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The McNair Program

The Ronald E. McNair Postbaccalaureate Achievement Program provides enriching scholastic experiences to prepare eligible undergraduates for the challenge of graduate education. It is designed to increase the number of low-income, first-generation college students and underrepresented minority students in doctoral programs. Its long-range mission is to help increase the diversity of college and university faculties. This program was established in memory of astronaut, physicist, and Challenger crewmember, Dr. Ronald E. McNair.

Born on October 21, 1950 in Lake City, South Carolina, Ronald E. McNair achieved early success in the segregated public schools he attended as both a student and an athlete. He attended North Carolina A&T State University where in 1971 he received a B.S. degree in physics. He went on to study physics at MIT, specializing in quantum electronics and laser technology, completing his Ph.D. in 1977. As a student he performed some of the earliest work on chemical lasers, publishing groundbreaking scientific papers on the subject. After completing his Ph.D., he began working as a physicist at Hughes Research Laboratories in Malibu, California, and conducted research on electro-optic laser modulation for satellite-to-satellite space communications. This research led to Dr. McNair’s work with NASA.

In January 1978, NASA selected him to enter the astronaut cadre, one of the first three Black Americans selected. McNair became the second Black American in space. During this mission McNair operated a maneuverable arm used to move payloads in space. The 1986 mission on which he was killed was his second Shuttle flight.

The McNair Program is one of several TRIO programs funded by the United States Department of Education. There are currently 155 colleges and universities participating in McNair programs across the nation. The Washington State University McNair program is funded through and administered by the Graduate School.

Portions of the above text were taken from The Crew of the Challenger Shuttle Mission in 1986, NASA.
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Sandi Klinger, Secretary Sr., Multicultural Student Services

Washington State University
McNair Achievement Program
Lighty Student Services, Room 190
Pullman, WA 99164-1062
Phone: 509/335/7702
E-mail: mcnair@mail.wsu.edu
Web Site: www.wsu.edu/~mcnair

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From the Dean of the Graduate School

The McNair Program at Washington State University provides undergraduate students with the opportunity to prepare for graduate education. One of the skills required for successful completion of a graduate degree is the ability to conduct research and contribute to knowledge base of an academic discipline. Through the McNair Journal, the McNair scholars not only gain valuable experience with research and scholarly inquiry, but also are provided with the challenge and opportunity to share their results. The contributions in the Journal reflect the diverse interests of the students as individuals and as emerging scholars. I know you will enjoy reading the journal.

Karen P. DePauw, Ph.D.
Dean & Professor

From the McNair Program Director

The McNair Program at Washington State is pleased to present this first volume of the McNair Journal. For the authors it represents the culmination of a year of work in preparation for and anticipation of eventual graduate study. For each, in his or her own way, the task of beginning a research project that ultimately would end as a their first publication brought home the meaning behind the name of the spaceship Challenger in which Ronald McNair's life ended. The process of having an idea for research, formulating a statement of the problem, designing the research, gathering data, analyzing the results and putting all of this on paper and presenting it at an end of the summer symposium was a ongoing series of challenges. Perhaps the most important lesson is that the papers in this volume represent just the beginning of more challenges they will confront in the academic enterprise and beyond. These students are the “challengers” of tomorrow. As the reader will find, these students have focused on a variety of issues and concerns, and have approached them from a wide range of perspectives and methodologies. Despite these differences they came to appreciate the common thread—the challenge of ideas and the search for understanding.

Steven R. Burkett, Ph.D.
Associate Dean and Director

Journal Disclaimer

The WSU McNair Achievement Program staff has made every effort to assure a high caliber of research. However, the results and conclusions reached by each author are their own. Any errors or omissions are strictly the responsibility of each author.
Chicana Gang Members: Resistance to Traditional Women’s Roles

Patricia Acevedo, McNair Scholar
Steven R. Burkett, Ph.D., Faculty Mentor
Department of Sociology

ABSTRACT

This is an ethnographic project designed to explore the lives, needs, and struggles of three Chicana gang members in the Lower Yakima Valley in Washington. The intersections of race, class, and gender are discussed and viewed through the narratives of these young women. The objective was to explore whether the gang is an outlet for resistance to social structures and traditional women’s roles. Though each of these Chicanas were in different stages in their development, it is nevertheless clear that each experienced the gang as a “safe agency” in which they were free to resist traditional roles and incorporate nontraditional roles while continuing to struggle for acceptance in terms of mainstream values.

INTRODUCTION

“GANG,” is a controversial label created to define a group of people. However, the meaning varies from person to person. It is sometimes used to refer to an organization, criminals who join together, or a familia. It sometimes includes reference to common values and interests, to a social environment, to a territory, and/or to criminal involvement. It may be identified with a specific race, class, or gender. Although extensive research exists describing gangs, gang members, and gang activity, there remains a general lack of knowledge about the relationship between group dynamics and criminal behavior. This makes a general definition of delinquent gangs difficult.

Several criminologists have provided definitions of gangs. For example, as noted by Bursik and Grasmick (1995), Frederic Thrasher was the first to spark interest in the study of gangs. In 1927, he defined a gang as “an interstitial group originally formed spontaneously and then integrated through conflict. The result of this collective behavior is the development of tradition, unreflective internal structure, esprit de corps, solidarity, morale, group awareness, and attachment to a local territory.” Later, according to Bursik and Grasmick (1995), Klein (1992) described a gang as: “an identifiable group of youngsters who are generally perceived as a distinct aggregation by others in their neighborhood, recognize themselves as a group (almost invariably with a group name), and have been involved in a sufficient number of delinquent incidents to call forth a consistent negative response from neighborhood residents and/or law enforcement agencies.” Despite all the research, there remains little consensus on what a gang is, who is a gang member, what constitutes gang activity, and how gangs arise. Further, along with these ambiguities, there is another critical, but often ignored, aspect of gangs. That is, what is the involvement and importance of women in gangs.
Until recently, investigation of the role of girls in gangs has been neglected. While there has been a growing number of studies investigating the connections between male gangs, violence, and other criminal activities, relatively little research has focused specifically on female involvement in related activities. As with all young women who find their way into the juvenile justice system, girls in gangs have been “present but invisible” (Chesney-Lind, 1998). In early writings, girls were defined solely in terms of their interpersonal and structural relations to male gang members. Their roles were described by male gang members to male researchers and interpreted by male academics. For example, Thrasher (1927) found that gangs in Chicago were overwhelming male. He described the girls who were involved as “immoral.” He describes their chief activities as petting, necking, illicit sex, and mugging. More recently, Campbell (1995) has noted that there are some predominantly female gangs, and that they have names like the Tulips, the Lone Star Club, the Under the L gang and the Night Riders.

Historically, girl gang members have been either overlooked or stereotyped as “tomboys” or “sex objects” (Campbell, 1995). The relative absence of research on the role of girl gang life has perpetuated the stereotype that they are primarily auxiliary members and relegated to gender-specific crimes such as seducing males, concealing weapons, and instigating fights between rival male gangs. In a study by Bernard (1949), female gang members in New York took on their own names even though all were affiliated with male gangs. Characteristically, their function was to carry weapons because they were assumed to be immune to search by male officers. In addition, they provided alibis, acted as spies and lures, and provided sex for male members. The overwhelming impression was that gang girls are sexual property.

The 1950’s were the era of the street worker, that is, social workers who attempted to reach teenage gangs and reform their behavior. They described gang members as passive, exploited people of low self-esteem and ability. Girls were seen as sexual objects to be cajoled, tricked, or forced into sexual relations. There was no mention made of the rapes, gangbangs, or homosexual prostitution by boys, let alone their involvement in normal, if precocious, sex. The street workers’ aim seems to have been not to encourage the independence of girls from boys, but to inculcate “feminine” middle-class values about their sexuality by conducting classes in cosmetics and etiquette, organizing sewing parties, and gathering charity boxes to send to foreign countries (Campbell, 1995).

The Study

Being raised in the Yakima Lower Valley in Washington, I grew up with a negative image of young gang members. The only image I saw in the media was a portrayal of deviant Chicanos who had committed murder, robbery, or drive-by shootings and left his gang sign spray-painted on the wall of some building. I began to wonder why the phenomenon of gangs seemed to be increasing dramatically within the area. At the time, I simply made my own assumptions or explanations as to why youth, and in particular women, became involved in gangs. My ideas seem consistent with those Dietrich (1998) who describes the gang as a group that provides youth with the freedom to search for themselves and argues that “these choices appear to offer liberation, a means of achieving dignity and values and a direct route to freedom and ‘respect.’” I attempt to ask, in a more systematic way, the questions I have always had in hope of gaining a better understanding of the needs of young women who are gang members.

Here I explore the role of girls in gangs by looking at the world through their eyes. As a woman, and as a Chicana, I believe that an examination of the lives, needs, and struggles of Chicana gang members in the Yakima Lower Valley is much needed. This research focuses on these women’s lives and listens to their experiences from a perspective other than that of the media, male researchers, or male gang members.
I chose to focus on the experiences of Chicana adolescents because the lives of these women are filled with challenges and boundaries set by socioeconomic status, social pressures such as being successful “law-abiding citizens,” and pressures from peers and family. It is a process of self-discovery in which an individual is dealing with the transition from youth to adulthood. These young women not only have to face these new experiences and changes, they must also cope with structural conditions that make the process more difficult. As explained by Dietrich (1998): “Chicana adolescents experience a variety of social, economic, and cultural pressures that orient them towards making decisions to join gangs.” These Chicanas are neither adults nor children; they occupy the curiosity of increasing responsibilities, but are still controlled by certain rules and restrictions. Further, as Chesney-Lind (1998) notes, when female researchers have studied female gang members, a different perspective emerges. This perspective suggests that girl gang members do not fully accept conceptions of their roles and positions as they are often, and stereotypically, described.

I am especially interested in Chicanas because of their seemingly high involvement in gangs. The importance of integrating feminist delinquency theory is to be critically aware of explanations of female behavior that are sensitive to its context in a male-dominated or patriarchal society. As Chesney-Lind argues, it is clear that the shape of female behavior and misbehavior is affected by gender stratification. It is, in effect, the response of a male-dominated system to female deviance. A feminist analysis of delinquency allows us to examine ways in which agencies of social control, including the police, the courts, and prisons, act to reinforce a woman’s place in male society.

This study represents preliminary ethnographic fieldwork. I felt that the only way to really grasp and successfully comprehend the experiences of Chicanas involved in gangs was to go into their communities and directly interact with them. It was also important for me to conduct my fieldwork in my hometown, the area in which I lived my experience as an adolescent Chicana. Further, it is crucial for me to increase the awareness of my community about these youth. It is also necessary to provide a framework to better understand the needs of these women so that programs or services to successfully reach out to them can be created. In addition, this research entailed questions relating to the struggles of race, and class, and their impacts on gang involvement among Chicanas.

To find answers we must conduct research on female gang membership on its own terms rather than as a comparative footnote to studies of the male gang. It is crucial that we incorporate the community and the class, gender, and race contexts to address the impacts that each has had on these girls’ lives. It is my hope to identify what it means to be a woman growing up as a Mexicana/Chicana and how coping and adapting to the environment in the Yakima Lower Valley may lead to involvement in a gang. Gangs can be seen as representing a means by which some youth seek to resolve problems presented by their structural and cultural positions in relation to both their families, and processes of racism and sexism in the larger society. The words and actions of gang members seek to resolve the intractable problems of class by simultaneously opposing and rejecting some aspects of community and mainstream values while incorporating and internalizing others (Cohen, 1972; Hall and Jefferson, 1976).

It is also necessary to investigate whether involvement in a gang is an empowering and liberating process in the development of individual identities. It is possible that these women have taken an unconscious “feminist” approach to survival and regained their voice and space as women and as an oppressed Chicanas. When girls and women affiliated with gangs are described, it is often through media stereotypes of “bad” or “evil,” or even overly “masculine” girls. I will examine whether these girls seek liberation from the stigma attached to their gender, race and class by their involvement in the gang in ways distinct from males.

While individuals do make life choices, these choices are often constrained or shaped by their social, political, economic, and cultural environments. Chicana adolescents often succumb
to efforts to control them that are exerted by their families, school officials, and boyfriends. Still, many find creative means to assert control over their daily lives, their bodies, and their futures. Unfortunately, their efforts toward emancipation sometimes result in pregnancy, criminal records, or drug addiction. These difficulties can then trap them into reproducing what had been labeled in discussions of public policy as the “cycle of poverty” (Dietrich, 1998).

**HYPOTHESES**

Given the above, this research is directed by the following question: Is the gang viewed by Chicana gang members as one of few opportunities for resistance to social structures and traditional women’s roles? I address the following hypotheses:

Hypothesis 1: The gang is one of few options young Chicanas see available to them to validate who they are. Here I explore the idea of the gang as a provider of emotional needs such as a sense of belonging, and as an avenue for self-empowerment.

Hypothesis 2: Participation is perceived to be a survival or coping mechanism in dealing with poverty, and the oppressive conditions many of these women face in their daily lives. We must question their position as young working-class Chicanas and how they are treated by the educational system, the juvenile justice system, and their family, and the effects of their socioeconomic status on their lives. These are institutional, social and cultural boundaries that sometimes constrain both behavior and thoughts.

Hypothesis 3: Gang member activity provides an outlet for young Chicanas to exercise independent and non-traditional female roles. This is based on feminist theory to examine the relationship between the roles Chicanas play and the pressures to engage in traditional roles. These pressures come from traditional family roles and expectations, and demands from their male counterparts.

**METHODS**

**Participants**

I interviewed three Chicana gang members living in the Yakima Lower Valley. Two are former gang members and one is presently a gang member. Their names have been changed to secure their identity. I refer to them as Natalia 18, Crystal 22, and Susana 19. Two of the girls are third generation U.S. citizens and one is second generation. In addition, I interviewed a detective who directs a gang taskforce in Yakima.

**Questionnaire**

I formulated questions designed to address my hypotheses. The questionnaire was not viewed by the participant and was used only as a guide. Each interview was recorded while I took notes. Later, transcripts of the interviews were produced.

**Procedure**

The study was conducted from June 6 though July 28, 2000. The fieldwork was conducted in two weeks. I called all alternative school in the Yakima Lower Valley and explained my research interest in Chicana gang members. I asked if they could assist me by allowing me to speak to some of the girls known to be gang members, or refer me to another
contact. I also visited the Juvenile Justice Center in Yakima and spoke to the assistant director about my research. He referred me to two probation officers who introduced me to two girls involved in gangs. I was introduced to a third participant by a social worker at a youth outreach program designed by the Farm-workers Clinic. I visited the first participant at her home and then moved to a park to conduct the interview. I met the second participant at her work and conducted the interview in an available office in her department. I visited the third participant at the house of the first participant and then conducted the interview at the same park where I conducted the first interview. Each participant read and signed a confirmation letter, which explained the research and the interview procedures.

Each interview was unique. Each participant’s individuality led the discussion and sometimes addressed questions not included in my questionnaire. Therefore, the amount of time for the interviews ranged from one and a half hours to three. When I first met each subject, we talked casually about ourselves. This helped to create a sense of trust and an assurance of confidentiality. This also helped decrease the uneasiness of discussing issues regarding their experience with the gang, social institutions, and family. I dressed very casually when meeting with each of them and spoke about myself and my experiences in the Yakima Lower Valley. They asked about my college experience and discussed their ambition to continue their education.

Two participants seemed genuinely interested in sharing their experiences with being affiliated with a gang. The first participant seemed uneasy at first, but eventually began to disclose her thoughts. The second participant was enthusiastic and completely ready to share her story with me. She told me she would be completely honest about her experiences because she wants others to know about life in the gang. The third participant seemed very distant and hesitant. I asked her if she was sure she wanted to continue the interview. She accepted, but her answers were short and concise. She later told me that her lack of attention was due to a drug substance in her system. Nevertheless she described herself as usually quiet, but very direct.

RESULTS

Gangs have always been viewed as a social problem and as an example of deterioration in society. School officials have often banned and censored anything that can be seen as gang-related. Youth have been criticized and ostracized from communities. I agree that we must continue to develop outreach programs that are able to connect and meet these gang member’s needs. However, to do that we must question what they are lacking in their community, homes, and schools. This exploration brings forth a voice that has been historically minimized, misinterpreted, or ignored by scholars, friends, family, and society. Before we attempt to find solutions to these women’s dilemmas, needs, and/or problems we must first listen to their “stories and their lives.”

I wanted to determine whether both the immediate environment and traditional women’s roles influenced the subjects’ behavior and way of thinking. The investigation focused on whether the gang is a process in which these girls rejected the constructed social boundaries. Through their narratives we are able to see such rejection. For example, most of them rejected school, an institution in which they perceived that they were neither respected nor supported in any way. From an outsider’s point of view, school rejection can be seen as “social deviance and poor judgment.” However, for some, the choice of joining a gang is their only opportunity for resistance. These choices are not any different from those of a white middle-class girl who makes the decision about which group or organization within school best fits her needs and lifestyle. These decisions or choices are not about “being deviant,” but limitations in opportunity. They are normal adolescent girls looking for acceptance and a comfort zone. They are simply attempting to survive given the limitations in their lives.
While these young Chicanas do make life choices, these choices are often constrained or shaped by their economic and cultural environments as well. These girls are subjected to a variety of cultural norms that constrain their behavior. Anglo norms, Chicano norms, the norms associated with being a woman, and norms associated with being an adolescent are also circumscribed by class structure within the United States. Therefore, these young women find themselves in a struggle in which they must find alternative ways to fulfill their immediate needs.

