



The University Of Texas At Arlington McNair Research Journal

Summer 1996
Volume 1

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Jason Soard

Characterization Of The Assimilatory Nitrate Reductase From A Facultative
Methyloolithotroph, *Pseudomonas* AM1
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Conceptionalization And Practice Of Science By National Groups
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Use Of Magnetic Susceptibility And Spectral Reflectance Measurements
To Determine Paleoclimate During The Pleistocene In Europe
James R. Marlatt

Matching Cultural Value Orientations To Ad Appeals: Exploring
The Role Of Individualism-Collectivism In The USA Versus Mexico
Michael Mosley

and more . . .

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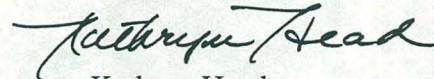
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Notes From The Director

It is with much pride and respect that I congratulate the 1996 Ronald E. McNair Postbaccalaureate Achievement Program scholars at The University of Texas at Arlington on their achievements this year. The results of their summer research projects as evidenced in the following pages are testament to the perseverance, dedication and scholarly ambitions of these outstanding students.

The scholars' achievements, I think, may be attributed not only to their own hard work and seriousness of purpose, but also to the guidance and encouragement of their faculty mentors and to the unqualified support of the administration at the University. Together, outstanding progress may be realized.

Best wishes on future success. The McNair Scholars Program remains fully supportive and vitally interested in all of your academic endeavors.



Kathryn Head

Director

McNair Scholars Program

Dedication

The McNair Scholars Program dedicates this premier volume of research papers
in memory of McNair Scholar

Nora Jean Henry Allen

Nora celebrated life everyday and shared her exuberance with us. We will
remember her as a strong, positive role model. We thank her
for her friendship and her smile that always greeted us.



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CONCEPTIONALIZATION AND PRACTICE OF SCIENCE BY NATIONAL GROUPS

Helen King
Mentor: Dr. Frances Harrold

ABSTRACT

The purpose of this study will be to progress toward an understanding of the conceptualization and practice of science as held by national groups such as the Institute for Creation Research (ICR), or local groups such as the Metroplex Institute of Origin Science (MIOS), which promote 'scientific creationism' and compare this perspective with that of members of the scientific community who oppose creation science, as represented by The North Texas Skeptics. A preliminary goal is to achieve some understanding of why evolutionary theory, in particular, is unacceptable as a valid scientific hypothesis to the members of such religious fundamentalist groups. Key issues will be an understanding of the relationship and attitude of each group toward science, as well as the relationship between science and religion for each of these sample populations. It is hoped that this research will help to clarify the deeper issues involved in the conflict of ideas and ideologies as regards attempts by fundamental religious groups (those that support 'literal creationism' or 'scientific creationism' as the only possible scientific explanation for the 'origins of mankind') to remove the teaching of evolution from public school classrooms, or force the implementation of an 'equal time' presentation of 'creation science.'

CREATION SCIENCE PRESENTATION

What is 'creation science'? Who believes in it? Why is the theory of evolution anathema to these people? Creation science is a topic that has been much in the news over the last decade. The issue as to whether the creationist version of science is religion or not has been hotly debated, dissected, and not very satisfactorily decided, at least in the opinion of its proponents.

According to Christopher Toumey, in *God's Own Scientists*, creationism is ... a system of cultural meanings about both immorality and science that helps fundamentalist Christians make sense of the realities, anxieties, changes, and uncertainties of life in the United States in the late Twentieth Century. As a system of meaning about immorality, creationism offers a series of theories that allege that the idea of evolution is intimately involved, as cause or consequence or both, in the moral disintegration of modern US life. These feelings about immorality are the commonstock of fundamentalist thought; creationism, then, is the subcategory of fundamentalism that ties those feelings to the problem of evolution."

Fundamentalist Christians accept the plenary authority of the Holy Bible as the primary authority in their lives. But there is a second kind of plenary authority, namely scientific authority. The credibility of creationism depends on coming to terms with the plenary authority of science. Creationists attempt to

do this by contending that science corroborates creationism. Thus we have the terms scientific creationism and creation science.

Creation science is thus proposed as a scientifically grounded model of origins which builds its foundations on the Bible, and draws its argumentation directly from evolutionary literature. Arguing by exegesis, the proponents of creation science take quotes out of context, often misrepresenting or distorting the content in defense of their own position.

One such case concerns a Dr? Carl Baugh, director and curator of the Creation Evidences Museum in Glen Rose, Texas. Dr? Baugh claims a MA in archaeology, and a Ph.D. in Education from the Pacific International University in Queensland, Australia. This institution has no formal curriculum, classes, research facilities, or academic staff.

Baugh claimed, in a public lecture, that Hebrew scholars broke a secret code in the Pentateuch, the first five books of the Bible. He claimed that these scientists discovered hidden within the text, encrypted, the names and birth or death dates of numerous historical figures, including Adolph Hitler. My research showed that the scholars began with certain formulated numerical search sequences and a list of names. Hitler was never mentioned, neither was he on any of the lists used.

Another organization which conducts 'creation science' research is the Institute for Creation Research, better known as ICR, based out of El Cajon, California. Its founder, Dr. Henry M. Morris, holds a Ph.D. in Hydraulic Engineering from the University of Minnesota. Dr. Henry Morris and his son, John, who has a Ph.D. in Geological Engineering from the U. of Oklahoma, have written numerous books on the topics of creation science and flood geology. They conduct seminars all over the country entitled Back To Genesis. I attended one such seminar in Dallas. While this group is trying to build a reputation as a scientific research organization, it comes as no surprise to find them using tactics similar to those of Dr? Carl Baugh, including an article in their publication, Acts and Facts, about the previously mentioned Hebrew scholars.

My research was intended to focus, however, not on the issue of whether creation science is a valid approach to scientific inquiry, but rather it has been an attempt to determine the social constructs and beliefs which dictate how the world in general, and science in particular, are viewed and understood by those who profess a belief in creation science, as well as the world view of individuals and groups who oppose creation science. My methodology included research of literature both by and about groups such as the ICR and The Metroplex Institute of Science Research (MIOS), who are advocates of creation science; as well as The North Texas Skeptics (NTS), a group of area citizens dedicated to a critical analysis of any highly debated or controversial topics involving paranormal or supernatural factors. My research also involved attending seminars, meetings, and lectures (both taped and live) presented by all of the aforementioned groups.

I was able to interview several members of both MIOS and NTS. The questions used in conducting the interviews elicited responses about such variables as the subject's level of education; job/profession; religious affiliation; personal response in defining terms such as theory, hypothesis, and scientific method; questions about biblical validity and authority; and whether evolution science and/or biblical creation science should be taught in public schools.

It may surprise some of you to learn that many of the upper echelon proponents, as well as numerous rank and file members of creationist groups hold MAs and PhDs in the fields of technology, engineering, the hard sciences and/or education. While a few of these degrees are of questionable origin and integrity,

and show dubious foundation of academic training, the vast majority were earned from respected, accredited institutions of higher learning. This demonstrates quite clearly that while not all who promote creation science are as well credentialed, the academic view that these people are either dumb, ignorant, unbalanced, or just fringe fanatics needs to be carefully reconsidered. Indeed, they consider themselves to be a part of the scientific community. As UTA sociologist Dr. Raymond Eve noted, these people are "...neither ignorant nor dumber than a sack of hammers."ⁱ Likewise, most of the NTS members I interviewed hold post-baccalaureate degrees in similar fields.

Sociologist Michael Cavanaugh addressed this very issue by pleading for the reevaluation of proverbs, which he termed 'packaged-down knowledge.' He had a particular fondness for the proverb, "In the land of the blind, the one-eyed man is King." Cavanaugh views groups such as the ICR as specialized 'knowledge industries' which dispense their own version of scientific truth to a select audience of faithful followers. In such a case the one-eyed king can grievously mislead and misinform his followers, who identify strongly with the cause and belief system being presented.

Zdzislaw Mach, in *Symbols, Conflict and Identity*, quoted Edwin Ardener as suggesting "...that the process of identification... in the social world involves a crucial factor of power relationship[s] (sic). (Ardener 1987)."ⁱⁱ Thus, by ascribing certain qualities to particular people or groups, or by including them in well defined categories, people organize their world, classifying it according to a personalized (conceptual) symbolic model of reality and relationships."ⁱⁱⁱ Social interactions and beliefs which may seem irrational to an observer, become clear and rational when analyzed in terms of the conceptual model of the world view of the group being considered. Fundamentalist Christians see the alliance between the federal government and institutional science as a threat to their cultural and moral identity by promoting the teaching of evolution. The struggle to gain scientific validation of creationist scientific models thus has become a defense of personal religious truths and an attempt to control the means of cultural reproduction - the public school system.

This is of vital consideration when dealing with and attempting to understand the creationist viewpoint. The why of their belief in creation science is crucial to an understanding of their argumentation and logic. The answer seems to lie in attitudes about biblical authority and the relationship between science and religion.

One of the first questions I asked was "Do you feel that biblical, or any other, presuppositions should be a valid basis for the interpretation of scientific data?" The Skeptics I interviewed responded unanimously and in the negative.

All but one MIOS member answered yes to this same question. MIOS members agreed unanimously not only that the origins account in Genesis is a factual representation of simple historical truths, but also that a correct interpretation of scientific data would support this model of origins. One MIOS respondent with a Ph.D. in physics replied:

I believe it can if you mean "supported" or "shown consistent with". Most of the Genesis account of origins is beyond the pale of science as the entire event was supernatural and even the very laws by which our universe operates were brought into existence at that time.

When questioned about the relationship between scientific authority and religious authority, all

interviewed subjects in both groups agreed that scientific and religious authority were in no way related since they dealt with different realms of human thought.

Finally, the most telling responses came in answer to two related questions - the first asked if the Bible should be held answerable to scientific standards; the second concerned scientific authority and religious authority and whether one supersedes the other. One Skeptic respondent stated:

They shouldn't be pitted against one another. Since creationists insist that this be done, I can only say that biblical authority has no place in the classroom just as Origin of Species shouldn't be inserted after Genesis in the Bible.

When asked this same question, the creationists interviewed responded negatively. A homeschooling mother said:

Religious authority is from the Bible and does trump science, which is handled by men and is men's knowledge, which is constantly changing. The Bible was not written to give scientific facts, so it is not a viable comparison. It was not written to be tested.

Another MIOS member, an eighth grade science teacher replied:

When we say religion we get into discussing organizations of man.
When teaching creation, I teach what I know about God.
That (knowledge) supersedes all, man-made, acquired knowledge.

My findings lead me to agree with historian Ronald Numbers in that what most distinguishes the leading creationists from their evolutionary counterparts is not intellect or even integrity, but cosmology and epistemology. The people I interviewed, both creationists and evolutionists, have a clear understanding of scientific terminology and methods. Creationists, however, subordinate science to biblical authority as a source of truth. Whereas evolutionists either reject religious authority or reconcile the two within their own personal belief systems.

Misunderstandings will continue as long as each camp attributes its own existential assumptions to the other side without realizing how irrelevant they are in the opposite context. We need to stop talking and really listen in order to begin making progress towards mutual understanding, if not agreement.

NOTES

i Eve, Raymond. "Weird Science." *theMet*; 7-17-96; p. 13.

ii Mach, Zdzislaw. *Symbols, Conflict, and Identity*; p.6.

iii *Ibid*.

Research Survey Interview Format:

Subject: Worldview of Creationists and Those Who Oppose Creation Science

Interviewer: Helen King, Graduate Student at The University of Texas at Arlington,
Working with Dr. Frank Harrold

I. Introduction - Statement of Purpose

The purpose of this study is to explore the social and cultural values of proponents of scientific creationism as well as people, such as members of the North Texas Skeptics, who do not agree with scientific creationism, in an attempt to gain an honest and accurate insight into the world view and cultural system of meanings of both groups. It is hoped that this effort will help to correct or replace stereotypes and simplistic clichés about beliefs held by each group.

II. Background Information

- 1) It would be helpful to know a little about your educational background.
- 2) What level of education have you attained? In what field? and from what institutions?
- 3) What is your job/profession?
- 4) What is your religious affiliation?
- 5) How important is religion in your life?

III. I am going to ask you some questions about science, scientific knowledge, and religious beliefs in order to help me develop a cultural profile.

- A.
 - 1) Tell me what you mean by the term 'science.'
 - a) What is the nature of science?
 - b) What is the scientific process?
 - c) What makes knowledge/study scientific?
 - 2) Do you feel that biblical, or any other, presuppositions should be a valid basis for the interpretation of scientific data?
- B.
 - 1) Tell me what you mean by the term 'theory.'
 - 2) Is evolution a theory or a fact? Explain.
 - 3) Do you agree or disagree with this statement: 'Scientists seek facts, but sometimes the best they can do is theories.' Explain.
 - 4) Tell me what you mean by the term 'hypothesis.'
- C.
 - 1) Do you believe that science is an instrument for progress? If not - explain?
 - 2) Do you accept science as a credible form of knowledge?
 - 3) Do you feel that scientific discoveries tend to break down people's ideas of right and wrong?
- D.
 - 1) Is the account of origins found in Genesis a factual representation of simple historical truths?
 - 2) Can the Genesis account of origins be borne out by a correct interpretation of scientific data?
- E.
 - 1) Do you think that most scientists are atheists?
 - 2) Deleted - until can effectively reword.
 - 3) Is scientific authority on an equal standing with biblical authority?
- 4) Is there a conflict for you between scientific and religious beliefs? If so, how do you deal with it?

- F. 1) Do you believe that evolution should be taught in public schools?
- 2) Do you believe that the biblical account of creation should be taught in public schools as an alternative explanation of origins?
- G. 1) Can scientific knowledge and authority be used to substantiate the historical authority of creationist accounts of origins as revealed in Genesis?
- 2) Is it proper to do so, or perhaps impious?
- H. 1) Do you agree with Henry M. Morris and ICR interpretations of scientific data, especially as regards flood geology?
- 2) In seeking scientific validation of creationist claims, is the Bible being held answerable to secular scientific standards?
- I. 1) As concerns the relationship between religious authority and scientific authority, does one trump, or supersede the other?
- 2) Can any meaningful progress be made in the discussion/debate between creationists and the opposing scientific community over the issue of evolution?

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EXCAVATION ON GOVERNOR'S ISLAND DESIGN THROUGH ARTIFICIAL EXCAVATION

Dan Gonzalez
Mentor: Mr. Bill Boswell

ABSTRACT

The lack of physical evidence of an architectural past in many American cities denies us the ability to experience that past. A new process of design through artificial excavation, a theoretical excavation of past historical events, allows us to recreate this experience. This method of excavation, first developed by Peter Eisenman, was used as the basis for this research project. Three events chosen from Manhattan's past became the excavated artifacts that were constructed on the Governor's Island. These events were, the Manhattan grid, Manhattan Utopias and the Urban Forest.

When we examine photographs or drawings of a particular building we are able to acquire specific amounts of information of that building. By reading a verbal description of the spaces in that building we are able to imagine what some of the spaces might be like. Yet, even with this information we are unable to truly describe what it is like to walk through that particular building. Verbal and graphic descriptions do not offer the ability to create an experience. Photographs of buildings are two dimensional representations of three dimensional spaces and objects. It is therefore difficult to experience what it would be like to walk around or through the interior spaces of the building photographed. The absence of a tangible object or building prevents us from experiencing the space. In essence, we need to be in the space to experience it. By using our tactile senses we are able to offer an experiential description of the space. The object or building used to create this experience becomes the artifact of our experience.

In archaeology, artifacts discovered by excavation are interpreted by archaeologist. These interpretations help recreate a past history that is related to a particular site during a specific time period.

The process of excavation retains its central role in fieldwork because it yields the most reliable evidence for the two main kinds of information archaeologists are interested in: 1) human activities at a particular period in the past; and 2) changes in those activities from period to period. Very broadly we can say that contemporary activities take place *horizontally in space*, whereas changes in those activities occur *vertically through time*. It is this distinction between horizontal "slices of time" and vertical sequences through time that forms the basis of most excavation methodology (Renfrew and Bahn,90).

The technical aspects of excavation involve the use of the unit-locus-stratum-level-feature-artifact labeling system for excavation. These terms are defined as follows:(Sharer and Ashmole)

- 1) Unit: a vertical cut in the earth used to reveal a vertical dimension of archaeological data and to explore a horizontal dimension along one axis.
- 2) Locus: a sub-unit or division of a unit
- 3) Stratum: the definable layers of an archaeological matrix (the physical medium that surrounds, hold, or supports archaeological data) or features revealed by excavation.
- 4) Level: an arbitrary level of 10 cm or less within a natural stratum.
- 5) Feature: anything created or caused by humans; a non portable artifact, not recoverable from its matrix without destroying its integrity.

6) Artifact: a discreet and portable object whose characteristics result wholly or in part from human activity.

Each strata offer information on the order of events that took place on that site. Also, the artifacts that are discovered must also have the corresponding strata assigned to them so that archaeologists are able to create a picture or order of events that took place on the site. A way of looking at archaeology is to think of it as "a vast, fiendish jigsaw puzzle invented by the devil as an instrument of tantalizing torment, since: a) it will never be finished; b) you don't know how many pieces are missing; c) most of them are lost for ever; d) you can't cheat by looking at a picture (Bahn,5).

By examining these artifacts we are able to imagine or experience an historical past through visual and tactile senses. This allows the artifacts to become the controlling factors that enable us to experience the past.

In the United States, the urban fabric of neighborhoods is constantly changing. Buildings, once intrinsic to the composition of this fabric, are often demolished and replaced with newer buildings. Consequently, these buildings completely erase any evidence of previously existing buildings. Those who live in these neighborhoods are aware of the change in the landscape. Yet, a first time visitor to the neighborhood will never know of the previous composition of the neighborhood. This neighborhood, as well as many cities in the United States, lack the artifacts of an historical past that could enable us to experience an architectural past.

Since we do not have these tangible artifacts we must acquire our artifacts from the events of an historical past. We must excavate our verbal and graphic history since many of our cities do not contain architectural ruins or artifacts that are needed to create an experience. By excavating through our historical past, the events that we choose to represent become the theoretical artifacts. This form of artificial excavation, first used in some of Peter Eisenman's projects, is used as the impetus for the development of this project.

In his Berlin project the, "strategy for developing the site was twofold. The first intention was to expose the particular history of the site; that is, to render visible its specific memories, acknowledge that it was once special, was some place. The second was to acknowledge that Berlin today belongs to the world in the largest sense, that its specificity and identity have been sacrificed on the altar of modern history, that it is now the crossroads of every place and no place (Eisenman,24)". Here Eisenman writes about exposing a historical event or memory that is relevant to the site. Although these elements are intangible they become constructed artifacts that can be experienced. Eisenman excavates Berlin's historical past to acquire these artifacts.

Before we can begin to apply this theoretical concept of excavation to the project the following comparison between conventional and artificial excavation must be made:

Conventional Excavation

- ◆ Digging is done vertically down, by layer or strata.
- ◆ Artifacts are discovered and interpreted.
- ◆ Cannot be certain what will be found.
- ◆ Will never be sure that interpretations are accurate.

Artificial Excavation

- ◆ There is no physical digging.
- ◆ Artifacts are constructed that represent historical events.

- ◆ Specific historical events are excavated.
- ◆ Interpretations are fairly accurate.

There are some distinct advantages to artificial excavation as an approach to design. For example, we are able to control the sources and the results of what we are trying to represent in our design. We can also recreate a past that might otherwise be lost to redevelopment and expansion.

Now that the concept has been defined and described we can proceed with its implementation. The location of this project is on Governor's Island to the south of Manhattan. The island's ownership has been transferred from the Federal government to the State of New York. The basic criteria for the project was to redesign the spaces on the island and create areas of commerce and habitation.

The primary focus of this project was to rediscover and recreate a past that is tactile and visual, three dimensional. In order to achieve this the concept of artificial excavation was used. Instead of implementing the methods of conventional archaeological fieldwork which involve the process of discovering by systematically excavating into the ground. A theoretical excavation into the verbal and pictorial history of Manhattan was performed. Three events that influenced the evolution of Manhattan were excavated. These were the Manhattan Grid, Urban Utopias and the Urban Forest.

The Manhattan grid which was imposed in 1811 was analyzed and implemented on the site as a way of connecting Governor's Island with Manhattan. This also served as a memory to the underlying structure that regulated past and present growth of Manhattan.

The implementation of the grid was forced onto the island. It was followed and respected regardless of the natural terrain of the land. "Extending logically in all directions, arbitrarily terminating at the islands shores, this grid denied the priorities of the natural topography as its vertical and horizontal lines were raised above land depressions and leveled beneath the crests of hills (Boyer,8)".

