlers, severing the link between drug producers and their pushers.” He also added that the extrajudicial killings

accounted for less than 0.03 per cent of drug-related deaths, making it worthwhile to continue.²³ Police began raiding villages of different ethnic groups, including those of the *Akha* throughout the Chiang Mai and Chiang Rai provinces. Many *Akha* suspected of drug possession or drug use disappeared suddenly from their village. Some are believed to have been ambushed while traveling between villages, especially at night. A good number of *Akha* from a village in Mae Jan district in Chiang Rai Province were beaten, brutalized and mutilated, without regard to age.²⁴ Beatings and killings of *Akha* also occur in places like detoxification centers and prisons. An *Akha* man in a provincial drug rehabilitation center was beaten by three soldiers who were annoyed at his inability to speak Thai; the man later died in the hospital upon arrival due to internal bleeding.²⁵

Prime Minister Thaksin has been repeatedly criticized over the improper way his government handled the war on drugs campaign. Following the extrajudicial killings in March 2003, the Ministry's Deputy Permanent Secretary Veerasak Futrakul invited United Nations Commission on Human Rights representative to make observations on the situations in the kingdom. However, according to Pradit Charoenthaitawee, a member of Thailand's National Human Rights Commission, the UN would like to dispatch Asma Jahangir as a special rapporteur to Thailand, but the Thai government has not allowed her entry.²⁶ As a response to the UN response to external interventions, PM Thaksin declared that "the UN is not my father. We, as a UN member, must follow international regulations. Do not ask too much."²⁷

Thematic Elements Of The Genocide Convention

Thailand's denial of the *Akha's* rights to citizenship and land already violates some of the basic principles enshrined in the Universal Declaration of Human Rights. The maltreatment towards the *Akha* during the "war on drugs" campaign also fits a definition of genocide included in the U.N. Convention on the Prevention and Punishment of the Crime of Genocide. The Convention clearly identifies elements crucial to the definition of the crime, including the notion of the intent to destroy groups; the types of groups to which the convention extends protection; and the kinds of acts considered genocidal.²⁸

The historical events of systematic annihilation of Armenians by Turks and of Jews by the Nazis during World War I and II provided the impetus for the United Nation's adoption of the Genocide Convention in 1948. According to Article II of the Convention, genocide is defined as "any of the following acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group, as such":

- a) Killing members of the group;
- b) Causing serious bodily or mental harm to members of the group;
- c) Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part;
- d) Imposing measures intended to prevent births within the groups, and
- e) Forcibly transferring children of the group to another group.

In its early formation, the word "genocide" was coined to apply

to situations in which individuals become the objects of destruction not for any reason particular to them, but simply because they are members of an identifiable social or ethnic group. Ethnocide conveys the same idea as genocide, but can be thought of as the destruction of culture which could be brought about by a variety of means including, but not limited to, outright killing of their members.²⁹ Some of the examples of ethnocide are conversion by missionaries and removal of poor children for placement in orphanages. These actions undermine existing culture and many ultimately prevent birth within the remaining groups of the population.

Missionaries' Role In Ethnocide

Christian missionaries in Thailand have played a role in the destruction of *Akha* culture, either through conversion or the removal of *Akha* children and the placement of these children in orphanages. Missionaries bring with them Western lifestyles, entice local people to believe in God via material incentives, and impose their values and teachings upon the *Akha*. At a time when non-Christians around the world are sensitive about the role of Christian missionaries, *Akha* people in northern Thailand get economic relief, along with the teaching of Jesus. In December 2002, President Bush created a center for faith-based initiatives within the United States Agency for International Development (USAID). The Department of Labor has since given \$700,000 to the International Justice Mission (IJM), a faith-based, human rights organization whose mission is to combat human trafficking efforts and abuses in developing countries.³⁰

Missionaries use funds to remove children from villages to educate them in parochial schools, creating tension within

communities, as well as undermining culture. According to Matthew McDaniel, (American activist) “missionaries have succeeded in converting close to 50 percent of the *Akha* villages in Thailand, and they are aggressively going after the rest.”³¹

However, despite the claim that Christian missionaries have contribute to the *Akha*’s loss of cultural identity, some argue that “the hill tribe people can still retain their culture, even after converting, since religion is only one aspect of their lives.” Moreover, since the Thai government have shown little attention to the hill tribe communities and have also ignored them on economic and social matters, without faith-based groups, many might be even worse off. The Christian missionaries care for orphans who lost their parents to AIDS, provide schooling in remote areas, and offer other services such as basic health care. Furthermore, some local Christian organizations even ensure that the *Akha* retain their language and family ties.³² Nevertheless, funds used in international development projects are difficult to monitor; organizations such as the IJM may use the plight of the *Akha* people as a cover to win foreign funding, in the name of economic development.

In addition to recruiting new converts, missionaries in Thailand are also known for their “family planning program.” Paul Lewis, one of the pioneer missionaries to serve in Burma and Thailand in the early 1960s, initiated a family planning program by using sterilization as a form of birth control among the *Akha* in Thailand. This method, according to Lewis, was popular among the *Akha*. The program was sponsored by the McCormick Family Planning Program and the Thai government.³³ However, controversy surrounds this issue because the program has not been attuned to the culture and needs of the *Akha*, and even though Lewis states

throughout his dissertation that the decision is made solely by the women themselves, some resent the decision afterwards when they realize that they can no longer conceive. Matthew McDaniel, who had worked with the *Akha* for the past 15 years, argues that Lewis and his colleagues forcefully sterilized *Akha* women against their will, or that the women were not fully informed about the procedure.³⁴ The important elements of genocide, “intent to destroy,” is not present in this family planning program, but the intent is actually to restrict the size of groups.”³⁵

Development Programs

However, notwithstanding the claims of various types of human rights violations, the Thai government, with the help of various international agencies, has planned the highlanders’ development programs since the 1960s. The quite idealistic objectives of the programs have been to stabilize the residence and secure the livelihood of highland peoples; to discourage and eventually replace opium production; to discourage and stop deforestation; and to encourage highlanders to participate as citizens in the national life of Thailand.³⁶ Further, His Majesty, the King of Thailand has launched “The Royal Projects” whose initiatives are to “bring prosperity to the highlanders.” The majority of the projects focus on agriculture, irrigation, and environment with simple objectives of teaching people the essentials of self-sufficient and environmentally friendly methods of farming.³⁷ Overall, the royal projects have contributed greatly to the alleviation of poverty amongst the *Akha* population; clean water is now available in remote areas, as well as sanitation and access to medical and health care.³⁸ However, critics argue that officials working under the project find even more legitimate

reasons to evict or relocate poor highlanders, using claims that they encroach on national forest land which is being planted with pine to be supplied to logging companies.³⁹

Conclusion

Thailand's constitution gives executive power to a prime minister and his cabinet. Thailand's current Prime Minister Thaksin Shinawatra and his government eased citizenship rules for hill tribes when his administration came to power in 2001, but it is not yet clear how many have benefited from the changes. Thaksin should consider granting full citizenship to members of the hill tribes, without any conditions. The fact that a large percentage of the hill tribe population lack citizenship leaves them ineligible to vote, own land, obtain lawful employment, and makes it harder for them to access education and health care. Up until now, the hill tribes are vulnerable to police corruption and abuse in Thailand.

Currently, Thailand is in the process of drafting a national human rights plan of action as well as a national education plan of action. The Thai government asserts that it "attaches great importance to creating awareness and understanding on the issues of human rights among the people at all levels, both those at risk of being violated and those who are prone to abuse their power." Over the past few decades, Thailand has consistently taken on humanitarian tasks, particularly in providing safe shelters for millions of displaced persons and refugees from neighboring countries. Further, during the 54th United Nations General Assembly in 1999, Thailand co-sponsored 33 draft resolutions in social, cultural and human rights. The items in which they place high interest are the rights of women, children, and the disabled, indigenous peoples which

include hill tribes displaced persons and refugees; national human rights institution; human rights education; right to development; and racism and racial discrimination.⁴⁰ However, despite the mentioned efforts, Thailand still acts as though it is afraid to grant citizenship to ethnic minorities and to regard them as Thai. Part of the reason maintained by the Thai government is that granting citizenship to ethnic minorities en masse will create overwhelming demand for citizenship by other groups, mainly illegal immigrants from Burma and Cambodia.