The findings from the interviews were not all consistent since the three women were at different stages of development and affiliation with the gang. Hypothesis 1 posited that the gang is the way of seeking validation of self. By validation I mean whether the gang provided a sense of belonging and pride of who they are as young Chicanas. All three interviews revealed that the gang offered them a comfort zone because members accepted them for who they are. They were not looking for that ‘ideal’ image of what a young Chicana should be. The gang provided an outlet for these women to release some of the stresses they carry with them on a daily basis. This includes not feeling accepted by other classmates and feeling powerless against others who have more than they do.

*Crystal:* The gang made me feel pride, this is who I am. It gave you respect, probably not the respect that you wanted. I intimidated people to leave me alone or to get something that I wanted.

Hypothesis 2 focused on their environment and their socioeconomic status and how this may influence their behavior and membership in a gang. This hypothesis was also supported because they spoke of how the gang was their protector from injustices in school and the juvenile justice system. During this period of adolescence they were coming to the realization that they did not own certain things or carry certain privileges. The gang helped them cope with this disparity. They were able to relate to the others in the gang. They shared special bonds together that only they were able to understand and communicate to one another. The gang also offered them solutions, whether positive or negative, to defend and empower themselves. These girls were not getting the attention they needed. They searched and found acceptance in the gang.

*Natalia:* I think here in school it’s all about sports. If you aren’t into sports like in the varsity team or a cheerleader then you are nothing.

Hypothesis 3 focused on traditional and non-traditional women’s roles. Traditional women’s roles include being “good mothers,” “good girls,” and nurturers who are passive, submissive, one who attends church regularly, and a good student. Non-traditional women’s roles include struggling to resist these traditional roles and recognizing the importance of trying to search for one’s individuality, one’s own space and, most importantly, reclaiming or strengthening one’s voice. Also included is rejecting male domination, and physical, sexual and mental abuse and violence. Obtaining a career, being single mothers and supporting and raising their child on their own while working full-time and getting an education, becoming a scholar, scientist, *chola*, and involvement in the military are all forms of taking non-traditional women’s roles.

Based on one’s interpretation of the dynamics involved in the gang, support for this hypothesis is questionable. The narratives of Natalia, Crystal, and Susana show that they agree, to an extent, that they lead non-traditional roles. This is not to say that the gang is the way out or the way to success because clearly it is not. However, it does provide the opportunity to learn and empower oneself as an individual. After the “romantic ideal” stage is over, when they are no longer seen as strong assets to the organization, acts of violence, crime and abuse decrease as they
take a step back and re-analyze their position. Upon reflecting on their lives, each agreed that the
lessons learned and the confidence obtained were taken to a different level and stage of their
lives. They gained power and unity within their lives, which was attributed to the gang. We can
argue this hypothesis was supported or not supported depending on the framework used.

Different frameworks are utilized to defend each argument. One views these Chicana
gang members through the lens of the gang and their community. The other is through the lens of
the dominant society, which argues that they are still mothers vulnerable to male domination and
seeking male validation. From the first framework these women are now searching for the best
for their lives and their children with or without the help of their male counterparts. They have
learned to survive and defend themselves from discrimination. Crystal and Susana, for example,
are both single mothers striving to meet their idea of “success” by working and educating
themselves while still raising their children.

Although these Chicanas are in different stages of their development, it is nevertheless
clear that each experienced the gang as a safe agency to resist traditional roles and incorporate
non-traditional roles. However, it is also clear that they continue to struggle to gain acceptance
via mainstream values.

Crystal: Their dad is a loser, I’ve gone though a lot with this man. He was
beating the hell out of me. Now, I want to get a better job, buy my own house,
have my kids graduate and settle down-have the all-American dream!

LIMITATIONS

The first limitation was the short amount of time to complete the research and the time of
year. At the time I was conducting my fieldwork, most students were on summer vacation and
the alternative schools were not in session. This made it very difficult to connect with female
gang members. Another limitation was the issue of confidentiality. Probation officers and the
detective had information on some of these girls, but they were not allowed to share any names. I
spoke to a counselor who had many female gang member contacts. He was able to refer me to
them, but they were under the age of 18, and this age group was not approved by the Human
Subjects Review Committee.

Due to the sensitivity of the issues discussed some of the participants did not feel ready or
willing to discuss their full experiences. Other participants may have been involved in criminal
activity or been aware of certain acts of violence, but did not want to disclose this information. I
believe one potential participant withdrew for this reason, even though I had described the
procedure and assured her that no questions would be related to sex, drugs or crime. Again, I was
viewed as an outsider and, they were extremely cautious. A third limitation was the distance
from Pullman to the Yakima Lower Valley, which made contacting participants and officials
difficult.
Induction of Parturition: A Comparison of the Effects of Lutalyse and Estrumate on Sows

Michelle Lee Conover, McNair Scholar
Mark Mirando, Ph.D., Faculty Mentor
Ruth Newberry, Ph.D., Faculty Mentor
Department of Animal Sciences

ABSTRACT

The aim of this study was to determine the efficiency of prostaglandin analogue treatments on the induction of parturition during late pregnancy in sows, based on fewer and less intense side effects. Twenty-four sows were randomly treated on day 114 of gestation with: (1) 175 micrograms Estrumate; (2) 10 mg Lutalyse; (3) 2 ml saline (control) or on day 115 with 2 ml saline (control). Sows injected with Lutalyse showed a significant increase in position changes/minute as compared to the C114 treatments. L114 treated sows displayed a significant increase in frequency of bar biting compared to the E114, C115, and C114 treatments, and a significant increase in frequency of defecation compared to the C115 and C114 treatment. These results demonstrate that sows treated with Estrumate are likely to have fewer, less intense side effects than sows treated with Lutalyse.

INTRODUCTION

Modern swine producers aim to minimize disease problems in their herds and optimize litter size and growth. Grouping and inducing the sows to synchronize farrowing increases the chances that producers will be present during the farrowing. Hence, complications prior to and following parturition may be prevented or eased and producers may make optimum use of their facilities (Hammond, 1980).

Currently the most effective method of induction of parturition in sows involves intramuscular (im) injections of prostaglandin F$_{2\alpha}$ or its prostaglandin analogue. Two commercially available prostaglandin F$_{2\alpha}$ or prostaglandin analogues are Lutalyse (PGF$_{2\alpha}$) and Estrumate (Cloprostenol). Both of these products will induce parturition, PGF$_{2\alpha}$ within 22-40 hours and Cloprostenol in 24-33 hours. However, it is important for producers to know which product is more effective (at manufactures recommended doses) and has fewer or less intense side effects (Widowski, et al. 1990, and Randall, 1990). Previously, Boland, et al. (1997) had compared Prostaglandin F$_{2\alpha}$ (Lutalyse) to one of its analogues (Cloprostenol) for efficacy in the induction of parturition. This study revealed that parturition was induced when both forms of prostaglandin were used (each at very different dose levels) and that there was no difference in the effectiveness of the two prostaglandin treatments for induction of parturition. These results revealed that Lutalyse and Cloprostenol are quite similar in inducing parturition, but nothing about the observable, adverse reactions in the sows.

According to Pharmacia and The Upjohn Company (Lutalyse Product Label), several of the most frequently observed side effects caused by Lutalyse (10 mg dose) were redness in skin
color, nesting behavior, defecation, urination, abdominal muscle spasms, and contractions of the smooth muscle around the pregnant uterus and intestinal tract (Robertson, et al. 1978). Although these adverse reactions may last only last 10 minutes to 3 hours without being detrimental to the animal’s health, past research provides evidence of increased stress response following prostaglandin administration. One study revealed that when space-restricted sows were injected with prostaglandin, levels of frustration and stress increased due to the physical interference of the farrowing crate in nest-building activity (Boulton, et al. 1997). Due to the relatively high incidence of these side effects and several others (bar biting, restlessness, pawing), alternative prostaglandin products that may have less severe side effects need to be examined (Friendship, et al. 1990).

Estrumate is a prostaglandin analogue (Cloprostenol), so it may also cause these side effects. However, since the recommended dosage for Estrumate is only 175 micrograms (11), which is significantly lower than that for Lutalyse (10 mg), it is possible that these side effects will be less intense and less frequent. Additionally, there are numerous anecdotal reports that the side effects of Estrumate are less severe than those for Lutalyse.

Given the above, the guiding hypothesis of this study is: Estrumate will be equally as effective as Lutalyse in inducing parturition in sows and will exhibit fewer and less intense side effects.

MATERIALS AND METHODS

The experiment was conducted at the Washington State University Swine Center where large white, landrace, and crossbred sows were each housed in individual farrowing crates. Twenty-three sows were randomly allocated on day 114 of gestation to one of three treatments listed below or on day 115, when only treatment 3 was administered.

**Treatment 1.** Six sows received 175 micrograms of a prostaglandin analogue (Estrumate) as an intramuscular (im) injection on the morning of day 114.

**Treatment 2.** Six sows each received an im injection of 10 mg of prostaglandin F₂₁ (Lutalyse-Upjohn) on the morning of day 114.

**Treatment 3.** Six sows each received a single im injection of 2 ml saline on the morning of day 114. Five different sows received a single injection of 2 ml saline on the morning of day 115 (controls).

Injection of the three sows (one per treatment group) was performed at one-minute intervals and in random order. After injection, the animals were observed from 0-45 minutes. From preliminary experiments, 45 minutes was adequate for a complete observation of side effects resulting from the prostaglandin and saline treatments. In each group of three sows, the first sow was injected at minute 0, and observed from minutes 01:00, the second sow was injected at precisely minute 1:00 and observed from 1:00-2:00, and the third sow injected at 2:00 and observed between 2:00-3:00 minutes. At minute 3:00, the first sow once again was observed for an entire minute. This method was continued for 45 minutes (0-45:00). A list of specific criteria and behaviors (Table 1) was created from a preliminary experiment and from previous studies and was monitored for in this study.
STATISTICAL ANALYSIS

Data obtained from the SAS program was transformed from the duration and frequency to the proportion of time (per minute) performing the behavior. The Tukey test was used to determine mean differences between treatments and the t-test and s-test were used for testing normality and significance.

Table 1. ETHOGRAM OF BEHAVIORAL CATEGORIES USED

<table>
<thead>
<tr>
<th>Behavior</th>
<th>To Record:</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position-</td>
<td>(Count changes)</td>
<td>Standing fully upright on all four legs</td>
</tr>
<tr>
<td>Standing</td>
<td>↑</td>
<td></td>
</tr>
<tr>
<td>Lying</td>
<td>↓</td>
<td>Lying on belly or side with legs on ground</td>
</tr>
<tr>
<td>Sitting</td>
<td>S</td>
<td>Sitting upright with two front legs on the ground</td>
</tr>
<tr>
<td>In between</td>
<td>↑ or ↓</td>
<td>Moving between standing and lying, or sitting and lying positions</td>
</tr>
<tr>
<td>Bar Biting</td>
<td>Mark X</td>
<td>Biting of cage/crate bars or feeders: ≥1 bite per minute.</td>
</tr>
<tr>
<td>Scratching</td>
<td>Mark X</td>
<td>Rubbing or kicking at sides of belly with legs: ≥1 scratch per minute.</td>
</tr>
<tr>
<td>Defecating</td>
<td>Mark X</td>
<td>Self-explanatory</td>
</tr>
<tr>
<td>Vomiting</td>
<td>V (vomit) or W (wretch)</td>
<td>Expulsion of food or liquid from oral cavity, not foaming at mouth</td>
</tr>
<tr>
<td>Scratching on Bars</td>
<td>Mark X</td>
<td>Object scratch: rubbing head, back or sides against features of pen</td>
</tr>
<tr>
<td>Vocalization</td>
<td>G (grunt) or S (squeal)</td>
<td>Grunts, squeals: ≥1 vocal sound per minute to record.</td>
</tr>
<tr>
<td>Urination</td>
<td>Mark X</td>
<td>Self-explanatory</td>
</tr>
<tr>
<td>Pawing</td>
<td>Count # of times</td>
<td>Sweeping or dragging of front leg directed at floor (or wall)</td>
</tr>
<tr>
<td>Rooting</td>
<td>Count (if possible)</td>
<td>Oral/nasal contact with head movement directed at floor (or wall) must be two full, side-to-side movements per three seconds.</td>
</tr>
<tr>
<td>Tail Wagging</td>
<td>Mark X</td>
<td>At least one complete side-to-side or front-to-back movement of tail.</td>
</tr>
<tr>
<td>Licking Floor</td>
<td>Mark X</td>
<td>Tongue contact with floor: ≥1 per minute.</td>
</tr>
<tr>
<td>Chewing</td>
<td>F (food) or S (sham)</td>
<td>At least two open and shut jaw movements per two seconds. Mouth may be open and closed to eat.</td>
</tr>
</tbody>
</table>

RESULTS

When using either prostaglandin E₂₄₆ (Lutalyse) or prostaglandin analogue (Estrumate) and at different dose levels, parturition was induced. The mean hours to parturition for the L114 and E114 treatments was about 26.6 hours and 30.7 hours respectively. C114 resulted in 59 hours to parturition and C115 was 34 hours.

Position Change. During the 15 minutes post-injection that each sow was observed, the animals injected with Lutalyse showed a significant increase in the mean frequency of position changes (Figure 1, P < 0.05). The Lutalyse induced increase was significantly greater than the d114 control mean value and slightly greater than the Estrumate and time-matched control values, d115 control. C115 and induced sows displayed an increase in their fixture-directed behavior as compared to the C114 sows. This was most likely due to the 24-hour difference in pre-farrowing time.

Bar Biting. Figure 2 shows the frequency of bar biting, per minute, following treatment. The sows injected with Lutalyse (L114) had a higher frequency of bar biting compared to the
sows treated with Estrumate (E114). The mean difference was 0.18 bites per minute. L114 sows displayed increased bar biting behavior compared to the time controls (C115) and as expected the day 114 control (C114). Here the mean differences were 0.20 and 0.22 bites per minute respectively. Using Tukey’s Studentized Range Test, these differences are significant (P < 0.05). The mean difference in frequency of bar biting between the E114, C115 and C114 treatment groups was not significant.

**Figure 1.** Frequency of Position Changes, per minute

![Figure 1](image1.png)

**Figure 2.** Frequency of Bar Biting, per minute

![Figure 2](image2.png)

**Defecation.** Figure 3 shows a considerable increase in the frequency of defecation among sows injected with the Lutalyse treatment (L114). There was a significant mean difference between the L114 and control (C114, C115) treatments; the mean for both controls was 0.192 defecations per minute (P < 0.05). E114 treated sows also defecated slightly more than the control treatments and less than the L114 treatments, but the difference was not significant (P > 0.05).

**Number Born Alive.** There was a significant difference of 3.26 pigs between the L114 and E114 treatments (P < 0.05). There were no significant differences for the number born alive between the L114 and C115 or C114 treatments (see Figure 4).

**Stillborn.** Figure 5 reveals that there were no significant differences between any of the treatment groups in the number of stillborn pigs (P > 0.05). Also, there was less variation among
number of stillborns between the L114 and E114 groups than the L114 or E114 and the control groups. However, this difference was not significant.

Other behaviors. There were no significant differences (P > 0.05) between the L114, E114, C115, or C114 treatment groups for any other behaviors examined including: scratching, vomiting, scratching on bars, vocalizing, urination, pawing, rooting, tail wagging, licking floor, or chewing.

**Figure 3:** Frequency of Defecation, per minute

![Figure 3: Frequency of Defecation, per minute](image)

**Figure 4:** NBA of Treated Sows

![Figure 4: NBA of Treated Sows](image)

**DISCUSSION**

This study was performed during a three-month period on a large swine-producing herd. Thus, management and environment conditions were identical for all treated and control sows. Based on the mean values for all sows, it is evident that the treatments groups (L114 and E114) resulted in induction of parturition in less than 31 hours following injection, and the timed control (C115) in less than 35 hours after injection.
These results are similar to those of Hammond and Matty (1980) and Widowski et al. (1990) that showed single 10 mg doses of PGF$_{2\alpha}$ can successfully induce farrowing within 22-40 hours, and a 175 microgram dose of Cloprostenol can induce farrowing in 24-33 hours.

The incidence of sows experiencing side effects from the Lutalyse (L114) and Estrumate (E114) treatments was in some cases significantly different ($P < 0.05$), depending on the particular behavior. In sows treated with Lutalyse, an increase in the frequency of position changes, bar biting and defecation was apparent when compared to the Estrumate and control groups. These mean differences between L114 and E114 ranged from about 0.12 position changes/minute, to 0.13 bar bites/minute, to 0.18 defecations/minute.