The grid was a rectilinear system that was imposed on an island that was clearly not rectilinear. The primary reason the grid was imposed was that in the early 1800's it was thought a system of rectilinear streets would allow builder to build more efficient housing units. In turn, this efficient way of building housing would create better living among the citizens.

Manhattan Utopias, which recall the first structures that influenced the many Manhattan skyscrapers. Many of these structures were only conceptual and never got built, but they helped to create an image of what a high rise building could be. "In this branch of Utopian real estate, architecture is no longer the art of designing buildings so much as the brutal skyward extrusion of whatever site the developer has managed to assemble (Koolhaas, 72)".

One example of a utopia would be Gaudi's Manhattan Hotel. "Gaudi's design is a paradigm of floor-by-floor conquest of the Skyscraper by social activities. On the outer surface of the structure, low floors provide individual accommodation, the hotel rooms; the public life of the hotel is located at the core, on enormous interior planes that admit no daylight (Koolhaas, 89)".

One of the restaurants, "is decorated with a concentrate of European mythologies that will be reinforced by the choice of menu and European music, played by a large symphony orchestra. Each of the other restaurants, with its own hermetic iconography, represents another continent; the stack together represents the World (Koolhaas, 89)". This image of a hotel was radical for the early 1900's. Its design, although never built, epitomized the thoughts and images that many people had about Manhattan's future.

We must also mention coney island and some of the buildings that were constructed at the turn of the century. Many of these unique structures were constructed as part of amusement parks which allowed

them to be as outrageous as possible. We can see this in Luna Park for example. As well as in the proposal for the Globe Tower.

These Manhattan Utopias were not only in the form of built structures, they were also represented in the form of renderings that would depict ideal scenarios for the 1930's. Some of these renderings depicted visions of what Manhattan or a similar city of the future might look like.

The Urban Forest, was recreated with new building types to recall the early gardens and parks that existed throughout Manhattan in the early 1900's, that were converted in commercial districts. These new structures also maintain a present day connection with Central Park. Also this part of the concept is taken from actual experiences that were acquired from an Etruscan archaeological excavation. The site was on top of a tree covered hilltop that offered varying qualities of light. The different ways in which light filtered through the trees on the site was very dramatic. The concept of urban forest is not a literal one. The new building types and roof structures that are developed in the project help recall the image of a forest profile. By designing the structures in this manner we can say that the buildings themselves become the elements that recreate the forest.

These three events were constructed on Governor's Island to recreate an experience of Manhattan's past. These events become the artifacts of this excavation. However, the name artificial excavation might be a little bit misleading. In one sense this entire process does become artificial because it does not follow the conventional process of archaeological excavation. Yet it does become or still is a form of excavation. It is not an excavation for the physical evidence of a previous past. Instead, it is the excavation of a historical past that uses specific events in that history as the artifacts. It is these artifacts that are used to recreate and construct an historical experience.

Once these artifacts were constructed on Governor's Island the excavation process was completed. Elements of Manhattan's past could now be seen and experienced. Through this form of artificial excavation we have implemented elements of a past existence into our present reality and by doing so we will hopefully find clues within these new urban structures about our future.

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CHARACTERIZATION OF THE ASSIMILATORY NITRATE REDUCTASE FROM A FACULTATIVE METHYLOTROPH, *PSEUDOMONAS* AM1

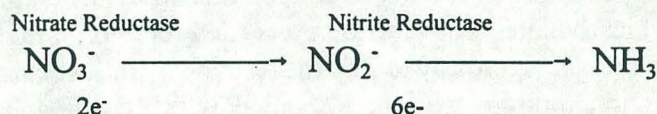
George Scott Pesiridis
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ABSTRACT

The pathway concerning the fixation of inorganic nitrate to nitrite and then to ammonia via the enzyme nitrate reductase is a novel system incorporating inorganic material into a complex organic system. The enzyme of study is derived from a strain of gram negative bacteria, *Pseudomonas* AM1 (*Ps.* AM1), also known as *Methylobacterium extorquens* (5). The growth pattern of *Ps.* AM1 was studied to determine the optimum optical density for *Ps.* AM1 which was taken during mid-exponential growth phase. *Ps.* AM1 cells were initially used from various growth media consisting of methylamine, ammonium chloride/methanol, ammonium chloride/succinate, nitrate/methanol and nitrate/succinate. In the presence of inorganic nitrogen sources, such as nitrate, the enzyme activity was proposed to be high whereas in the presence of organic nitrogen sources, such as ammonium chloride, the activity of the enzyme was proposed to be reduced a significant amount. These characteristics are proven in the contents of this paper, and represent the indirect regulation of nitrate reductase via different growth sources. Characterization of the enzyme using gel electrophoresis staining techniques provides valuable information about the molecular weight and subunits of nitrate reductase. Measurements of enzyme activity are also done to further characterize this novel enzyme.

INTRODUCTION

The research presented concerns the characterization of the protein nitrate reductase (NR). Previous research with nitrate reductase has been accomplished in various species of bacteria, yeast, fungi, algae, and higher plants (15). *Pseudomonas* AM1 (*Ps.* AM1) is a methylotrophic bacteria able to utilize single carbon sources such as methanol (CH₃OH) and methylamine (CH₃NH₂) (14). Our primary interest in *Pseudomonas* AM1 is its ability to convert inorganic nitrogen sources, such as nitrate (NO₃⁻), into organic nitrogen sources, such as ammonia (NH₃). The total incorporation of inorganic nitrogen into the organic system of *Ps.* AM1 is an 8 electron transfer via two enzymes, nitrate reductase and nitrite reductase. The interest of this research concerns the first enzyme in this two step process transferring two electrons to nitrate to make nitrite.



The source of electrons for the reduction of nitrate may come from various sources, such as NADH or NADPH, *in vivo*. However, methyl viologen, an artificial electron donor, is used in the research as a source of electrons. Other prosthetic groups and metal ions may also be involved in the flow of electrons. Nitrate reductase from the yeast *Candia nitratophilia* was found to contain one

molecule of cytochrome b_{55} and one molybdenum atom (10). Nitrate reductase from *Azotobacter vinelandii* contains one molybdenum atom and four iron atoms to facilitate electron flow (9). The presence of a similar electron transferring system may exist in *Pseudomonas* AM1 however its occurrence is not yet known.

The contents of this paper express the results of the preliminary enzyme assay and the development of the nitrate reductase activity stains.

MATERIALS AND METHOD

Growth and Maintenance of organism

Pseudomonas AM1 was grown in 500mL batches. The constant growth factors consisted of 0.5% (v/v of media) trace elements, 1.0% (v/v of media) 1M phosphate buffer, and 1.0% (v/v of media) 9% (w/v) magnesium sulfate in 20mM phosphate buffer. *Pseudomonas* AM1 was studied after it was grown on five different combinations of growth sources. The (v/v) ratio of 5M methylamine (CH_3NH_2), 1M ammonium chloride (NH_4Cl), 1M sodium nitrate (NaNO_3), 1M sodium succinate (NaC_4H_5), and 50% (v/v) methanol (CH_3OH) in the media were 2.25%, 1.25%, 1.25%, 2.5%, and 1%, respectively. The five growth source combinations are as follows: CH_3NH_2 , NH_4Cl /sodium succinate, $\text{NH}_4\text{Cl}/\text{CH}_3\text{OH}$, NaNO_3 /sodium succinate, $\text{NaNO}_3/\text{CH}_3\text{OH}$. After proper sterilization, growth was initiated with a 0.4% inoculum from a reserve flask grown on CH_3NH_2 . *Pseudomonas* AM1 was grown on a shaker (260 rpm) at 30°C. *Ps.* AM1 cells were harvested at mid-exponential phase by centrifugation at 9000 rpm for 20 minutes. The cells were then washed with 20 mM MOPS buffer and recentrifuged.

Preparation of cell extracts

Resuspended cells were used immediately due to the unstable nature of nitrate reductase *in vitro*. Recentrifuged cells were weighed and resuspended in 20mM MOPS at a ratio of 3mL of buffer for each 1g of wet cell weight. This cell suspension was then homogenized to obtain a homogeneous suspension. The cell extract was obtained by rupturing the cells using a French pressure cell at 1200 PSI. The exudate was then centrifuged at 15000 rpm for 15 minutes. The supernatant fluid, containing the *Ps.* AM1 proteins, was saved and the pellet was discarded.

Protein assay

The protein concentration was determined using the method of Bradford (6). Bovine serum albumin fraction V was used to obtain the calibration curve for protein concentration determination.

Enzyme assay

The determination of product, nitrite (NO_2^-), was done by monitoring the absorbance using a Beckman UV/VIS spectrophotometer at 540nm. The assay was described by Chen (7) and consisted of; 200 μL of *Ps.* AM1 crude extract, 400 μL of 200 mM MOPS (pH 7.5), 100 μL of 60 mM methyl viologen, 150 μL of dH_2O , 100 μL of 0.1 M NaNO_3 . The reaction was initiated by the addition of 1% (w/v) sodium dithionite in 0.095M sodium bicarbonate. The reaction proceeded for approximately 15 minutes, or other desired time, at 37°C and then shaken vigorously to stop the reaction by influencing oxidation of the system. Nitrite produced in the reaction mixture was then coupled with N-(1-naphthyl) - ethylenediamine dihydrochloride (NED) and 1% (w/v) sulfanilamide in 3 M HCl. The production of nitrite was determined colourmetrically at 540nm. The absorbance readings were compared with readings prepared on a standard nitrite calibration curve to determine the amount of nitrite production. Enzyme activities were reported in μmol of nitrite/min/mg protein.

Gel electrophoresis

Procedures concerning the use of native acrylamide gel electrophoresis were used to obtain an activity stain of nitrate reductase. The method of native acrylamide gel electrophoresis used was described by previous work done by Dodson (8).

The following stock solutions were prepared: 4X separating gel buffer (11.5% (w/v) Tris, pH 8.48), 4X stacking gel buffer (1.92% (w/v) Tris, pH 6.9), separating gel acrylamide (38% (w/v) acrylamide/ 2% (w/v) N,N'-methylenebisacrylamide), and stacking gel acrylamide (5% (w/v) acrylamide/ 1.25% (w/v) N,N'-methylenebisacrylamide). A fresh catalyst solution was made prior to casting the gels which was composed of 2.5 mL of 0.02% flavin mononucleotide and 150 μ L of 10% ammonium persulfate diluted to 25 mL with dH₂O.

The separation gel was prepared first, composed of: 2.5 mL of 4X separating gel buffer, 2.5 mL dH₂O, 3.38 mL of fresh catalyst solution, and 20 μ L of N,N,N',N'-tetramethylethylenediamine (TEMED). The separation gel was cast and filled to approximately 6-7 cm from the bottom of the glass plates. This was then covered with a thin layer of isobutyl alcohol to prevent drying and set to polymerize for 1.5 hours. After such time, the isobutyl alcohol layer was poured off and the stacking gel was prepared. The stacking gel was composed of: 2.5 mL 4X stacking buffer, 2.5 mL fresh catalyst solution, 5.0 mL stacking acrylamide, and 5.0 μ L of TEMED. The stacking gel was cast with a 10 lane comb and allowed to polymerize for 2 hours.

Protein samples were prepared with varying concentrations of protein extract (1-4 mg/mL), however protein samples of approximately 2 mg/mL seemed to work the best for the desired activity stain. Protein samples were composed of 90% (v/v) diluted protein and 10% (v/v) native sample buffer (50% (w/v) sucrose and 0.1% (w/v) bromophenol blue). The bromophenol blue in the sample buffer was used as the tracking dye so one can visualize the migration of the proteins through the gel. Approximately 20 μ L of the prepared protein samples were loaded into each lane of the prepared gels.

The electrophoresis tank was filled with ~650 mL of lower tank buffer. The inner cooling core was lowered into the electrophoresis tank and ~110 mL of upper tank buffer was added to the upper tank chamber. The gels were run for 2.25 hours in a 4°C environment at 20 mA.

Activity staining

Nitrate reductase activity was detected using an altered procedure described by Hucklesby and Hageman (1973) (11). The gel was taken from the inner cooling core and placed into a dish in an enclosed N₂ AtmosBag. N₂ was pumped into the AtmosBag while degassed solutions of reaction mix (200 mM MOPS pH 7.5, dH₂O, and 60 mM methyl viologen), 0.1 M NaNO₂, 1.5% sodium dithionite in 0.095 M sodium bicarbonate, and 2.5% triphenyltetrazolium chloride were put into the AtmosBag. The vented AtmosBag was then sealed and the reaction mix was poured onto the gel. The degassed dithionite solution was then added to the gel dish, 5% (v/v) of the total reaction volume. The gel was gently shaken for 30 minutes in a 37°C environment. The substrate, 0.1 M NaNO₃, was added and clear bands corresponding to the protein bands appeared within several minutes. The reaction mixture was then poured off and the 2.5% triphenyltetrazolium chloride solution was poured over the gel. The gel was then removed from the AtmosBag for analysis.

RESULTS

Growth

Successful growth of *Ps. AM1* was observed for all media sources except NH_4Cl /sodium succinate. Contamination of the flask was an experimental reoccurrence. Therefore, all data present does not include nitrate reductase *Ps. AM1* grown on NH_4Cl /sodium succinate.

Enzyme Assay

One major hypothesis was proved showing that *Ps. AM1* grown on various growth media will experience a correspondingly different enzyme activity. *Ps. AM1* grown on an inorganic nitrogen source, such as NaNO_3 , experience larger values for nitrate reductase activity compared to *Ps. AM1* grown on an organic nitrogen source, such as NH_4Cl , due to the necessity for an organic nitrogen source absent from the media. This observation leads to many interesting questions concerning the mode of regulation for nitrate reductase.

Activity stain

The protein bands corresponding to nitrate reductase were easily observed in the oxygen free environment provided by the AtmosBag. The bands appeared as a clear band on a dark blue background. These bands corresponded to nitrate reductase activity and existed as the pure protein separate from all other *Ps. AM1* proteins. Efforts to save the stain for further analysis in the oxygen environment proved to be difficult. The tetrazolium red dye appeared to create a light pink background rather than a red background making analysis rather difficult. Efforts to photograph the gel in its dark blue state are still in progress using a Fototype polaroid camera. Improvements using the tetrazolium red dye as an activity staining tool are also of current interest.

DISCUSSION

The enzyme assay presented in this paper is used in various ways to determine other characteristics of nitrate reductase. It is currently being used to determine the optimum pH for nitrate reductase activity. Future uses of the assay will be to determine information concerning the enzyme kinetics of nitrate reductase. Michalis-Menton plots will be of interest in the near future providing information about the K_m and V_{max} values.

The regulation of nitrate reductase may prove to be quite interesting. Regulation of nitrate reductase by other organisms is not really studied to the extent necessary to encompass a nitrate reductase regulation system. It is shown in this paper that such a system definitely exists. It is likely that nitrate reductase may be regulated by several different modes operating simultaneously. Nitrate reductase can be regulated at the levels of enzyme synthesis and degradation, reversible inactivation, concentration of substrates and effectors, and other intracellular signals (15). The overall incorporation of nitrogen into the organic system goes further to involve glutamate dehydrogenase and glutamine synthetase (3). Therefore, regulation of nitrate reductase is dependent on the regulation of other systems of proteins and the overall levels of intracellular nitrogen.

Current interest concerning the gel electrophoresis deals with the concept of activity staining using the SDS-PAGE process. SDS-PAGE traditionally denatures the protein samples to a point at which no enzyme activity is present. However, previous research of nitrate reductase from *Rhodobacter capsulatus*

strain BK5 shows that a protein sample incubated at 37°C, rather than boiled, allows for retention of enzyme activity (1). This procedure was tried several times, but no enzyme activity has yet been determined. Success from the SDS-PAGE activity stain would provide a direct link to the molecular weight of nitrate reductase.

The native acrylamide gel electrophoresis provided some valuable information about nitrate reductase. The process to obtain the final stain is still in development, however some hypothesis are posed and proven. It was hypothesized that nitrate reductase from *Ps. AM1* grown on different growth conditions might possess different nitrate reductase isozymes. From the current observations, only one nitrate reductase isozyme exists. Further research is necessary before concluding this observation.

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SENSORY RECEPTORS IN THE GILLS OF CHANNEL CATFISH (*ICTALURUS PUNCTATUS*)

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Mentor: Dr. Mark Burleson

ABSTRACT

Sensory receptors are a primary link in the neural network that controls cardiovascular and ventilatory reflexes. To date, most studies of these receptors have focused on mammals leaving less emphasis on lower vertebrates such as fish. Gills are the major respiratory organs in water breathing vertebrates and also function as the primary sensory locus controlling cardiovascular and ventilatory reflexes. Developmental and phylogenetic data suggest that the first gill arch of extant bony fish is homologous to the carotid arch, where the major groups of receptors controlling blood pressure and O₂ levels are located in mammals. Early studies suggest that modulatory mechanisms of mammalian and piscine receptors may be similar. Branchial receptors are sensitive to oxygen and carbon dioxide, blood pressure and mechanical displacement (movement). Sensory information from these receptors is transmitted as afferent neural activity via the glossopharyngeal (IX) and vagus (X) nerves to cardiovascular and ventilatory centers in the brain. These receptors provide important feed-back to central pattern and rhythm generators which coordinate the cardiovascular and ventilatory systems to insure efficient gas exchange. Most previous studies have used isolated, perfused gill preparations. Thus, the fundamental purpose of this study was to develop a method to study these receptors in a more natural setting (*in vivo*) using an anesthetized spontaneous breathing (ASB) catfish. This study answers several hypotheses. First, branchial mechanoreceptors (both phasic and tonic) are active during normal ventilation. Second, although hypercapnia has a stimulatory effect on ventilation frequency (f_v) as well as increasing operculum pressure (P_{op}), it does not have an inhibitory effect on gill mechanoreceptors (mammalian pulmonary mechanoreceptors are inhibited by CO₂). Finally, acetylcholine has a major stimulatory effect on both internal (blood facing) and external (water facing) branchial O₂-chemoreceptors and thus may play a role in the transduction of an O₂ concentration into a neural signal.

INTRODUCTION

Sensory receptors mediate the ability of organisms to alter gas exchange in response to environmental and physiological challenges such as hypoxia, hypoxemia, acute temperature fluctuations, and exercise. A better understanding of the mechanisms that these receptors use to operate may provide important insights for the treatment of human respiratory diseases.

Fish provide a unique model to study cardioventilatory control mechanisms because these systems are more primitive, simple and perhaps offer a more broad evolutionary understanding of ourselves. Fish represent primitive vertebrate ancestors and a homology has been suggested to exist between the carotid (first gill) and aortic (second, third, and fourth gills) arch where chemoreceptors and baroreceptors are located within mammals (Burleson and Milsom 1995). Natural aquatic environments fluctuate in oxygen concentration (depending on rain fall, aquatic vegetation, and the presence of chemicals (i.e. toxins) in the environment). In comparison terrestrial air breathers exist where the oxygen concentration levels are fairly

high and constant (approximately 20%). In their natural environment, fish respond to hypoxia by increasing ventilation, decreasing heart rate as well as moving to more oxygenated environments to insure efficient gas exchange. The ability to respond to constantly changing environments is due to two sets of chemoreceptors oriented internally and externally. Aquatic (external) hypoxia induces bradycardia (decreased heart rate), which can be attenuated by sectioning the cranial nerve branches IX and X to the first gill arch in trout, salmon, as well as channel catfish (see Milsom for review). However, heart rate is unaffected by altering internal oxygen levels (inducing hypoxemia or injecting NaCN), although, both internal and external hypoxic conditions elicit increase ventilation amplitude and frequency.

Mechanoreceptors are sensitive to changes in displacement of respiratory passages and it is thought that their location primarily determines the sensory modality to which they respond as well as their response characteristics. These receptors can respond solely on the degree of change (tonic or slowly adapting receptors) or only to the rate of change (phasic or rapidly adapting receptors) or both rate and degree of change. Phasic receptors display a rapid burst of discharge during the opening and closing of the operculum conveying information about the rate and direction of deformation while tonic receptors respond to rate of movement and position. Thus, during inspiration, receptors may respond to increased flow (displacement or bending of the gill arch, filament or raker), volume (stretching of muscle and connective tissue), pressure (adduction and abduction of the filament). Such receptors provide information in the positioning and orientation of structural elements within the gills which enables for maintaining high and efficient gas exchange.