According to Article 15 of Universal Declaration of Human Rights, everyone has the right to a nationality and no one shall be deprived nor denied this right. In Thailand, citizenship is a right granted at birth to anyone born within the kingdom. It is available to foreigners living in Thailand after a certain number of years. Thus, the *Akha* who have been in the country for generations should not be denied of Thai citizenship.

In Thailand, societal discrimination against the *Akha* and other ethnic minorities is based on the beliefs that they were involved in drug trafficking and environmental degradation. There have been recognitions, particularly from the U.S. State Department, that allegations of mistreatment and abuse towards the highlanders are credible. They have also noted that the Thai government publicly acknowledged that the mistreatment occurred and has promised to punish those found responsible for such abuse.⁴¹ As listed in the Convention, Article IX allows for disputes between parties to be adjudicated by the International Court of Justice because accusations of genocide are made by one state against another; this process, however, has never occurred.

For the *Akha* in Thailand, there are not any existing legal

strategies that they can rely upon to ensure that they can truly benefit since there is no body of international law to clarify the parameters of the Convention. The various types of violations against the *Akha* will continue to occur simply because they are members of a visible minority group. Even after having lived their migratory existence in Southwest China and Burma before migrating to and remaining in Thailand for many decades, most *Akha* remain unlawful residents of Thailand. The lack of citizenship prevents them from legally owning land, participating in political process, and makes *Akha* vulnerable victims of labor exploitation and sex trafficking. Not having proper identification in Thailand may cause *Akha* and other ethnic minority to be fined or even deported. It also forces them to face systematic abuse from the Royal Thai Forest department, which has sole ownership of national forest land on which many *Akha* live. They are denied their migrating lifestyle, have to live in designated villages and are forced to relocate. The police target them as illegal aliens who do not belong to the country and often are subject to searches and arbitrary arrests, often citing lack of proper identification papers. Furthermore, Christian missionaries also play a role in the ethnocide of *Akha* culture by imposing western values on them and using material enticements in order to convert them. The *Akha's* long association with opium has negative impact from government policies, especially in the recent "war on drugs" by the Thaksin administration, which has been widely criticized for human rights violations.

There are some positive developments, however. His Majesty the King of Thailand initiated the "Royal Projects," which have increased the living standards of highlanders in general, including the *Akha*. The Thaksin administration eased some of the regulations which

deny citizenship to the *Akha*, and currently the Thai government is already in the process of drafting a human rights plan of action and a national plan of action on human rights education. The important questions, however remain: will these new developments will be instrumental in stopping the ethnocide of the *Akha* culture? Or, will they save this culture that is so prevalent in tourist promotion of Northern Thailand?

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Myotonic Dystrophy: The Structure of Cug Repeats in Solution

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Abstract

Myotonic dystrophy (DM), a genetic and neuromuscular disorder, is the most common form of adult-onset muscular dystrophy and results in symptoms such as proximal muscle weakness, myotonia, iridescent cataracts and cardiac arrhythmia. Myotonic dystrophy type 1 (DM1), the most prevalent type of DM, is caused by a (CTG)_n expansion in the 3' untranslated region of the dystrophin myotonin protein kinase gene. At the RNA level, the CUG repeats form a stem-loop that is thought to be the pathogenic element. We determined that the crystal structure of CUG repeats and found that the repeats form a structure similar to standard double-stranded A-form nucleic acid. Since crystal structures may be misleading, however, we will verify A-form conformation using a solution-based assay. A-form double-stranded RNA (dsRNA) is known to be cleaved into small RNA molecules in cells. Therefore, we predict that the cellular machinery recognizing and cleaving these dsRNA should degrade expanded CUG repeats. To test this hypothesis, we will monitor the cleavage of CUG repeats in solution using an enzyme that recognizes and cleaves A-form dsRNA.

Introduction

Myotonic dystrophy (DM), the most common form of adult-onset muscular dystrophy, is a neuromuscular disease that affects approximately 1 in every 8,000 individuals and is characterized by a defective gene passed from one generation to the next (Mooers). The disease is progressive so that the characteristic symptoms of muscle wasting and weakness develop gradually over the lifetime of an affected individual. In addition to general muscle weakness, people with DM also have myotonia, the delayed relaxation of voluntary muscles after contractions. While this is a mild problem in early onset patients, affected individuals eventually lose the ability to release the hand from a grip due to the myotonia (Kurihara). Besides the muscles in the hands, the first muscles to be affected are usually those of the face, neck, forearms and feet. In addition to targeting muscles, DM affects the nerves that control muscles and the interactions between muscles and nerves. The clinical symptoms vary in severity from person to person but typically include the following: myotonia, cardiac disease, cataracts, mental disorders (including mental retardation), testicular atrophy, respiratory impairment, adverse reactions to anesthesia, difficulty in swallowing (dysphagia) and other gastrointestinal tract involvement, excessive output of insulin, abnormal carbohydrate metabolism, and excessive sleeping (Ranum). DM is thus appropriately termed a multisystematic disease since it can affect the tissues and organs of many body systems in addition to the voluntary muscle system.

The symptoms of DM are so diverse that they must be examined carefully in order to provide a proper diagnosis. While fifty percent of those with the disease show visible signs by approximately twenty years of age, many do not develop distinct symptoms until

after age fifty. As a rule, the severity of the disease increases with successive generations while the age of onset decreases. In the most severe case, an infant can inherit a rare condition of congenital DM (maternally transmitted) leading to profound bodily weakness as well as difficulty in sucking, swallowing and breathing. Although myotonia is not a feature of the congenital DM, motor development is usually delayed and some children may even show some signs of mental retardation (Ranum). Since DM is progressive in children and adults, most symptoms usually do not lead to disability until fifteen to twenty years after the onset of symptoms. At an early stage of the disease process, most affected people demonstrate weakness and wasting of the facial, jaw and neck muscles as well as frontal balding in men. A simple physical examination can be performed to detect myotonia, and special laboratory tests (i.e. muscle biopsy) can be conducted to confirm the diagnosis. Because DM is a heredity disease, an examination of DM history in the family can also serve as a good indicator that a person has the disease. DM runs in families because it is transmitted from generation to generation by individuals who have inherited the defective gene. Because the defective gene is autosomal (non-sex linked) dominant, it only takes one DM gene from either the father or mother to produce the disease in an offspring (Voet). In other words, if one parent has the disease, there is a 50% probability that a child will inherit it.

There are two types of myotonic dystrophy: type 1 (DM1) and type 2 (DM2). Both types are caused by a repeating unit within the non-coding region of a gene on a chromosome, a large molecular structure that packages genetic information in the form of DNA in the cell. To picture the location of the disease in the body of an affected person, you can image yourself in a library. The library

represents 23 chromosomes of genetic material and contains shelves that represent individual chromosomes. When you pick one of the books on a shelf, you look at a particular gene on a single chromosome. The pages in the chosen book, in turn, represent DNA sequences (or the genetic alphabet). If there are multiple copies of the same page, a repeating unit exists. Because multiple copies of the page are unnecessary, they do not fit in the context of the book, the shelf and the library. This repeating unit illustrates the problem faced in DM1: a CTG repeat expansion in 3' untranslated (non-coding) region of the dystrophin myotonin protein kinase (DMPK) gene on chromosome 19.