Due to the relatively high incidence of these side effects following PGF$_{2\alpha}$ treatment, it has been suggested that producers consider using an alternative prostaglandin product (Diehl, et al. 1974a), such as Estrumate. In this study, sows treated with Estrumate experienced an increase in frequency of bar biting and defecation after injection. However, the differences between E114 and the timed control (C115) were not significant ($P > 0.05$).

The most likely reason for the increased number of side effects from Lutalyse compared to Estrumate was the increase in dosage, e.g. Lutalyse at 10 mg and Estrumate at only 175 micrograms. Friendship et al. (1990) compared different dosages of prostaglandin F$_{2\alpha}$ given im and via the vulvomucosal route. They found that, if administered via the vulvomucosal route, 5 mg of PGF$_{2\alpha}$ was as effective in inducing parturition as a 10 mg dosage given im. Also, the 5 mg vulvomucosal injection of PGF$_{2\alpha}$ resulted in fewer and less obvious reactions to the treatment and the side effects were less severe than the sows in the control groups. Diehl et al. (1974a) showed that a 5 mg a injection of PGF$_{2\alpha}$ induced 8 out of 10 sows to farrow. In another study Diehl, et al. (1974b) found no significant effect from either 5mg or 10mg of PGF$_{2\alpha}$. Further experiments examining the efficacy as well as the side effects of im injections of PGF$_{2\alpha}$ at different dosage levels need to be performed to support this theory.

**CONCLUSION**

The current study, like many previous studies, verified that it is possible to achieve farrowing with single injections of a prostaglandin F$_{2\alpha}$ (Lutalyse) or a prostaglandin analogue (Estrumate). However, this particular study showed that sows treated with Estrumate have fewer,
less intense side effects (i.e. increased position changes, bar biting, and defecation) than sows treated with Lutalyse.

REFERENCES


Receptive Language in Children with Developmental Apraxia of Speech

Jackie D. Long, McNair Scholar
Jeanne Johnson, Ph.D., Faculty Mentor
Carla Jones, M.A., Faculty Mentor
Department of Speech and Hearing Sciences

ABSTRACT

The purpose of this study was to determine whether different subgroups of children with developmental apraxia of speech (DAS), with and without receptive language impairment, were evident and to provide descriptive data on the degree of receptive language delays. Four subjects were first tested to determine the presence of DAS, and then used to examine receptive language skills. Three of the four subjects demonstrated significant receptive language deficits. This suggests that there are, in fact, subgroups within DAS. However, due to the small number of subjects tested further research is recommended.

LITERATURE REVIEW

Despite the recent surge of interest in developmental apraxia of speech (DAS), researchers have not yet succeeded in identifying any single distinctive feature of this disorder. There is then, little consensus among researchers and clinicians regarding the definition, etiology, and behavioral characterization of DAS (Davis, et al. 1998). However, the literature has yielded a baseline of commonly occurring behavioral characteristics of DAS which appear useful for diagnosis. Nevertheless, though there is a discrepancy between receptive and expressive language, clinical experience has shown that some children with DAS are, in fact, deficient in both receptive and expressive language. This then, both raises questions and generates controversy.

Developmental apraxia of speech (DAS) is “a neurologically based disorder in the ability to program movements for speech volitionally in the absence of impaired neuromuscular function” (Smith, et al. 1994, p. 82). A number of interchangeable terms have been used to describe children with characteristics of DAS. Theses include: apraxia, developmental articulatory dyspraxia, childhood verbal apraxia, developmental apraxia of speech, and developmental verbal dyspraxia. These terms reflect differing ideas regarding the cause of the disorder, rather than the defining characteristics. According to Jakielski, et al. (1998, p. 3): “Currently, those who view the disorder as motor-based use the term DAS, while those who view the disorder as language-based advocate for the term ‘developmental verbal dyspraxia.”

Children with DAS are typically unintelligible. According to Davis, et al. (1998), their speech is comprised of a limited phonemic repertoire, frequent omission errors, a high incidence of vowel errors, inconsistent articulation errors, altered prosody, and increased errors on longer units of speech output. They also exhibit significant difficulty imitating words and phrases, and a predominant use of simple syllable shapes.
The characterization of developmental apraxia was originally derived from apraxia of speech in adults. This disorder category is based on acquired brain damage resulting in difficulty programming speech movements (Broca, 1861). Morley, Court, and Miller (1954) first applied “dyspraxia” to children based on similarity of symptoms seen in adult apraxics (Davis, 1998). While apraxia of speech in adults is acquired, or “associated with cerebral lesions caused by degeneration or trauma, which occur after speech has developed” (Steinburg, 1980, pp. 8), the cause of developmental apraxia of speech in children is unknown. Gubbay, et al. (1965) suggested inadequate cerebral dominance, delayed maturation, and structural lesions as causal factors associated with this disorder. Rosenbek and Wertz (1972) and Yoss and Darley (1974) also report neurological abnormalities in children with DAS.

Several theories have been developed to explain DAS, but none have proven sufficient to account for the variety of characteristics present in children exhibiting the disorder. For example, one criteria commonly used to diagnose children with DAS is the discrepancy between the child's expressive (production) and receptive (comprehension) language. However, as mentioned previously, clinical experience has shown that this is not always accurate. To explain this inconsistency, Crary (1993) recently theorized that there are two subgroups of DAS depending upon location of involvement in the brain. Crary proposed a model for developmental motor speech disorders in which “overlapping motor and speech-language functions exist within the left-hemisphere ‘language areas’” (Crary, 1993).

The implication of this theory is that “although motor and speech dysfunctions may occur independently, there are cases in which dysfunctions in both may occur” (Crary, 1993, p. 59). Abnormalities located more posteriorly, in the area that controls receptive language, would result in receptive language delays along with DAS, whereas abnormalities located anterior to this area, would produce DAS characteristics only. This study will attempt to provide data on the possible extent of receptive language deficits in children with developmental apraxia of speech by asking the question: “Are there subgroups of children with DAS who do and do not evidence receptive language delays?”

METHOD

Subjects

Subjects included one boy and one girl. These two were tested by the examiner. Data for two additional female subjects were obtained from previously administered test protocols provided by other examiners. All four children had hearing within normal limits and were previously diagnosed with DAS.

Procedure

The Screening Test for Developmental Apraxia of Speech (Blakeley, 1980) was used to determine subjects' performance on speech and non-speech motor tasks. Because the psychometric properties of this test have not been examined, the reliability and validity of the test are unknown. Further, the scoring of this test relies partially on expressive language discrepancy, which is the variable at question in this research. Therefore, the results were not scored, but rather presented as a description of subjects' behaviors on the tasks described below:
**Vowels and Diphthongs:** The first subtest examined the subjects' ability to produce vowels and diphthongs. Each subject was asked to repeat words read by the examiner. There were two or three words for each vowel or diphthong target.

**Oral-Motor Movement:** For this subtest, subjects were asked to perform movements with his/her tongue and lips following the examiner's model.

**Verbal Sequencing:** Subjects were asked to imitate five sets of trisyllables (/p^t^k^/ /) and then to repeat each of the set of trisyllables three times (/p^t^k^-p^t^k^-p^t^k^/).

**Articulation:** Subjects were asked to repeat words modeled by the examiner. Each word contained a target phoneme in each of three word positions (initial, medial, and final).

**Motorically Complex Words:** Subjects were asked to imitate the correct production of long, difficult words three times. The words tested were “aluminum, linoleum and statistics.”

**Transpositions:** Subjects were again asked to repeat words modeled by the examiner. Transpositions or reversals and redundancies of sounds and syllables (metathetic errors) represent another aspect of difficulty in speech articulation said to be frequently present in the child with developmental apraxia of speech (see Rosenbe and Wertz, 1972). The words included in this subtest are designed to provoke transpositions (Blakeley, 1980).

**Prosody:** Connected speech was analyzed for deviations in rate, phonemic spacing, inflection, and stress.

**Listening Comprehension:** The listening comprehension portion of the Oral and Written Language Scales (OWES) (Carrow-Woolfolk, 1995) was administered to test subjects' receptive language skills. The reliability and validity of this test have been thoroughly examined and prior data demonstrate the internal consistency of the scores, the stability of the standard scores, interrater agreement, and the validity of the test. The examiner provided a verbal stimulus, and the subjects responded either by pointing to one of four pictures or by identifying the number of the picture (1, 2, 3, or 4) which matched the stimulus.

Finally, letters requesting copies of test protocols of children who had taken the Blakeley and either or both of the OWLS and the Peabody Picture Vocabulary Test (PPVT) (Dunn and Dunn, 1997) were sent to other clinics to obtain additional data. The PPVT also tests receptive language and is commonly administered as a subtest of the Screening Test for Developmental Apraxia of Speech. Because administration of the Blakeley and the PPVT is more common than the Blakeley in combination with the OWLS, results of the PPVT were also taken as an acceptable measurement of receptive language. In some cases, results of additional language tests were available and the scores were also noted. The receptive language skills of Subjects 1 and 2 were tested directly by the examiner, while information for Subjects 3 and 4 was provided by other sources. All data were analyzed descriptively.
RESULTS

Evaluations of the subjects revealed that three of the four children showed significant receptive language delays. Results for the four subjects are described according to DAS characteristics and receptive language skills. Table 1 summarizes the subjects’ receptive language scores.

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>GENDER</th>
<th>AGE</th>
<th>PPVT</th>
<th>OWLS</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AE</td>
<td>Percentile</td>
<td>AE</td>
</tr>
<tr>
<td>1</td>
<td>M</td>
<td>11-01</td>
<td>7-07</td>
<td>5th</td>
<td>6-09</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>6-06</td>
<td>8-06</td>
<td>9th</td>
<td>7-10</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>15-0</td>
<td>4-01</td>
<td>&lt;1st</td>
<td>93rd</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>6-10</td>
<td>3-07</td>
<td>1st</td>
<td>&lt;1st</td>
</tr>
</tbody>
</table>

*Age scores are presented as “years-months”.*

SUBJECT 1

Screening Test for Developmental Apraxia of Speech

*Vowels and Diphthongs:* Subject 1 was able to correctly produce 12 of 14 different vowels in words. One of the missed sequences was the / au / sequence. He was asked to say “now, out, cow,” and said / aut, mal, kau /. This response suggests that he was able to correctly produce the / au /, but had difficulty with sequencing. The other missed sound was / ^ /. When asked to say “mud, hut,” he said / m^d, hEt /. This inconsistency is typical of DAS.

*Oral-Motor Movement:* Subject 1 was able to produce all movements of the tongue with relative ease with the exception of placement of the tongue behind the upper teeth. On this task, he eventually achieved correct placement of the tongue, but showed significant difficulty. He was unable to produce sequences of lip protrusion-retraction.

*Verbal Sequencing:* Subject 1 was able to correctly produce each set of trisyllables on either the first or second trial. However, when asked to repeat each set of trisyllables three times, he was unable to do so correctly for any set on any of the three trials.

*Articulation:* Errors were as follows for each position in words:

<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Initial</th>
<th>Medial</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>/j/</td>
<td></td>
<td></td>
<td>distortion</td>
</tr>
<tr>
<td>/s/</td>
<td>w / r</td>
<td>z / s</td>
<td>omission</td>
</tr>
<tr>
<td>/r/</td>
<td></td>
<td>f /</td>
<td>omission</td>
</tr>
<tr>
<td>/t /</td>
<td></td>
<td>d / t</td>
<td></td>
</tr>
<tr>
<td>/v/</td>
<td></td>
<td></td>
<td>omission</td>
</tr>
<tr>
<td>th (voiced)</td>
<td></td>
<td></td>
<td>omission</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>v / 3</td>
<td></td>
</tr>
</tbody>
</table>

It should also be noted that on first attempt at a series of words, Subject 1 made frequent sequencing errors. For example, when presented with “Santa-bicycle- miss,” he said “Santa-miss-bicycle.”
Although the subject's speech revealed many inconsistencies, as is characteristic of developmental apraxia of speech, a few error patterns were noted. For example, final consonant omission was observed several times, especially when the final consonant was a fricative. Also, labiodental sounds were substituted for linguopalatal sounds. 

**Motorically Complex Words:** Subject 1 was able to correctly produce “aluminum” on his first try. However, he was unable to produce the other words on any of the trials.

**Transpositions:** Errors are as follows:

<table>
<thead>
<tr>
<th>Target Word</th>
<th>Subject 1’s Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>package</td>
<td>/ paesIdI /</td>
</tr>
<tr>
<td>difficult</td>
<td>/ dlvIdo /</td>
</tr>
<tr>
<td>horrible</td>
<td>/ hrblI /</td>
</tr>
<tr>
<td>plastic</td>
<td>/ plaezl /</td>
</tr>
<tr>
<td>accident</td>
<td>/ aez dl /</td>
</tr>
</tbody>
</table>

For the majority of the words, he was able to correctly produce the initial consonant, but deleted the final consonant.

**Prosody:** Rate and spacing were affected by the subject's difficulty in pronouncing various words, but inflection and stress were relatively normal.

**Oral and Written Language Scales**

Subject 1 (11 years 1 month) scored at an age equivalency level of 6 years 9 months (see Table 2). This placed him below the first percentile for his age group. These results indicate extremely poor receptive language. Examination of the subject's incorrect responses indicate difficulty with sentences including negation and prepositions. In addition, sentences or descriptions with several parts or complex wording were frequently missed. The subject may not have used contextual cues or may have had limited meanings for words, which was noted on one particular question where the subject confused the word “cap” as in hat for “cap” as in lid.

**Peabody Picture Vocabulary Test-III**

The PPVT-III placed Subject 1 in the 7 year 7 month age range. This is in the fifth percentile, which is clearly a low score.

**SUBJECT 2**

**Screening Test for Developmental Apraxia of Speech**

**Vowels and Diphthongs:** Subject 2 correctly produced all vowels and diphthongs.

**Oral-Motor Movement:** Although she was able to perform multidimensional movements of the tongue, Subject 2 showed significant difficulty with sequences of lip protrusion-retraction.

**Verbal Sequencing:** Subject 2 was able to imitate each set of trisyllables as well as repeat each set three times within at least three trials.
Articulation: Errors were as follows:

<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Initial</th>
<th>Medial</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>/r/</td>
<td>w/r</td>
<td>w/r</td>
<td>w/r</td>
</tr>
<tr>
<td>/ /</td>
<td>s /</td>
<td>s /</td>
<td>s /</td>
</tr>
<tr>
<td>th (unvoiced)</td>
<td>f / th</td>
<td>f / th</td>
<td>f / th</td>
</tr>
<tr>
<td>3</td>
<td>z / 3</td>
<td>z / 3</td>
<td>z / 3</td>
</tr>
</tbody>
</table>

Motorically Complex Words: The subject was unable to correctly produce these words.

Transpositions: Errors are as follows:

<table>
<thead>
<tr>
<th>Target Word</th>
<th>Subject 1’s Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>hamburger</td>
<td>/ haemb go /</td>
</tr>
</tbody>
</table>

Prosody: Prosody was normal.

Oral and Written Language Scales

Subject 2 (age 6 years and 6 months) scored at the 7 year 10 month age range. This placed her in the 79th percentile, indicating normal to above average receptive language skills.

Peabody Picture Vocabulary Test-III

The PPVT-III was also administered and indicated above average receptive language skills. Subject 2 placed in the 90th percentile, or 8 year 6 month age range.

SUBJECT 3

Screening Test for Developmental Apraxia of Speech

Vowels and Diphthongs: Subject 3 was able to produce 12 of 14 different vowels in the words. One of the missed sounds was / au /. She was asked to say “now, out, cow,” and said / mafn, aut, kau /. The other target sound was / ou /. She was asked to repeat “hoe, no, go,” and said / hi, gou /. Her production indicated that she was sometimes able to produce the sound, but was unable to repeat the sequence. This is typical of DAS.

Oral-Motor Movement: Although she was able to perform multidimensional movements of the tongue, Subject 3 was unable to produce sequences of lip protrusion-retraction.

Verbal Sequencing: Subject 3 was unable to produce / p^t^k^ /, / k^t^p^ /, / t^t^p^ /, or / k^k^t^ / on any trial. However, she did produce / p^p^t^ / on four trials. When asked to repeat each set of trisyllables three times, she was unable to produce the / t^t^p^ / sequence or the / p^p^t^ / sequence on any of the three trials.
Although Subject 3’s speech was appropriately inconsistent for her diagnosis as apraxic, a few error patterns were noted. For example, on two occasions, she shortened three syllable words to two syllables. In addition, Subject 3 either omitted the linguadentals “th” (voiced) and “fu” (unvoiced) or substituted labiodentals ( / f / and / v / ). Finally, substitutions or omissions were noted for the liquids / r / and / l /.