The first purpose of this project was to develop an *in vivo* experimental preparation in order to study the neurophysiology of a water-breathing aquatic vertebrate. The second purpose was to record afferent nerve activity from oxygen-sensitive chemoreceptors in the first gill arch and to test the effects of acetylcholine (a putative stimulant of either type I glomus cell or the afferent nerve fiber). Most previous studies have used isolated perfused gill preparations (Burleson and Milsom 1995). *Ictalurus punctatus* (channel catfish) are anatomically well suited for studies on branchial receptors in intact fish. Numerous studies, primarily on mammals, have focused on O₂-sensitive chemoreceptors. To date, none of these studies have unequivocally identified the neurotransmitter involved in the primary transduction mechanism. In addition, the effects of CO₂ (hypercapnia) on mechanoreceptor activity will be tested. Hypercapnia has an inhibitory effect on pulmonary stretch receptors in terrestrial vertebrates which allows the lungs to expand or increase in size which, in turn, increases the volume of air and facilitates CO₂ removal. In channel catfish, hypercapnia stimulates ventilation amplitude and frequency. This response is mediated by receptors in the gills (Burleson and Smatresk 1996). Moreover, previous studies are unclear whether one of these two types of mechanoreceptors (phasic) are active during ventilation (de Graff, Ballintijn, and Maes 1987; Saunders and Sutterlin 1969).

MATERIALS AND METHOD

Animal Preparation

Channel catfish, weighing between 250 and 1000g were obtained from a commercial supplier and maintained in 1,900-L tanks with recirculating gravel filters. All fish were held at temperatures that varied between 20 to 25 degrees Celsius on a 12L:12D cycle. Fish were anesthetized with 1.0g of MS-222 (ethyl-m-aminobenzoate, Sigma) dissolved in 10 liters of aerated dechlorinated tap water, transferred to a surgery

table, and artificially ventilated with anesthetic solution. Specimens were secured for a ventral approach and the pericardial cavity was exposed to allow cannulation (PE-10) of the ventral aorta (VA) which allowed for internal administration of pharmaceuticals. The incision was then sealed with silk suture and a latex patch with cyanoacrylate adhesive. Another cannula (PE-160) was inserted into a hole drilled into the operculum to record gill ventilation frequency (f_g) and opercular pressure amplitude (P_{op}). Pectoral spines were clamped in a stereotaxic device which secured fish in an experimental holding chamber.

Two separate surgical methods were performed for the different types of receptor recordings. More specifically, injections of gallamine (0.1 ml/10 ml Cortland saline) were administered I.P. to paralyze fish for recordings of chemoreceptors. Alternatively, since it was important to preserve ventilatory movements, but prevent struggling while recording from mechanoreceptors, a spinalectomy was performed just caudal to the cranium in some experiments. Cranial nerves IX (glossopharyngeal) and X (vagus) were exposed through an opening in the cranium. After surgery, fish were transferred to a Plexiglas holding chamber, where ventilation was assisted with a low flow of water containing a reduced amount of MS-222 (0.2 g per 10 liter of dechlorinated tap water). At this concentration of anesthetic, catfish ventilate spontaneously and exhibit cardioventilatory reflexes to both NaCN and aquatic hypoxia (Burlison and Smatresk 1989).

Nerves were cleared of fascia and desheathed under a dissection microscope and immersed in mineral oil to provide insulation and prevent desiccation. Ventilatory rate (f_g) and opercular pressure amplitude (P_{op}) were measured from the opercular cannula (PE-160) using a pressure transducer and associated with a strain gauge amplifier (Gould). Opercular pressure amplitude was measured to approximate changes in ventilatory effort.

Experimental Procedure

Fish were allowed to stabilize for a period of approximately 30 min., whereupon cranial nerve IX was partially sectioned. Small bunches of axons were teased free from the remaining nerve and then placed onto a platinum bipolar electrode. The signal was amplified and filtered (Grass P5) and processed for counting of action potentials with a window discriminator (Winston Rad 2A). The raw nerve signal, analog rate output from the window discriminator and ventilatory trace from the pressure transducer were digitized and collected using a commercial data acquisition system (Cudas) and displayed on a 386 IBM compatible computer. External hypoxia was produced by switching the submersible pump to another reservoir (also with 0.1 g of MS-222 per 10 liters of dechlorinated tap water) that had been bubbled with N_2 to the desired P_{O_2} .

Putative chemoreceptors were located using this hypoxic solution as well as external NaCN administered by injecting with 500 μ g of NaCN dissolved in 1 ml of Cortland saline into the ventilation water flow. The effects of internal NaCN (50 μ g in 0.15 ml of Cortland saline), given as a bolus injection into the VA. Acetylcholine was administered internally by 100 nmol bolus injection and 500 nmol in 0.5 ml for external administration. Saline (internal) and Water (external) were used as control injections for both NaCN and acetylcholine and had no effect on these receptors. The effects of hypercapnia on the mechanoreceptors were examined switching the submersible pump to a reservoir bubbling 5% CO_2 in air using a gas-mixing flowmeter (Cameron Instruments).

RESULTS

Mechanoreceptors

From the twenty six catfish analyzed in this study, seventeen tonic mechanoreceptors and nineteen

phasic mechanoreceptors were isolated. Various test were performed on these receptors to determine the physiological responses. These tests include exposure to hypercapnic (5% CO₂) solution and hypoxic (dechlorinated tap water bubbled with N₂) solution. From the afferent nerve fibers isolated, seven tonic mechanoreceptors and five phasic receptors were subjected to CO₂ which elicited increased f_v as well as P_{op} but had no effect on the nerve discharge. Six tonic and eight phasic mechanoreceptors were exposed to hypoxia which also had no effect on afferent discharge. In addition, a comparison of discharge characteristic of phasic (two which were isolated) and tonic (five which were isolated) between their apnic (non-breathing) and spontaneously breathing phases are illustrated and explained.

The phasic mechanoreceptors illustrated in fig. 1 was recorded from a nonbreathing fish. Both the histogram (averages of nerve firing frequencies - top trace) and raw nerve signal (bottom trace) show five consecutive moderate burst of nerve activity with each deflection of the jaw of the fish (administered by pressing down on the jaw of the fish with a Q-Tip) followed by five increased rate of deflection of the jaw and finally one jaw deflection held for an extended period of time and then released.

fig. 1

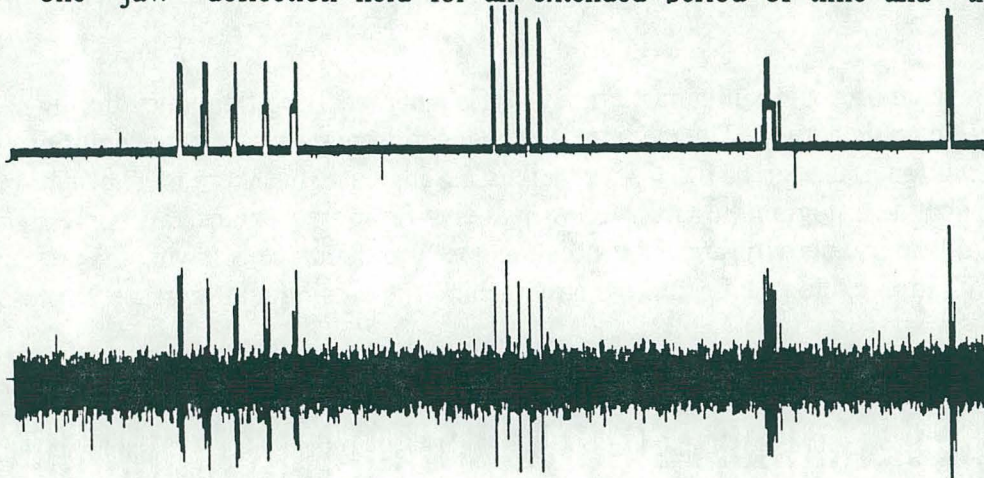


Fig. 2 shows a rapid discharge of nerve activity during the closing of the operculum followed by a silencing of the nerve signal during the opening of the operculum as well as during apnea. Fig. 3 illustrates a completely separate entity of the ventilation cycle, a phasic mechanoreceptor active during the opening of the operculum. Both figure traces include a histogram (top trace), raw nerve signal (middle trace), ventilation trace (bottom trace).

fig. 2

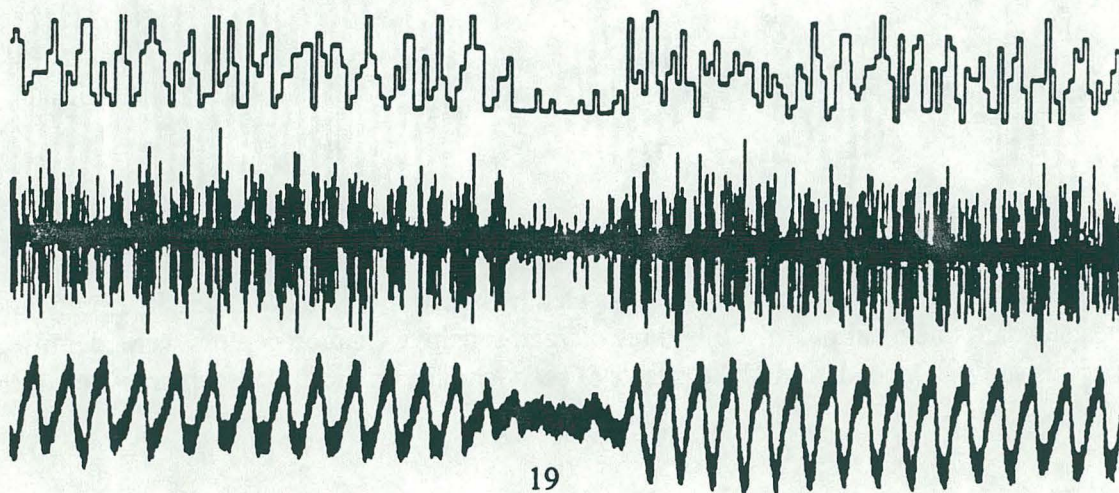
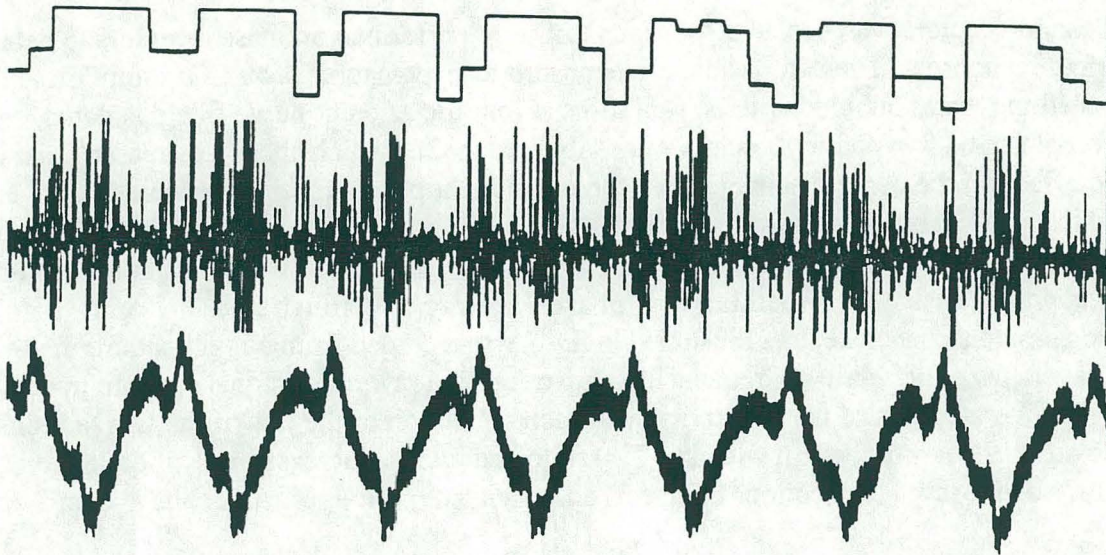
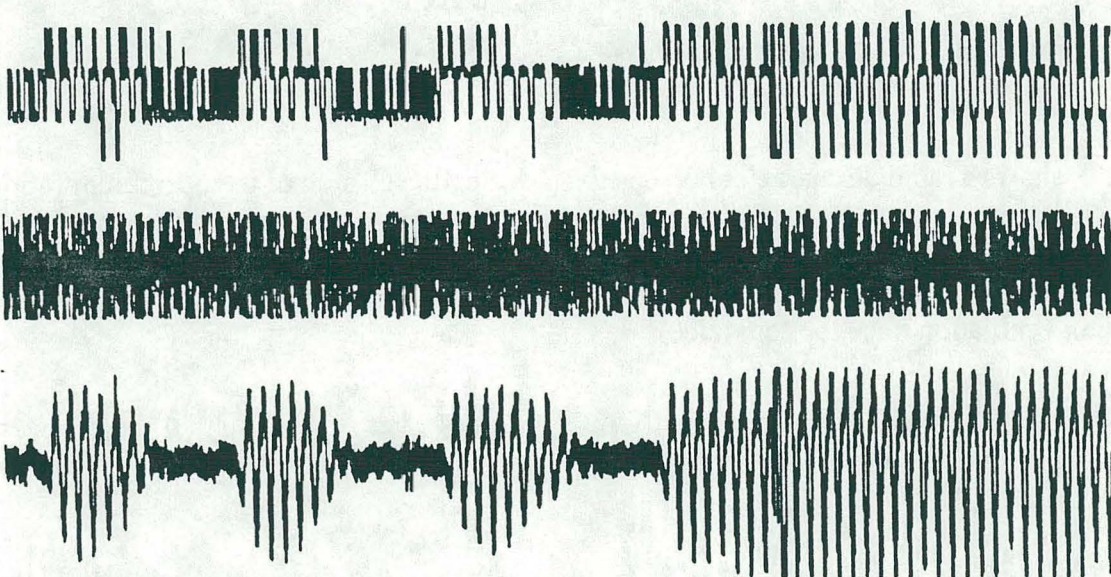


fig. 3



The tonic mechanoreceptors illustrated in fig. 4 has a higher firing frequency during spontaneous ventilation than during apnic period. The medium was changed from normal oxygen solution (normoxic) to a hypercapnic solution. As seen in fig. 4 f_v as well as P_{op} increase, but there is no effect on the nerve discharge. Once again, the histogram (top trace) showing nerve firing frequencies, raw nerve signal (middle trace) showing real time nerve activity, and the ventilation trace (bottom trace) showing the pressure changes throughout the ventilation cycle (the upstroke distinguishing the closing and increase in pressure of the operculum).

fig. 4



Chemoreceptors

Oxygen- sensitive chemoreceptors where located by injection of NaCN (50ug internally and 500ug externally), a standard chemical probe. Only three oxygen-sensitive chemoreceptors were identified during the course of this study. Once identified the effects of acetylcholine on these O₂ receptors where tested. Fig.

5 illustrates an internally oriented O₂ receptor. An 1 nmol/0.1ml bolus injection was administered into the ventral aorta of the fish and both the histogram (top trace) and raw nerve signal (bottom trace) show an increase in the discharge of the nerve activity.

fig. 5

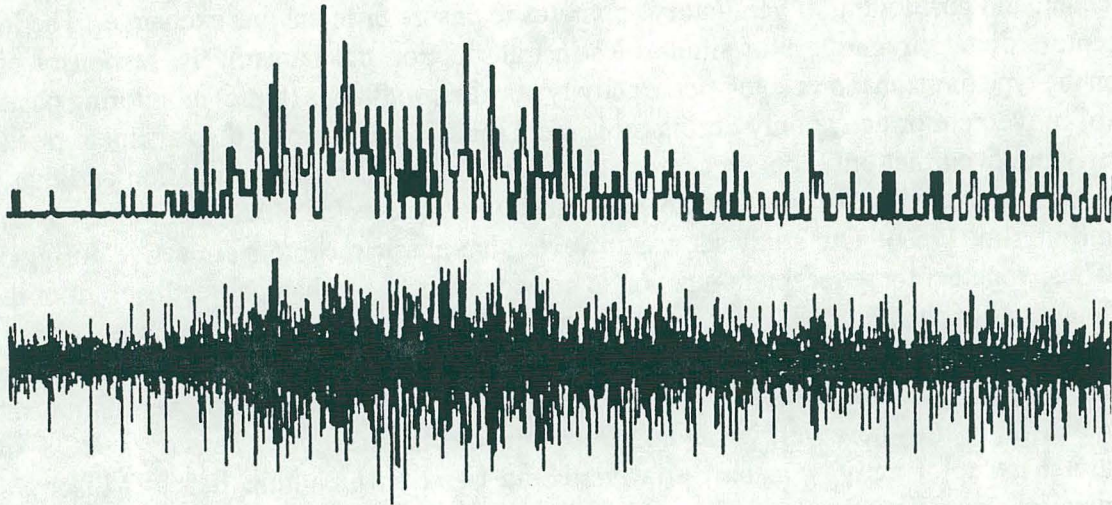
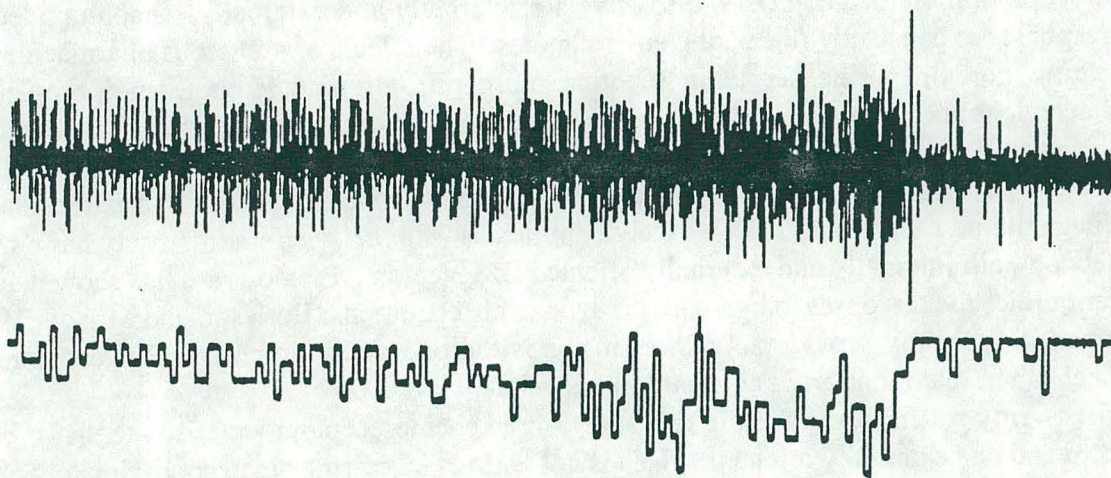


Fig. 6 illustrates an externally oriented O₂ receptor. An 500nmol/0.5ml injection of acetylcholine was administered into the ventilation water flow. The activity is almost identical to the previous just described, except for the delay time was almost instantaneous (approximately 5 seconds). Although it can not be seen in either fig. 5 or 6 ventilation amplitude and frequency would have normally been stimulated as well. Internal Acetylcholine injection would have elicited bradycardia as well (Burlison and Milsom 1995).

fig. 6



DISCUSSION

Mechanoreceptors

The discharge characteristics of both tonic and phasic mechanoreceptors provide feedback on the rate of movement and positioning of ventilatory apparatus to ensure efficient gas exchange. The location of these receptors dictate, regardless of similarities in transduction mechanism, the responses elicited. Depending on the type of mechanoreceptor, nerve activity may be continuous (tonic) monitoring positioning and the rate of movement or active only during movement (phasic) monitoring displacement rate. It has been previously believed that only tonic receptors were active during normal ventilation and that phasic receptors were only activated in extreme defense like adduction responses (de Graaf, Ballintijn, Maes, 1987; Saunders and Sutterlin, 1969). Our study shows, however, that phasic receptors are active during normal ventilation. Thus, together these receptors function to provide afferent mechanical feedback from the gills to ensure efficient gas exchange.

This study not only addresses the characteristics of mechanoreceptor discharge, but test the effects of CO₂ on the discharge characteristics as well. As shown, CO₂ has an effect on ventilation rate and amplitude (increasing both), however, it has no effect on mechanoreceptor activity. CO₂ inhibits pulmonary stretch receptor activity in terrestrial vertebrates and air-breathing fishes (Milsom, 1995). Previous studies on channel catfish have shown that denervation of cranial nerves IX and X to the gills abolishes the ventilatory responses to CO₂ (Burlison and Smatresk, 1996). Thus, although the ventilatory effects of CO₂ are mediated by receptors located in the gills our data suggest that branchial mechanoreceptors are not involved.

The effects of increasing ventilation rate and amplitude is simply due to sensitivity to high concentration levels CO₂ (possibly CO₂ chemoreceptors that have not been identified) that are normally encountered in natural aquatic environments. In addition, CO₂ is approximately 30 times more soluble in water than in blood. Thus, the lack of inhibiting mechanoreceptors to increase ventilation volume is not a necessary physiological function for aquatic vertebrates such as catfish.