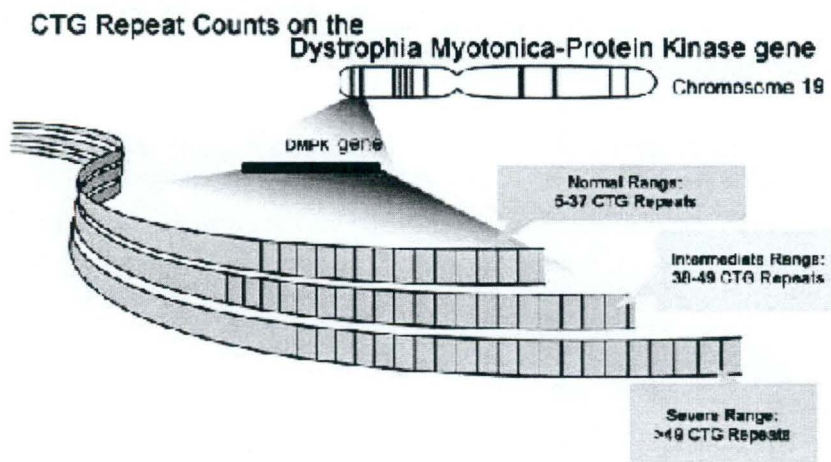


Figure 1: CTG Repeat Counts on the DMPK Gene

The number of repeats is directly proportional to the severity of the disease. Therefore, increasing the number of CTG repeats in the non-coding region of the DMPK gene on the long arm of chromosome 19 in DM1 amplifies the severity of the disease. In terms of myotonic

dystrophy, there is a significantly greater number of repeats in the congenital (the most severe) form than the adult form of DM1. Normal individuals typically have between 5 and 37 CTG repeats, whereas individuals with DM have more than 50 or sometimes even thousands of CTG repeats (Ranum). Since the number of repeats increases from generation to generation, the disease theoretically worsens as it is transmitted in the family lineage.

Myotonic dystrophy is one of many repeat expansion disorders. Aside from DM1 and DM2, repeat expansion disorders include Huntington's disease (CAG repeat), Fragile X syndrome (GCC repeat), Friedreich's ataxia (GAA repeat) and Spinocerebellar ataxia (CAG repeat).

The number of CTG repeats leads to DM but is not the direct cause of the disease. The CTG repeats, which occur in DNA, are converted to RNA forming CUG repeats. The CUG repeats are what become the pathogenic element in DM.

To fully understand the conversion of CTG repeats to CUG repeats in DM1, we refer to nucleic acids, the molecules that enable living organisms to reproduce their complex components from one generation to the next (Campbell). There are two types of nucleic acids: deoxyribonucleic acid (DNA) and ribonucleic acid (RNA), both of which are composed of three components: a nitrogenous base, a pentose and a phosphate group. The two forms of nitrogenous bases are pyrimidines (six-membered ring of carbon and nitrogen atoms) and purines (six-membered ring fused to a five-membered ring). The pyrimidines include cytosine (C), thymine (T) and uracil (U). The purines include adenine (A) and guanine (G). Following Watson-Crick geometry, only a pyrimidine can pair with a purine through molecular interactions called hydrogen bonding.

However, there are only two possible pairings since one forms three hydrogen bonds and another forms two hydrogen bonds. In DNA, cytosine pairs with guanine and thymine pairs with adenine. In RNA, thymine is replaced with uracil. DNA and RNA then form helical structures that involve stacking base pairs that twist in several different conformations.

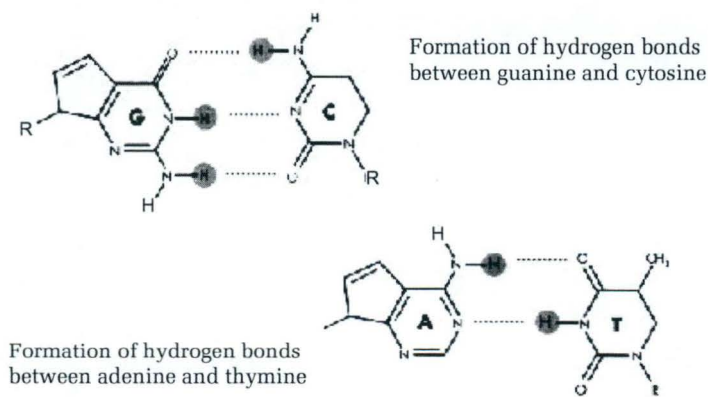


Figure 2: Watson-Crick Base-Pairing

When two strands come together to make double-stranded nucleic acid, they can take many different structural forms. B-form DNA is the biologically predominant form of DNA, but DNA can also be A-form or Z-form, depending on a number of factors that include the quantity and orientation of base pairs per helical turn. RNA, on the other hand, is usually single-stranded, but will typically adopt the A-form conformation when double-stranded. In the case of DM, the CUG repeats fold back on themselves forming a long, double-stranded stem-loop structure held together by hydrogen bonds. While Cs pair with Gs, there is an unfavorable pairing between two Us at the RNA level. This odd pairing is called U-U mismatches. The U-U mismatches are tolerated as the energy

living cells in the human body.

DNA → RNA → Protein

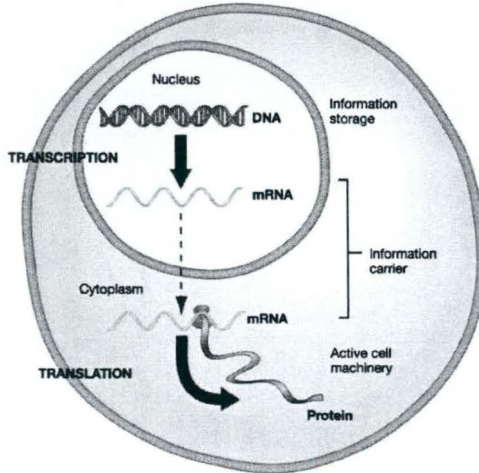


Figure 4: The Central Dogma

DNA is copied into translatable RNA by transcription and RNA processing. To initiate transcription, and thus regulate gene expression, a stimulus from the external or internal environment signals the local unpacking of DNA in the chromosome of the nucleus. Transcription produces unmodified RNA in the form of pre-mRNA with the assistance of proteins such as RNA polymerase, transcription factors and control elements including enhancers, activators and repressors. Pre-mRNA contains exons (coding regions) and introns (noncoding regions) that determine which regions code for proteins. To remove the noncoding regions, a splicing complex assembly called the spliceosome excises the introns and joins adjacent exons to form mRNA, which is then translated by the ribosomes in protein synthesis.

In DM1, however, improper splicing occurs resulting in incorrect proteins. At the RNA level, the CUG repeats form an extended stem-loop structure that sequesters a group of proteins collectively known as muscleblind (MBNL) proteins (Dansithong). This sequestration of MBNL causes the improper splicing to occur. The MBNL-sequestering CUG stem-loop structure thus leads to inappropriate gene expression programs that result in disease.

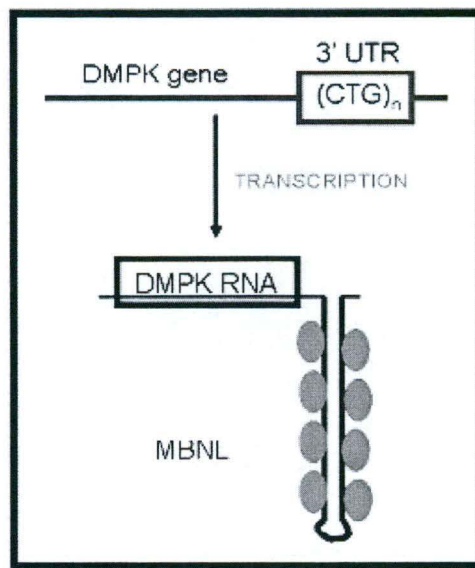


Figure 5: CUG Repeat Stem-Loop Structure with Sequestered MBNL

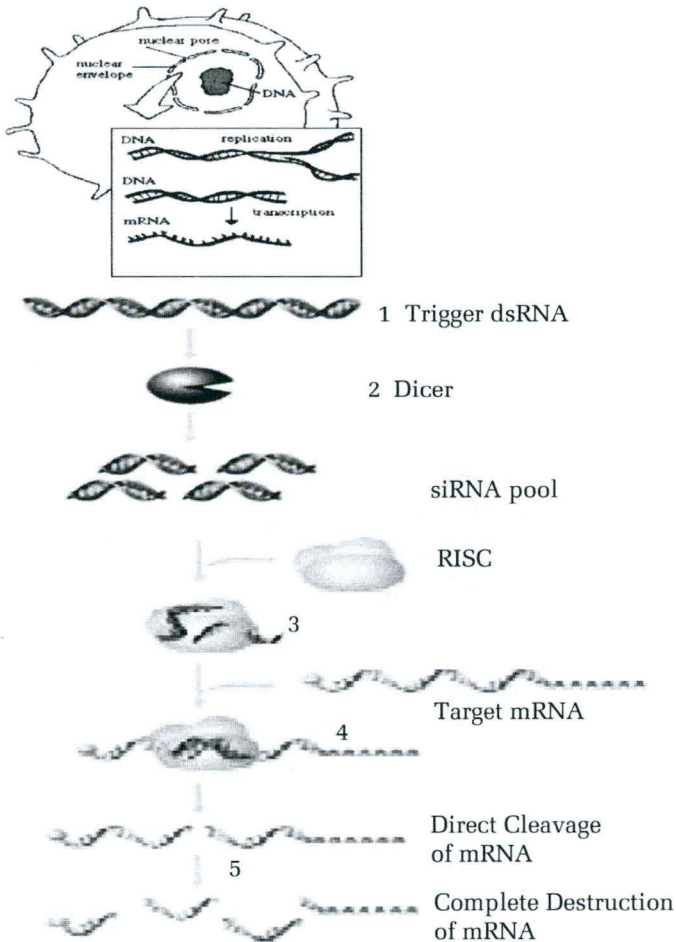
The DMPK protein cannot be made from the repeat-containing mRNA because a so-called toxic stem-loop structure forms and inhibits translation (Mooers). As a result, this turns off gene expression. To study this gene regulating mechanism, scientists have recently studied how specific double-stranded