**Articulation**: Errors were as follows:

<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Initial</th>
<th>Medial</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>/n/</td>
<td>m / n</td>
<td>/name^/ for banana</td>
<td></td>
</tr>
<tr>
<td>/t/</td>
<td>k / t</td>
<td>/ keo/ for potato</td>
<td></td>
</tr>
<tr>
<td>/w/</td>
<td></td>
<td>omission</td>
<td></td>
</tr>
<tr>
<td>/b/</td>
<td>d / g</td>
<td>d / g</td>
<td>omission</td>
</tr>
<tr>
<td>/g/</td>
<td></td>
<td>omission</td>
<td></td>
</tr>
<tr>
<td>/j/</td>
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<td>t / s</td>
<td>omission</td>
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<tr>
<td>/s/</td>
<td>w / l</td>
<td>w / r</td>
<td>/r ( /ka^/)</td>
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<tr>
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<td>/t</td>
<td>/t</td>
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<tr>
<td>/d3/</td>
<td>d / d3</td>
<td>3 / d3</td>
<td></td>
</tr>
<tr>
<td>th (unvoiced)</td>
<td>f / th</td>
<td>f / th</td>
<td></td>
</tr>
<tr>
<td>/z/</td>
<td>d / z</td>
<td>s / z</td>
<td>omission</td>
</tr>
<tr>
<td>/v/</td>
<td>v / th</td>
<td>v / th</td>
<td>omission</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>omission</td>
<td></td>
</tr>
</tbody>
</table>

**Motorically Complex Words**: The subject was unable to produce any of the words on any of the trials.

**Transpositions**: Errors are as follows:

<table>
<thead>
<tr>
<th>Target Word</th>
<th>Subject 3’s Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>basket</td>
<td>/ baesIt /</td>
</tr>
<tr>
<td>hamburger</td>
<td>/ haembo /</td>
</tr>
<tr>
<td>music</td>
<td>/ muzI /</td>
</tr>
<tr>
<td>package</td>
<td>/ paetI /</td>
</tr>
<tr>
<td>elephant</td>
<td>/ Ef n /</td>
</tr>
<tr>
<td>girl</td>
<td>/ d^/</td>
</tr>
<tr>
<td>hockey</td>
<td>/ hakI /</td>
</tr>
<tr>
<td>difficult</td>
<td>/ dIr^l /</td>
</tr>
<tr>
<td>horrible</td>
<td>/ hab^/</td>
</tr>
<tr>
<td>plastic</td>
<td>/ paetI /</td>
</tr>
<tr>
<td>accident</td>
<td>/ aesI /</td>
</tr>
</tbody>
</table>

Subject 3 reduced all of the three syllable words in the section into two syllables. For the majority of the words, she was able to correctly produce the initial consonant correctly, but deleted the final consonant.
**Prosody**: Subject 3’s rate was increased intermittently resulting in the alteration and/or deletion of sounds and syllables which reduced intelligibility. However, both the inflection and stress in her voice were appropriate.

**Peabody Picture Vocabulary Test-III**

The PPVT-III was administered by a professional speech-language pathologist and placed Subject 3 (age 15 years) in the 4 year 1 month age range for vocabulary. This indicated a severe deficit in receptive language skills.

**Test of Adolescent Language-2**

The following are the results of the TOAL-2:

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Percentile Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening/Vocabulary</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Listening/Grammar</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

The percentile rank of less than 1% reveals that Subject 3’s performance is greater than three standard deviations from the norm. This confirms a serious deficit in receptive language skills.

**SUBJECT 4**

**Screening Test for Developmental Apraxia of Speech**

**Vowels and Diphthongs**: Subject 4 correctly produced all vowels and diphthongs in the stimulus words.

**Oral-Motor Movement**: Subject 4 performed all oral-motor movements successfully.

**Verbal Sequencing**: Subject 4 she was unable to imitate any set of trisyllables, as well as repetition of trisyllable sets, on any trial.

**Articulation**: Errors were as follows:

<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Initial</th>
<th>Medial</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>/f/</td>
<td>p / f</td>
<td>p / f</td>
<td></td>
</tr>
<tr>
<td>/ng/</td>
<td></td>
<td>k / g</td>
<td>n / ng</td>
</tr>
<tr>
<td>/g/</td>
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<td>k / g</td>
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<td>/d/</td>
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<tr>
<td>/j/</td>
<td>1 / j</td>
<td>omission</td>
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<td>/s/</td>
<td>t / s</td>
<td>k / s</td>
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</tr>
<tr>
<td>/l/</td>
<td>w / r</td>
<td>omission</td>
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</tr>
<tr>
<td>/r/</td>
<td></td>
<td>d / d3</td>
<td>s / d3</td>
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<tr>
<td>/l/</td>
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<td>t / t</td>
<td>/t</td>
</tr>
<tr>
<td>/d3/</td>
<td></td>
<td>d / d3</td>
<td></td>
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<tr>
<td>th (unvoiced)</td>
<td>d / th</td>
<td>f / th</td>
<td>s / th</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>k / 3</td>
<td>/3</td>
</tr>
</tbody>
</table>
**Motorically Complex Words:** Subject 4 was unable to produce any of the words on any of the trials.

Subject 4 reduced all three-syllable words into two syllables and deleted some fricatives.

**Prosody:** Prosody was rated according to the test protocol as readily apparent and adding a distinct characteristic to the subject's speech.

**Transpositions:** Errors are as follows:

<table>
<thead>
<tr>
<th>Target Word</th>
<th>Subject 4’s Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>basket</td>
<td>/baekEt/</td>
</tr>
<tr>
<td>hamburger</td>
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</tr>
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<td>/mju k/</td>
</tr>
<tr>
<td>package</td>
<td>/paekEts/</td>
</tr>
<tr>
<td>elephant</td>
<td>/EpEnt/</td>
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<tr>
<td>difficult</td>
<td>/dIk t/</td>
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<tr>
<td>horrible</td>
<td>/h^pl/</td>
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<tr>
<td>plastic</td>
<td>/paek t/</td>
</tr>
<tr>
<td>accident</td>
<td>/aekEnt/</td>
</tr>
<tr>
<td>nose</td>
<td>/nos/</td>
</tr>
</tbody>
</table>

**Peabody Picture Vocabulary Test-Revised**

The PPVT-R placed Subject 4 (age 6 years 10 months) in the 3 year 7 month age range and the first percentile, indicating very poor receptive vocabulary.

**DISCUSSION**

To date, research has not determined the existence of subgroups of children with developmental apraxia of speech who do and do not evidence receptive language delays. In fact, it was not until recently that the possibility of such subgroups was even examined. Crary (1993) hypothesized that overlapping motor and speech-language functions in the left hemisphere will create situations in which motor and speech-language dysfunctions occur simultaneously. Testing the receptive language skills of children with developmental apraxia of speech, Crary also hypothesized that subgroups of children with and without receptive language deficits would emerge. The findings of this study supported the hypothesis, and provide initial evidence of receptive language deficits in children with DAS.

The children tested in this study were all previously diagnosed by a professional speech-language pathologist as having DAS, but were retested using the *Screening Test for Developmental Apraxia of Speech*. This allowed current examination of their speech and motor skills. Performances of all subjects were in agreement with previous diagnoses.

Results of the language portion of this study indicated that three of the four children tested showed significant receptive language delays. The only inferences that can be safely taken from this study are that there are DAS children with receptive language deficits and there may be children without these deficits. Due to the small number of subjects additional research is needed to examine the receptive language skills of children with DAS.
The receptive language scores of Subjects 1, 3, and 4 are inconsistent with the current diagnostic criteria that receptive language is innate. Subject 2’s scores also stand out as not only equivalent or above her expressive language skills, but above most children her age. Because current diagnostic tests and treatment approaches for this disorder were developed under the assumption that children with DAS possessed normal language skills, revision of these tests and techniques is critical to accommodate the specific needs of children who are delayed in this area. For example, diagnostic tests with complicated or lengthy verbal instructions may not be understood by a child with receptive language delay, thus compromising the validity of that test.

Finally, these findings suggest that a child with receptive language delay will likely benefit from instructions involving imitation of the tasks to be performed to ensure that the directions are understood and that the test is examining DAS, not the child’s receptive language. Clearly, research is also needed to provide a more reliable set of data on the prevalence of receptive language delay in children with DAS. Additional research on the cause of these receptive language delays is recommended.

REFERENCES


“In the U.S.A. -- It’s English or Adios Amigo:” The Politics of Race and Language in the Yakima “Old Town Pump” Court Case

Cecilia A. Martínez Vásquez, McNair Scholar  
José M. Alamillo, Ph.D., Faculty Mentor  
Departments of Comparative American Cultures and Political Science

ABSTRACT

On November 10, 1995, Michael Cantú, Carlos Olivera and Enrique Mendoza were ejected from the “Old Town Pump” tavern in the Yakima Valley, Washington, for speaking Spanish. This rural area is known for its growing Mexicana-o/Latina-o population and its major agricultural productions. Immediately after the incident, the three men filed a civil action lawsuit against the tavern owner for discrimination. Considering the changing racial-ethnic demographics of Yakima and other rural communities as well as the court system’s negative treatment of Mexican Americans in the United States, I examine the politics of race and language in the “Old Town Pump” court case. This is accomplished through a critical analysis of court transcripts, local newspaper articles, court testimonies and an interview from a local radio station. I argue that the legal system and larger community of the Yakima Valley used racialized language to depict the three Mexican males as “criminals,” thus highlighting ways in which language and racial differences underlie race, class and gender tensions in the Yakima Valley community.

INTRODUCTION

The “Old Town Pump” case involved three Mexican men who were ejected from a tavern for speaking Spanish. The three plaintiffs, Michael Cantú, Carlos Olivera and Enrique Mendoza, accused the tavern owner, defendant Joyce Rae Ostrander, of racial discrimination for allegedly refusing to serve them alcohol and ejecting them from the bar because of their race. As evidence of this claim, they noted that a sign stating “In the U.S.A. it’s—English or adios amigo” was hanging in the tavern before and a few days after the incident. Several months later, the men filed a class-action lawsuit in the Yakima County Superior Court against Mrs. Ostrander.

Almost immediately following the defendant’s lawsuit notification, the Yakima Herald Republic contacted the defendant to ask for her reaction to the lawsuit. Mrs. Ostrander responded to that local newspaper by stating… “[w]e have the right to refuse service to anyone, …[t]his is America, where English is supposed to be the main language. We don’t want Spanish gibberish here, and we mean it” (Rose, “Nationalism” A1). After this response, other media sources focused their attention on the incident because it was the first lawsuit to highlight the racial tension between whites and Mexicans in the Yakima Valley, and Washington in general.

The “Old Town Pump” case is important because it focuses on the difficulties of race relations in the Yakima Valley area. The racialized language illustrated in this case serves to
highlight the racial tensions caused by the inability of Whites, subjected to racist ideology, to respond to the changes in the racial and ethnic demographics of the Yakima Valley including the recent influx of Hispanic families to the region. According to the 1990 census, Yakima County’s Hispanic population was estimated to be 45,114. The latest population count made by the 2000 census showed an increase in the Hispanic community to 79,905 (United States Census Bureau, 2001).

The “Old Town Pump” case also illustrates different forms of covert and overt racial prejudice and racial discrimination found in the legal system and community of the Yakima Valley. Examples of covert and overt racial prejudice and discrimination are illustrated in the testimonies of the defense attorney, the defendant, witnesses, and the responses of the local residents to the incident. The defense attorney depicted the plaintiffs as “criminals” and “foreigners,” thus employing unfounded racist stereotypes. At the same time the “criminal” record of the plaintiffs was used to discount the testimonies and stories of the three Mexican men. The defense attorney argued that the plaintiffs were not a “reliable” or “believable” sources of information because they had “criminal” records. In a litigation process this legal strategy is commonly used to discredit the opposing party. As a rhetorical strategy, it promotes common negative cultural stereotypes in popular culture and the media.

LITERATURE REVIEW

A common concern among ethnic minority groups has been the existence of racial bias in the court system. The increasing concern with racial disparity has generated research that attempts to identify the causes of and possible solutions to existing racial tensions.

In 1988, Peggy C. Davis (1989) conducted a study to determine whether minorities believe the court system to be racially biased. The study concluded that ethnic and racial minority people in New York, and elsewhere in the United States reported, with conviction, that the law will work against them. In addition, this study found that minorities are more likely than other “Americans” to doubt the fairness of the court system.

In another study, Sheri Lynn Johnson’s “Black Innocence and the White Jury” (1985) analyzed the ways in which racial bias influences the determination of whether a person of color is found innocent or guilty of a crime. Johnson found disparities in the way people of color are treated and judged when dealing with the court system. Furthermore, Johnson argues that the race of the victim and defendant have a great impact on the determination of guilt and length of sentence if conviction is the outcome.

Given the issues identified by Johnson and Davis, research has been extended beyond the black and white dichotomy to include other groups. To gain a better understanding about how the courts interact with immigrants, Bauer (1999) investigated how culture affects the status of Latin American immigrants in the U.S. legal system. She found that language and cultural differences affect the way in which court officials perceive immigrants. Bauer noted that cultural differences in communication between immigrants and court officials often lead to erroneous judgments on the part of court officials.

In a recent study of Mexican immigrants, Mendez (1997) sought to explain the manner in which Mexican immigrants suffer the consequences of being culturally “different” in their interaction with the court system. Mendez found that the limited English skills of Mexican immigrants become a problem during litigation proceedings. Further, the absence of interpreters for Mexican immigrants complicates the understanding of the legal proceedings during the process of court litigation. Thus, their status as the cultural “other” becomes a barrier for Mexican and Latino/a immigrants in the US legal system.
In still another study, Edwardo L. Portillos (1998) examined the disadvantages resulting from stereotypical notions that court officials have about ethnic minority groups. Portillos explained that Latinos/as’ perceptions of cultural differences in the legal system feed into dominant racial stereotypes found in “American” culture. Portillos argues that police and courts often perceive Latinos/as to be “gang members,” “drug dealers” and “violent criminals.” As a consequence, these stereotypes have an indirect impact on the way in which court officials handle cases dealing with Latinos/as. These stereotypes, then, contribute to the manner in which legal officers interact with and treat Mexican court defendants and plaintiffs.

The racist perceptions of Mexicans described by Portillos continue to be commonly expressed in small agricultural communities such as the Yakima Valley. As the largest Hispanic group, Mexicans have experienced an increasing number of racial discrimination incidents. These incidents have appeared in newspapers and broadcast news and have gained national attention. The “Old Town Pump” tavern incident is one of these highly publicized cases.

**RESEARCH QUESTION**

I am concerned with what the racialized language in the “Old Town Pump” court case defense arguments, testimonies, and community responses reveals about Mexican /Anglo relations in the Yakima Valley. I examine the racialized language used to depict the three Mexican men as “criminals.” I also look at the social construction of “Mexicans” as racialized “Others” and how this was used to deny the Plaintiffs equal membership in the local community; racialized members with no claim to the benefits of U.S. citizens. In this way, I show that the Plaintiffs were put on trial simply for “being Mexican” and “speaking Spanish” rather than treated as victims of racial discrimination. What emerges in this case is the question of whether Mexican Americans with their own ethnicity/race identity and language, can be fully accepted as an integral part of the Yakima Valley citizenry and the larger “American” community in general.

**METHODS**

Qualitative data were collected from two local newspapers: the *Yakima Herald Republic* and *El Mundo*. The information from newspapers was derived from personal interviews, legal documents and letters written by local residents of the area. Additionally, a transcript of the court case, Michael Cantú, Carlos Olivera, and Enrique Mendoza vs. Joyce Rae Ostrander, d/b/a “Old Town Pump,” was examined. The transcript contained information recorded by the legal interpreters. An interview conducted by the local radio station, Radio KDNA, and recorded as part of an updated news report of the incident, was also examined.

**DISCUSSION**

The racialized language used in the “Old Town Pump” litigation proceedings and by community supporters perpetuates, normalizes and institutionalizes common stereotypes associated with a working-class Mexican community. This includes terms such as: “poor,” “gangsters,” and “criminals.” In this case, the attorney constructed the following scenario: A respectable Anglo defendant is accused of wrong doing by Plaintiffs from an ethnic minority group, which happens to have engaged in previous “criminal activities.” The defense attorney stated, “[i]n the face of this evidence, Plaintiffs’ offered only their own self-serving statements. Whether such claims might be sufficient to defeat summary judgment in other cases… in the case
of discrimination, ‘treatment, [is] the basis for liability, not a complainants’ subjective feelings’” (Defendants’ reply Brief-2). In this statement, the attorney suggests that the plaintiffs are an unreliable source of information, and that the sensitivity of the Plaintiffs is overstated and less important than that of his client. In addition, the attorney stated that his client is the victim of the evil intentions of “criminals,” and that she was incapable of acting with racial prejudice or exhibiting discriminatory attitude against ethnic minority groups. The defense attorney stated, “([m]inority status) doesn’t give the person the right to disregard the rules that the rest of us have to follow, …[w]e should applaud Ms. Ostrander for her efforts to keep drunks off the road” (Green, “TV” C1). Here the defense permits discrimination as long as one has a justification for doing it. What the attorney was doing in this statement is yet another example of institutional racism and prejudice. Now people know that it is okay to discriminate because there is no punishment for doing it. It is obvious that the Plaintiffs’ race was an issue in this case and the previous statement is evidence of it.