Chemoreceptors

Chemoreceptors monitor O₂, CO₂, and toxins both internally and externally enabling adequate physiological responses to constantly fluctuating environments. The effects of numerous pharmacological agents (epinephrine, norepinephrine, serotonin, nicotine, muscarine, atropine, isoproterenol, propranolol, dopamine and acetylcholine) have been screened in previous studies on isolated, perfused trout gills to determine stimulatory and modulatory effects (Burlison and Milsom, 1995). Recent mammalian studies have suggested that acetylcholine may be the primary neurochemical involved in the oxygen transduction mechanism (Fitzgerald and Shirahata, 1994). Acetylcholine, as can be seen in this study has a major stimulatory effect on both internally and externally oriented O₂ receptors. Previous studies show that this neurotransmitter mimics the responses to hypoxic and hypoxemic conditions (Burlison and Milsom 1995). Further investigation will only provide an answer if this is the primary neurochemical released in the transduction mechanism that monitor O₂ concentration levels.

From the twenty six fish examined in this study, three chemoreceptors were isolated (two being internally oriented and one externally oriented). This is not entirely surprising since approximately 5% of sensory receptors examined previously were O₂ sensitive (Burlison and Milsom 1993). If this percentage of O₂ sensory is an accurate estimation, it is not difficult see how such a small number receptors can have

such a profound effect.

CONCLUSIONS

The results of this study demonstrate clearly that both tonic and phasic mechanoreceptors are active during normal ventilation and together provide critical information of mechanical displacement and positioning of ventilatory apparatus. In addition, this study provides substantial evidence of the effect of CO₂ in aquatic vertebrates (lack of inhibitory effect on either tonic or phasic mechanoreceptors) which may eventually provide additional information in understanding evolutionary transitions from aquatic to terrestrial environments. Having a broader understanding on the transduction mechanisms and the profound effect acquired by this diffuse (very few) oxygen monitoring system, O₂-receptors will not only provide an understanding of evolutionary developmental perspective, but may provide important insights in treating human respiratory disorders. Also, this study demonstrates that acetylcholine is a potent stimulant of both internally and externally oriented O₂ chemoreceptors. Finally, this experimental preparation is a very useful tool for neurophysiological studies in intact fish.

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**THEORY AND PEDAGOGY IN THE
DEVELOPMENT OF MULTICULTURALISM:
A MODEL FOR "THE ACADEMY"**

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ABSTRACT

The debate over multi cultural education continues to dominate and inform pedogorical discussions about approaches to teaching minority children. The states of Texas and California recently achieved a "minority-majority" status in the racial composition of its public school systems which adds further complexity to an already complex learning dilemma. Schools, as a microcosm of society at large, are attempting to advance curriculum reflecting the diverse complexion of the communities in which they reside. This paper examines contemporary classroom learning theory in support of establishing an effective pedogorical posture for implementation of a community outreach program at the University of Texas at Arlington to serve are educators challenged by the curriculum demands of multi cultural education (MCE).

INTRODUCTION

The state of Texas recently achieved a "minority-majority" status in the racial composition of its public school system. This is at a time when "at risk" students are increasing, drop-out rates are at an all-time high, and the public school system is facing an overall period of great challenge. Teaching effectiveness, textbook content, and pedagogy are under fire in terms of how they relate to minority students. Research studies have indicated that students respond to methods that reflect elements of their home culture, however, public school teachers have either not been trained in the implementation of multi cultural curriculum or exhibit a high degree of anxiety when confronted with the instructional materials that vary from traditional Eurocentric teachings. Additionally, attempts in redefining the educational system to reflect a mixture of cultures is met with a mood of resistance from parents, educators, and even some students.

For the first time in more than a decade, Texas is taking a hard look at what students are expected to know. Educators, parents, curriculum specialists, and representatives from the business sector have teamed up to produce the first draft of essential knowledge and skills for various subject areas. Departing from Texas tradition, the draft proposes radical pedagogical change - a shift from specifying what educators should teach to detailing what skills students should have. At the same time this philosophical change is occurring, the State has opted to shift textbook selection rom a "state based" to a "district based" process . Multiculturalists see the combined force of these events as enabling for aggressive reform in both teaching strategies and instructional materials.

On the national level, optimism can be found in recent debate propelled by the Fall 1994 introduction of the National History Standards Document (NHSD). Focusing primarily on canon composition, NHSD has expanded the debate arena to include not only educators and administrators, but national political figures; cutting-edge scholars; and both left and right wing social, religious, and political groups, as well. In response to the broadening of the debate arena, discussion themes have also expanded; they now include

discussions of canon composition, "historical truth," and "American tradition." The National History Standards Document has propelled the already heated, emotional, and often irrational debate about multiculturalism to new heights; participants include the likes of Newt Gingrich, Arthur Schlesinger, JR., Henry Louis Gates, People for the American Way, and even the Moral Majority.

Assessing reaction and response to the National History Standards Document allows an evaluation of the potential affects of pedagogical shifts at the local level. It has been used in this research as the basis for determining sources of fear and resistance to multiculturalism in the educational curriculum. Corresponding solutions to these fears and resistance is grounded in the work of Henry Louis Gates, Daniel McLaughlin, and The National Faculty. Not to be omitted, is the value of previous research by Drs. Carter G. Woodson and Kenneth Clark in the problem identification and hypothesis stage of research.

LITERATURE REVIEW

Traditional educational methods have failed to "fully" educate minority students. As early as 1933, Carter G. Woodson was initiating discourse on the "**Mis-Education of the Negro**". He advanced that teaching strategies and materials ensured that Black students held their race in contempt through a psychological process that glorified Eurocentric images and behaviors. On an impossible quest for assimilation, which only a few mulattos achieved, Black students pursued an elusive white identity that resulted in a shattering of cultural values and self-esteem. From this internal collapse arose a contempt of their own race and a resignation to second-class citizenship in the United States of America.

Twenty years later, in the now-famous Brown *versus* Topeka case, Dr. Kenneth Clark conducted psychological testing with dolls that demonstrated that while Black students held an awareness of their own color or racial background, they consistently selected White dolls when prompted by questions of preference or "goodness". Black dolls, by the same group of students, were likewise, consistently chosen when prompted by questions of dislike or "bad". Dr. Clark, like Woodson before him, concluded that Black students suffered self-rejection with a truncating effect on their personalities and a premature onset of a "corrosive awareness of color".

Almost a half-century later, educators and social scientists are still grappling with the idea of a diminished or suppressed identity among minority students - only recently has this crisis been associated with a manifestation through standardized test scores. A proliferation of recent literature like **The Bell Curve** and Dinesh D'Souza's **The End of Racism** have sought to defer this association through the resurrection of extinct biological-predestination theories to account for differences in learning response and academic achievement between the races. Response to the aforementioned literatures have been overwhelmingly negative - an indication that most people, regardless of race, do not accept a premise of genetic inferiority for minority classroom performance. If not genetic predisposition, what then accounts for the low levels of achievement by minority students in comparison to people of non-color.

Daniel McLaughlin in "Critical Literacy for Navajo and Other American Indian Learners" asserts that the low achievement levels of American Indians and other minority learners have previously been explained by educational theorists from one of three vantages: First, that students themselves are deficient; second, that schools are ineffectively organized; or third, that home-school culture gaps produce missed opportunities for academic achievement. Rejecting these pedagogies McLaughlin opts for a fourth

explanation - he argues that minority students are affected by factors of race, class, and culture that pose barriers to educational power in the classroom. These factors, according to McLaughlin, set up struggles of power and domination that adversely affect the minority student. In essence, he agrees with psychologist and social-educational anthropologist Allison Davis (1948) that because they are influenced by race, class, and culture, educational institutions are a microcosm of society, and as such, they can best be assessed in terms of effectiveness by the degree to which these factors can be minimized through a redistribution of educational power or multiculturalism.

For purposes of this study **multi cultural education** is theoretically conceptualized as “**promoting social-structured equality, cultural pluralism, and equal opportunity in schools through power-equity among groups.**” Grounded in the social studies of McLaughlin and Davis “The Academy” seeks to form its theory and pedagogy around the proposition that a redistribution of educational power can be achieved through teaching strategies and instructional materials that facilitate a relationship between the student, his/her learning environment, and conditions of his/her social scene as informed by race, class, and culture.

HYPOTHESIS

Minority students succeed academically to the extent that schools reverse relations of power and domination that characterize dominant and minority groups as a whole. Four theories of learning occupy contemporary educational thought: Deficit Theory, Effectiveness Theory, Cultural Differences Theory, and Critical Theory. Of these four prevalent theories, Critical Theory is thought to be hypothesis enabling.

METHODOLOGY

“The Academy” project is in its embryonic or conceptualization state. Formation of operational concepts is deferred to the task of establishing a pedagogical concept (selection of a learning theory). The working hypothesis directs us to consider a theory that allows the consideration of race, class, and culture as independent variables relative to the dependent variable “academic success”.

Employing theoretical systems, we will comprise a set of propositions about race, class, culture, and academic success which are amenable to deductive and probabilistic reasoning. To develop this line of thinking, we will first distinguish Critical Theory from Deficit, Effectiveness, and Cultural Differences Theories in terms of the diagnostic and prescriptive categories each set of notions provides. Following the premise of the hypothesis, interpretive language will be used to argue that the Critical Theory presents the greatest possibilities for educating minorities through a redistribution of educational power. Allowing that Critical Theory persists from the hypothesis phase, we will define curriculum structures that operationalize the Critical Theory and corresponding critical literacy instruction. These structures will be derived from literature and concepts in experiential learning, process writing, and project-oriented teaching approaches. At the implementation stage random surveys will be used to select a sample frame from Metroplex educators and students. The observational phase will employ a pretest and posttest methodology to assess program gains. Results will be published through The National Faculty.

RESULTS

At this stage, research results are unavailable, therefore, research implications have been substituted into the design model.

Research Implications:

- Paradigm Shifts in Approaches to schooling minority students.
- Re-evaluation of standardized test inferences about minority learning aptitudes.
- Minimization of “contrast” factors between teacher profile and student profile.
- Formation of an educational model to locate minority identity and self-esteem within the classroom to transferable life experience.

DISCUSSION

Table 1 provides an overview of the four trains of thought about educational theory. Each outlines different diagnoses of minority student failure, focuses on different units of analysis, begins with different philosophical starting points, is grounded in different disciplines, comes with different assumptions about learning, and specifies different implications for policy and program development. Our discussion centers on the pros and cons of each theory in application to the hypothesis.

CONCLUSION

Conclusive empirical observations are incomplete - research is in initial stages. It is intended, however, that this research amounts to more than obfuscating rhetoric which, in theorizing what is wrong with mainstream school practices without identifying what educators can actually do, simply compounds the problem and bastardizes multi cultural education.

Student Profile

- 14% were children of teenage mothers
- 14% were illegitimate
- 40% will be living with a single parent b age 18
- 30% were latchkey children
- 25% live in poverty
- 15% had a first/home language other than English
- 15% had physical or mental challenges
- 10% had poorly educated parents
- 30% were of Color

Teacher Profile

- 90% are Anglo
- Most are monolingual
- Most have middle class backgrounds
- Most have never experienced poverty
- Few, if any, have been in special education programs
- Most experienced teachers grew up in two parent families
- Most experienced teachers grew up in single income families

Data Sources: Student - compiled from students entering grades 1-12 in the last half of the 1980s (Hodgkinson, 1988; Here They Come, 1986)

Teacher - NEA, 1987, (Grant & Sleeter, 1989; Armstrong & Savage, 1990)

PRICE IMPROVEMENT AND THE NYSE SPECIALIST

Chad Zutter
Mentor: Dr. Robert Jennings

INTRODUCTION

This paper is an empirical analysis of the level of price improvement received by SuperDOT orders executed on the New York Stock Exchange (NYSE). Specifically, we examine whether the level of price improvement received by investors on the NYSE is robust to changes in the benchmark bid/ask quote. Currently, the NYSE suggests that the average level of price improvement an order executed on the NYSE receives is superior to that received by an order (with comparable terms) executed on the regional exchanges or by a third market dealer. Ross, Shapiro, and Smith find that on average the NYSE executes orders at a price 4 cents per share better than the National Best Bid and Offer (NBBO) (1996).

Although, it is the purpose of this paper to measure the level of price improvement received by SuperDOT orders for the 144 stocks in our sample executed on the NYSE over a three month period, this paper does not attempt to compare levels of price improvement across exchanges. Future analysis could include a comparison of the level of price improvement among the various exchanges. However, a comparison among exchanges would be premature until such time as a consistent and comparable measurement is determined and comparable data are obtained.

Preliminary results from a Merrill Lynch pilot program (footnote article) and a study done by Ross, Shapiro, and Smith (1996) support the NYSE's claim. Ross, Shapiro, and Smith suggest a transparent methodology to measure levels of price improvement as to allow comparison across exchanges, with which they find in favor of the NYSE. However, they do not incorporate regional exchange data in their study. It is our intention to compare our results to those found by Ross, Shapiro, and Smith pertaining to the NYSE. Our data consists of all SuperDOT transactions and quotes for 144 NYSE-listed securities traded over a three month period from November 1 through January 31, 1991.

Initially, we measure the level of price improvement as Ross, Shapiro, and Smith did, which is the difference between the execution price and the NBBO at the time of order submission. We compare our results to those found by Ross, Shapiro, and Smith. Additionally, we measure the level of price improvement using various other reference quotes (put in footnote definition of reference quote), and compare these results to those obtained earlier. This method of analysis allows us to test the sensitivity of the level of price improvement as the relative reference quote changes. One possibility might be that the quote is relatively stable prior to execution and then shortly after execution it changes. In such a case we would suspect that there exists the possibility that the specialist (dealer) might be strategically timing the execution of customer orders relative to the adjustment of the quote, thus resulting in higher levels of price improvement being reported.

The incentive for the NYSE to be able to report high levels of price improvement is the attraction of order flow away from other exchanges. Likewise, the specialist benefits from an increase in order flow since he receives compensation from order execution and earns trading profits. Specialists earn trading revenue in two ways: by capturing the spread and whenever stock prices change to their advantage. Thus, the greater number of orders a specialist executes the greater his opportunity to earn trading profits, all other

things being equal. This incentive is also present on the regional exchanges who compete with the NYSE for order flow. For greater detail of the specialist's profit and loss opportunities review *Specialist Gross Trading Revenues at the New York Stock Exchange* (Sofianos, 1995).

In the past the regional exchanges acted as local trading hubs for the commerce in their immediate area. However, over the years they, along with the Over-The-Counter (OTC) markets, have siphoned-off a considerable amount of the NYSE's customer base. Lee (1992) finds that as of 1990, only 66 percent of the NYSE-listed Consolidated Tape trades were executed on the NYSE. This trend has continued throughout the past decade, as the regional exchanges continue to gain order flow. Some of their increase in order flow comes from the expanding overall market customer base, however, some comes from the existing NYSE customer base. This is a trend that the NYSE would like to stop. The NYSE is now aggressively trying to regain lost customers and continue to attract new ones. A major component of the NYSE strategy to attract order flow is to promote their level of price improvement.

The importance of this paper is made evident through an understanding of the need to have market participants comply with their fiduciary responsibilities to the individual investor. The opportunity for price improvement presents a direct benefit to the individual investor, and thus should be reported accurately. Price improvement represents a reduction in the investor's transaction costs and ultimately results in an increase in the investor's net return. For this reason, the investor wants and is entitled to have his orders executed on the exchange that stands ready to offer the highest level of price improvement. In short the individual investor seeks to have his orders executed at the best available "effective" bid or ask.

There are essentially two spreads in a market offering price improvement. The NBBO is the current posted spread and then there is the effective spread. Say, that the current NBBO spread is 3/8 or 37.5 cents and the specialist executes an order resulting in 12.5 cents price improvement. The result of this level of price improvement is an effective spread of 12.5 cents ($37.5 - 25 = 12.5$); 12.5 cents on either side of the quote.

We trust that our findings if proven to be significant will help to identify and define new policies for the reporting of price improvement. Such policies set forth by the exchanges and the Securities and Exchange Commission (SEC) would ensure that the individual investor's interests are met with the full responsibilities due them. Currently, there exists no formal rule outlining the proper measurement and reporting of price improvement orders receive when executed.

PREVIOUS FINDINGS

Supporting the NYSE, Merrill Lynch claims that the NYSE offers the best opportunity for price improvement (put their quote in footnote). As a result of this belief, Merrill Lynch has pulled its specialists off the floors of the regional exchanges and has consolidated their transactions on the NYSE. Further, they launched a pilot program with the NYSE which notifies customers whenever they receive price improvement on an order.

The Merrill Lynch pilot program called "ML/NYSE Prime" tracks the amount of price improvement for an NYSE order and reports this amount to the investor on the order receipt. Prime measures the level of price improvement relative to the NBBO at the time of order execution verses the time of order submission. The program comes at a time of increased scrutiny and pressure from the SEC on all market participants as the SEC seeks to improve the way small investors are treated in the securities markets.

Merrill claimed that in the first week of the pilot program the NYSE was able to save investors a total of \$1 million on 72,000 trades (Daniel Levine, San Francisco Business Times, 11/10/95). This is an average of \$13.889 per trade ($\$1,000,000/72,000$). It would be interesting to note the distribution, of the \$1 million saved, on a per share basis.

A recent report by Ross, Shapiro, and Smith also found favorable results supporting the NYSE. They offer, in their opinion, "empirical evidence that market orders--especially smaller retail orders and orders in actively-traded stocks--receive prices on the NYSE that are substantially better than they would receive if they were sent to regional exchanges or the OTC market." A counter point to their finding, however, is that no regional data was included; they only made approximations for the regional data. First, they conclude that price improvement on the NYSE occurs frequently in 1/8 markets. They found that about 40 percent of all price improvement occurred in the 1/8 markets; where small orders (100-499 shares) in actively-traded stocks received price improvement 19 percent of the time. In markets where the quote is larger than 1/8, orders received price improvement 64 percent of the time. Overall, they found that market orders executed on the NYSE received price improvement 28 percent of the time, with an average of 4 cents per share better than the NBBO. They suggest that the majority of price improvement is a result of orders interacting (crossing orders), not the specialists. They sight the NYSE's higher volume, and thus greater ability to cross orders, as one of the main reasons for the greater investor benefit. It merits noting, in response to the above mentioned, that the specialist even though simply crossing the orders still has some discretion as to when the orders are executed. The specialist has the greatest control over the timing of limit order execution. Therefore, the specialist has the opportunity to execute the order cross relative to a particular quote, which can result in a higher level of price improvement being reported.

In addition to measuring the percentage of orders that receive price improvement we measure the percentage of shares that do and compare this percentage to the former. Given that the NYSE executes nearly all the larger orders it is likely that their percentage would drop when measured relative to the number of shares. Say for example, that on a given day the NYSE executes one million orders consisting of 50 million shares. They report that 25 percent of the orders receive price improvement. However, the 250 thousand orders that were price improved only accounted for 10 million of the total share volume. Thus only 20 percent of the total shares received price improvement, which obviously "paints" a different picture than reporting that 25 percent of the orders were price improved.

PRICE IMPROVEMENT AND THE SPECIALIST

Ultimately, price improvement may be the result of the miss-timing of quotes and execution prices. This dynamic can result in higher levels of price improvement being reported, which in-turn attracts order flow. For example, if the current bid and offer are $25 \frac{1}{4}(10,000)$ and $25 \frac{1}{2}(1,000)$ respectively. The specialist receives a buy market order for 500 shares, thus the order is guaranteed to execute at a price of $25 \frac{1}{2}$ or less. It is at this time, that the specialist has the opportunity to try and price improve the order, and is required to do so. If the specialist executes the order at $25 \frac{3}{8}$ the order receives price improvement of 1/8.

It is possible in the example above that the specialist acted strategically in executing the order at $25 \frac{3}{8}$, just before he moves the quote to $25 \frac{3}{8}$. This would be considered a strategic move on the part of the specialist if prior to the execution of the order he knew of (or at least expected) the quote adjustment. If this

were the situation then even though the order received 1/8 price improvement the investor is being misled. In other words the investor's order was likely to execute at a price of 25 3/8 once the quote moved there regardless of the specialist's decision the execute it prior to the adjustment. If the investor believes that the level of price improvement is superior on one exchange he will insist that his orders be executed on that exchange as opposed to other venues. It is this customer "loyalty" that the exchange and the specialist hope to create by promoting their levels of price improvement. Both the exchange's and the specialist's profits increase as the number of orders transacted increase, all other things being equal.