RNA molecules silence certain genes using a phenomenon known as RNA interference (RNAi). In RNAi a cleaving enzyme, appropriately called Dicer, cuts double-stranded RNA molecules into short fragments (Vermeulen). While one strand degrades, the other strand (miRNA) associates with a large protein complex. This miRNA-protein complex then binds to mRNA molecules that have the complementary sequence and degrades them or blocks translation (Hutvágner). Since protein sequestration and RNAi both prevent the process of proper translation, understanding how Dicer cleaves double-stranded RNA becomes important in learning more about the structure of expanded CUG repeats in solution.

Dicer plays an important role in preventing protein synthesis, and recent research has shown that Dicer cleaves A-form RNA. Since expanded CUG repeats in *crystal* are similar to A-form and have been cut successfully by Dicer, cleaving expanded CUG repeats in *solution* by the same enzyme should confirm that the structure of DM is A-form in solution as well. Studying the effect of Dicer on double-stranded RNA is important in finding a possible treatment for DM. If we confirm the CUG repeats are A-form, then we can target this structure with small molecules that could function as a drug. This would eliminate protein sequestration that causes improper splicing in DM.

DM is a mysterious health problem because there are still many unanswered questions about the molecular basis or mechanism of the disease. Currently, no specific treatments have been found for the muscle weakness and wasting in DM. To help affected DM individuals, physicians prescribe ankle and leg braces that help support muscles as weakness progresses and medications that can

Figure 6: Dicer Activity



relieve myotonia. Some people choose to test for the defective gene in DM by obtaining a genetic examination that searches for the expanded CUG repeats. While this procedure is helpful in diagnosing the disease, it remains a highly controversial medical issue. In some cases, children (and not the parents) are interested in

knowing if they have the defective gene that causes DM. Whether this potentially life-changing decision is up to the children or the parents remains an ethical concern.

Overview of Methods

Myotonic dystrophy type 1 (DM1) is caused by expanded CUG repeats that form a stem-loop thought to be the pathogenic element at the RNA level. The crystal structure of CUG repeats has been found to form a structure similar to standard double-stranded A-form RNA. Dicer is a specific cleaving enzyme that cuts double-stranded A-form RNA. Since Dicer cuts CUG repeats in crystal, we predict that it should also degrade expanded CUG repeats in solution. To test this hypothesis, we will monitor the cleavage of CUG repeats in solution.

We begin with two circular DNA molecules called plasmids: one containing expanded CTG repeats and the other not containing CTG repeats. The plasmid containing CTG repeats is cut out, and using gluing enzyme ligase, is inserted into the one without CTG repeats. This procedure is done by a process known as molecular cloning, a technique that extracts a gene or piece of DNA from one organism and inserts it into a second organism. This cloning method allows genes to be used and studied.

We have a CTG-containing plasmid. We also have a CAG-containing plasmid in the laboratory. Using a restriction enzyme called BAM HI, we cut both plasmids to form two linearized double-stranded DNA molecules: one molecule contains expanded CTG repeats and the other contains CAG repeats. The two linearized DNA molecules are transcribed into RNA transcripts using RNA polymerase, a RNA-synthesizing enzyme. The RNA transcripts

contain expanded single-stranded CAG and CUG repeats, respectively. These RNA transcripts are annealed, forming a stem-loop or double-stranded structure.

Then we perform a Dicer assay by adding Dicer enzyme to (1) a stem-loop with CAG repeats, (2) a stem-loop with CUG repeats, and (3) a double-stranded structure with CAG and CUG repeats. Sets (1) and (3) are our controls. Set (1) is our negative control, and we expect to see no Dicer cleavage because expanded CAG repeats are not A-form. Set (3) is our positive control, and we expect to see Dicer cleavage because expanded CAG/CUG repeats are A-form. Set (2) is our test experiment, and we hope to see Dicer cleavage. This would confirm our hypothesis that the expanded CUG repeats of DM are A-form in solution.

Materials and Methods

3.1 Molecular Cloning

The (CTG)₅₄ repeat expansion is excised from a plasmid called PSP72 using BAM HI, a restriction enzyme. Using ligase, this DNA insert is put in an empty vector (host plasmid) called pcDNA3. The (CTG)₅₄-containing plasmid is grown overnight in *E. coli* cells to produce multiple copies of the defective gene-containing plasmid. Once grown to capacity, these plasmids are purified for enzymatic digestion. A (CAG)₅₄-containing plasmid is cloned in the same manner.

3.2 Enzymatic Digestion

Five micrograms of (CTG)₅₄- and (CAG)₅₄-containing plasmids are individually digested using BAM HI. Buffering solution and deionized water are added to complete the digestion. This reaction

is incubated for 1 hour at 37°C. The linearized DNA is purified and extracted using a phenol/chloroform/isoamyl alcohol solution. The DNA concentration is determined using an ultraviolet (UV) spectrometer.

3.3 Transcription

One microgram of both (CTG)₅₄- and (CAG)₅₄-containing plasmids are individually transcribed using T7 RNA polymerase. Dithiothreitol (DTT), NTP Mix, radiolabeled CTP, Tris (pH 9), yeast pyrophosphate, RNAsin and deionized water are added to complete transcription. This reaction is incubated overnight at room temperature. The mixture is loaded with loading dye into a denaturing polyacrylamide gel to purify the CUG repeats from abortive transcription products. This procedure runs for approximately 2 hours at 300 volts. The radioactive RNA bands are visualized using a Storm 860 phosphorimager and IMAGEQUANT 1.2 software. The RNA transcripts are excised and eluted from the gel in sodium acetate (pH 5) overnight at -4°C. The RNA transcripts are then purified by being precipitated in cold ethanol, spun, air-dried and washed.

3.4 Annealing

The transcripts are single-stranded (CAG)₅₄- and (CUG)₅₄-containing RNA. To form double-stranded RNA, two desired RNA strands are annealed using an annealing buffer solution and deionized water. The reaction is then heated for 5 minutes at 95°C. To form the stem-loop structures for each of the repeat expansions, the reaction mixture is cooled for 20 minutes in ice. To form double-stranded RNA containing both complementary strands, the reaction

mixture is cooled for 20 minutes at room temperature.

3.5 Dicer Assay

Three double-stranded RNA (dsRNAs) are prepared: ds(CAG)_{54} , ds(CUG)_{54} and ds(CAG/CUG)_{54} . The dsRNAs are digested using recombinant Dicer enzyme. Buffering solution and deionized water are added to complete digestion. This reaction is incubated for 18-20 hours at 37°C. Once completed, the Dicer-cleaved dsRNAs are stored at -20°C.

3.6 Visualization

The Dicer-cleaved dsRNAs are loaded with loading dye into a denaturing gel. This procedure runs for approximately 2 hours at 300 volts. The radioactive dsRNA bands are visualized using a Storm 860 phosphorimager and IMAGEQUANT 1.2 software.