In the same way, the five witnesses testifying in court on the incident used racialized language to describe the Plaintiffs. These testimonies also contributed to the image of the Plaintiffs as “violent,” “aggressive” and “criminal” individuals. This is especially true because the Plaintiffs were speaking Spanish, a language that according to the witnesses no one, other than the Plaintiffs and their Anglo companion, could understand. Jeffrey W. Rhodes, witness, offered his opinion about the lawsuit stating: “…this whole incident I believe did not occur because of race, creed or religion. I believe it simply occurred because of the three plaintiffs’ intoxicated, obnoxious, loud behavior. And, when the three were cut off and asked to hold it down or get out, it then became revengeful on the plaintiffs part” (Declaration of Jeffrey Rhodes—2).

Wendy Matney, a bartender present the night of the incident added: “Jeff Alder, the other gentleman that was with the three, has informed me that he was offered one-fourth of the money they get from this lawsuit if he backs up the story of what happened” (Declaration of Wendy Matney—2). Although her statement was used against the Plaintiffs, there was no evidence that Mr. Alder was in fact given this offer. According to the court’s records Mr. Alder was not called to testify at any time. Clearly this is evidence not normally allowed in court.

The community also had an opinion about the Hispanic population in the valley. These sentiments were expressed in letters to the editor published in the local newspaper. The issues of language and race, which were the focus of the litigation, were also directly connected to the sentiments expressed by the larger community with regard to the Mexican/Hispanic community. A community member that accompanied Mrs. Ostrander during an interview said: “[w]e don’t need to listen to Spanish, we don’t know what they’re saying. They could be across the room plotting to rob this place” (Rose, “Nationalism” A1).

Additionally, a large segment of the community referred to the Mexican/Hispanic community as unwelcome migrant residents, foreigners or seasonal immigrants. This sentiment of invasion on the part of the long-time settlers of the area infers a sense of “otherness” with regard to the Mexican/Hispanic community. These sentiments are very important to consider when discussing court cases of discrimination. Those same sentiments reflect the reasons why many incidents of discrimination are not reported, that is, for fear of retaliation. Other times, incidents such as the “Old Town Pump” case are not reported because of the Plaintiffs’ fear that court officials, who are generally Anglo, will not penalize the accused. At the same time there is the belief that court officials have also internalized the feelings expressed by the larger community.

With the rejection of the language of newly arrived residents is the feeling of unwelcome. This same feeling was expressed when a writer to the editor stated:
We have adopted English as our main language. If you go to another country to live, you adopt their primary language. We are loosely referred to as ‘Little Mexico.’ Yakima isn’t what it used to be, a nice and safe retirement town (not city), a good place to raise your children. Not anymore. My parents are thinking of moving from this ‘nice retirement town.’ As far as raising my children here, not a chance! My hometown is Yakima and I used to be proud of it (Emerick, “Letter” F5).

This statement illustrates underlying racial hostilities that were being voiced openly as a result of ‘The Old Town Pump’ incident. Another example of these sentiments is expressed by a community member who stated: “…Native Americans were forced, yes, forced to learn English and use it as part of our daily lives, so should other people who ‘come’ to the United States. [Or] are they the new conquerors of the ‘U.S.’ now?” (Tomeo, “Letter” F). Finally, another resident illustrated the sentiment of exclusion in a statement:

[w]e the locals can’t be expected to change an entire society to fit the demands of a few outsiders. I believe the people from other countries who can’t or won’t adapt to our society don’t like it here. When the host community doesn’t change they call it institutional racism and discrimination. The solution to the Hispanic problems in Yakima is simple and reasonable: Adopt and be welcome, or leave (Goss, “Letter” F5).

Again, the reactions from those favoring the actions of Joyce Ostrander were not only well expressed, but they also illustrated sentiments that are directly connected to how the legal system works and who it favors.

The local Latina/o community was not surprised by comments such as those expressed above. For example, according to one report: “Reyes-Colon said he was unnerved by the Old Town Pump’s policy, but not surprised. ‘It fits the growing fear and ignorance in people who think they’re being left out as the American pie gets bigger,’ he said. ‘But they have to face it. Hispanics will soon be the largest minority group in the United States. We’re here, and we’re going to stay’” (Rose, “Nationalism” A1).

LIMITATIONS AND RECOMMENDATIONS

This project was undertaken as preliminary research for a larger project. Given time limitations, some important elements were not available. This included personal interviews with all parties involved in the case and with community leaders. Many of the individuals involved had left the community and others were simply not reachable. Additionally, only limited research studies on race relations in Yakima Valley and Washington were available as background information. Finally, a pool of similar cases is needed for comparative purposes and to establish a pattern to support these findings. Although similar cases have been reported, court transcripts were not available at the time of the study.

This study has opened a window of opportunity for future research in the Yakima Valley area. Recommended future research includes: conducting interviews of all parties involved in the “Old Town Pump” case; examining similar court cases; and examining the relationship between the Latina/o community and the legal system in the Yakima Valley.
CONCLUSION

The message is clear. There is no room for new arrivals or for change. The long-time settlers don’t want Mexican/Hispanic immigrants to become part of the Yakima Valley community. Many of these newly arrived residents are not seasonal workers. They bring their families with them and yet they are treated as foreigners. This is the case of the three Mexican men. Two of them speak English and have been raised in the Yakima Valley. Thus, the issue is not so much that they don’t know English or that they needed to learn it in order to blend in. However, in spite of this, for speaking Spanish they were perceived as Mexican/Hispanic seasonal workers that residents don’t like.

After reading the reactions of the supporters of Joyce Ostrander, it is almost impossible not to speculate that the “Colorblind Society” by which the legal system in the Yakima Valley is guided by is biased. These comments revealed not only a direct connection to the Judge’s verdict, “[w]hile Ms. Ostrander’s sign and comments demonstrated what I consider an incredible lack of sensitivity to the plaintiffs, I find for the defendant” (Green, “Judge” A1). However, the comments expressed above suggests that Mrs. Ostrander’s sentiments towards Spanish speaking residents are shared by many other community members, regardless of whether they consider themselves racist. All of these people live and work in the Yakima Valley area. They have contact with the Mexican/Hispanic community, which they refer to as a “problem.”

Although the articles published in the newspaper do not state the professions these people practice, one must assume that they are likely to be part of the legal system that comprise the jury pool in court cases in the Yakima Valley area. These people might be business owners, professionals, and/or the people hired to assist the community. This is especially important to consider when looking at the racial demographics of the Yakima Valley.

The concerns, stereotypes, sentiments and speculations expressed by these community members are common amongst growing communities in the Yakima Valley. However, these same judgments run the risk of becoming institutionalized and normalized into the daily lives of the community members and legal system. In a similar vein, the social construction of Mexicans/Hispanics as “foreigners” does not allow this community to establish roots in the local community. It also makes it easier for public assistance agencies to justify ignoring the needs of the Latino/a community. Consequently, when an economic crisis arrives, support for repatriation, harassment, and intimidation of Mexicans/Hispanics becomes accepted without fear of sanctions. When racial discrimination is not addressed as in the case of the “Old Town Pump” tavern, those discriminated against are automatically portrayed as deserving such treatment for one reason or another.

REFERENCES

The Role of Stereotype Internalization in Defining Normative Behavior Among Black Students in Predominantly White Institutions

Erica Matthews, McNair Scholar
Yolanda Flores Niemann, Ph.D., Faculty Mentor
Department of Comparative American Cultures

ABSTRACT

The purpose of this research is to determine whether some African American students enrolled in a predominantly white institution (PWI) act out ascribed behaviors as a result of perceived group norms. Thirty-two African American students (18 male and 14 female) at a PWI were surveyed. Respondents were questioned about: (1) their perceptions of how African Americans behave; (2) how they personally behave; and (3) how their immediate peer group behaves with respect to ascribed black stereotypes. Initial results revealed a strong correlation between the respondents’ behavior and their perception of how their peers and other African American students behave. These findings suggest that some black students at this PWI may internalize at least some stereotypes regarding their behavior and academic performance, and behave accordingly.

INTRODUCTION

The title of a recent book asks, "Why are all the Black kids sitting together in the cafeteria?” (Tatum, 1997). An underlying assumption prevails in the United States that African Americans are a naturally homogenous group. What has not been addressed is whether the negative self-perceptions of students affect normative group behavior within the black academic community. It has been proposed by some that attitudes and perceived norms apply independent and additive effects on behavioral objectives, which, in turn, influence obvious behavior (see Terry, 2000). The question addressed here is: how are these attitudes and perceived norms created and maintained within the African American student population? Individual perceptions and their effects on intergroup behavior need to be considered when seeking the answer to this question.

Intergroup behavior and social identity models (e.g., Tajfel, 1971) assert that individuals categorize their social world into distinct social groups. In these models, “group” is defined as a collection of individuals assembled on the basis of internal and external criteria (Tajfel, 1982). Further, choosing a group to belong to plays a significant role in the creation of an individual’s identity.

The need to assimilate into a group, in addition to how an individual chooses a social group, is described in Tajfel’s (1971) social identity and intergroup behavior model. Tajfel’s position is that social categorization is a function of society, and a group serves the individual as a function of his or her social identity (Tajfel, 1982). Students entering a new environment such as
college are likely to position themselves into a group or social category as a function of their growing self-identities (Chavous, 2000).

Social identities classify an individual’s place within a community’s social order (Tajfel, 1971). A social identity establishes what kind of social, economic, and political privileges will be given to an individual (Chavous, 2000). Tabbie Chavous (2000) claims that in the United States, one’s phenotype is the determining factor in a person’s social identity. Chavous states that “race essentially is used as a defining category for students for comparative purposes.” This implies that African American students entering a PWI may be singled out and identified according to their physical appearances.

One reaction that may take place within an individual who is incapable of leaving his social category is to interpret the attributes of the group so that its unwelcome features, (e.g., low status) are either justified or made acceptable through reinterpretation (Tajfel, 1974). This research proposes that black students at PWIs may interpret ascribed stereotypes as normative, positive, “black” behavior.

Cross’ (1971) model of psychological nigrescence, or black self-actualization, infers a Negro-to-Black conversion experience (Parham and Helms, 1985). Nigrescence theory proposes that there are five distinct stages to the “nigrescence” phenomenon. These stages, as described by Cross (1971), are preencounter, encounter, immersion-emersion, internalization, and internalization-commitment. Immersion-emersion is a phase in nigrescence in which the African American idealizes what he or she believes to be “black” or “blackness” (Cross, 1971, 1978). Individuals immerse themselves in everything they consider to be “black”; “…Everything of value must be black or related to blackness” (Parham and Helms, 1985). Black students at PWIs are likely to be engaged in the immersion-emersion stage of racial identity development due to their age range and minority status, and are more likely to assert their “blackness” while experiencing immersion-emersion (Parham and Helms, 1985a).

Cross posits that his model of the African American identity process is one that occurs under conditions of perceived oppression (Cross, 1971, 1978). Further, and “[a]ccordingly, self-actualization and feelings of self-acceptance were preceded by feelings of inferiority, shame, guilt, and rage, as well as feelings of black pride” (Parham and Helms, 1985). Black students, in the manner of African American stereotypical behavior, may act out internalized feelings of inferiority, shame, and rage. For example, black students on PWIs may criticize those who receive “A”s in their classes for trying to act “white.” They unknowingly assert their ascribed mental inferiority, and maintain group stereotypes.

The repertoire of beliefs concerning blacks in America can be construed as Eurocentric idealism (Parham and Hale, 1985). William Helmreich concludes that in the U.S., there exists an attitude, often shared by both whites and blacks, that African Americans are inferior to European Americans. Negative stereotypes, then, have become the definition of what it means to be black in the U.S. This, in turn, may develop into normative group behavior in some situations or under some circumstances.

According to social norms theory, individuals monitor and change their behavior in order to conform to perceived norms (Berkowitz, 2000). These perceptions may not reflect reality, but an individual’s behavior, as well as the consequences of that behavior, is real nonetheless. A number of particular behaviors may be ascribed to a specific group, such as those behaviors traditionally assigned to African Americans (Miller, et al. 2000). This behavior distinguishes the group from others, and also serves to solidify group relationships by giving them something that they share in common (Miller, et al. 2000). When considering black students at PWIs, these in-group behaviors provide the norm for blackness, black behavior, and/or black identity that is the measure of the in-group.

As already noted, the purpose of this study is to examine the relationship between perceived group norms and individual behaviors for black students at PWIs. The research was
undertaken at a predominantly white university campus. During the 1999-2000 school, only 466 of approximately 17,000 students were African Americans.\(^1\) The numbers alone suggest that black students entering the institution may experience feelings of anxiety, isolation, and fear, which may, in turn, initiate identity crises. This may then lead to the assertion of an individual’s ethnic identity. This inquiry postulates that black students entering such an environment are likely to experience the personal and social dilemma of self-identity actualization and undergo the immersion-emersion stage presented in Cross’ nigrescense model.

METHODS

Thirty-two self-identified African American students participated in the study. Eighteen students were male, and 14 were female. Eleven respondents were between the ages of 18-20, ten were between the ages of 20-22, four were between 22-24, and seven were age 25 and above (N=32). A majority of the participants were within the age range indicated by the immersion-emersion stage of the nigrescense model. Grade levels of the participants included seven freshmen, seven sophomores, seven juniors, six seniors, and one graduate student.

The subjects were recruited from Black student groups, from the Black Student Center at the university, and by recommendations from those who had already agreed to participate. To insure anonymity, respondents placed completed packets in a plain, sealed, unmarked envelope. The sealed envelopes were then collected by group representatives and/or placed in the investigators' mailboxes.

Questionnaire items (see Appendix) were developed from existing literature on stereotypes (Helmreich, 1997) and from responses to focus groups regarding Black behavior and identity on campus. Respondents were queried on: (1) their perceptions of how African Americans behave; (2) how they personally behave; and, (3) how their immediate peer group behave with respect to ascribed black stereotypes.

RESULTS

The following provides an initial exploratory analysis of the data. Correlational analyses were conducted between items representing respondents’ behaviors and respondents’ perceptions of their peers’ behaviors, and respondents’ perceptions of behaviors of African American students. These analyses were grouped with items addressing the same topics, behaviors, or attitudes. The correlation (r) between items, the mean responses and standard deviations for each item, and the level of significance for the correlations using a two-tailed test of significance are reported below.

The findings reveal a strong positive correlation between the respondents’ use of the Multicultural Center and the respondents’ perceptions of other African American students’ use of the Multicultural Center (see Table 1). Among these respondents, use of the Multicultural Center was minimal, and they report that use of the center by their peers is also low. These results suggest that some African American students expect low attendance of both the Multicultural and African American centers by other black students. This expectation, in turn, appears to express itself in a personal lack of motivation to utilize the tools provided by the school to aid the students with their academic goals.

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\(^1\)These figures were obtained from the Registrar’s Office of the institution in which the students were enrolled.
There was a strong positive correlation between the subjects’ choice of speech and dress patterns and the subjects’ perceptions of how other black students enrolled at the school speak and dress (see Tables 2 and 3). The tendencies of the means are in accordance with the postulation that young African American students may separate themselves from “white” students through behavior and outward appearances. Speech and dress patterns may, in turn, result in self-segregation created by a lack of communication between black and white students. The feelings of isolation from the white community may, then, further enforce the expression of black stereotypes by African American students.

There was a strong negative correlation between the respondents’ reported personal use of marijuana and the respondents’ perceptions about other African American students’ use of marijuana.
marijuana (Table 6). Responses reflect the opinion that many black college students, including their peers approve of and engage in smoking marijuana. However, many respondents reported that they did not personally smoke marijuana.

**Table 4.** Perceptions related to employment

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<th>1</th>
<th>2</th>
<th>3</th>
<th>Mean</th>
<th>Standard Deviation</th>
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<tbody>
<tr>
<td>1 By African American Students</td>
<td>1.0</td>
<td></td>
<td></td>
<td>2.9375</td>
<td>1.1341</td>
</tr>
<tr>
<td>2 By respondents</td>
<td>.502**</td>
<td>1.0</td>
<td></td>
<td>3.4063</td>
<td>1.2916</td>
</tr>
<tr>
<td>3 By respondents’ peers</td>
<td>.663**</td>
<td>.648**</td>
<td>1.0</td>
<td>3.2813</td>
<td>1.0545</td>
</tr>
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</table>

This finding is in direct opposition to the predictions. We expected a positive correlation between the respondents’ use of marijuana and their perceptions of other African American students’ use of marijuana. The perception that other black students engage in illegal drug activity while the respondents’ refrain from using suggests that these students possess negative beliefs regarding black students and drug use. Discrepancies such as these may obstruct the internalization of a positive self-image among African American students and impart a negative image of black students to the general student population. The findings raise questions about perceptions regarding marijuana use among black students.