The Security and Exchange Commission in staying with its efforts to bring about a National Market System (NMS), as called for by Congress in the Security Acts Amendments of 1975, requires that specialists seek the most favorable terms available for a customer's transaction. In doing so the specialist is required to provide price improvement opportunities for all customer orders. The SEC does not suggest how this should be accomplished, saying only that the specialist should take advantage of all available resources in meeting this end.

The specialist occupies a unique position in a stock exchange. All transactions on that exchange are funneled through the specialist, who acts as either a broker or a principal (dealer) in each transaction. Keeping the limit order book gives the specialist privileged information about the market and this information has considerable value. Having full knowledge of the limit order book allows the specialist to better determine his inside quote. The specialist can also use the limit order book to reduce his exposure in the market. In return for the monopoly position granted by the exchange, the specialist is required to make a market in the stock, to keep the bid-asked spread reasonably small, and to trade to stabilize prices.

The specialist satisfies two basic roles on the exchange. First, the specialist can act as a broker for some transactions, such as limit orders. In this function, the specialist facilitates transactions for others and charges a fee. Second, the specialist can act as a dealer, buying and selling, for his own account. Exchange rules regulate how the specialist may perform these two roles. It is worth noting that the specialist benefits while performing either of these roles and that an increase in customer order flow to the exchange serves to further benefit the specialist while carrying out his duties. The greater number of orders a specialist has the opportunity to execute the greater the specialist's individual liquidity and the lower his inventory costs, *ceteris paribus*.

The specialist as a dealer, is required to stand ready to buy or sell securities on order from other members of the exchange or the public. This requires a considerable capital investment by the specialist in order to maintain a sufficient inventory, and it also involves taking a risk position in the stock. As compensation for the capital investment and the assumption of risk, the specialist attempts to make a profit on each share of stock traded. Acting as a dealer or market maker, the specialist maintains a bid-ask spread--the difference between the price at which he is willing to buy and to sell a share. The specialist offers to buy shares at the lower bid price and to sell at the asked price. For example, assume that the specialist believes that a share is worth exactly \$100. The specialist can make money by buying shares for slightly less than the "true" price of \$100 and by selling shares for slightly more than \$100. For, this example the bid price might be \$99.875 and the asked price might be \$100.125. Thus, the bid-ask spread is \$.25, and this difference represents the gross profit that the specialist tries to capture by trading.

METHODOLOGY

This paper uses data collected from the SuperDOT system; it consists of all small orders (less than

3,000 shares), transactions, and quotes for 144 NYSE-listed securities traded on the NYSE over a three month period. The measurements found in this analysis are meant to infer on the entire population of SuperDOT orders executed on the NYSE.

First, we consider possible measurement techniques for measuring the level of price improvement, such as, the timing of the measurement and the appropriate reference quote. For instance, one possible measurement of the level of price improvement is the difference between the execution price and the midpoint of the NBBO (reference quote) at the time of execution. The appropriate reference quote is often subject to debate. In our analysis we measure the level of price improvement relative to the quote: at the time of execution, at the time the order was placed, and five minutes before and after the time of execution. For each of the different reference quotes used we consider both the midpoint and end-points (bid and ask) as the points of measurement.

Again, measuring the level of price improvement relative to the NBBO five minutes after the execution of the order allows us to compare the results to those measured relative to the quote at the time of execution. If these two measures differ significantly then we might speculate that the specialist executes orders based on the expectation that the quote is about to move in favor of the investor. By executing the order prior to the adjustment of the quote the specialist does not change the price at which the order executes, however, it does result in a higher reported level of price improvement.

Second, we examine the differences between the level of price improvement when measured on a per share basis verses on a per order basis. Reporting the average level of price improvement received by an order does not accurately reflect the investor's savings. In contrast when the average price improvement is reported on a per share basis, regardless of the order size, the investors savings is estimable; however lessen the significance of looking at per order statistics when considering orders of similar size. For example, if an exchange offers an average of 2 cents per share price improvement then all that is necessary to calculate the expected price improvement on the order is the number of share in the order. Whereas, if an exchange reports average price improvement relative to orders it is not possible to calculate the expected price improvement for an order, without first knowing the average order size. Therefore, the correct and prudent method for measuring price improvement is on a per share basis. This approach provides for the best possible comparison across orders and exchanges.

Finally, we consider the differences between measuring the level of price improvement in terms of a percentage or dollars. Reporting the level of price improvement as a percentage of shares (or orders) is not commensurate with the full disclosure rules. For example, two different exchanges both report an average price improvement of 29 percent of all shares, thus both seemingly providing the individual investor with an equal opportunity for price improvement. However, one of the exchanges only provides an average of 2 cents per share, while the other provides an average of 4 cents per share. Both exchanges price improved 29 percent of all shares executed but one exchange's performance is clearly superior to the other. It is nice to report the percentage of shares that receive price improvement but this by itself tells us little about the actual level of price improvement. The individual investor is benefited more by having his orders executed on the exchange that averages 4 cents per share. If the investor is not given the benefit of full disclosure he can be misled and encouraged to execute his orders on an otherwise inferior exchange.

We believe that the correct and effective way to measure the level of price improvement it to use the quote at the time the order is placed as the reference quote and to measure on a per share basis in terms of dollars.

DATA

Using the Trade, Order, Report, and Quote (TORQ) database we examine the level of price improvement received by trades in 144 NYSE-listed securities over a three month period. The TORQ data gives an unprecedented description of transactions, quotes, order processing data, and audit trail data for a sample of 144 NYSE-listed stocks for a three month period from November, 1990 through January, 1991. This data allows us to examine the level of price improvement at the time of execution relative to various quotes during the life of the order. One such measurement, is that relative to the quote at the time of execution. At the time of execution the automated order tracking system time stamps the completion of the order. Using the transaction time stamp we can measure the level of price improvement in the fashion that the NYSE currently measures price improvement. TORQ also gives us the ability to measure the level of price improvement relative to the NBBO approximately five minute before and after execution. This attempts to evidence whether or not the quote is being adjusted just prior to or just after the execution of an order, such that higher levels of price improvement would be reflected. The TORQ data gives us a complete history of all quotes and transactions, including times, for the 144 stocks tracked. One deficiency with the TORQ data is its age, at this time it is roughly five years old. In furthering this research it would be prudent to updated the data. The data used by Ross, Shapiro, and Smith and that cited by Merrill Lynch is much more recent. In any event we will compare our results directly to theirs.

CONCLUSION

The incentive for the specialist to strategically manage the sequence of events relating to an order in hopes of reporting higher levels of price improvement is present due to the lack of specific guidelines by the SEC. In the absence of guidelines there are many inconsistencies between exchanges, as to how they measure price improvement. As stated by Ross, Shapiro, and Smith "comparing price improvement statistics across exchanges can be confusing. Some of this confusion is due to a lack of standard definitions. For example, some exchanges (or dealers) define price improvement as trades "within" the quote as a percentage of the trades which occur when the quote is larger than 1/8 (or some minimum tick); others as trades "within" the quote as a percentage of all trades. Still others define price improvement in terms of the percentage of orders (executing at better than the quote at the time of arrival). Some prefer to calculate percentages in terms of shares (rather than orders). In every case, at least conceptually, price improvement can be measured as the execution price relative to some benchmark price." If the trade does better than the benchmark, it receives price improvement; if the trade price is equal to the benchmark, there is no price improvement; and if the order does worse, it can be described as negative price improvement (or price impact).

The NYSE defines price improvement for a market order, as a buy (sell) order executed at a better price than the best national offer (bid) at the time of order submission. This methodology is consistent with that used by Ross, Shapiro, and Smith but not that utilized by the ML/NYSE PRIME program. Moreover, it is the Prime measurement that is reported to the investor.

We found that the level of price improvement is mostly stable across benchmark, although, the level does rise with each successive later benchmark. The extreme difference between the order submission benchmark and 15 seconds after execution benchmark is 4 percent and 3 cents. Where number of orders

price improved increased by 2 percent and the average dollar amount per share increased by 3 cents. We found that overall all, when using order submission time, about 28 percent of the orders are price improved, however, contrary to Ross, Shapiro, and Smith we found an average of only 2 cents per share better than the NBBO. This difference suggests that there exists a difference between the level of price improvement before and after it became a marketing tool. Thus, the exchange is now under greater pressure to seek the higher dollar amount of price improvement for an order given that they are using it in hopes of attracting customer orders, whereas, before it became a marketing tool the exchange merely had to suffice the SEC requirements.

Instead we suggest that in accordance with the fiduciary responsibilities of the exchange and the specialist, price improvement should be measured as the difference between the NBBO at the time the order is placed and the eventual order execution price. This is reasonable since the NBBO at the time the order is placed is the price that the specialist is at a minimum obligated to execute the order at; providing that the order is within the quoted depth. This method also supports comparison across exchanges. If the specialist executes the order at a price more favorable to the investor than the posted quote then the difference is the amount of price improvement. Further, we believe that price improvement is better stated in per share terms rather than per order terms. For example, a market order for 1,000 shares is executed on the NYSE and receives \$125 price improvement on the order. Whereas, a market order for 100 shares is executed on a regional exchange and receives \$25 price improvement on the order. If we say that the NYSE price improved their order by \$125 while the regional only price improved their order by \$25 it would appear that the NYSE granted superior price improvement. However, a closer examination of the facts indicates that the NYSE price improved their order by 1/8 per share while the regional price improved their order by 1/4 per share. Thus, the price improvement was superior on the regional. Finally, price improvement should be measured in terms of dollars rather than as a percentage. This method provides greater detail and allows for direct comparison across exchanges.

It goes without saying that the NYSE transacts a larger volume of orders than all the regional exchanges combined, which given their method of measuring price improvement (amount per order) gives them a clear advantage over the regional exchanges. However, this fact combined with the fact that the NYSE orders are typically much larger in size (number of shares) than the regional orders would surely dampen the level of price improvement the NYSE reports.

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USE OF MAGNETIC SUSCEPTIBILITY AND SPECTRAL REFLECTANCE MEASUREMENTS TO DETERMINE PALEOCLIMATE DURING THE PLEISTOCENE IN EUROPE

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ABSTRACT

Paleoclimate analysis, using magnetic susceptibility (MS) and spectral reflectance (VIS) measurements on continuous vertical profiles of previously collected sediments from caves in Albania and Portugal show an excellent correlation with known archaeological data and climate (temperature and rainfall) variations in these areas. MS data allow determination of warm versus cold climates. In addition, using the recently developed D/W (dry-wet) index, a method combining MS data with VIS data for goethite (a hydrated iron-bearing mineral) can be used to determine variations in rainfall during pedogenesis. MS and VIS data from archaeological excavations at Fontéchevade and La Chaise caves in southern France, where known anthropologic artifacts and dates are available, affords an opportunity to study climate during the time that Neanderthals were living in Europe. These paleoclimate variations can be useful in understanding site evolution by correlating MS samples directly to the excavations where macro-faunal and micro-faunal data are available. The paleoclimate variations can also be dated using dates already obtained from earlier excavations at the sites.

Pleoclimatic sequences are known to be preserved in caves because the environment is sheltered from weathering effects associated with exposure. These effects produce, during times of cooler climate, soils outside the cave that have lower MS magnitudes than those produced during warmer climates. Soils then accumulate in caves as sediment where they undergo only limited post-depositional pedogenesis and biological disturbance. Using continuous vertical profiles of all sediments found in an archaeological context, paleoclimatic estimates can be made for all archaeological levels. Results of this work show that during deposition of the sediments sampled at Fontéchevade and La Chaise caves, climate changed from very cold glacial climates to warmer interglacial climates and then started back toward glacial climates once again. A single, small-scale cold snap is observed in the upper portions of the Fontéchevade sequence and represents a time of serious weather deterioration at that time, probably similar in magnitude and length to climate associated with the more recent Younger Dryas cold period that lasted from ca. 11,500 to 10,500 B.P.

INTRODUCTION

Fontéchevade Cave is located outside the village of Fontéchevade, near Montbron, in the Charente district of SW France (Figure 1). Two areas are currently being excavated in the cave and they are separated by ~14 meters. The main excavation (main coupe) is located toward the front of the cave while a secondary "sondage" or test excavation is located well in the back of the cave. Both areas have been excavated previously by French workers and are now being re-excavated by a team of French and American workers led by Prof. André Debénath at the University of Perpignan in France and by Dr. Harold Dibble at the University of Pennsylvania.

Located just a few kilometers from Fontéchevade Cave is the La Chaise Cave excavation (Figure 1). The cave is situated at the edge of the village of La Chaise, ~ 5 kilometers to the west of the town of Montbron. At both Fontéchevade and La Chaise, the caves evolved along a N-S trending system of fractures in a Jurassic limestone that is exposed in the area. La Chaise Cave consists of several rooms including the one for which data are reported here, Bourgeois-Delaunay. The cave has abundant archaeological artifacts of both Upper and Middle Paleolithic age, believed to cover a span of ca. 150,000 years. However, the dates are poorly defined because precision on individual ages is poor (Blackwell et al. 1983). Among the notable finds are bones with defleshing marks, bored bones from the Middle Paleolithic Mousterian and Acheulian (Debénath, 1974), several Neanderthal remains, including some bones from children, perhaps as old as 150,000 years (Blackwell et al., 1983). Debénath describes an undisturbed living floor, with a structure composed of antlers, that may be even older. There is also evidence in the cave of cultural horizons (between excavation levels 7 and 11) that are believed to be evidence of the cultural transition from the older Acheulian to the younger Mousterian Neanderthal traditions.

Magnetic Susceptibility (MS). MS measurements of loess and other sediments have been used recently in paleoclimate studies and as a proxy for the much slower, costly and time-intensive oxygen isotope ($\delta^{18}\text{O}$) measurements that are most often used in the analysis of deep-sea sediments. The alteration of magnetic minerals that occurs with a changing climate allows MS to be effective as a proxy. These changes come about primarily through the process of pedogenesis (soil formation), but can also result from changes in sea-level and corresponding increases or decreases in continental erosion. Variations in the continental ice volume during the Quaternary are considered the main cause of sea-level oscillations. Influx into marine sediments of terrigenous material (some of it magnetic), is greater during times of lowered base level. Coupled with this is the glacial/interglacial difference in the weathering cycle.

PREVIOUS WORK

There are many uses of magnetic geophysical data. These include the commonly known methods like magnetic prospecting where magnetometers are used to locate buried objects in environmental exploration and in archaeology as well as locating other unusual zones in the subsurface, such as geological anomalies (faults and other features) within underlying sediments. Magnetic surveys have been used to locate buried cultural features since the 1950's, but only by a few individuals (Martin et. al., 1991). The recognition and measurement of unusual magnetic anomalies in the subsurface, caused by changes in the concentration, orientation and type of iron oxides (hematite, maghemite, magnetite and goethite) in the soil is the key to locating buried archaeological sites and features. Other magnetic anomalies are often found associated with storage pits, due to higher humus content, or buried, high-iron-content objects and hearths (Weymouth, 1986).

In archaeology, research in archaeomagnetism is also important, where Earth's magnetic field signature, acquired by objects such as hearths built by ancient peoples, can be used as an important relative dating tool (Ellwood, 1971; Wynn, 1986). Archaeomagnetic samples come mainly from hearths, kilns or associated sediments, but they can also include those materials that accumulated at the site during long periods of slow sediment deposition.

Magnetic susceptibility (MS) is another, but very different type of magnetic measurement. Simply stated, MS is a measure of how susceptible a material is to becoming magnetized when placed in a magnetic

field. All materials exhibit MS, but many iron-containing minerals are very easily magnetized and therefore show a strong MS signature. Quartz or calcite, on the other hand, very common minerals in sediments, show an MS response only when measured using the most sensitive instruments. Recently, MS measurements have been employed in the study of archaeological materials taken from caves in an effort to characterize ancient climates (Ellwood et al., 1996a). This work is based on the premise that during soil formation, magnetic minerals such as maghemite are formed. When climate is warm, more maghemite is formed than when climate is cold. The soil formed outside of caves is washed into caves, thus filling these caves over time with sediment containing varying amounts of maghemite, depending on the climate at the time of deposition. Living in these caves were ancient people, so that the material artifacts they left behind are buried by the sediments accumulating in the cave. By analyzing the MS of sediments at different levels in the cave, the paleoclimate can be reconstructed for the time during which people were living there. In turn, the effect of climate on these ancient peoples can be studied.

It has also been shown that MS variations can be used to correlate between excavations (Ellwood et al., 1995). This is important to archaeologists because they have no easy way of correlating archaeological levels and because the sediment layers containing artifacts are often difficult to interpret. MS profiles show trends and magnitude variations (discussed below) that allow correlation when the trends and magnitudes are similar and the ages of excavations overlap. This report presents preliminary results from the Fontéchevade Cave excavations in the Charente district of SW France, being conducted by archaeologists Prof. André Debénath from the University of Perpignan, SE France and Prof. Harold Dibble from the University of Pennsylvania, and their multinational crews. Also included here are MS results from an additional excavation performed several years ago in the cave of La Chaise by Prof. Debénath.

Spectral reflectance (VIS) measurements in the visible light range have been used for the purpose of characterizing the iron mineralogy in sediments and have been shown to be very useful in archaeological studies (Ellwood, et al., 1995). This early work helped delineate paleosols within studied sections as well as helping with intra-site correlation. This work was expanded by Ellwood et al. (1996b) to include the hydrated mineral goethite which is sensitive to variations in moisture content in the environment.

METHODS

Sample Collection. Sediment samples were collected in 8cc plastic sample boxes along continuous vertical profiles at each site studied. Continuous samples are used to reduce the chance of omission of a stratum from the data set. Each sample was given a sequential number in the profile set and the depth to the sample location was measured. This was accomplished using an electronic surveying device and a grid laid out with an arbitrary zero from which to gather the vertical, horizontal and lateral position of the top and bottom sample in each profile. Individual sample position was then calculated by extrapolation.

Laboratory Analysis. Samples were analyzed using one or more of the following methods:

1. MS was determined for all samples using a balanced induction coil instrument commonly called a susceptibility bridge. In the susceptibility bridge each sample is exposed to a magnetic field and a digital readout is recorded. This process is repeated 3 times, the mass of each sample is measured and then these data are fed into a computer and the MS calculated relative to a set of standards. (The bridge at UTA is calibrated to results from the National Bureau of Standards [Schwartzendruber, 1992]). The resulting MS data are then used to estimate the temperature (warm or cold climate) at the time of deposition, higher MS

values indicate warmer climate while lower MS means colder climate.

2. Spectral reflectance (VIS) was performed on all samples using the Perkin-Elmer Lambda 6 Spectrophotometer at UTA to determine the percentage of the mineral goethite in these samples. This process used a powdered sample, mixed to a thin slurry with deionized water and spread evenly on a standard glass microscope slide. After allowing to dry thoroughly, it was analyzed in the spectrophotometer. The first derivative of the resulting spectral peak at 435 nm wavelength was used to estimate the percentage of goethite in the sample.

RESULTS AND DISCUSSION

At Fontéchevade Cave the main coupe and sondage are stratigraphically the same at approximately 2 m below the main datum. While the MS data trends at this point are similar between the two profiles, the point of overlap was not chosen based on this correlation but on the stratigraphic similarity. Figure 2 shows the profile of the two data sets with the overlapping points. The similarity between the two is evident at depths of 2 m and greater. Given the horizontal separation of the two profiles, ~14 m, and the high agreement between the MS data sets, a strong correlation can be confirmed.

MS data for Fontéchevade Cave indicate that the deposition started during glacial times (low MS magnitudes) while increasing MS values at the site indicate that climate was warming as time progressed. Within the major cycle (general trend) indicated in the data set there are many more subtle cycles that allow for correlation to other sites as well as estimates of short-term climatic variations. These cycles indicate brief periods of warming and cooling that quickly dissipate.

Three areas were sampled at La Chaise Cave (LC-1, LC-2, and LC-1A) and these are located within 15 m of each other. Stratigraphically LC-1 and LC-2 are similar at >1.5m depth (Figure 3). As with Fontéchevade Cave, the correlation of the MS data between units is very good although the point of overlap at La Chaise Cave was chosen based on the MS data and not on the stratigraphy. Figure 3 shows the MS data for two areas, LC-1 and LC-2. There is a set of anomalous MS values associated with samples that were collected from loose soils filling voids between limestone blocks that fell as a single break-down event. This zone is represented in as archaeological Level 4 and when the data from this level are removed, a clear correlation between the two profiles is apparent. Also plotted in Figure 3 is an additional profile from the back of the cave. Combining multiple profiles in this way results in a single composite profile that represents all the MS variations recovered from within the cave. These data can then be interpreted in terms of climatic variations or be used to correlate to other archaeological sites in the area.