Results

Figure 7 shows various RNA molecules running on a denaturing gel. A denaturing gel is a device used to separate molecules based on molecular size. The ladder is loaded to provide a standardized “ruler stick” that measures the distance molecules travel on the gel. In this case, single-stranded CUG repeats (ssRNA) and double-stranded CUG repeats (RNA stem-loop) migrate through the gel more quickly due to their relatively small molecular size. However, double-stranded CAG/CUG repeats (dsRNA) do not flow through the gel as quickly since they have a relatively large molecular size. Based on the distances that the RNA migrated through the gel relative to their molecular size, this annealing gel demonstrates a somewhat successful annealing of ssRNA to form dsRNA and

RNA stem-loop. However, the results are not reliable because there is a lot of smearing that could have altered the outcome. Further experimentation is needed before conclusions can be made.

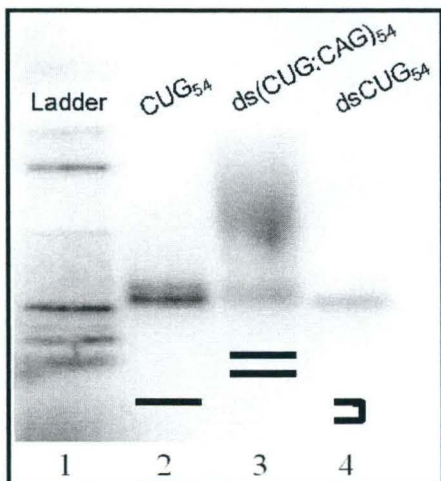


Figure 7: Annealing Assay

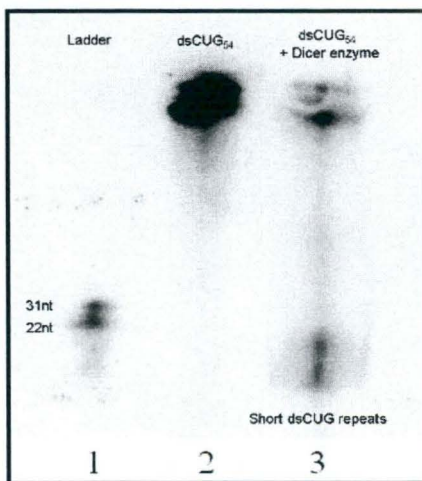


Figure 8: Dicer Assay

Figure 8 shows various RNA molecules running on a denaturing gel. The ladder is loaded to provide two points close to the size of the cleaved product. In this case, long double-stranded CUG repeats (long dsRNA) are visualized in the absence and presence of the Dicer enzyme. Dicer, an enzyme that specifically cleaves double-stranded molecules into fragments that are approximately 22 nucleotides (22 nt), cuts long double-stranded CUG repeats into short double-stranded CUG repeats (like miRNA in RNAi). This Dicer assay demonstrates a successful cleavage of long dsRNA to short dsRNA. The result needs to be reproduced, and the rate of RNA cleavage needs to be determined by varying the length of time the reaction is allowed to proceed.

Discussion and Future Direction

Since the summer of 2005, when work on this project begun, I have managed to demonstrate with some success that the expanded CUG repeats of DM are A-form in solution because they are cleaved by the A-form specific Dicer enzyme. This result confirms the previous study that showed expanded CUG repeats in DM are A-form in crystal. Continued research will strive to produce clearer and more conclusive images of the annealing and Dicer assays. To accomplish that goal, I will need to optimize the molecular cloning, transcription, annealing and cleaving procedures in this experiment. If successful with the Dicer assays, I will move onto circular dichroism, a laboratory method that I anticipate will support the hypothesis that the structure of CUG repeats are A-form in solution as they are in crystal.

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Immigration Phenomenon in the Emerald City

by Edwin Vega

History/Spanish

Faculty Mentor: Lynn Stephen, Anthropology

No matter how high the United States government builds fences, immigration will continue. Early immigrants to the United States came from Western Europe. They came as cultural groups, changing the atmosphere of the place they made their home. During the period of industrialization at the turn of the 20th century, immigration patterns changed. Newer immigrants came from Eastern and Southern Europe trying to escape economic oppression and hoping to work in the U.S. with the long range objective of returning to their respective countries. The majority of those immigrants, however, stayed and made new lives in the United States. During World War II, the United States responded to a shortage of farm workers by creating the Bracero Program. It called for Mexican farm workers to labor in the fields of mainly western coastal states with the understanding that they would return to Mexico after the program was discontinued. Just as earlier European immigrants stayed, so did former Braceros in the middle of the 20th century. Later, primarily in the 1970s, more Mexicans crossed the border, generally for economic reasons. Other immigrants from Central America countries such as El Salvador and Guatemala also made their way to the U.S. because of wars in their own countries. The various historical phases of U.S. immigration raise questions

about continuing changes in immigration patterns and whether the United States is now witnessing a new phase of immigration.

The Study

Studies of immigration¹ in the U.S. have produced many theories and ambiguous conclusions. Most researchers have focused on adult immigrants and immigrants who have lived in the U.S. for many years. There has been minimal research on young people immigrating to the U.S. Of the existing studies about immigrant youth, the concentration has primarily been on their education and involvement in gangs.² For example, education specialist Angela Valenzuela³ and sociologist Robert C. Smith both focus on the experiences of immigrant youth in schools, not their lives in border society. Indeed, there have been very few ethnographic studies of undocumented Latino youth that emphasize their personal experiences in immigration, their life challenges, their strategies for becoming economically independent, and their integration into the Latino⁴ and local communities.⁵

The ethnographic approach to this study has several justifications. First, this study reflects my interest in immigration and Latino studies. Secondly, the goal has been to understand in detail the experiences and challenges of recent, undocumented immigrant youth. Another objective has been to discover how participation in a group focused on self-development, validation of cultural differences, and mutual support help young Latinos to adjust to life and to become socially connected in Eugene, Oregon.

Dr. Lynn Stephen, professor of Cultural Anthropology at the University of Oregon, and I collaborated in collecting quantitative and qualitative data. The quantitative portion of the study analyzes

the demographics of the city of Eugene and directs specific attention to immigration patterns, as well as to individual reasons for residency in Eugene. The qualitative (ethnographic) aspect of the study focuses on Juventud FACETA, a local youth group. In-depth interviews with seven young participants in Juventud FACETA took place over an eight-month period. Ethnographic methods used included observing the participants, as well as recording and analyzing the field notes.

Juventud FACETA is a group made up of young men and women from Mexico, Chile, and Central America, ranging in age from eighteen to twenty-four. They come from a variety of ethnic backgrounds within their respective countries.⁶ The group is principally a support group for young immigrants who congregate once a week to discuss issues such as discrimination, racism, identity, and the growing hostility toward them and other immigrants after September 11, 2001. The group members also participate in recreational activities such as picnics and camping trips. Juventud FACETA is part of Amigos de los Sobrevivientes, a dwelling that helps survivors of torture and political oppression cope with daily life and overcome their trauma.

Overall, the intention of this study is to shed light on issues, such as racism, that some of these young immigrants face and to discover how these young people have integrated into U.S. society, in this case in Eugene, Oregon. The study is important because it focuses on a group never before examined, and it suggests ways to study other similarly overlooked groups.

Juventud FACETA Profile

The detailed look at the group members of Juventud FACETA

Name/ Characteristic	Cristiana	Leo	Jose	Ana	Beto	Eduardo	Patricia
Age at Migration	17	20	17	16	19	17	21
Year of Migration	1999	1999	2000	2001	2000	1998	1985
Level of Education prior to Migration	Some College	Some College	High School	Grade School	Some College	High School	College
Current Level of Education	GED	GED	GED	Obtaining GED	GED	Obtaining GED	BA
National Identity	Mexican	Guatemalan	Mexican	Mexican	Chilean	Guatemalan	Salvadorian
Ethnic Identity	Mixtec	Quiché	Mixtec	Zapotec	None identified	Quiché	None identified
Languages Spoken	Spanish	Spanish Some English	Spanish	Spanish Some Zapotec	Spanish	Spanish	Spanish English
Initial Use of Family Networks	Yes	No	Yes	Yes	Yes	Yes	No
Current Use of Family Networks	No	No	No	No	Yes	Yes	No

that follows provides information about when each individual came to the US, age at the time of immigration, current and prior levels of education, national identity, ethnic identity, language spoken and use of family networks. These categories were chosen because they sketch an important ethnographic picture. The illustration of age and year of immigration demonstrates some important aspects of the present phase of U.S. immigration. Facts about the immigrants' educational exposure are included in the table because they point out how important education is in their lives. National and ethnic identity data and language data show the diversity of the group. Finally, information about family networks shows the transition from dependency to an independent lifestyle in Eugene.