**Table 5.** Perceptions related to work ethic

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<th>Mean</th>
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<tbody>
<tr>
<td>1 By African American Students</td>
<td>1.0</td>
<td></td>
<td></td>
<td>3.5161</td>
<td>1.1341</td>
</tr>
<tr>
<td>2 By respondents</td>
<td>.363**</td>
<td>1.0</td>
<td></td>
<td>4.1613</td>
<td>1.0984</td>
</tr>
<tr>
<td>3 By respondents’ peers</td>
<td>.693**</td>
<td>.574**</td>
<td>1.0</td>
<td>3.8065</td>
<td>1.1950</td>
</tr>
</tbody>
</table>

**Table 6.** Perceptions related to marijuana use

<table>
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<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Peers approve of use</td>
<td>1.0</td>
<td></td>
<td></td>
<td>3.4063</td>
<td>1.2664</td>
</tr>
<tr>
<td>2 By respondents</td>
<td>-.527**</td>
<td>1.0</td>
<td></td>
<td>1.4375</td>
<td>.5644</td>
</tr>
<tr>
<td>3 By respondents’ peers</td>
<td>.372**</td>
<td>-.553**</td>
<td>1.0</td>
<td>2.6875</td>
<td>1.3060</td>
</tr>
</tbody>
</table>

In summary, the responses provide support for Norms Theory (see Berkowitz, 2000). There is a consistent pattern of association between the respondents’ behavior and their perceptions of how their peers and other black students behave. This is also consistent with intergroup behavior models proposed by Tajfel (1974). As indicated in Tables 1-6, stereotypical attributes ascribed to African Americans have been reflected in the reported behavior and perceptions of the respondents (Parham and Helms, 1985, Cross, 1971, 1978). Respondents’ perceptions of normative “black” behavior are consistent with several negative stereotypes.
(Helmreich, 1997). This suggests that black students, at least at this PWI, may internalize some stereotypes regarding speech, dress, deviant behavior, and academic performance.

Despite the consistent pattern of support there is one anomaly in the findings that requires discussion. That is, the negative correlation regarding marijuana use. The results indicate a surprising discrepancy between the respondents’ behavior and their perceptions of other African American students’ behavior. This raises an interesting question: Why were other stereotypical behaviors viewed as normative “black” behavior and followed by participants, but not marijuana use? It is possible, for example, that marijuana use isn’t as prevalent in the black student body as the respondents believe. It is also possible, of course, that there is some error in the self-reports of personal marijuana use.

DISCUSSION AND CONCLUSION

“Fitting in” with social groups and feeling part of a whole is something that all people encounter during their adolescent and early adulthood years. However, for black students at PWIs, fitting in takes on a completely different meaning. Students that are members of ethnic minorities base many of their friendships on ethnicity rather than other commonalities. The assumption of racial homogenization of minorities in the U.S. prevails at PWIs, and the ascription of negative stereotypes to black students is in some ways, a given. What is disturbing about these findings is the suggestion that some negative stereotypes are viewed as normative, and that some endeavor to live up (or down) to these standards.

Further analysis of stereotype internalization of African Americans is required in order to explore this issue thoroughly. Studies suggest that revealing the true nature of the peer group behavior to a subject may result in a change of perceived group behavior and external expression (Berkowitz, 2000). It is possible that normative behavior within the black student body at PWIs can be redefined to include positive affirmation of African American successes, as well as an acceptance of the differentiation that exists within the black community. These changes in attitude would be essential to a positive model of perceived “black” identity. An unbiased model of African American behavior is essential to the establishment of a positive self-image in black college students enrolled in PWIs.

REFERENCES


APPENDIX

1.1 What percentage of African American students at WSU utilize the Multicultural or African-American Centers?
1. 0-20%  2. 20-40%  3. 40-60%  4. 60-80%  5. 80-100%

1.2 How often do you utilize the services offered by the Multicultural and African American student centers?
1. Not at all  2. Very little  3. No opinion  4. Use somewhat  5. Use very much

1.3 How often do you observe those of your immediate peer group utilizing the services offered by the Multicultural and African American student centers?
1. Not at all  2. Very little  3. No opinion  4. Use somewhat  5. Use very much

2.1 To what extent do the people of your ethnic community at WSU speak in a different manner or use different vocabulary than the Anglo students at WSU?

2.2 To what extent, on average, do you communicate or speak in a different vernacular than the Anglo students at WSU?

2.3 To what extent have you observed those within your immediate peer group at WSU speaking in a different manner than the Anglo WSU students?

3.1 To what extent do the people in your ethnic group at WSU dress differently than Anglo WSU students?
3.2 To what extent do you dress in a different manner than Anglo students at WSU?

3.3 To what extent do the other members of your immediate peer group dress differently than the Anglo students at WSU?

4.1 What do you believe is the percentage of people within your ethnic group at WSU who are employed or actively seeking employment?
   1. 0-20%  2. 20-40%  3. 50-75%  4. 75-90%  5. 90+%  

4.2 What is the average percentage per year attending WSU that you have been employed or actively seeking employment?
   1. 0-20%  2. 20-40%  3. 50-75%  4. 75-90%  5. 90+%  

4.3 What is the average percentage per year attending WSU that your friends have been employed or actively seeking employment?
   1. 0-20%  2. 20-40%  3. 50-75%  4. 75-90%  5. 90+%  

5.1 To what extent do you believe that those within your ethnic community at WSU work hard at their jobs?

5.2 To what extent do you work hard at your job while at WSU?

5.3 To what extent do the members of your immediate peer group at WSU work hard while employed?

6.1 To what extent do those of your immediate peer group approve of marijuana use?

6.2 If you were at a party where there was marijuana being smoked, would:
   1. Take a hit and keep going  2. Just say no  3. Reprimand those smoking for engaging in illegal drug activities

6.3 To what extent do the members of your peer group engage in smoking marijuana?
Illustrating Three-dimensional Apparel Designs Through Linking Computer Aided Design Programs

Hsueh-Ping Meier, McNair Scholar
Carol J. Salusso, Ph.D., Faculty Mentor
Department of Apparel, Merchandising and Textiles

ABSTRACT

Currently, industry-standard fashion modeling and illustration is limited to twodimensional software that produces relatively flat and unrealistic images. Advancing to three-dimensional fashion modeling illustration provides an opportunity to present a vivid, realistic rendering of textile color, pattern, and texture. It also provides the opportunity to explore body form variation, posture, and stance. Using three-dimensions the clothed body can be illustrated from many different angles and in varied lighting contexts. Three-dimensional illustrations can be viewed in depth rather than from the limiting perspective of flat, frontal views common in current illustrations.

INTRODUCTION

The use of computer aided three-dimensional fashion design (CAD) and illustration is not well established within the fashion industry. Perhaps the level of complexity is one reason. Presently there is no single software package that can create a custom three-dimensional figure, a texture, and a garment in one program. The purpose of this research was to examine the use of existing software for creating virtual fitting models for apparel design exploration while maintaining a balance in quality, efficiency, and cost. A tutorial was also developed to guide students through the process of using this software.

METHODOLOGY

This study used currently available computer software packages to achieve fashion design illustrations. It was necessary to explore a range of computer-aided-design software to determine the capability and effectiveness of available products. Three different software were identified as both compatible in transporting files during the process and effective in achieving the desired outcomes. The summary of steps of tutorial in the project included: 1) the use of Poser 2 software to develop a series of senior level teaching materials to help students visualize real human figures of differing body proportions in various postures; 2) the use of the update, Poser 4, to develop correct proportions for various sized human figures with different skin colors, hairstyles, and ranges of motion; 3) the generation of human figures exported to Fashion Studio 2000 where 3D garments were designed; 4) the exportation of figures and garments to 3D MAX R2, where garments designed for the human figures are attached to the respective figures and then fully rendered; and 5) the use of 3D MAX R2 to fully render the surface color and texture characteristics of all the textiles.
TUTORIAL

Using Poser 4 program to create a human figure

It is understood that users must have strong background knowledge to visualize real human figures of different body proportions in various postures. They can then use the Poser 4 program to create and choose a variety of figures from its control panel. This program is a three-dimensional character animation and figure tool that allows the users to manipulate posture as well as the size of figure. Three-dimension fashion models are built cumulatively by following the sequence of steps outlined below:


Screen View 1 – The opening screen view of Poser 4.

2. Choose the desired model from the existing default program library or build a custom model.
   
   • Body parts can be manipulated to the desired position by clicking and dragging or typing in the number in the provided window of the control panel.
   • Add the different components such as hairstyles, cosmetics and shoes.
   • To export the result, go to File > Export and save it as a .dx file. Name it body.dx file.
• Export the same file again as an object file and name body.obj.

Using Fashion Studio 2000 program to create the garment


2. Change the files type indicator to DXF files (.dxf), find body.dxf file, and then click open.


3. Set the selecting mode by clicking in the menu Edit>Select > Object.

4. Select the imported body.dxf.

5. Scale up the size of the body.

6. Disable the 3d mode and enable 2d mode.

7. Use the body form to measure and create the cloth panel.

8. Mark the seam attachment lines.

9. Save the 2d file as body. 2d.
10. Enable the 3d button.

11. Align the cloth panel on to the body.

12. Disable the gravity from the environment menu bar.

13. Go to Simulation > Compute Simulation.


15. Click start.

16. Save the 3d clothes file as File>Save 3D cloth file. Name cloth.3d.

17. Export the same file as File>Save Object file.

18. Change the files type to 3D Object file (.obj).

19. Save the file as cloth.obj.

Using 3D Studio MAX R2 to put the garment back onto the body

First, download the plug-in from http://www.habware.at/duck.htm for import as well as export of obj files (Blab, 2000).

1. Open the application.

2. Import the cloth.obj file from Fashion Studio 2000.

3. Import the body obj file from Poser 4.

4. Align cloth and body in the proper orientation.

5. Adjust the garment on to the body.

6. Edit the dress to achieve proper fit and appearance when rendered.

7. Apply texture and color onto the dress.

8. Adjust the texture manually to your liking.

9. Use Mesh Smooth to smooth the body as well as garment.

10. Increase the luster of garment and body through Shininess and Self-Illumination adjustments.

11. The result is a fully rendered 3D-fully-dressed human figure ready for the runway!
12. Change the texture of dress by clicking on the texture mode to get desired results.

13. Apply spot and ambient lighting.


15. Add complementary components such as ground, shadow.


**RESULTS**

The result of this project is a set of "snap shot" visual records of the figures and fashions created through use of integrated software. Once the human figures are generated, designed and changed, the seasonal collection of new fashions presented by the virtual model becomes a reality. This design approach not only elevates students’ understanding of body type variations, but enhances conceptualization of relationships between three-dimensional human body proportions and two-dimensional flat patterns.
Developing the technology for three-dimensional fashion illustration and visualization provides better and simpler ways to achieve realistic virtual garment designs that fit three-dimensional human figures. With virtual fashion modeling, faculty and designers have greater capability for illustrating visual results when using different fabrics for the same silhouette. This tool also makes it possible to trouble-shoot for visual effects and correct either design or textile characteristics before proceeding to garment production.

**Screen View 4** – A screen view of the rendered design.

**LIMITATIONS**

One limitation of this project, which includes importing and exporting the image files between the software programs, is that is outlines a trial and error process involving limits in the per person range of file types that can be imported and exported. Having a uniform file type for import and export would greatly improve the ability to transfer files between different software packages. This would allow the designer to work in several programs simultaneously to achieve predetermined goals. Furthermore, there is potential for confusion when one is faced with the task of having to master multiple programs in order to create an end product.

The restrictions of these software packages become clear as one becomes practiced in using numerous software packages. *Poser 4* is an outstanding three-dimensional character animation and design tool for digital artists and animators. The new edition of *Poser* is even more user-friendly. *Fashion Studio 2000* is new three-dimensional software for making and sewing cloth through a virtual simulation. This program allows users to create a garment in two
dimensions as a pattern-making exercise. The computer simulation feature then provides the ability to sew the cloth panel onto the three-dimensional body.

Unfortunately, these software packages are still very new and need to be “de-bugged” and tested seriously and then reintroduced to users. When fully developed, this software has the potential for wide use by three-dimensional character artists and the apparel industry for quick rendering of three-dimensional design concepts. The 3D Studio RX2 program is an excellent computer-aided-design tool. It will be a powerful tool that will accept most import and export file types.

CONCLUSIONS AND RECOMMENDATIONS

This project demonstrates the potential of three-dimensional fashion illustration software to enhance the creative and instructional abilities of educators and designers within an evolving apparel industry. By modeling visual effects before producing potential designs, industry can be more efficient and effective. By expanding a student’s ability to visualize the clothed body three-dimensionally and holistically, he or she can become a better designer across a range of body types, styles, and textile components. Certainly design quality will be enhanced by moving beyond two-dimensional, flat, frontal perspectives.

It is recommended that one three-dimensional graphic software program be developed that is both affordable and capable of accomplishing the entire design process. This includes: 1) proportioning a human figure; 2) replicating real body proportions; 3) designing garment silhouettes; and 4) mapping textile color, pattern and texture as realistic representations of potential designs. Such software will be invaluable in enhancing the visual effects of designs on specific human figures, and is critical to customizing design per client and/or for the mass production of respective figure types.

In the near future, a visualized human figure with correct proportions will be developed. This will require adding a measurement algorithm that allows input of body measurements. This will also increase the value of the software as a tool for customizing design to actual body proportions.

REFERENCES

An Economic Analysis and Study of the Ocean Liner Shipping Industry in Response to the Ocean Shipping Reform Act of 1998

Sylvia L. Mendez, McNair Scholar
Fred Inaba, Ph.D., Faculty Mentor
Department of Economics

ABSTRACT

The purpose of this paper is to determine how small, medium and large shippers react to changes in the ocean-liner shipping industry under the Ocean Shipping Reform Act (OSRA) of 1998. The focus is on the importance of negotiating contracts with carriers and the choice to use either a shipper’s own leverage or the leverage of a third-party agent. I hypothesize that large shippers will be more supportive of OSRA when negotiating favorable rates than small shippers. Data were collected from a wide variety of companies that ship from Pacific Coast ports to Asia. Our analysis implies that OSRA forces shippers to rely on their own clout or that of a third-party agent to gain desirable service contracts. Finally, the research describes desirable shipments from the perspectives of both carriers and the shippers.

INTRODUCTION

The Ocean Shipping Reform Act (OSRA) of 1998, PL# 105-258\(^2\) went into effect in May 1999. The intention behind OSRA was to open market interactions by relying on the supply and demand of carriers and shippers. This resulted in promoting a competitive market in the shipping industry. This paper explores the open market interaction culture that has increased the importance of negotiating service contracts in the shipping industry.

Before OSRA, the Federal Maritime Commission\(^3\) regulated the ocean-liner shipping industry. Service contracts were determined by published tariff rates under contracts that were open to the public. The published service contracts included the lane, rate, volume and length of contracts. Theses policies were created to assure that smaller shippers were not discriminated against by carriers who wanted to deal only with large volume shippers. There were also “me too” service contracts which required carriers to give the same service contracts to shippers with similar shipments. This allowed small shippers to use the same contracts that the big shippers were able to negotiate.

OSRA has created a deregulated environment in the shipping industry. A shipping company in Washington said that deregulation allows them to negotiate the best contract with the carrier based on their own market clout.\(^4\) A fruit company in California,\(^5\) which shipped to

\(^2\) The United States Department of Transportation’s Maritime Administration (MARAD)
\(^3\) United States Department of Agriculture (USDA) Agriculture Marketing Services
\(^4\) The Federal Maritime Commission (FMC), a division of the United States Department of Transportation
\(^5\) Personal interview with a Company’s Transportation Manager
countries in Asia, said that the new law has caused them to put more money in the negotiating side of business. They expressed that they feel they are now in the business of selling freight instead of fruit.

A major provision of OSRA regarding rate negotiations allows carriers to engage in confidential contracting and annuls common carriage service contracts. The terms of service contracts need to be filed with the Federal Maritime Commission, but that information is not made public. Also, service contracts under OSRA do not allow “me too” service contracts. With the new confidentiality, shippers under the new regulation system and third-party agent's negotiations become more critical in getting the best contract length, price and service.

With this new environment, we argue that shippers of large volume, recurrent lots are more likely to get favorable rates and service from the carriers (Pirrong, 1993). Thus, large shippers are more likely to negotiate favorable contracts in the OSRA environment. On the other hand, in order for small and medium sized shippers to ship under favorable rates and services, we suggest that they must use third-party agents who will consolidate sporadic shipments into large volume, recurrent lots. In this way they gain the leverage needed to negotiate effectively with the carriers.

**RESEARCH QUESTION**

OSRA promotes a market environment in which carriers and shippers must negotiate rates and services (Pirrong, 1992). In order to maximize profits, carriers will strive to fill their vessels to capacity to attract large-volume, recurrent shipments. To do this, carriers might want to offer rate discounts for large-volume and/or recurrent service. It is reasonable to expect that shippers with these desirable transportation demand characteristics are large shippers. Thus, small, irregular and infrequent shippers will be less desirable to carriers. Hence, carriers will be less willing to offer rate discounts to small shippers.

Given the above, we can expect that OSRA will promote rate and service negotiations between shippers and carriers. Specifically, large shippers should be more successful at negotiating favorable rates than small and medium-sized shippers. Therefore, large shippers should have a favorable attitude toward OSRA. With this study I hope to determine the characteristics of the shippers that match the types of predicted rates and observable services.