At Fontéchevade Cave the composite MS data show a general warming trend in overall climate with times of greatest warmth evident in the shallowest sediments. There are several short-term climate variations within the overall warming trend and one period that is indicative of much colder climate (Figure 2). While the large-scale climate trend can be attributed to a Milankovitch climate cycle, the minor fluctuations may be the result of local short-term climate anomalies or they may be Neo-glacial cycles.

The La Chaise site has MS data showing the final stages of a warming trend giving way to the beginning of a cooling trend (Figure 3). This change marks the beginning of the next glacial cycle and has been dated to ca. 120,000 years (Blackwell et al., 1983). Smaller fluctuations are again present representing minor changes in the overall climate. These minor changes have been used to correlate between the Fontéchevade and La Chaise composite profiles (Figure 4). Note the excellent agreement between the lower portions of the La Chaise MS data set and the upper portions of the Fontéchevade data set. While

magnitudes and trends are similar, in particular there are three short-term climate peaks that are represented in both composites. The time separating these peaks, as well as the relative magnitudes are essentially identical between the two caves. The composite profile in Figure 4 is the result of our inter-site correlation.

Examination of the MS composite profile for Fontéchevade and La Chaise caves (Figure 4) shows a cold beginning (glacial time) with warming through most of the sequence. Then late in the history represented in these sediments, climate reached a maximum (interglacial time) and began to cool once again. This long-term trend is punctuated with 3 very short-term warming events as well as one longer, but short-term very cold event that may have been similar in magnitude to the Younger Dryas Neo-glacial cycle that occurred from ca. 11,500 to 10,500 B.P. (O'Brien et al. 1995).

Using the VIS data for Fontéchevade and La Chaise caves to determine the D/W index, wet versus dry climatic periods were identified. These periods, in conjunction with the MS data give an estimate of total climate. The shading included in Figure 6 represents the VIS moisture determination data set. Most of the sediment recovered from the cold climate represented at Fontéchevade Cave indicates relatively dry times. As the interglacial was approached, however (upper part of Fontéchevade and into La Chaise sediments), climate became more moist. Then, as climate once again began to cool, drier conditions reappeared (Figure 5).

CONCLUSIONS

Research from Upper Paleolithic caves in Europe has demonstrated that magnetic susceptibility (MS) data in conjunction with spectral reflectance (VIS) data yields estimates of paleoclimate and can be used to correlate between archaeological excavations if the excavations overlap in time. These earlier studies demonstrate that higher MS and VIS values indicate times of warmer/wetter climate, while lower MS and VIS magnitudes represent times of cooler/drier climate.

Research from the middle Paleolithic caves at Fontéchevade and La Chaise in the Charente district of SW France demonstrates that MS data allow both intra- and inter-site correlations at and between these caves. Using this result it was then possible to develop a composite profile, using MS data, that covers the time of deposition represented by sediments deposited in the cave. This composite profile proxies for the climate in the region at the time these sediments were deposited. A preliminary paleoclimate curve for the middle Paleolithic is presented and represents deposition starting during a glacial period, extending into interglacial time, and finally beginning to return to glacial climates.

It is clear from these results that use of these methods at multiple sites can provide links to otherwise seemingly unrelated sites. This is useful in gathering the broad spectrum picture of the region and the associated climate. The sites at Fontéchevade and La Chaise, while in close proximity to each other, show little archaeological evidence to link them chronologically. Use of MS and VIS show the two sites to have an overlapping history. Applying this method to the excavation at Fontéchevade allows for the determination of the climate associated with any archaeological level.

Caves can provide ideal environments for sediment deposition that are unaffected by in-situ pedogenesis, and from such sediments paleoclimatic trends can be extracted. Because paleoclimate analyses of this type are performed on the entire data set from which archaeological materials are extracted, we believe that MS data provide a unique opportunity to evaluate the effect of climate on the behavior of ancient peoples.

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FIGURE CAPTIONS

- Figure 1: Shows the location map of Fontéchevade and La Chaise caves in the Charente district of SW France (not to scale). Fontéchevade and La Chaise caves are about 5 kilometers apart.
- Figure 2: Gives the composited MS profile from two excavation units within Fontéchevade Cave. There is about 14 meters separation between the main coupe and the sondage. The archaeological levels shown are for the main coupe.
- Figure 3: Displays a composited MS profile from three excavation units, LC-1, LC-1A, LC-2, within La Chaise Cave. The single low MS value near 1.5 meters depth represents a limestone layer and is an indicator of an unconformity or missing sediments in the record. Sediments below are Middle Paleolithic while the sediments above are much younger Upper Paleolithic. The archaeological levels from LC-2 are given.
- Figure 4: Shows the composite MS profile for Fontéchevade and La Chaise caves with interpretations of warm/cool climatic conditions. The zone of overlap represents the area of the correlation between the two sites.
- Figure 5: Details the composite MS profile for Fontéchevade and La Chaise caves (Figure 4) with the DW index data included indicating wet/dry climatic conditions. Overall wet/dry is shown in shaded bars is in agreement with the general trends seen in figure 4.

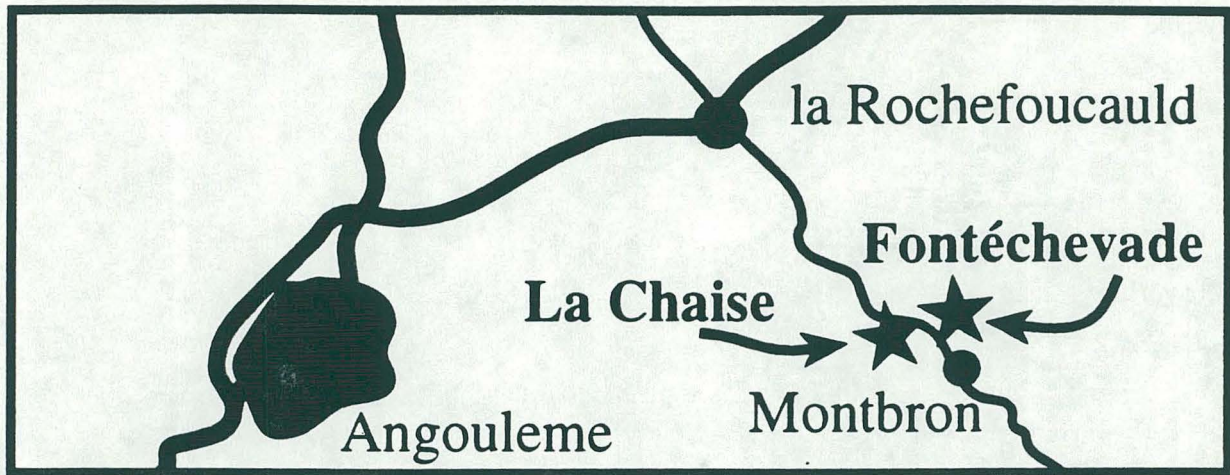


Figure 1

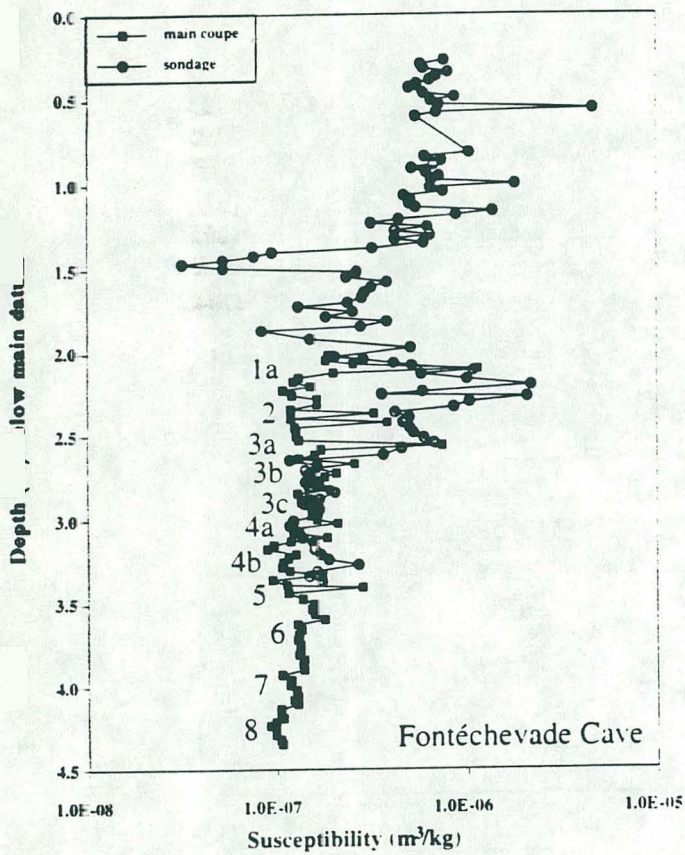


Figure 2

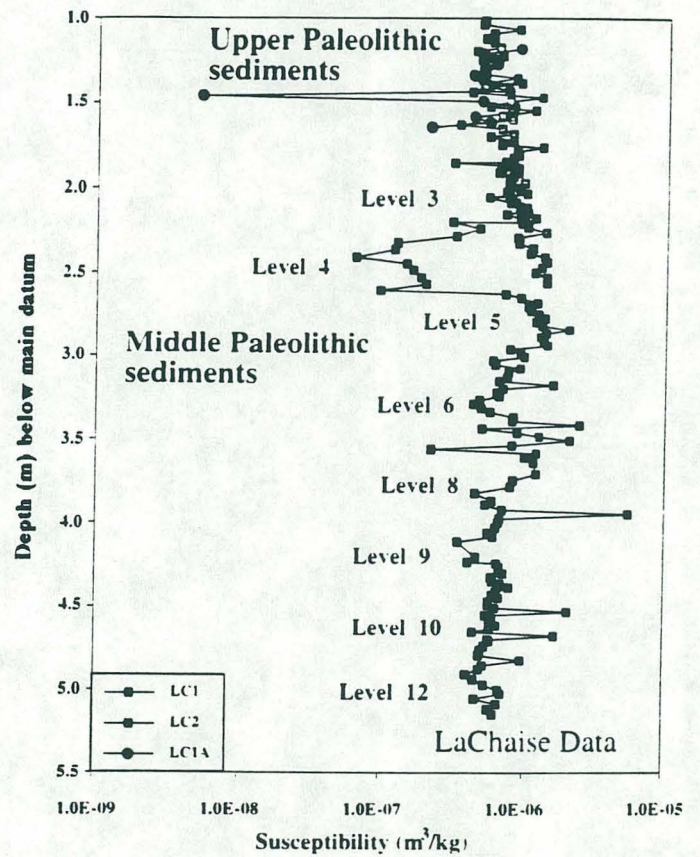


Figure 3

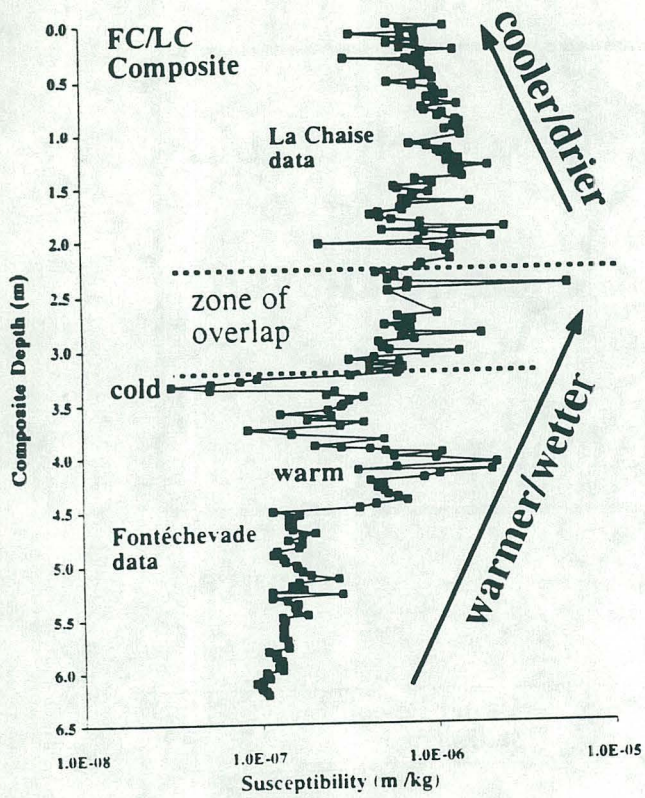


Figure 4

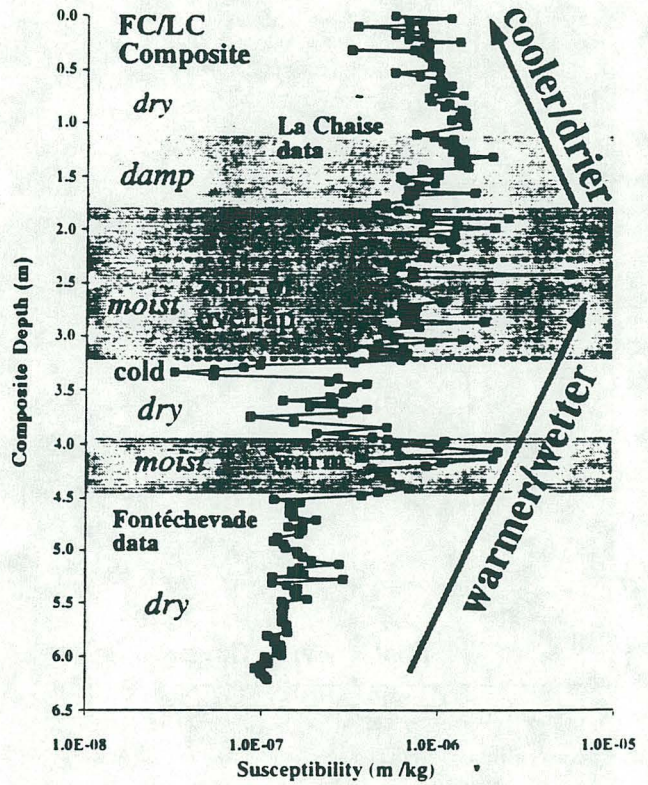


Figure 5

**“FACILITATING EDUCATIONAL OPPORTUNITY
AMONG HISPANIC STUDENTS
IN THE COMMUNITY COLLEGE:
THE BOARD CONNECTION”**

**Jackie Franklin
Mentor: Dr. Jose Gutierrez**

ABSTRACT

The governance board of a community college is the bridge between the community and the community college. The intent of this research is to further examine the role of the governance board and explore options to improve educational attainment among Hispanics in the community college.

INTRODUCTION

Research appears to suggest that education is the most influential factor in determining the outcome of one's life. The correlation between education and achievement is evident: The more education one attains the better the educational or economic outlook one secures. There is no doubt that in today's fast paced technological society one can obtain occupational security with a high school diploma. The reality is that a higher education, whether academic or vocational is no longer an option but a necessity.

However, educational attainment in higher education remains low among Hispanic Americans when compared to non-Hispanics. For example, in 1993 46.9 percent of Hispanics did not have a high school education while only 6.4 of Hispanics held Bachelors degrees. For non-Hispanics the statistics differ greatly, 17.9 were not high school graduates while 15.2 held Bachelors degree.¹ Although there has been some improvement since the 1970's in educational attainment among Hispanics there is still unbalance.

The focus of this paper is community colleges as a gateway of educational opportunity among Hispanics. Specifically, the role of the governance board and the impact the governance board has in the process of creating a multicultural environment.

THE COMMUNITY COLLEGE

Community colleges are a twentieth century invention. Originally these were two year educational institutions were established to train individuals in industry, agriculture, and education.² The concept of an open door higher education institution combined with an increasing population of high school graduates who wanted to further their education led to these institutions becoming public. The first community college, Joilet Junior college in Joilet Illinois opened its doors in 1901.

Since the community college share characteristics of both secondary schools and four year universities, this aspect of public education has been neglected. It was not until the "baby boom" era of the 1960's with the overwhelming number of adolescents leaving high school and looking for different outlets to expand their education that community colleges gained mass acceptance and popularity³. Today their are over 1400 community colleges. These institutions which are commonly referred as "junior colleges" or "technical schools" provides an opportunity for a higher education for many individuals who had been

traditionally denied this privilege.

There are four main functions to a community college. According to the American Association of Community Colleges, the purpose of a community college are: To provide a vocational or occupational course work which leads to an Associate degree; to provide as a transition to a traditional liberal arts program in a four year university; for personal enrichment courses taken without earning academic credit; to provide developmental or remedial programs⁴.

The most beneficial aspect to a community college is that regardless of gender, ethnic origin, or socio-economic status community colleges have historically provided an opportunity and access to a higher education. Presently, there are 5.7 million students enrolled in community colleges. Fifty-eight percent of community college students are women and 46.7 of all minorities in higher education are attending a two year college.⁵

How do community colleges affect the Hispanic American population? In 1992 Hispanics accounted for approximately ten percent of community college students. Many Hispanics begin their path to a higher education in community colleges. From 1976 to 1992 the percentage of Hispanic American students has increased dramatically from five to eight percent.⁶ However, although enrollment among Hispanics students is increasing, the representation among faculty and administration remains low. In 1993, Hispanic faculty constituted only three percent. The same low percentage of three percent holds true for Hispanics that held administrative positions such as the presidency in community colleges.⁷ If we are to create an environment of educational attainment among Hispanics and other minority groups including women, it is imperative that there is recruitment for faculty, administration, and governance board.

THE GOVERNANCE BOARD

The governance board of community colleges functions as the connection between the community and the school. There are five to nine governance board members known as trustees. They have several functions, perhaps the most important function they have is in selecting and terminating a president. The governance board also functions in budgets, programs, and personnel although they have a great influence, they are generally not involved in daily affairs⁸. How one becomes a trustee differs greatly depending on state. Presently there are seventeen states that have locally elected boards and fifteen states that have appointed board members. The levels of control vary from local to state control⁹.

Presently there are about 5000 trustees. There has been much criticism in this administrative area of community colleges. Elected board members often have high political ambitions and the college board of trustees is the first step in their political career. Appointed board members receive the same criticism being accused of being involved with high levels of political and special interests within the community college.

Perhaps the greatest criticism for the community college governance board is the lack of representation. As of today, there is very little research done with the demographics of a governance board. What is known is that is lack of minority representation. The debate concerned over governance board is that if they function in providing a bridge between the community and the community college, why does the governance board not represent the community nor the community college? Traditionally, the governance board is made of white males, with an average age of 56, who have a Bachelors degree or higher, and are professionals and have managerial occupations, with an average income of \$55,000.¹⁰

Today, the demographics differ greatly from that of the community and the community college students.

How important is representation on the governance board? Since they have an influence in selecting and terminating a community college president, have control in programs and budgets, it is safe to note that the governance board to have extensive influence. With the growing population of Hispanics and other minorities seeking to advance their education by enrolling in community colleges, it is imperative that boards take action to accommodate their students. The first and foremost step begins with creating a diverse governance board.

CONCLUSION

In the mid-eighties, Austin Community College adopted a twelve step program in recruiting minority faculty. The first step in this twelve step program began with the governance board and the trustees that was diverse or supported affirmative action policies. Since the twelve step program minority faculty has grown by 120%.¹¹ This example is cited since it is the governance board that ultimately has a great impact in creating policy that supports a multicultural environment. The governance board has an influence in recruiting minority faculty, approval of a diverse curriculum, and ultimately these policy are the first steps to the successful recruitment of minority students. In order to facilitate educational opportunity among Hispanic students and other minority students, changes must be made within the highest level. As the number of minority enrollment increases, there needs to be more emphasis on representing the students and the community, this begins with the governance board.

1. Years of School Completed by Selected Characteristics: 1993" No. 234. Statistical Abstract of the United States: 1994, U. S. Department of Commerce. 114 ed., 1994.

2. Cohen, Arthur M. and Florence B. Brewer, The American Community College, (San Francisco: Jossey-Bass Publishers, 3) 1992.

3. Phillippe, Kent A., ed., National Profile of Community Colleges: Trends and Statistics: 1995-1996, (Washington D.C.: American Association of Community Colleges, 2) 1995.

4. http://www.acc.rich.edu/research_agenda.htm.

5. Ibid.

6. Schick, Frank L, and Renee Schick, Statistical Handbook on U.S Hispanics, (Phoenix: The Oryx Press, 79)1991.

7. Phillippe, Kent A. ed., National Profile of Community Colleges: Trends and Statistics: 1995-1996, (Washington D.C: American Association of Community Colleges, 37)1995.

8. Piland, William E., "The Governing Board" in Managing Community Colleges by Arthur Cohen, (Jossey Bass Publishers, 82) 1994.