Immigration Patterns of Juventud FACETA

The population of Oregon is mostly white, but the Latino population has increased in the past ten years. In the city of Eugene, the population is about 137,893. The Latino population is five percent or approximately 6,843, as reported by the 2000 U.S. Census. Many people in Eugene believe that the official number is low. There are likely to be more Latinos than reported because some people did not wish to be counted. Fear is one of the main reasons why immigrant people do not choose to fill out an official federal document, such as the census papers. Most immigrants see the census as a way to expose their undocumented status, making it easier for the Immigration and Naturalization Service (INS) to deport them. Another reason that those figures are low is the language barrier. Eugene is a city where English is the dominant language. It is not like the U.S. Southwest or East Harlem, where Spanish intertwines with English and sometimes predominates.

Thus, Latin American immigrants find it difficult to communicate with English speakers in the community, let alone participate in civic activities. For these reasons and others, federal statistics such as the 2000 U.S. Census, should be questioned.

Behind the census figures lie a multitude of life histories about Latinos immigrating to the United States. People immigrate to the United States for a variety of reason. Some come for economic reasons, basically to find decent-paying work. Others leave their countries because of repressive governments. Youths immigrate for these same reasons: to escape repression and to seek economic opportunity. Though the individual stories of the youths we studied varied, all shared immigration stories connected to these reasons.

Studies about immigration point out the importance of social and family networks in helping people to migrate.⁷ The immigrant's journey to the U.S., such as the one described by Ruben Martinez in his book *Crossing Over*, has typically involved connecting with family members in the United States and crossing over as an adult. Interviews conducted with Juventud FACETA members⁸ suggest that , for immigrant youth, family connections may have brought them to the U.S. and provided them with initial points of contact, but those same networks have also been sources of conflict, confrontation, and unhappiness. Many group members left their family networks to try to survive economically and socially on their own.

The story of Cristina is a case in point. She had connections with family members who were already residing in the United States, but that did not necessarily mean that they were automatically supportive. She was forced to work long hours, do house chores,

and pay rent. She reported that she consistently had only four hours of sleep. She did not feel she was getting the family support that she had anticipated before immigrating.

Cristina's story also revealed that she had been deluged with positive images of the U.S. prior to her arrival. She, along with a cousin, crossed the Arizona border near Agua Prieta (Dark Water). Before crossing over, she, like many immigrants, had images of prosperity and opportunity. She did not expect to be working as hard as she had been working in Oaxaca. In Cristina's case, her cousins bombarded her with unreal depictions about life in the U.S. that Cristina summarized:

They explained that in the U.S. you can obtain everything that comes your way, and you can send all the money you want back home. They painted it for me in all these colors and when I arrived here I didn't see any colors.⁹

One group member, however, had a different experience. Leo, a Guatemalan Quiché, immigrated by himself without any family connections in the U.S. He came because of his very difficult childhood and because of civil turmoil in his native country of Guatemala. Leo's youth was turbulent in many respects. Guatemala was in a state of civil war throughout the 1970s and the early 1990s, and Leo found himself in a war at home. His step-father beat and overworked Leo at the age of six. The abuse from his step-father became constant throughout his adolescent years. As time passed, Leo learned to be independent and found ways to overcome the turmoil. For example, at seventeen he started attending a college in the capital, Guatemala City. While in college, he became politically active, protesting against the government's repression of peasant

farm workers. Later, he became a government target because of his political involvement. Repression from his step-father, tenuous work, no means to speak out against government oppression, and lack of measures to be stable in life resulted in Leo's decision to immigrate to the United States.¹⁰

Experiences in Eugene, Oregon: Education, Isolation, Identity and Racism

As soon as most of the Juventud FACETA members made their way across the border, they found themselves isolated, not just from U.S. society, but also from their relatives. All shared experiences of abandonment and melancholic attitudes about life. Once the group members started to feel comfortable about living and knowing how to survive in the United States, they slowly became independent. With that independence came the question, why Eugene, Oregon?

Getting Educated

Eugene is currently the third largest city in Oregon and home to the University of Oregon. The educational opportunities available in such a community are well known, and they attracted some of the Juventud FACETA members. Except for one group member, all of the participants had some experience with higher education in their native countries.¹¹ After coming to the U.S., they did not want to lose that connection with education. Access to education was important for them to improve their chances in Eugene and to learn English, a key element in improving work opportunities. Ana, the one study participant who did not have the higher learning exposure, enrolled in courses as soon as she settled in Eugene.

The University of Oregon is home to the High School Equivalency

Program (HEP), which aids people who did not finish high school to obtain GEDs. Three of the seven members earned their GEDs through HEP. Others went to the local community college, Lane Community College (LCC), to learn the English language. Jose, who is a Mixtec and cousin of Cristina, said, "My experience at LCC was a beautiful experience. I met people from different cultures, and it felt good knowing that there were other people who spoke Spanish. I love to learn about many things, and I know that English and a GED is a necessity here. I think Eugene is a good place to study."¹²

In all of the cases, the youth interviewed did not come from the poorest sectors of their societies. They came from poor, working-class, or lower middle-class families and usually had some education. They also had some networks and connections with people who helped them in the U.S. In most cases, however, these connections turned out to be unsupportive family members. Consequently, they came to Eugene because the city gave them the opportunity to acquire an education. However, despite having family and network ties in their initial years in the U.S., eventually life in Eugene presented them with a different reality—isolation.

Isolation, Invisibility--Creation of Juventud FACETA

Life in Eugene for members in Juventud FACETA has been, and continues to be, one of isolation and invisibility. Observation shows that for almost all members, daily life is structured like this: from work to home, then from home to school, and finally from Amigos de los Sobrevivientes to home. The Eugene community, as a result, does not notice this daily routine. For seven people, one way to overcome this invisibility was through participating in Juventud FACETA.

The creation of Juventud FACETA is due in large part to Patricia Cortéz, who is a Salvadoran immigrant. Juventud FACETA members refer to her as the “angel.” Patricia immigrated to the U.S. independently in her late teens. Patricia suffered tremendously in Los Angeles, California, where she worked three or four jobs simultaneously. She barely had time to sleep. On two occasions, Patricia was homeless, making church auditorium floors and city parks her beds. During the time when the sky was her roof, Patricia always had intentions to attend school. In El Salvador, she was an extraordinary student from elementary school through the early years of college. While residing in San Francisco, she connected with some people who had housing for her in Eugene, a factor that influenced her to move. One of the first things she did in Eugene was to enroll in English classes at Lane Community College. As time went by and she became more comfortable speaking English, Patricia wanted to create a support group for young immigrants because she felt that the struggles, isolation, and turmoil they face should not be issues confronted alone. Consequently, in early August 2002 she established Juventud FACETA.¹³

Over the past year, Juventud FACETA has helped its members overcome isolation and invisibility. One way has been through social connections to civic life. The group has enjoyed times at the park. They usually play a game of basketball and afterwards have a picnic. Outdoors events build confidence and encourage members to participate in the community, casting off the shadows of invisibility and isolation. With participation of members from Chilean, Guatemalan Quiche, Mexican Mixtec, and Zapotec cultures, Juventud FACETA has created a network of support, increased self-confidence, bolstered friendships, and advocated political activism

around immigration politics. Although the social connections of Juventud FACETA help its members overcome isolation, they still have concerns about identity, race, and hostility towards Latinos immigrants, especially in the wake of September 11, 2001.

Identity and Racism

In the United States identity labels shift as immigrants cross the border. Here, Latino is a commonly used term, and every label used south of the border disappears.¹⁴ Juventud FACETA member Jose, who is from Oaxaca, Mexico, ponders the treatment of indigenous people after crossing the border and living in the city. Jose asserts:

I come from an indigenous place. It is a place where people are humble. It is beautiful. When a person comes to this place, we question this person's reasoning. But we do not deny hospitality. In contrary, we help, we offer food, shelter. They are treated differently when they arrive in a city. They are rejected. When someone arrives to an indigenous place, they are welcomed with open arms; they offer what they have to eat and a place at their table. It is sad to see how an indigenous person is treated for who they are and their form of dress. The ideology of every person is different. They treat you the way you look, if you are dressed unsuitable to them. There [the city] if people see you wearing a sombrero, wear sandals, have dark brown skin, they are discriminated against [*sic*].