**METHODOLOGY**

First, we used an economic analysis to predict the patterns of rates and services that are likely to emerge when carriers and shippers negotiate service contracts (Clyde and Reitzes, 1998). The carrier's job is to provide a vessel to transport products from point A to point B. The carrier's profit depends on the ability to fill its vessels to full capacity. The average cost of shipping a container is lower if the vessel is billed than if it was partially billed. Thus, carriers can utilize these economies of scale to offer rate discounts to attract large-volume shipments.

We concluded that carriers would rather have a few big shippers with long term contracts to fill their vessels than many small shippers with short or long-term contracts (Sjostrom, 1989). Profit motives lead us to this conclusion since carriers who sign long-term contracts with a large volume are guaranteeing themselves business for an extended period of time. This allows them to budget their cost effectively and efficiently. Long-term contracts reduce the number of times a carrier must seek out shippers and negotiate contracts. This lowers transaction costs. Carriers incur a range of other costs such as the vessel, fuel, and crew. These costs can be affixed to each of the voyages, so when there is a long-term contract, the transaction costs are minimized over a
number of voyages. The lowered transaction costs over time allow carriers to offer shippers lower rates when they sign long-term service contracts. In order for small and medium shippers to obtain lower rates they need to provide desirable shipments to the carriers as well. So their optimal choice is to band together and consolidate their shipments into larger, more frequent lots. In this way they provide a large shipment that can be serviced under a long-term contract.

Second, we collected data to determine whether our economic analysis was supported by the facts. We surveyed companies on the Pacific Coast who were shipping on the Trans-Pacific shipping route to Asian countries on the mainland and the islands (See Appendix A). We consulted with representatives of eighty-three companies that ship the following products: dried fruits and vegetables, fresh fruits and vegetables, forestry products, processed foods, and meat and poultry.

ANALYSIS

Our first objective in the survey was to determine company attitudes toward OSRA. The support for OSRA seems to be muddled. Many felt that the Reform Act did not do all it was supposed to do. For example, some respondents did not feel the Reform Act created a more competitive market. Others felt the Reform Act required more time and effort to negotiate rate and service contracts than is efficient.

Tables 1 and 2 illustrate the support and opposition to OSRA (those interviewed that were not familiar with OSRA were not included in this data). The support for OSRA seems to be muddled and the opposition for OSRA is slightly higher among the small and medium shippers. From the interviews, many large shippers were knowledgeable about OSRA, but felt it was too limiting to hurt their business and contracting methods. However, they did not oppose the law. They were just unsure of its impacts. On the other hand, small and medium shippers opposed the Reform Act because is removed common carriage and required that more time be diverted to rate negotiating.

Table 1. Percentage of shippers in each class that support OSRA

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<tr>
<td>Small</td>
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<tr>
<td>Medium</td>
<td>52%</td>
</tr>
<tr>
<td>Large</td>
<td>35%</td>
</tr>
<tr>
<td>Very Large</td>
<td>100%</td>
</tr>
</tbody>
</table>

Since we concluded that carriers desired large volume and recurrent lots under a long-term contract, we asked who was signing long term contracts and what benefits they saw in this choice. Table 3 shows that large shippers are more likely to sign long-term service contracts, while small and medium sized shippers are less likely to sign.

The most common benefit the interview participants shared by signing the long-term contracts was the ability to plan ahead for costs and profits. Other benefits that were revealed from the interviews were the strong relationships with carriers that can be built and having consistency of service with carriers.
Table 2. Percentage of shippers in each class that oppose OSRA

<table>
<thead>
<tr>
<th>Size</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>11%</td>
</tr>
<tr>
<td>Medium</td>
<td>13%</td>
</tr>
<tr>
<td>Large</td>
<td>6%</td>
</tr>
<tr>
<td>Very Large</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 3. The percent of size and type of shippers who sign long term service contracts

<table>
<thead>
<tr>
<th></th>
<th>Regular Shipments</th>
<th>Irregular Shipments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>27%</td>
<td>0%</td>
</tr>
<tr>
<td>Medium</td>
<td>35%</td>
<td>0%</td>
</tr>
<tr>
<td>Large</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>Very Large</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Next, we wanted to determine which companies felt that they had their own leverage in negotiating rates. The findings in Table 4 support the conclusion from our economic analysis. That is, large shippers are more likely to rely on their own leverage in negotiating with carriers (Gooding and Neel, 1997). The data also reveal that small and medium shippers do not rely on themselves for leverage. The interview participants shared that they are able to negotiate on their own clout because they are big enough to fill vessels with large-volume, recurrent lots. Small and medium shippers who cannot rely on themselves must rely on the clout of third party agents to get reasonable rates for service with the carriers. The third-party agents consolidate shipments to create large volume, recurrent lots. This allows their customers to compete with the large shippers with large volume and recurrent lots to acquire the same long-term service contracts with comparable rates. The third-party agents may or may not do the rate negotiating for their customers. However, the rate negotiating third-party agents have gained has increased the popularity of OSRA stipulations.

Our research revealed two types of third party agents: freight forwarders and shippers’ associations. It is clear that small and medium shippers with irregular and regular shipments need to work with third-party agents to adequately compete with large shippers with large volumes and recurrent lots. A shippers’ choice for a third-party agent is uncertain since there are both advantages and disadvantages in either choice.

Before OSRA, the freight forwarders initial responsibilities were simply logistical matters. Their tasks included booking space with a carrier, attaining export clearance, arranging for products to be containerized, completing export documentation, assembling cargo insurance, advising on domestic and foreign regulations, and contributing assistance on labeling, marking and packaging for the shipper. Many shippers have strong connection with their freight

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6 United States Department of Agriculture (USDA) Agriculture Marketing Services
forwarders because of the variety of personalized tasks the freight forwarders offer their customers. Many shippers distinguish their relationship as a partnership more than a customer relationship.

Table 4. Percent of size and type of shippers who use their own leverage in negotiating rates

<table>
<thead>
<tr>
<th>Size</th>
<th>Regular Shipments</th>
<th>Irregular Shipments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>27%</td>
<td>0%</td>
</tr>
<tr>
<td>Medium</td>
<td>35%</td>
<td>0%</td>
</tr>
<tr>
<td>Large</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>Very Large</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

With OSRA's provisions on confidential service contracts and the termination of common carriage service contracts, the roles of third party agents in negotiating service contracts have become more valuable. Along with the many duties freight forwarders present, many are getting more involved in rate negotiating. The freight forwarders use their influence to generate a service contract that the shipper cannot get on their own. The leverage a freight forwarder is derived from its contracts, experience, reputation, and large volume shipments. Rate negotiation has become a time-intensive job with the extensive facilitation that has to be done with carriers.

Table 5. Percent of shippers who were using freight forwarders for their leverage

<table>
<thead>
<tr>
<th>Size</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>48%</td>
</tr>
<tr>
<td>Medium</td>
<td>32%</td>
</tr>
<tr>
<td>Large</td>
<td>0%</td>
</tr>
<tr>
<td>Very Large</td>
<td>0%</td>
</tr>
</tbody>
</table>

Compensation for freight forwarders comes from a previously agreed upon amount, documentation charges, and a percent of the ocean freight rate. From the interviews with the company managers and transportation specialists, I found that all types of shippers, both small and large, commonly used freight forwarders. The difference came when the duties of the freight forwarders were discussed in detail. As seen in Table 5, small and medium shippers were more likely to use them to leverage lower freight rates. Nearly all of the shippers interviewed used them for documentation, paperwork, and keeping them up with the rules and regulations of the ocean liner shipping industry.

The other popular reported intermediary for those interviewed were the shippers' associations (Mongelluzo, 2000). Shippers' associations are generally non-profit cooperatives. They are organized by a group of individual shippers who pool their cargo together and collectively negotiate with carriers. Generally, shippers' associations are large enough to compete and effectively administer the best service contract possible for their membership. The shippers’ associations sign the service contracts, and all of the members have access to those
contracts. Different shippers’ associations provide a different range of services for their membership. “Full-Service” associations, take possession of their member's cargo, take care of logistic matters and handle rate negotiations. Another type of shippers’ association is the “Rate Negotiator.” This type of association handles negotiating service contracts solely for their membership. Their primary responsibility is to provide the best service contract for their membership.

Table 6. Percent of size and type of shippers that use shipper's associations

<table>
<thead>
<tr>
<th></th>
<th>Regular Shipments</th>
<th>Irregular Shipments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>45%</td>
<td>19%</td>
</tr>
<tr>
<td>Medium</td>
<td>23%</td>
<td>60%</td>
</tr>
<tr>
<td>Large</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>Very Large</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

Table 6 shows that as we expected, small and medium size shipper are more likely to rely on shippers’ associations. Since the shippers’ associations give them the volume leverage to compete with the large shippers they are most useful to the small and medium shippers. Members are not required to use the association's logistical help; they can use freight forwarders for this type of service or their own staff. Many shippers used an intermediary for this type of work, small or large.

Since shippers’ associations are non-profit organizations they do not necessarily receive compensation. They can recover their costs in two ways: 1) either charges a markup on each container shipped; or, 2) charge each member a flat administration fee such as dues or registration fees.

CONCLUSION

OSRA has created an environment for market forces to drive the shipping industry freight rates. Thus, rate-negotiating tactics have increased in importance (Neel and Gooding, 1996). This now necessary negotiation contest has and will continue to change the shipping industry. If the small and medium shippers want to be players, they must rely on their own clout for leverage or rely on the clout and leverage of third-party agents. The carriers will continue to be looking for long-term contracts with large volumes and recurrent lots. When a shipper and carrier are both able to make use of economies of scale they have the advantage of obtaining lower costs per container.

Shippers who choose to use their own leverage will need to have the desirable shipments, of large volume and recurrent lots to attract formidable service contracts with carriers. Our survey showed that those that were able to negotiate on their own generally shipped sufficient volumes. We claim that such shippers possesses the leverage necessary to obtain rates lower than those offered by the carriers.

If shippers choose to go with third party agents they are able to rely on the leverage of others to stay competitive and effective in the market. Our findings suggest that those using third-party agents needed them for their consolidation tactics and for several other reasons. For
example, many used an intermediary because of their experience. Small and medium shippers that ship small and irregular shipments often lack the experience needed to negotiate with carriers. The shippers also needed them because of they lacked the personnel to deal with the shipping aspects of their businesses.

The predictions were supported by the real-world data collected through the survey. I found that under the new provisions of OSRA, large shippers are in a better position to negotiate fair and reasonable service contracts because they shipping in large volume and recurrent lots. In service contracts, small and medium shippers were subjected to dealing through third-party agents for their clout. Those using the third-party agents were very happy with their services and did not feel that they were being directly harmed by this added step. Small and medium shippers do feel that OSRA will be a threat to their long-term business, but with the growing strengths of freight forwarders and shippers' associations they will survive the governmental policies of OSRA.

REFERENCES


APPENDIX

SURVEY

Company: _______________________________ Product(s): _______________________________

Company ships dry, reefer or both. (Circle which)

Company is an exporter, importer, or both. (Circle which)

Do you support OSRA?

____ Very much
____ Unsure
____ Not at all

Have you changed the way you handle exports/imports to Asia in response to OSRA?
If yes, how?

Do you belong to a shippers' association for the purpose of handling exports or imports between the United States and Asia?
(i) Do you use an association?
   a. When did you join?

(ii) If not using an association,
   a. Are you a member of an association? If yes, why don't you use it?
   b. Do you know what a shippers' association is?
   c. Have you ever contacted a shippers' association? If yes, why didn't you join?

Do you use long-term or short-term contracts? List two reasons why you select a contract of this length.

   (i) If preferred length is short-term, do you worry about transactions costs?
   (ii) If preferred length is long-term, would you change your mind if the freight rate were the same regardless of contract length?

Please complete the following chart:

| Column One: What goods do you ship to (from) Asia? |
| Column Two: How many containers (TEU) do you ship between the U.S. and Asia annually? |
| Column Three: How "regularly" do you ship each of these goods? |
| Column Four: Do you use an intermediary (other than a shippers association, if using an association) for shipping any of these goods? |

<table>
<thead>
<tr>
<th>Good</th>
<th>Volume</th>
<th>Regularity</th>
<th>Intermediary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1=Only irregularly</td>
<td>1=Freight Forwarder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2=Seasonally, from __________ to __________</td>
<td>2=NVOCC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3=Monthly</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4=Weekly</td>
<td></td>
</tr>
</tbody>
</table>

Imagine that you or your intermediary approached a carrier and tried to leverage them for a lower freight rate, do you think the carrier would budge?

Why or why not?

What carrier do you most frequently use?
Worker Response to Change in the Workplace
Daylashunta L. Randolph, McNair Scholar
Craig Parks, Ph.D., Faculty Mentor
Department of Psychology

ABSTRACT

This study investigates how workers react to changes in everyday work procedures. Employees in an on-campus administrative unit were surveyed for their responses to the change from a Macintosh to a PC computing system. Three underlying themes were extracted from the employee responses. These themes consisted of: 1) variations in learning time; 2) a false consensus bias; and, 3) complexity issues. Implications for management are discussed.

INTRODUCTION

Our world is in a state of constant of change. As changes occur, those affected must learn to adapt. There are many aspects of one’s life that can change. One very critical concern to social and behavioral scientists is the impact of change on one’s career or job. When a worker deals with change in the workplace, there is an inevitable reaction both in the workplace and other areas of one’s life. Regardless of its nature, and whether the response is positive or negative, it is automatic.

Reactions to change have been of interest to researchers for many years. Holmes and Rahe (1967) studied the effects of change in life events on individuals. Events examined ranged from the death of a spouse, to marriage and divorce, to minor violations of the law. These are all events that somehow cause a range of physical and psychological reactions on the part of the individual. Holmes and Rahe found that different levels of life events, such as divorce and vacation, induce different levels of stress. Later, Folkman and Lazarus (1988) divided the larger events examined by Holmes and Rahe into daily living events to study the impact of daily hassles. By creating scales for these events, they were able to identify their subjects’ stressors and pleasures. Items such as “time with family,” “physical appearance,” and “workload” were included. It is evident from these studies that change often has a major impact on these every day tasks. What is still not clear are the effects on an individual when dealing with more mundane tasks such as procedural changes in the workplace.

The overwhelming extent of downsizing and technological advances that currently characterize most workplaces means that it is not unusual for workers to have to adapt to change. More specifically, it is not unusual for the scope of a worker’s duties to increase or decrease depending upon the nature of planned change in the work setting. When this occurs, there are, no doubt, both psychological and physiological effects. Although consideration of both is important, the focus of this study will be limited to an examination of the psychological effects individuals encounter when dealing with change in the workplace.
RESEARCH PROBLEM

Understanding the psychological effects of changes in the workplace is of great importance for two very simple reasons. First, careers are a large part of daily living and it is important that the workplace remains a comfortable environment. In order to have healthy employees, both mentally and physically, the job must be a place with as little disruption as possible. When disruption in normal routines does occur, workers often become uneasy. Being aware of possible reactions before they happen is beneficial both to the worker and the employer. Second, as an employer, knowing how to help workers through transitional periods allows for worker performance to be maintained. This also keeps employees happy which, should, in turn, strengthen worker loyalty and increase worker productivity.

This study is based on a survey of workers in an administrative unit in a large university. Within this setting, workers recently changed from working with Macintosh computing systems, to PC computing systems. This change was made so that the unit would be compatible with other units within the university. The focus of this study is on how this workplace change affected the performance, reactions, and perceptions of employees in the unit. Thus, the results should provide reactions to look for when procedures within the workplace are changed and resources are redistributed. This may help identify warning signs for both the employees and employer.

METHODS

Participants. The subjects in this study are employees within an on-campus administrative unit. The employees within this unit range in tenure from one to twenty-three years. Seven employees were surveyed for this study.

Materials. Data were derived from two questionnaires. One questionnaire was designed specifically for this study to survey worker reactions, feelings, and interpretations of the change made within the administrative unit (see Appendix A-1). The second questionnaire is a daily hassles and uplifts scale created by Folkman and Lazarus (1988) (see Appendix A-2) to determine which specific daily events were either uplifts or hassles for each worker. Consent forms were included with the surveys to ensure permission to use the written responses. Once the questionnaires were collected, a debriefing sheet was provided to explain to the employees why they were asked to complete the survey.

Procedure. The questionnaires were distributed in the subjects’ workplace. The worker questionnaire, the daily hassles and uplift scale, and the consent forms were given to each worker. Subjects were instructed that this survey was to be completed by choice. The completed questionnaires were collected two days later, along with the signed consent forms. The debriefing sheets were then distributed.

Data Analysis. The data for this study were analyzed by using content analysis techniques. This method was used to extract patterns of response from the employees. Once the study was completed, the data were given to the supervisor upon request.