**THE CONTEMPORARY AMERICAN INDIAN
IN THE URBAN SETTING:
I SEE YOU, BUT DO YOU SEE ME?**

**Joseph Bohanon
Mentor: Dr. Thomas Watts**

ABSTRACT

This study involving 42 American Indian respondents from an urban and non-urban setting examines the education, tribal language, and health and social welfare of the American Indians. Separate interviews in the urban and non-urban areas were given using the same questionnaire. The vast majority of the respondents expressed a strong belief in pursuing a higher education to provide a better life for themselves and their families, and personal goals often incorporated the desire to attain a higher education with a desire to do one's best for one's self, family and community.

INTRODUCTION

Historically, American Indians have encountered the philosophy that Western ways are superior to those traditional, Indian tribal cultures. In many respects, American Indian individuals have suffered from losses connected to that of cultural oppression. Social disorganization, cultural and social change, cultural conflict, and the resulting interpersonal stress have been documented as causing crime, suicide, and numerous other social and health-related concerns among Indians. The suicide rate among American Indian youths, twice the national average, has been directly related to their being raised outside of their cultural system.

LITERATURE REVIEW

The study begins on the largest recent migration of the American Indian beginning in the 1950's. Under the aegis of the Bureau of Indian Affairs, a new program, euphemistically called Relocation and Employment Assistance, was conceived and young Indians were encouraged to move from the reservations to nearby cities where they would be placed in new jobs and new government aid. Much of the program was poorly planned, little thought was given to pre-location job training or counseling, but during the first years of program hundreds of Indian families, migrated to Texas--Dallas, Fort Worth, El Paso, San Antonio, Houston and other metropolitan areas (Cash & Hoover 1977). From 1952 through 1968 some 67,522 Indians (heads of households) were relocated through this direct employment program. Today, there are more Indians living in urban areas than on reservations (Hanson 1980).

Though the BIA's relocation program is regarded by some as less than even a moderate success, or even as a failure, migration to urban areas enables many American Indians to escape poverty, unemployment, and underemployment. Only some 20 percent of urban Indians live below the poverty line compared with about 50 percent of those on reservations living below that level (Sorkin 1982). The urbanization of American Indians is a phenomenon of differential fertility and mortality of differential migration between these areas. (Thornton, Sandefur, & Grasmick 1982). American Indian urbanization is not only a physical occurrence. It is also a social and cultural process whereby the values and norms

of urbanism are transmitted to Indian peoples in non-urban areas through television, radio, printed matter, and other means of mass communication. In certain cultural respects, American Indians have undoubtedly thus become urbanized without direct contact with urban areas (Thornton, Sandefur, & Grasmick 1982).

Cultural changes encountered by the American Indian when moving to urban areas, they often discovered that behavior viewed as normal and admirable in tribal settings--for example, quietness and non-aggressiveness was considered odd by White society. Faced with such conflicts between traditional and urban ways, individual Indians were often forced to adjust culturally in ways ranging from total assimilation to cultural pluralism. Similar adjustments on a group level have resulted in such phenomena as urban pan-Indian movements and pan-Indian dances, powwows, and similar gatherings (Thornton, Sandefur, & Grasmick 1982).

Social changes involved in urbanization include a diminished role for extended families and a lessening of tribal importance. Though many American Indians continue to maintain extended family ties after moving to urban areas, the ties are typically no longer as pervasive as they were on reservations and in rural areas (Thornton, Sandefur, & Grasmick 1982).

Research indicates that American Indians move to urban areas primarily to improve their economic situations, either through better jobs or through access to better organized or better quality services. Research also indicates that urbanization can be a successful means of "upward mobility" for young, educated Indian males with training and experience. Rural-to-urban migration will probably continue to improve the economic conditions of Indians who choose to migrate in the decades ahead (Thornton, Sandefur, & Grasmick 1982).

Most Indian families adjusted to urban life, but at great emotional and spiritual cost. Others could not adjust and eventually returned to the reservation and rural areas. Urban Indian centers evolved out of a need for fellowship, emotional support, and a sense of community (Hanson 1980). In Dallas, the American Indian Center was founded in 1969 and a faction within the organization departed and formed their own organization, the Dallas Inter-Tribal Center and Clinic in July 1971. However, these two centers do not compete with each other but instead offer complementary programs (Sorkin 1978).

Rural off-reservation Indians do not live generally on trust lands but continue to enjoy certain privileges in their ancestral home reservation depending on location and tribal policy. They may also enjoy certain service benefits as individual Indians with respect to health care, for instance, depending on policies applying to specific areas. Urban Indians, however, are the largest off-reservation group of Indians in the country numbering over half the Indian population. They, too, may have some property rights in their ancestral reservation or voting rights in absentia, but these are not subjects that can be readily generalized about since in part they vary on the basis of tribal history as well as tribal policy with respect to absentee voting and definition of membership (Deloria, Jr. 1985).

RESEARCH DESIGN

The research design employed is called the grounded theory analysis which is a qualitative method. For Glaser, qualitative analysis means any kind of analysis that produces (rather than tests) concepts and hypotheses, and does not arrive at these hypotheses by statistical methods. The grounded theory approach is a method of analysis linked with data collection, using a systematically applied set of

procedures to generate an inductive theory about a substantive area. The focus of my study examined the needs of urban American Indians in the areas of education, tribal language, and health and social welfare. In particular, the comparison and contrast between American Indian youth at the high school and at the university level in urban and non-urban settings. With each group I entered the field for data collection via observation and interviewing to access the meaning of what was being observed to explore the potential or similarities among students concerning their educational experiences and their practice of traditional culture and language, in addition to other needs. I also interviewed the parents of the students participating in this study to elicit their experiences with education and assimilation into the dominant culture.

From my research work I developed categories, their properties and their relationships (hypotheses). And ultimately integrating these hypotheses according to emergent theoretical codes. In reporting the findings there is written records of analysis in reaching a theory. The raw data has been sorted from piles to present the results. Starting with interviews, observations and raw data and generating concepts from data and relating them to one another has been the goal.

In preparing the survey for the participants, there was an assemblage of American Indian community members that met to discuss the questionnaire. This advisory committee had experience in American Indian education, American Indian community affairs, and involvement with other American Indian studies. These people along with my mentor, a professor in Social Work, and myself developed the questionnaire (See page 14). The first part of the questionnaire consisted of statistical information and the second part asked questions which were open ended to produce some discussion. The last three questions involved evaluating the survey and blank spaces available for further comments.

STATISTICAL FINDINGS

57% of respondents live in small towns or rural areas. 43% of respondents live in urban areas.

Small town/rural age group 13-17 years

50% female

50% male

Education: 9.33 years (average)

Health (physical): 100% rated @ 5

Health (mental): 67% rated 4, 33% @ 5

Spiritual: 17% rated @ 0, 1, 4, and 5 each and 32% @ 2

Employment: 67% rated @ 1, 17% @ 2, and 17% @ N/A.

This group consisted of students ranging from middle school to high school. I was not surprised to find that this young group rated themselves at the highest level of physical health. Mental health ratings, however, came down somewhat. The majority of respondents rated their spirituality at the lowest level. The students gave employment the lowest rating.

Small town/rural age group 19-29 years

88% female

12% male

Education: 15 years (average)

Health (physical): 38% rated @ 4, 63% @ 5

Health (mental): 13% rated @ 4, 88% @ 5

Spiritual 38% @ 3, 25% @ 4, 38% @ 5

Employment: 25% rated @ 1, 38% @ 3, 13% @ 4, and 25% @ 5.

The majority of this group consisted mainly of college students. They rated both their physical and mental health at the highest levels. The responses from the spirituality ratings ranged from the middle to the highest ratings. Ratings for employment were balanced across the scale.

Small town/rural age group 33-54 years

56% female

44% male

Education: 13.78 years (average)

Health (physical): 44% rated @ 3, 33% @ 4, 22% @ 5

Health (mental): 11% rated @ 1, 33% @ 3, 22% @ 4, and 33% @ 5

Spiritual: 11% rated @ 1, 22% @ 3 and 4 each, and 44% @ 5

Employment: 11% rated @ 2, 44% @ 4, and 22% @ 5, and 22% N/A.

This group consisted of middle age respondents some of whom were college graduates. Physical health ratings were from the mid to high level. Mental health had some lowest ratings but the majority was mid to high. Ratings for Spiritual and Employment were balanced across the scale.

Urban age group 11-16 years

75% Female

25% Male

Education: 8.5 years (average)

Health (physical): 75% rated @ 4, 25 @ 5

Health (mental): 25% rated @ 3 and 4 each, 50% @ 5

Spiritual: 50% rated @ 3 and 5 each

Employment: 25% rated @ 0, 50% @ 2, 25% @ 5.

This group consisted of adolescents ranging from middle school to high school. Based on their responses for the physical health ratings the majority of students rated themselves at the next to highest level. Half of the respondents for the mental health rating chose the highest level. In the spiritual category, half of the students rated the mid level and half chose the highest level. This group had three-quarters employment.

Urban age group 21-25 years

25% female

75% male

Education: 15 years (average)

Health (physical): 25% rated @ 1, 50% @ 4, 25% @ 5 Health (mental): 25% rated @ 4, 75% @ 5

Spiritual: 25% rated @ 4, 75% @ 5

Employment: 25% rated @ 1, 50% @ 3, and 25% @ 4

The majority of this group consisted of college students. The physical and mental health ratings selected by the respondents were predominately from the mid to highest level. Three-quarters of this group chose the highest level of ratings for the spiritual category. Employment ratings balanced throughout the scale.

Urban age group 33-53

50% female

50% male

Education: 14.5 years (average)

The Contemporary American Indian In The Urban Setting: I See You, But Do You See Me?

Health (physical): 40% rated @ 3, 50% @ 4, 10% @ 5 Health (mental): 10% rated @ 3, 40% @ 4, 50% @ 5

Spiritual: 30% @ 3, 40% @ 4, 30% @ 5

Employment: 10% rated @ 1 and 2 each, 20% @ 4, and 60% @ 5.

This middle age group had some college graduates. Physical health ratings were from mid level to the next to the highest level. The majority of ratings were in the high level for their mental health. Spiritual ratings ranged from mid to highest level. over half of the subjects were employed.

CONCLUSION

College students from all areas strongly expressed the importance of pursuing a higher education, whereas urban high school students, as opposed to their small/ rural counterparts, did not place much emphasis in achieving a college degree.

57% of the total number of respondents live in small town/ rural settings; 43% of respondents live in urban areas.

The great majority of respondents stated having a sense of pride in their American Indian identity.

An overwhelming number of respondents stated they do not know how to speak a tribal language.

The vast majority of respondents emphasized their strong beliefs in education and the pursuit of higher education to provide a better life for themselves, their family, and community. The importance of family was also strongly expressed. Personal goals incorporated the desire to attain a higher education and to do one's best for one's self, family, and for community.

Some other observations noticed while administering the questionnaire was that the urban respondents hurriedly went through the questions and answering with very few words or phrases. While, on the other hand, the respondents from the non-urban areas had a slower paced style and much lengthier answers to the questionnaire.

This research needs a long term study and evaluation.

MCNAIR RESEARCH INFORMED CONSENT

I, the undersigned, do hereby consent to participate in this research project. This project involves interviews, which may include audiotaping sessions so that the researcher can better transcribe the material at a later time. The only person listening to the audiotape will be the researcher, Joseph Bohanon. This is a totally anonymous survey. At no time, under any circumstance will any name be asked for or used. It is without any pressure or coercion that I sign this consent.

Date

Signature

Witness

MCNAIR RESEARCH QUESTIONNAIRE

Age:

Tribal Affiliation:

Sex: Occupation:
Education: (Circle number of years completed) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
20 I presently live:
in a large urban area
in a small town
in a rural area

Rate your present: 1 to 5 - 1 least and 5 most
Health (Physical) Education Health (Mental) Spiritual Employment Other
(Please specify)

*Please answer these questions on the separate sheet of paper.

- (1) What does it mean to you to be an American Indian?
- (2) Do you know your tribal history and would you like to share any stories related to your Indian background?
- (3) Do you belong to a certain clan in your tribe?
- (4) Who or what are the influences that govern your life today?
- (5) What are your main concerns associated with education? family? personal goals?
- (6) If you could change anything about yourself or your life what would that be?
- (8) What geographical location did you originally come from?
Do you plan to return?
- (10) Do you know how to speak a tribal language?
- (11) Do you practice tribal traditions and customs in your daily life? Attend tribal ceremonies? Tribal activities?
- (12) How has spirituality affected your life?
- (13) What can be improved or changed about this questionnaire?

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INCREASING RETENTION OF McNAIR SCHOLARS

Diana Stedman
Mentor: Ms. Norma Benavides

INTRODUCTION

My internship required that I develop a Grant Proposal and attend Norma Benavides graduate class (5306 Administrative and Community Practice) The Rational Planning Model is the theory I used to develop my proposal. This model begins with the Determination of Goals and then proceeded through a series of steps. However, at any given step one may go back to any step in the sequence, the feedback loop, to add or adjust the proposal as needed. I was able to develop my proposal through six steps.

ABSTRACT

The purpose of this project is to the Increase Retention of students in TRIO program projects. It will identify TRIO participants. The project will monitor the progress of TRIO participants through year - end - reports. It will develop and implement strategies to recruit, retain, and support participants to achieve Master's level and Post - Master level of Education, by reducing barriers to completion. The mission of this project is to develop the opportunities for Ronald E. McNair Postbaccalaureate Achievement Program and TRIO participants by helping them in the financing of a productive education. The intent is to increase the number of under represented groups including low-income, first generation, and / or minority representation of graduate students.

TRIO Organizational Chart (Insert 1)

I did not know how many different programs the U. S. Department of Education sponsored until I started on this project. When the TRIO programs began in 1965 it was for three programs, today it manages to six programs. These programs are McNair, Student Support Services, EOC, Veterans UB, Upward Bound, UB for Math and science, and Talent Search.

Support/Nonsupport (Insert 2 & 3)

In this picture the bus represents the support a TRIO participants receives while they are attending a learning facility. The car in this picture represents the support and encouragement the minority, underrepresented, first generation student will receive as they attend a learning facility.

Affirmative Action Act recognized the past inequities of underrepresented groups or minorities in education, then Congress developed a set of goals to reduce the number of victims of discrimination, in an attempt to allow the underrepresented groups to catch up with the white majority.

Racial Make-up Of Tarrant County (Insert 4)

This chart demonstrates the ethnic makeup of Tarrant county. Today, the population estimates say that about three percent of the 1.39 million people who live in Tarrant County are Asian, compared with about seventy percent white, fourteen percent Hispanic and twelve percent black. John Sharp, Texas Comptroller of Public Accounts has predicted that in the year 2026 forty-seven percent of all school children will be Hispanic students.

UTA Fall Ethnicity Profile (Insert 5)

I compared this to the ethnic makeup of the student body at UTA. The chart reveals the student body

as 9 % Black, 9% Asian, 8% Hispanic, 1% Native American, and 6% International students. The ethnic profile for the University of Texas at Arlington for the Fall of 1995 clearly demonstrates that the majority of students (67 %) enrolled are white.

Faculty By Ethnicity (Insert 6)

In reviewing UTA Fall 1995 Facts Brochure, the majority ethnic group, 84.9 % Anglo, are to be responsible for the recruitment of students. Minorities and First Generation face many obstacles. To name just a few are: the lack of finances, family responsibilities, and no support.

What does UTA do to retain and motivate its students? So I interviewed the staff on campus.

Quotes

Sam Pippins, an undergraduate student at UTA said "Minorities work harder, they have more obstacles to overcome. The obstacles are frustrating." One obstacle identified in class by Norma Benavides, LMSW., is "Being female you do not get as many options."

I asked Zeb Strong, the Assistant director of UTA's Multicultural center how he motivates and retains students. He "Encourages students to be involved with the university groups" on campus.

After a couple of attempts, I interviewed Ms. Melanie Hariston, the Director of Student Recruitment stated that The University of Texas at Arlington has no retention policy in use at this time. One is being developed, but until it is implemented it is up to the individual instructors to retain the students.

Mr. Jim Walther the Graduate Student Advisor at UTA's Business School said the Under-Graduate school has no retention policy, however to ensure success and to motivate its Graduate students, its core courses require a Career class. This class provides non-academic testing. However, the students Graduate Management Admission Test score is highly significant in who is chosen for graduate school.

At a meeting in the student Union the speaker Ms. Shirley Binder, the Director of the Admissions Office at UTA stated "Ten percent of the students who enter Junior College ever enter and graduate from a four year college."

The U.S. Department of Education reported first year attrition at between sixteen percent and twenty percent with a forty percent of the students who enrolled as freshmen have left. The odds improved once a student entered the junior year after which eleven percent failed to return after the third year.

The TRIO programs do not share student information, nor are the TRIO programs well known to the student body. I asked Dr. Watts of the Social Work School for suggestions where to look for scholarship. His answer was to look into McNair. What's a McNair? Where's Hammond Hall?

Lisa Thompson, the Project Director of Upward Bound stated that once the student leaves High School and moves into college or technical school the student obtains no support until they are eligible for participation in the McNair program in their junior year.

Ethnicity Profile (Insert 7)

The program will identify and invite all TRIO participants, to participate in a continuum of support programs and wholesome connections for those that attend or may attend the University of Texas at Arlington. It will provide effective student support strategies through rapport, counseling, by teaching coping skills, and generating referrals for nonacademic needs.

Goals

Goals of the proposed program are:

1. Continue the opportunity for McNairs to enhance their education. This could be accomplished by a semester stipend, Study skills workshops, and providing Mentors.

2. Reduce or eliminating paper work and provide waivers for tuition and books for the McNair Scholars in applying for Masters and Doctoral studies.

Hiring a public relations specialist, Development of liaisons with community colleges and TRIO programs

3. Provide a continuum of support for the under represented groups and the utilization of TRIO Programs. McNair Scholars to serve as Role Models/ Mentors for one, provide peer support groups, identify and track TRIO participants though a computer network using Blumen data base software

Organizational Chart (Insert 8)

It is significant to have a Board of Directors to help with fundraising and Political Expertise will assists in maintaining the integrity of the program. The Executive Director will be responsible for the day - to - day administration of the program. This individual will seek out new Funding Sources and write the proposal for them.

The Public Relations Individual will establish and maintain cooperative relationships between the TRIO programs and other Educational Institutions. This individual will prepare and distribute fact sheets, news releases to the local public.

The Coordinator of Student Affairs is vital in providing the direct - care link to the students. This individual will assigns mentors to the TRIO participants.

Office Manager will manage the day- to- day office tasks.

The Information Specialist will set up the TRIO network and data base system.

Counselor will monitor Mentor and Mentee relationships. This individual will visit other campuses to assists in the establishment and maintenance of cooperative relationships.

Budget (Insert 9)

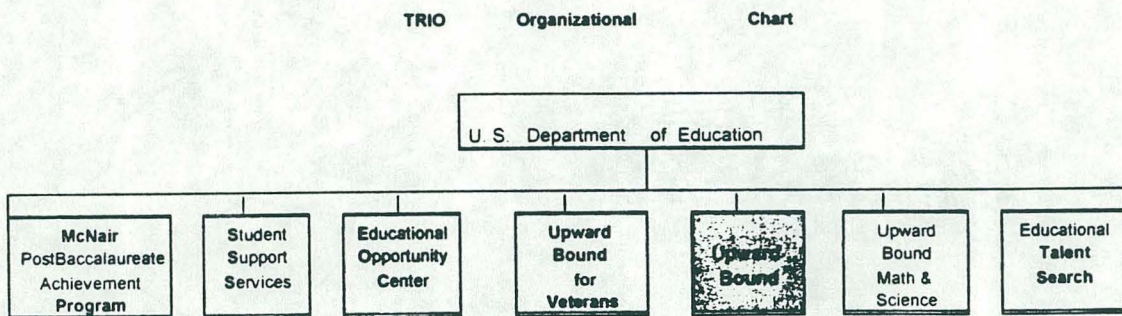
Initial funding will be from the United Way. Five hundred thousand.

Total Cost

The largest portion of the budget goes to salary three hundred twenty thousand eight hundred. Computers, software, networking cost is nine thousand six hundred.

Success (Insert 10)

The need of a mechanism to pull together all the student support programs to establish intertety, for a continuum of support form Junior High to the Doctorate program.

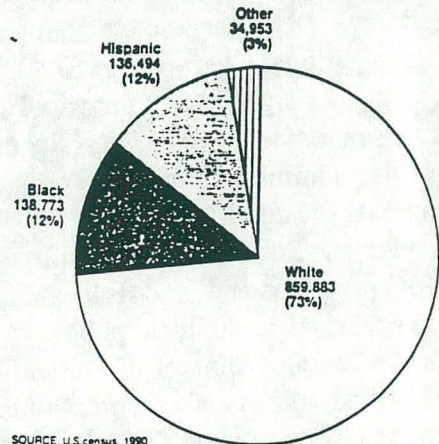


Insert 1

DEMOGRAPHICS OF RACE

Statistics compiled by Josh Romonek, Star-Telegram staff writer.