He acknowledges that experiences with racism in Mexico are the same in the U.S. Jose, accurately, sees that every person deserves respect. He also knows that in the United States and elsewhere, such respect is not the norm. Nonetheless, Jose views identity and race as very multifaceted, complex, and confusing. He said, as Professor

of Education in Harvard University Marcelo Suárez-Orozco did, that in Mexico he lucidly identified with his indigenous culture, which is Mixtec. North of the border, he realized there was no other alternative but to be labeled as a new Latino immigrant, making his Mixtec background secondary.

To counteract this concern, Juventud FACETA includes all ethnic, cultural, and national identities. Part of the philosophy of the group is to recognize and respect all cultures and ethnic backgrounds. Humbly, the group members state that they treat each other with dignity and respect. On several occasions, the weekly meetings have acknowledged a group member's background by having discussions about the person's culture, eating certain ethnic dishes, or showing a video about the person's native land.

Hostility After September 11, 2001

The tragic events of September 11, 2001, created fear in most people residing in the United States. Following September 11, 2001, the U.S. government passed initiatives to target immigrants, primarily people of Arab descent who were illegally in the U.S.¹⁵ Not only were the Arab immigrants targeted, but so were recent Latino immigrants. Group members from Juventud FACETA have also felt they were targeted as terrorist suspects.

Ana (who comes from a Zapotec background,) and is the newest member of Juventud FACETA, gave the most vivid descriptions of encounters after September 11, 2001. Ana was in Salem, Oregon's capital, working in the farm fields picking mushrooms. She stated that white-American women would look at her with suspicion and mistreat her in the workplace. Outside her workplace Ana confessed:

When I would walk to the store, I would always be afraid. Since I didn't have a car, I had to walk to the grocery store. I was always with fear; people would say that immigration [INS] was out deporting people on the streets that didn't have papers. The fear was due to the fact that I would see cars that appeared to be different, that looked as if they could be immigration.¹⁶

Times were difficult for her and the rest of the group members after the attacks in New York and Washington D.C. Two members, Leo and Eduardo, experienced racial profiling by Eugene police officers. Other members, too, experienced troubling occurrences in the workplace and feared losing their jobs.

Conclusion

Immigration has changed over time in the United States. Immigration has taken another turn, in which more young people are emigrating from Latin America. To understand this new phenomenon in immigration, we took an ethnographic approach to highlight conditions and experiences of participants in an immigrant youth group called Juventud FACETA.

Juventud FACETA member's experiences represent an important phenomenon in the field of Latino and immigration studies. First, all the members immigrated to the U.S. in their mid- to late adolescent years. Second, almost all of the members came with ties to higher education. And third, while in the United States, they became independent, breaking connections with relatives already settled in the United States. As undocumented immigrant youth, they have gained confidence, have overcome invisibility, and have been politically active in immigration rights.

While researchers have often concentrated on the experiences of recent adult immigrants, there is little research on the experiences of recent immigrant youth. In the state of Oregon there is almost nothing published specifically on recent immigrant youth. This study describes the experiences of some youth from this new wave of immigration and acknowledges major issues of adjustment about recent immigrant Latino youth in the United States. The hope is that other similar work can be done to give voice to the voiceless.

Notes

- ¹ In this analysis, the focus will be specifically on undocumented peoples from Latin America coming to the U.S.
- ² Waters, Tony, *Crime and Immigrant Youth*. CA: Sage Publications, 1999.
- ³ Valenzuela, Angela, *Subtractive Schooling: U.S.-Mexican Youth and the Politics of Caring*. New York: State University of New York Press, 1999.
- ⁴ In this research, the term “Latino” will be used because many scholars in this field of study think the term “Hispanic” accentuates the population’s connection with Spain.
- ⁵ Dr. Pierrette Hondagneu-Sotelo advocated in her book, *Gendered Transitions: Mexican Experiences of Immigration*, for the importance of gender in the study of immigrants. I am arguing for the importance of studying youth immigration.
- ⁶ Data collecting was conducted over a three month period.
- ⁷ Massey, Douglass, *Return to Aztlan: the Social Process of International Migration from Western Mexico*. CA: University of California Press, 1987.
- ⁸ I used pseudonyms for privacy reasons.
- ⁹ Interviewed by Dr. Lynn Stephen and Edwin Vega, 4/21/03 and 5/15/03.
- ¹⁰ Interviewed by Dr. Lynn Stephen, 6/26/03.
- ¹¹ Refer to profile page.
- ¹² Interviewed by Dr. Lynn Stephen and Edwin Vega, 4/22/03.
- ¹³ Interviewed by Edwin Vega, 7/21/03.
- ¹⁴ The broad application of the term “Latino” can erase other important ethnic, cultural, and national identity.

¹⁵ Akram, Susan M. and Johnson, Kevin R., *Race, Civil Rights, and Immigration Laws after September 11, 2001: The Targeting of Arabs and Muslims*. New York University Annual Survey of American Law, Vol. 58, 2002. Available at SSRN: <http://ssrn.com/abstract=365261>.

¹⁶ Interviewed by Dr. Lynn Stephen and Edwin Vega, 6/5/03.

Other Research by McNair Scholars at the University of Oregon

Abstracts

Liquid Droplets on Ratchet-like Surfaces

Benjamin Jose Alemán, Mathematics/Physics

Faculty Mentor: Heiner Linke, Physics

Film-boiling liquid droplets on spatially asymmetric surfaces exhibit preferential motion that obeys a first-order drag equation. A physical model for this self-propelled motion is presented here that accounts for the driving force and drag terms of the drag equation; the model employs flow of film-boiling generated vapor as the principle mechanism for motion. We compare the results to experiment and find good agreement across a wide range of droplet volumes and liquid types.

Mechanisms for Seismicity on the Southern Endeavor Segment

Michael Creech, Mathematics/Geological Science

Faculty Mentor: Douglas Toomey, Geological Science

The mid-ocean ridge is the longest continuous mountain chain on earth and is the source for the approximately 20 cubic kilometers of oceanic lithosphere generated each year. Mid-ocean ridges are classified by spreading rates into three groups: fast, intermediate, and slow. Fast spreading ridges are dominated predominantly by magmatic volcanism, whereas slow spreading ridges are predominantly governed by tectonic rifting. Intermediate spreading

ridges have yet to be classified by either of these two processes. The Juan de Fuca ridge is an intermediate spreading ridge that exhibits both magmatic and tectonic features. Earthquake swarms are indicative of both of these processes. Using data from the Endeavor seismic array, the swarm on May 10, 2004 can be classified as either magmatic or tectonic. A large magnitude earthquake followed by aftershocks will identify a tectonic event, and a magmatic event will reveal a migration pattern in the seismic record.

Indigeneity in the Early Slave Narrative

Christine Finley, Ethnic Studies/Sociology
Faculty Mentor: Shari Huhnforf, English

To date, leading critics of the slave narrative genre, including Henry Louis Gates, Jr. and William L. Andrews, have disregarded a significant part of early slaves' identities and histories by overlooking their indigeneity. Nevertheless, early authors of the slave narratives explicitly discuss their indigenous identities and the colonial processes of dispossession and removal in their narratives. I will analyze an early slave narrative, *The Interesting Narrative of the Life of Olaudah Equiano, or Gustavus Vassa, The African* (1789) to examine how a consideration of that slave's indigeneity transforms our interpretations of the text. Viewing African slaves in part as displaced indigenous people could reveal fundamental similarities between black and indigenous people located in this country, now called the United States, based on shared histories of forced removal, genocide, and other forms of colonialism. These similarities could, in turn, provide the foundation for political coalitions between black and indigenous communities to fight ongoing ideologies and practices of racism.