RESULTS

The responses from the workers clearly showed that the change from Macintosh to PC systems in the workplace had a significant impact on everyday work procedures. Three important underlying themes were extracted from the worker responses. First, there was a time factor because employees were still learning the new computing system after one year. This seemed to be related to frustration among some workers. The responses clearly showed differences in levels
of frustration between those who were still learning compared to those who were becoming experts with the new computing system. Second, a strong false consensus bias was apparent. This means that employees believed that other employees shared their views. Third, there is a complexity issue because the PC computing system uses more steps than the Macintosh. Using more steps added to the level of negativity and frustration on the part of the employees. However, the daily hassles and uplifts scale revealed no apparent correlation between the frustrations that arose as a result of changing the computing system and the workers’ daily hassles.

SUMMARY AND CONCLUSIONS

The three issues extracted from the employee responses included evidence that long periods of time were required to learn how to use a new computing system and that, for some, this apparently caused considerable frustrations. Further, there was a strong false consensus bias, as well as complexity issues.

Several issues surround the idea that long periods of time learning how to operate a new system created increased frustration for some. It is obvious that when it has taken over a year to learn a computing system that outputs the same results as the old system, workers can become frustrated. The responses suggest, then, that frustration is most definitely linked to the amount of time spent learning the new system. Further, if an employee is given an estimate of the amount of time it should take to learn the system and it takes longer, that too is likely to be a source of frustration. This issue is very important and relevant to workflow because when employees become frustrated, their level of productivity decreases. This is exactly what workers and management do not want to happen when implementing a new work procedure. It is important, then, that employers be aware of such a response and do what they can to support their staff during transitional periods.

There was also evidence of a strong false consensus bias in the workers’ responses. These results suggest that some who responded felt that their coworkers were experiencing similar feelings. In other words, if an employee was frustrated about the change, they felt that their coworkers were too. On the other hand, if an employee was satisfied with the change, they felt their coworkers were satisfied as well. When employees count on others sharing their same views and then find out that the opposite is true, this can be a dangerous set-back for an organization. For example, workplace morale may suffer when an employee is frustrated and that employee thinks others are too, but then learns that others are not because it may have an impact on interpersonal relations among coworkers. Rather than feel that they are frustrated because of a procedural change, those frustrations become displaced onto their coworkers. Again, this may produce outcomes that are not desired in an effectively run administrative unit. It is in the best interests of workers and management to be aware of the false consensus bias during times of transition.

The complexity issue is also of interest. For example, it takes a lot more steps to use the PC than it does to use the Macintosh to produce the same end result. Yet we know that the major reason for the change was to be more compatible with the larger university. Thus, the reason for the change was not disputed. The responses suggest that negativity and frustration are products of the more complex procedures, especially for individuals who are still learning. However, for those individuals who responded that they have a good grasp on the system, there were no complaints about the extra number of steps that it takes to complete a task. We know from prior research that people prefer to do things the simplest way possible (Dawes, 1988). This raises a question about why there was no universal negative reaction to having to perform several steps. If people desire to expend minimal effort, then why is it that those individuals who have a grasp
on the system not mention the desire for fewer steps? Perhaps individuals who have an easier time with the new system do not pay attention to what comes naturally, whereas those employees who are struggling pay attention to every aspect that they do not understand. Further research in similar administrative units is required to determine the general importance of the complexity issue.

Certainly there are other areas to be explored within the realm of procedural change. As noted above, it would be interesting to pursue the complexity issue. It would be interesting to observe workers in a real setting to measure the frequencies of positive and negative effects associated with a more immediate procedural change in the workplace. From passive observations along with personal interviews, it would be possible to determine the psychological aspects of work that may possibly be affected by change. This would provide a greater understanding on how workers are affected by procedural changes in the workplace. Greater understanding of these processes would, then, allow for planned change resulting in a more enjoyable and productive workplace for everyone.

REFERENCES


APPENDIX A-1

Workplace Questionnaire

Please answer the following questions to the best of your ability.

1. Compared to the previous computer program, what are the benefits of using the new computer program?

2. Compared to the previous computer program, what are the drawbacks of using the new computer program?

3. How easy has it been to learn the new program?

4. How long did it take for you to successfully learn the new computer program?

5. Do you feel that the new program is more effective than the old program?

6. What do you think your coworkers think of the new program?
7. Are you aware of why the new computer program was implemented?

8. How many years has this office employed you?

9. Is there anything else that you would like to share about your views on implementing the new computer program in this office?

**APPENDIX A-2**

**Daily Hassles and Uplifts**

Please fill out this scale at the end of the day. Fill it out in terms of what degree to which each item below was a **HASSLE** or an **UPLIFT** for you today (0 = Low and 4 = High).

<table>
<thead>
<tr>
<th>How much of a HASSLE was this item for you today?</th>
<th>How much of an UPLIFT was this item for you today?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 Your child(ren)</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Time with family</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Sex</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Fellow Workers</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Your Workload</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Meeting Deadlines</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Having enough money</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Your physical appearance</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 The weather</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Your neighborhood</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Cooking</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Home entertainment</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>0 1 2 3 4 Amount of free time</td>
<td>0 1 2 3 4</td>
</tr>
</tbody>
</table>
Effects of Serotonin and Nitric Oxide on Mid-gut Motility in Tobacco Hornworm (*Manduca sexta*) Larvae

Evelia Sandoval, McNair Scholar  
David Moffett, Ph.D., Faculty Mentor  
Department of Biological Sciences

ABSTRACT

The anterior mid-gut of the tobacco hornworm, *Manduca sexta*, is active in mixing freshly ingested diet with gut secretion. Spontaneous muscle activity is lost when the anterior gut is isolated, suggesting that neural and/or humoral inputs may be important in sustaining normal activity in vivo. In preliminary studies, both serotonin and cGMP (the putative second messenger for NO) were visualized in the anterior mid-gut by immunohistochemistry. We have also shown that serotonin and sodium nitroprusside (SNP), a NO donor, have measurable effects on the contractile state of isolated anterior gut. In these studies both serotonin and SNP caused a long-lasting contraction of longitudinal and circular muscle mounts.

INTRODUCTION

The anterior mid-gut of the tobacco hornworm *Manduca sexta* is active in mixing freshly ingested diet with gut secretion. The gut muscularis consists of a diffuse layer of circular fibers and six discrete bands of longitudinal fibers that run the length of the gut (Nardi, 1990). The gut is innervated by the central nervous system by way of the recurrent nerve that passes from the frontal ganglion along the dorsal foregut (Miles and Booker, 1994). This pathway branches at the junction of foregut and mid-gut to enter the enteric plexus, which contains intrinsic neurons. The roles of central inputs and intrinsic neurons in generating patterned gut activity have not been clarified. However, the general picture suggests that patterned output that originates in the frontal ganglion drives coordinated movements of the fore- and mid-gut as shown in Figure 1 (Copenhaver and Taghert, 1991).

Nitric oxide synthase produces nitric oxide in central nervous system neuron. Nitric oxide (NO) is part of a signaling molecule which leads to the formation of cyclic GMP (cGMP) in target cells (Bicker, 2001). Cyclic GMP causes the gut neuron to become more active, increasing release of serotonin (5-HT) onto the muscle, exciting it (Muller and Hildebrandt, 1995).

In these studies, serotonin, nitric oxide synthase (a marker for nitridergic neurotransmission) and cGMP (the putative second messenger for NO) have been visualized by immunohistochemistry in neurons innervating the anterior mid-gut. Changes in activity of longitudinal and circular muscle in response to serotonin and sodium nitroprusside (SNP, a NO donor) were measured *in vitro.*
RESEARCH OBJECTIVES

1. To show the distribution of serotonergic and nitroxidergic neurons innervating the gut.
2. To measure effects of serotonin and nitric oxide on muscular force development.

**Figure 1.** The fore- and mid-gut of the tobacco hornworm *Manduca Sexta.*

**METHODS**

Immunohistochemistry of serotonin, nitric oxide synthase and cGMP was conducted. Freshly dissected gut tissue was fixed in 2% paraformaldehyde. Whole-mounts were treated with one or more primary antibodies to serotonin, universal nitric oxide synthase and cGMP. The primary antibodies were localized with secondary antibodies conjugated with rhodamine red (red), fluorescein isothiocyanate (yellow) or AMCA (blue).

To determine the effects of serotonin and NO on mechanical activity, gut tissue from 5\textsuperscript{th} instar tobacco hornworms (*Manduca sexta*) was obtained by dissection of cold-anesthetized larvae weighing 6-13 gm. For studies of circular muscle (Figure 2), approximately 1 mm wide rings of gut were mounted horizontally between two hooks. One hook was fixed and the other was attached to an isometric strain gauge (UFI model 1030). For studies of the activity of longitudinal muscle, vertically-suspended gut segments 5-7 mm long were fastened to a rigid bar at one end and to the strain gauge at the other (see Figure 2). In both cases, the muscle was bathed in O\textsubscript{2}-saturated lepidopteran saline at room temperature. Digitized data were recorded and analyzed using Sable Systems software. Serotonin (5-HT) and sodium nitroprusside (SNP) were added from concentrated aqueous stock solutions to final concentrations as indicated.
RESULTS

*Immunohistochemistry.* NOS and serotonin axons run along the length of the gut on each side of the bands of longitudinal muscle. Figure 3 shows serotonergic axons with axon varicosities suggestive of synaptic contacts with the muscle, running on each side of a longitudinal muscle band. The nitridergic axons do not show similar varicosities.

Figure 4 shows isoviews of the same tissue, which was triple-stained for NOS, serotonin and cGMP. The close association of the nitridergic axons with the serotonin-positive cell body and the fact that the serotonin-positive cell body is positive for cGMP suggests that the nitridergic axons, possibly emanating from cell bodies in the frontal ganglion, synapse on serotonin neurons in the gut, which then appear to synapse on the longitudinal muscle fibers.

**Figure 2.** Muscle activity studies.

*Muscle Dynamics.* Further experiments showed that both SNP and serotonin caused an initial relaxation of longitudinal muscle lasting 1-2 min, followed by a longer contraction lasting up to 20 min. (see Figure 5). SNP and serotonin on circular muscle showed, as with longitudinal muscle, that both SNP and serotonin caused long-duration contractions of circular muscle rings (see Figure 5 and Figure 6).

**Figure 3.** Serotonergic axons with axon varicosities on each side of a longitudinal muscle band.
Figure 4. Isoviews of a longitudinal muscle band triple-stained with NOS (a), Serotonin (b), and cGMP (c).

Figure 5. Longitudinal muscle contractions.

Figure 6. Circular muscle contractions.

DISCUSSION

The isolated gut of *Manduca sexta* larvae is largely quiescent when placed in the muscle chamber, and does not show the spontaneous, cyclic activity typical of many preparations of visceral muscle. This finding indicates that exogenous motor input is paramount in generating
mixing and peristaltic contractions of the gut observable in vivo. The gross anatomy of potential motor pathways has been studied (Muller and Hildebrandt, 1995), but there is relatively little information about the nature and specific effects of neurochemical transmitters in mid-gut muscle of lepidoperan larvae.

These studies showed that the gut is innervated by neurons immunoreactive for serotonin and cGMP and suggest that the nitridergic neurons are postsynaptic to the serotonin neurons. The importance of such pathways for motor control of the gut is supported by the finding that both exogenous serotonin and NO donor elicit similar increases in muscle tone. The long timescale of the responses to serotonin and NO was unexpected, but is consistent with a modulatory style of action. This suggests that the neurotransmitters that drive short timescale responses remain to be elucidated. This suggestion is supported by our finding that the number of neurons detectable with methylene blue staining is considerably in excess of the number that are immunoreactive to serotonin or cGMP.

CONCLUSION

Immunohistochemistry confirmed that the gut is innervated by nitridergic and serotonergic neurons. This suggested that the serotonergic neurons may be postsynaptic to the nitridergic neurons.

In the muscle dynamics experiments, both SNP and serotonin caused long-lasting contractions of both longitudinal and circular muscle. This is consistent with an excitatory effect of NO on serotonin neurons.

The relative lack of patterned activity when the gut is mounted as a tube suggests that much or all of the patterned activity seen in the anterior midgut in vivo is the result of inputs from the CNS. However, the long timescale of responses to both SNP and serotonin suggests that these inputs serve a modulatory rather than an effective role.

REFERENCES

Catalyst Surface Chemistry Characterization Using Hexene Isomerization

Clyde Washington, McNair Scholar
William Thomson, Ph.D., Faculty Mentor
Department of Chemical Engineering

ABSTRACT

Heterogeneous catalysts can be used to speed or direct a reaction to produce desired products. Various properties of a catalyst, including surface chemistry, need to be determined experimentally before a catalyst can be used. The purpose of this research was to find a reliable method to characterize the surface chemistry of catalysts. Here hexane isomerization was used. The results reveal a clear distribution of products in the exit gases in the experimental situation. This research has provided a reliable method of finding the surface acidity of a catalyst.

INTRODUCTION

Heterogeneous catalysts are used in numerous chemical processes. These catalysts can be used to speed or direct a reaction to produce desired products. Various properties of a catalyst such as pore size, composition, and surface chemistry determine how it behaves in a reaction. Before a catalyst is used its properties need to be determined, so it can then be applied to the appropriate processes. Pore size and composition of a catalyst are determined during the manufacturing process and the catalyst is made to fit these specifications. The acidity of a catalyst is sometimes difficult to determine because it is influenced many factors. The surface chemistry of a catalyst should be found experimentally.

Catalysts can be used to remove organic compounds from water, convert carbon monoxide to less harmful gases, or to produce products such as maleic anhydride from n-butane. However, it is important to know the surface chemistry of a catalyst. If the wrong catalyst is used in a process it will not promote the desired reactions. Thus, knowing the surface chemistry of a catalyst allows engineers to determine what kinds of processes it can be used for.

The catalysts used for the processes mentioned above are all heterogeneous catalysts, but the surface chemistry of the catalysts varies. For example, Brita® water filters contain an activated carbon catalyst that is used to remove organic compounds and flavors from water. On the other hand, mufflers use a platinum based catalyst to reduce carbon monoxide emission by converting it to carbon dioxide. Vanadium Phosphorous Oxide (VPO) catalyst is used to convert n-butane to maleic anhydride. The activity of this catalyst favors production of maleic anhydride over combustion of the n-butane or production of aldehydes. The catalysts used for these processes are not interchangeable. The compositions and supports for the catalyst are different and this leads to very different surface chemistries.

The purpose of this research was to find a reliable method to characterize the surface chemistry of catalysts. The technique used in this experiment to determine the surface chemistry of the catalyst is hexene isomerization. Hexene is a six-carbon chain that contains one double bond. Rearrangement of the substrates on the chain and double bond migration are dependent on
acidity. The strength of an acid can cause double bond migration or rearrangements of the substrates on a hexene molecule.

EXPERIMENTAL DESIGN

Catalysts. Catalysts were prepared by Pacific Northwest National Laboratory (PNNL). Information regarding these catalysts is proprietary, so no information or results for the catalyst will be provided below.

Procedure. A 1-gram sample of the catalyst was loaded into a plug-flow reactor constructed of fused quartz (3/8 in. I.D.). The catalyst was loaded between two pieces of quartz wool. A thermocouple was placed at the center of the catalyst bed so the bed temperature could be monitored. The reactor was placed in a tubular furnace and heated at 350°C for three hours while helium gas was passed over the catalyst at a rate of 13 (ml/min) (Logie, et al. 2000). Once the three-hour heating period was over a syringe pump was activated that contained 2-methyl-2-pentene (2M2P). The 2M2P was vaporized in a preheating line before it reached the reactor. The total volumetric flowrate was (19 ml/min) with the addition of the 2M2P.

Data Analysis. The gaseous products from this process were fed to an inline gas chromatograph to obtain the distribution of the product gases. The GC was calibrated to detect 2M2P, 4-methyl-2-pentene (4M2P), 3-methyl-2-pentene (3M2P), 2,3-dimethyl-2-butene (2,3-DMB-2). The readings from the GC were used to find the composition of the exist gas. These compositions were used to calculate the conversion of 2M2P and selectivities for the product gases. Weak acids cause the 2M2P to isomerize to 4M2P, strong acids yield 3M2P, and stronger acids favor isomerization to (2,3-DMB-2) (Natal-Santiago, et al. 1999). The surface chemistry of the catalyst could be determined using this information and the distribution of the produced gases.

RESULTS AND CONCLUSION

The technique described above for finding the surface chemistry of a catalyst was successful in these experiments. There was a clear distribution of products in the exit gases that could be used to find the conversion of 2M2P and selectivities for the products. These conversions and selectivities revealed the surface chemistry of the catalyst. This research is on-going and the results are reported to PNNL. PNNL has the information regarding the catalyst and may use the results to identify practical applications for the catalyst.

This research has provided a reliable method to find the surface acidity of a catalyst. The process used to complete this research is simple and non-hazardous. It can be carried out in any research facility with minimal capital investment. The chemicals are inexpensive and readily available for most chemical manufacturers.

Mass transfer and operating conditions heavily influenced these results. If the pore size of a catalyst is too small the hexene cannot diffuse into the catalyst and the product distributions will not be representative of chemistry of the catalyst. Additionally, it is important that the reaction conditions are optimal for isomerization. If temperatures are too high the hexene may crack. If the temperature is too low, the reaction will not take place.
REFERENCES


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