Levinas, Sartre, and the Other

Nanda Golden, Philosophy

Faculty Mentor: Theodore Toadvine, Philosophy

In their works, both Emmanuel Levinas and Jean-Paul Sartre explicitly thematize “the Other.” This study attempts to draw out their accounts, put them in dialogue, and use both to forge a stronger understanding than either could provide alone. To hone the question of what the Other is for Sartre and Levinas, the author focuses on sections of two texts: Sartre’s *Being and Nothingness* and Levinas’s *Totality and Infinity*. The author finds that Sartre’s Other is centered around the look and the distinction between Other-as-subject and Other-as-object. Levinas’s Other is focused on his concepts of the face, infinity, and ethics. Comparing the two works reveals that neither accounts for empathetic interactions between self and other.

The Social Dynamics of Building a New Four Square Church

Kristina Kahl, Sociology

Faculty Mentor: Marion Goldman, Sociology

Social scientists use secularization theory to debate whether religious participation is weakening among U.S. population. A recent theory deems American society to be highly religious based on what is termed a “religious economy” in which an unrestricted religious marketplace allows for a higher demand of religious participation. Within the last fifty years the religious economy has produced a new supply of non-denominational churches, specifically the Four Square ministries. Although the participation level of Four Square

churches nationally has been slowly declining, in Eugene, Oregon, they have remained stable. Recent decisions to build a new Four Square church that might possibly attract different constituents and create a new market niche are under way. This research will focus on key participants of this process, specifically the female pastor who is the principle organizer of the planting for this new church. It will be of particular interest to discover if a gender-centered orientation develops. The goals of this small exploratory study are to document the complexities of religious involvement required in the building of a new church, whether this church fulfills any market niches, and if so, what market niche or niches it satisfies.

Transnational Violence and the United States War in Viet Nam

Khanh Le, Political Science/Ethnic Studies

Faculty Mentor: Lynn Fujiwara, Women's and Gender Studies

The United States employed racial slurs to dehumanize Viet nationals and construct them as "enemies" during the US war in Viet Nam. Thirty years later, the Viet/American community continues to encounter a hostile, war-created environment in the U.S. that manifests itself in hate crimes and other forms of hatred. Today, attacks on the Viet/American community by white Americans reflect racist constructions of Viet/Americans as "gooks" and "enemies," thus justifying both hate-motivated actions by individuals and institutional racism. An analysis of several specific hate crime and speech incidents committed against Viet/Americans will reveal how people were racially constructed in national and ethnic newspapers. Further, the language the assailants used,

as well as public commentary regarding each incident, allows a comparative examination of the construction of racial hate toward Viet/Americans during and after the war. These incidents not only reveal how heterosexual, white masculinity, and supremacist narratives attempt to reinforce, control, and oppress Viet/Americans through violent acts, but also show the ways Viet/Americans and other Asian/American communities have challenged these racist attacks.

Flavin Derivative Imprinted Polymers for Environmentally Safe Oxidative Catalysis

Damion Meany, Biology/Biochemistry

Faculty Mentor: Bruce Branchaud, Chemistry

Past research has shown that newly formed elemental solids and specially treated polymers can surround introduced molecules and form an imprint of them. In addition, antibodies, which are grown to bind the transition-state analog of a reaction, act as catalysts when introduced to that reaction. Most living organisms use isoforms of the biodegradable molecule flavin as co-factors for metabolically essential oxidative reactions. Riboflavin derivatives with the properties of transition-state analogs will be created and then imprinted within a polymer, and that polymer will then be used to catalyze novel oxidative reactions. This polymer can replace the environmentally hazardous heavy metal compounds commonly used to catalyze the oxidative reactions often used in organic synthesis. Polymer catalysts will also have enzyme-like specificity unlike the non-specific oxidation that occurs with heavy metal oxidizing agents.

**In Order to Preserve Our Future:
An Analysis of German and American Responses to the
Problems of Depression-Era Youth**

Tanya Parlet, History

Faculty Mentor: John Nicols, Mentor

Faculty Mentor: Daniel Pope, Mentor, History

Although the severity of the Great Depression prompted the governments of Weimar, Germany and America to enact specific programs to combat the growing problems of youth, the Nazi government began its youth programs independent of the Depression. Within the Third Reich, all youth policy was subordinate to the primary ideal of creating the perfect National-Socialist citizen. However, citizens and elites of both states did recognize a common experiential gap between the generations. Yet, in addressing this problem each state enacted strikingly different solutions. To improve our understanding of the dichotomy between the German and American responses, it is necessary to explore important elements of comparability. Although there were variations in degree, the programs in each country were centrally funded and administered. However, the programs implemented in each state held vastly different roles for families, churches, schools, and private and public youth organizations. An analysis of the policies adopted both in and outside the government to deal with youth problems in the 1930's, along with participant and organizational accounts, will increase our understanding of the often similar ideals, yet overall quite disparate approaches to assist and "improve" American and German youth.

Metal-mediated cyclization of 2-(Phenylazo)benzonitriles: New methods for the generation of the isoindazole nucleus

Jazmin Rivers, Chemistry

Faculty Mentor: Mike Haley, Chemistry

Heterocyclic compounds are important in organic synthesis because of their prevalence in biologically active compounds, such as inhibitors and anti-tumor agents. The indazole moiety constitutes the key subunit in many drug substances with a broad range of pharmacological activities. Structurally related isoindazoles, which have only recently begun to be investigated in drug discovery programs, have received only cursory examination as a result of the many synthetic difficulties of accessing this heterocyclic core. This paper focus on the cyclization of 2-(phenylazo)benzonitriles, which in turn are prepared in 3 steps from commercially available anilines. Depending on the reaction conditions, cyclization of the 2-(phenylazo)benzonitriles with SnCl_2 in EtOH gives good yields of 3-aminoisoindazoles, whereas use of ZnCl_2 in the presence of excess alkene affords aziridines by way of the isondazolylnitrene.

Why There Will Never Be a Nigger Eye for the White Guy: The Intersections of Race, Sexuality, and Consumption

Margarita Smith, Ethnic Studies/History

Faculty Mentor: Daniel Rosenberg, Clark Honors College

Faculty Mentor: Martin Summers, History/Ethnic Studies

In the early 1990s two parallel movements occurred in popular culture: black hip-hop artists reclaiming the pejorative nigger and the gay community reclaiming the pejorative queer. The intent of both linguistic shifts was to neutralize the power of the invective and to create an encompassing sense of community for underrepresented

groups. Through a critical analysis of recent cultural texts, this paper will explore the overt shifts in usage as well as the implicit associations in popular representations of the words nigger and queer. These texts demonstrate that representations seeking to subvert the pejorative often reinforce longstanding stereotypes.

Ideology and Policy: Public Discourse and the Birth of The Welfare Queen

Margarita Smith, Ethnic Studies/Honors College

Faculty Mentor: Martin Summers, Mentor Ethnic Studies/History

In political as well as cultural discourses, perceptions of welfare recipients are heavily imbued with specific assumptions based on gender, race and sexuality. The emergence in the mid-1970s of "The Welfare Queen" archetype was a significant discursive gesture in shifting sentiments regarding American welfare policy and foreshadowed subsequent welfare reform policy. Simultaneously, opposing political discourses and film representations sought to challenge both the meaning of the traditional family unit as well as the government's responsibility to the poor. The Welfare Queen myth constructs poor, racialized women as internal enemies of the state and creates the justification to disavow the poor within the ideological borders of the nation. Thus, not only are the poor unworthy of support, but they are also a threat to national integrity.

A Linguistic Analysis of Gesture in Second Language Discourse

Isaac Torres, Linguistics/Communication Disorders Science

Faculty Mentor: Eric Pederson, Linguistics

This is a study of the frequency of metaphoric hand gestures used while speaking about abstract concepts in one's second language. In this study, the native language of all subjects is Spanish, and the second language is English. The increased difficulty of orally articulating abstract concepts in one's second language should lead to a higher frequency of metaphoric hand gestures to help express the idea. This study follows the gesture classification system of McNeill (1992) and the methodology of Gullberg (1998). The subjects are presented with four hypothetical situations containing moral or ethical dilemmas, two of which are presented and discussed in Spanish and the other two in English. The conversations are video-taped and analyzed for the frequency of metaphoric hand gestures.



Congress established TRiO programs to provide educational opportunities for all Americans regardless of race, ethnic background, or economic circumstances. As part of that tradition, the McNair Program at the UO is funded by a grant from the U. S. Department of Education and receives substantial institutional support to achieve its mission.



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