Racial makeup of Tarrant County populace 1990



SOURCE: U.S. census, 1990

Insert 4

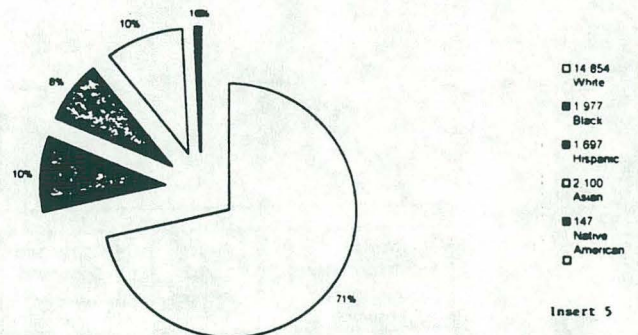
Tarrant County employment

Civilian labor force

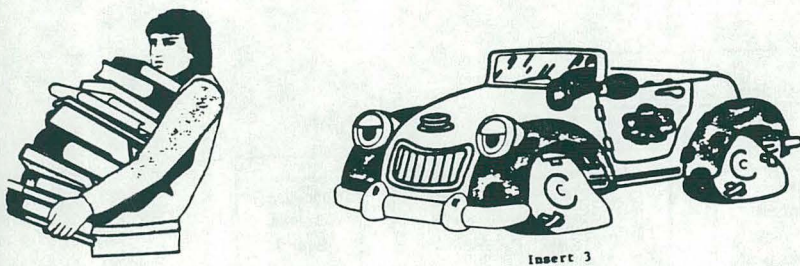
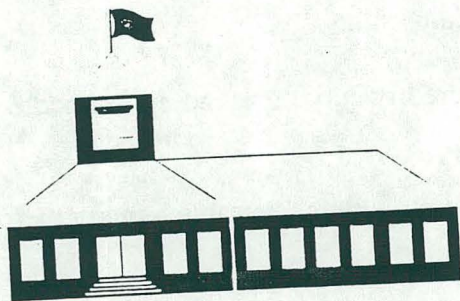
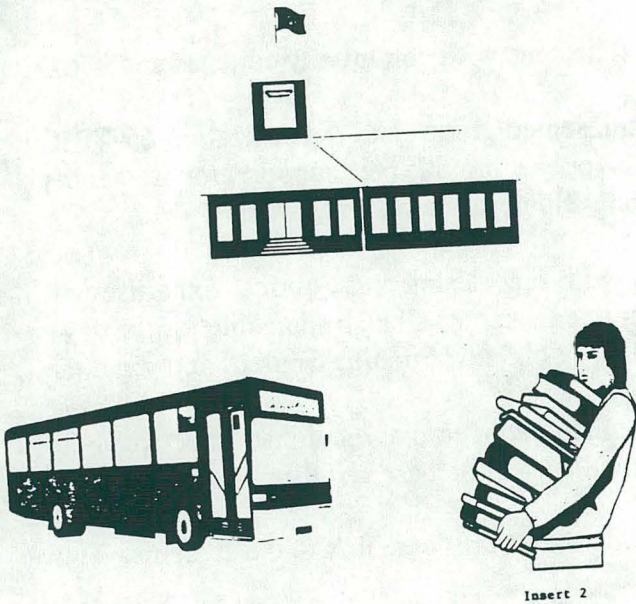
	Civilian Labor Force	Employment	Unemployment	Rate
Total	711,644	678,181	35,463	5.0%
Black	74,841	67,071	7,770	5.0%
Hispanic	74,535	69,486	5,049	6.8%
Other Minority	20,333	19,067	1,266	6.2%
Non-Minority	541,935	520,557	21,378	3.9%

SOURCE: Texas Employment Commission, Tarrant County, January 1989.

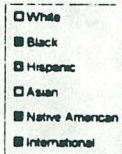
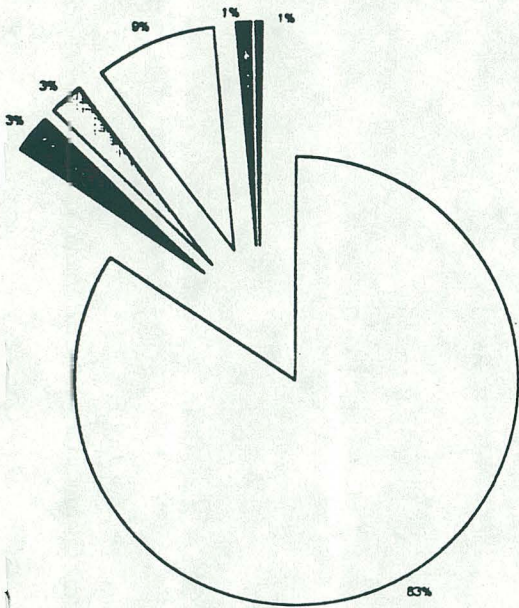
UTA Fall 1995 ETHNICITY PROFILE



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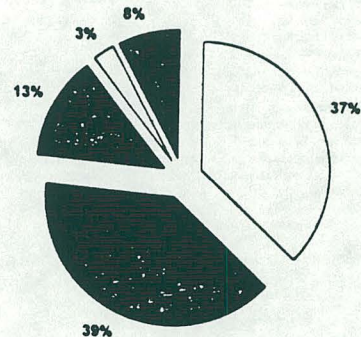


Faculty by Ethnicity



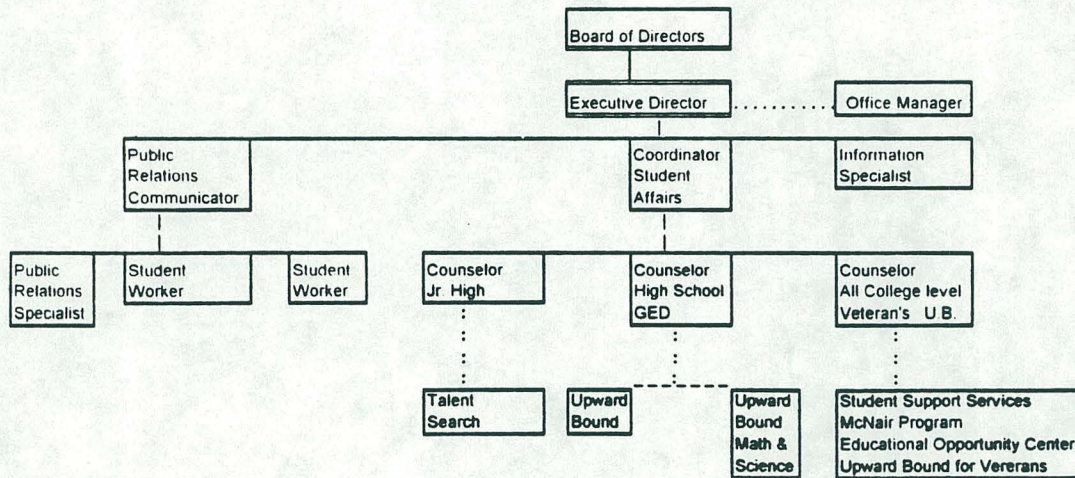
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McNair 1995 - 96 Ethnicity Profile



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Increasing Retention Organizational Chart



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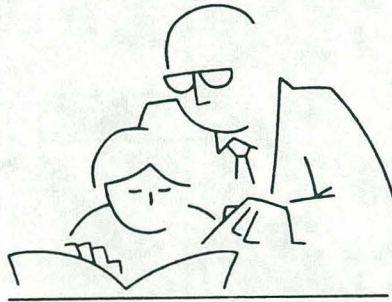
Increasing Retention of McNair Scholars

Project: Increasing Retention

Personnel Costs	% of Time	Salary	Fringe Benefits 10%	Subtotal	Total
Masters in Social Work	100%	\$ 55,000.00	\$ 5,500.00		
Accredited Business Communicator	100%	\$ 40,000.00	\$ 4,000.00		
Office Manager/Bookkeeper/Clerical	100%	\$ 20,000.00	\$ 2,000.00		
Information Specialist	50%	\$ 45,000.00	\$ 4,500.00		
Public Relation Specialists	100%	\$ 25,500.00	\$ 2,550.00		
Coordinator of Student Affairs	100%	\$ 40,000.00	\$ 4,000.00		
Counselor - Junior High	100%	\$ 25,000.00	\$ 2,500.00		
Counselor - High School	100%	\$ 25,000.00	\$ 2,500.00		
Counselor College	100%	\$ 25,000.00	\$ 2,500.00		
Staff	100%	\$ 20,000.00	\$ 2,000.00	\$ 32,050.00	
Staff - work study	50%	\$ 300.00			
Semester Stipends Spring & Fall	40 @ \$1000	\$ 80,000.00			
Public Speaking Disbursements	30 @ \$50	\$ 1,500.00		\$ 402,300.00	
Equipment					
Computers Server		\$ 2,200.00			
Individual units	4 @ \$1500	\$ 6,000.00			
HP Laser Printer	4 @ \$350	\$ 1,400.00			
Blumen Software	4 @ \$399	\$ 1,196.00			
Network supplies		\$ 1,000.00			
Fax Machine		\$ 550.00			
Copy Machine		\$ 950.00			
General Office Supplies		\$ 950.00		\$ 14,246.00	
Office Furniture					
Desks chairs carpet mats	4 x	\$ 1,500.00			
Operating Expenses					
Telephone Basic Service x 12 months	\$20/month	\$ 240.00			
Long Distance x 12 months	\$20/month	\$ 240.00			
Postage	\$25/month	\$ 300.00			
Printing Brochures		\$ 750.00			
Training Manuals		\$ 2,000.00			
Promotional		\$ 3,500.00			
Reimbursement for staff travel 200miles/month	1yr - 28/mile x 3	\$ 2,016.00		\$ 10,546.00	
TOTAL					\$ 459,142.00

Project: Increasing Retention

Operating Expenses				Subtotal	Total
Telephone Basic Service x 12 months	\$20/month	\$ 240.00			
Long Distance x 12 months	\$20/month	\$ 240.00			
Postage	\$25/month	\$ 300.00			
Printing Brochures		\$ 750.00			
Training Manuals		\$ 2,000.00			
Promotional		\$ 3,500.00			
Reimbursement for staff travel 200miles/month	1yr - 28/mile x 5	\$ 3,360.00			
Conference	\$500 x 4	\$2,000		\$ 13,890.00	
Grand TOTAL					\$ 466,486.00



Insert 10

THE RECIPIENTS' VIEWPOINT

Mary A. Walker

Mentor: Dr. Cassandra Simon

ABSTRACT

The new welfare reform initiatives have brought about changes for thousands of Aid to Families with Dependent Children (AFDC) recipients. This new reform will continue to unravel a sixty year old system. These changes, according to the pro-welfare reformers will move a large number of "welfare dependents" from a state of dependency to one of independence. There are common barriers which may be facilitating the failure of any welfare reform program. Welfare reform is not a new topic, it has been ongoing since the 1960s when it was first initiated by the Work Incentive Program (WIN) and again in 1988 by the Family Support Act. These programs were designed to push AFDC mothers to work and off welfare. Both programs failed in substantially reducing the welfare roll. So the question remains, based on previous welfare reform programs, can this new reform work successfully? A survey of local AFDC recipients was done to understand their barriers to self-sufficiency. It also sought to ascertain what they saw as the solutions to making them totally independent of welfare. A questionnaire was designed to uncover the ideas and perceptions of these AFDC recipients. The findings reinforce what previous studies have revealed, that it is difficult to remove a large number of AFDC recipients from the welfare "trap" at any given time. Recipients themselves are overwhelmed and do not appear to have a clear understanding of the welfare reform and how it will affect their lives. The best possible solution to developing strategies to combat any social issue is to first understand the problem holistically. Perhaps, the lawmakers should take into consideration the recipients perception of obstacles to self-sufficiency so that they can develop policies that will produce programs that can make it possible for AFDC recipients to successfully exit from welfare to work.

The word welfare bring about a variety of feeling and views, most if not all of them negative. The very mention of the word conjures up an image riddled with prejudice and stereotyping. The concept that welfare has only worsened poverty is commonplace in today's society. The most common belief is that welfare programs have done more harm than good. Aid to Families with Dependent Children (AFDC) as it is known, is given to provide the bare essential to approximately four million women (US House of Representatives, 1993) raising children. With all the emphasis on welfare today, one would assume welfare accounts for a large part of the budget when in fact, it accounts for only one percent of the federal budget and two percent of states budgets (US House of Representative, 1993). So why has this small program been the focus of such a large political battle?

To get a better understanding of welfare reform, first we must look at who makes up the welfare roll. Of the 13.6 millions AFDC recipients in 1992, more than two-third (9.2 millions) were children. These children accounted for 14 percent of the U.S. population under the age 18 and 63 percent of the children in poverty (US House of Representative, 1994). One cannot talk about welfare without talking about poverty. The blame is now being shifted to AFDC and its recipients for poverty. No state provides enough in benefits to keep a family out of poverty. The current grant amount for a family of three in Texas is \$188.00 (Texas Department of Human Services, 1995), which keep the family well below the poverty level. AFDC was established in the 1930s to assist families with children who could not support themselves. From the start,

the AFDC programs penalized women for departing from the prescribed roles of wife and mother (Thompson & Norris, 1995). The states set AFDC benefit well below those for other programs. One illustration of this involves the comparison of benefit levels for a single individual who receives SSI and an AFDC household of three. A single individual receives \$470.00 SSI grant, and a AFDC mother and two children living in Texas only receive only \$188.00 (Abramovitz & Newdom, 1994).

During the 1960s and 1970s, a change in the nation's economic conditions generated a large increase in the number of person needing welfare assistance. Faced with larger welfare rolls and unable to make "immoral behavior" a condition of aid, the state began to consider the work programs as a way to reduce the welfare roll. While early AFDC benefits were, in part, to keep the mother in the home, recent reform efforts now require mother to leave the home and enter the work force (Abramovitz, 1992).

Welfare reform is not a new topic, other work fare programs have been implemented and the two most noted for failure are the Work Incentive Program (WIN) and the Family Support Act with its mandated Job Opportunity and Basic Skills Training (JOBS) program. In 1967, WIN was enacted by an amendment to the Social Security Act. This was a behavioral standard as a condition of aid. Mothers with children 6 or older was required to enter a job-training or work placement program with the promise to help with child-care, employment and social services. The WIN program failed, it placed too few women in jobs, plagued with administrate flaws, inadequate child care services and numerous labor market barriers (Goodwin, 1989),(Garvin, Smith & Reid, 1978). In October 1988, President Reagan signed into law the Family Support Act "to foster the economic self-sufficiency of welfare recipients" (P.L. 100-485). The JOBS program had many of the same components as the WIN program. A three-year of 10 states (including Texas) reveals that JOBS program also has suffered from a lack of state funds and a host of other problems in implementation. Also the poor health, limited education, and presence of young children at home that made employment difficult for many women on welfare (Hagen and Lurie, 1995). The Family Support Act itself allows for considerable state discretion in the design and implement of welfare employment program. The program has not been fully implemented and cannot be measured 100%. In many instances the JOBS participants have only had basic education and training but not placed on jobs. At this point little is known about the impact of the JOBS program in reducing or alleviating poverty for AFDC mothers and their children (Halter, 1994).

The question for the current welfare bill, will it be any more successful than the WIN or JOBS programs in removing AFDC recipients from the welfare roll and placing them on jobs. The new welfare bill will abolishes the AFDC program and replaces it with lump-sum grants to the states for providing cash benefits to the poor. It will require the head of family receiving welfare assistance to work within two years with a set five year lifetime limit on assistance. Single parent with a child 6 or older can no longer claim the lack of child care as a reason for not working. The primary challenge of this welfare bill is simply to move AFDC recipients from welfare to work.

It is argued that many welfare recipient face multiple barriers to employment which prevent them from become self-sufficient. These barriers to employment may be either a temporary or an ongoing basis.

There is a clear need to develop a better understanding of their circumstances and needs. Before making assumption that this group is lazy or lack motivation there is a need to further examine their circumstances (Greenberg, 1993).

An ongoing research, by Dr. Cassandra Simon at the University of Texas at Arlington, is being conducted to study to understand the barriers to self-sufficiency and solutions to welfare dependence from the perspective of welfare recipients who are the most affected by the welfare reform. A minimum of 200

sample will be obtained within the Dallas-Fort Worth Metroplex area. I had the opportunity of working with her on this grant by completing the 60 sample in the Fort Worth area.

Methodology:

A survey of local AFDC recipients was done in the Fort Worth Community. The areas selected to complete the survey represent a large number of families from low socioeconomic condition. These families are either the working poor or AFDC recipients. The sample size was 60, but time allowed for only 43 to be input into the data base of the SPSS. This is a small sample of selected individuals who are currently receiving AFDC.

The research design was conducting face to face interviews and handing out questionnaires to the recipients in their place of residency. The instrument used was a six page form consisting of 76 closed-ended and 15 open-ended items. The questionnaire was designed by a 1996 Social Work Graduate student as part of her thesis. The instrument is broken down into fourteen sections covering demographics, family status, experience with AFDC, transportation, child care, medical issues, education, personal difficulties, employment barriers, work experience, job training, employment skills, and opinions on several issues. The recipients were informed of the anonymity and confidentiality to protect their interest and well-being. All recipients were given the option of having the instrument administered orally with them. The instrument took about 30 minutes each to complete. The analytical technique used was the qualitative data analysis to locate the frequency of distribution.

Finding:

Demographic information shows 42 female (98%), and 1 male (2%). This reflect the finding of the national data that most AFDC households are made up of female. The age ranged from 17 to 51 years old. The majority of the women was between the age of 20 and 25 years old. The ethnicity composed of 72% African American, 21% was Hispanic, and 7% was Anglo. The national data show that 38% - Anglo, 37% - African American, and 19% Hispanic. The level of education shows 2% with less than a high school, 51% with 9-10th grade education, 35% with 11-12th graduate, and 12% had some type of training beyond high school.

Family status: The marital status shows 67% single, 12% divorced, 12% separated, and 9% married. The average number of children per household was 2 (44%) and 1 (35%).

Experience with AFDC: The total of years on AFDC was less than 5 (63%), 60% had been on welfare two or more time, and the average length on each time was 1-2 years.

Transportation: 49% did not have transportation while 51% reported having some mean of transportation.

Child Care: 61% did not have anyone to care for their children, and 39% have available child care.

Illness/health problem: 85% reported none, and 15% reported that they or a family member had some type of health problem that would prevent employment.

Fear of losing Medicaid, food stamps, and/or housing assistance: The questions were if the fear of losing any of these were preventing them from seeking employment. Loss medicaid 86% reported No, loss of rental assistance 91% reported No, and loss of food stamps 93% reported No.

The final question on barriers to employment, if there were any responsibilities that were preventing or hindering them from being employed 70% reported No. The majority 79% reported that it was better to get a job than to receive AFDC.

Work Ethic: Previous work experience 79% reported having work in the past, and 21% reported no work experience. The question was asked if they felt it they should work for their AFDC check, 65%

reported Yes and 35% reported No.

Personal Difficulties/Opinions: Asked if they had considered having more children to stay on or increase their welfare benefits, 100% reported No. The final question was if they plan to be on AFDC for an additional two or more years, 77% reported No and 23% reported Yes.

Discussion

The survey finding, even from a small sample size, shows that most AFDC recipients are willing to work or be trained for a job. This contradicts the general belief that AFDC recipients are lazy and not willing to work. Thirty-four out of forty-three recipients reported they would rather work than receive AFDC. This reinforces the fact that no one wants to be in poverty or wish to be dependent on welfare. But much of the inability to escape poverty can be contributed to the lack of jobs, loss of jobs, low pay, and other factors that are beyond one's control. The recipients need skill that will help in obtaining good paying jobs. Jobs that they can pay child care, health care, housing, transportation and food. Some of the findings in the survey is questionable because of less assurance that our sample did not reflect the total population. It was a representative of the population of people currently receiving AFDC and reflects their views of AFDC. The sample does have value. But we need a larger sample size to accurately reflect the total population of people on welfare. Professor Simon and this researcher are in the process of getting more participants for the survey before we can consider the project completed.

Meanwhile, the new reform bill, society and lawmakers have failed to address the underlying causes of poverty, this is the real reason why people are on welfare. Until poverty is dealt with at the core, no welfare reform will be able to successfully and permanently remove a sufficient number of persons from welfare roll to jobs. Welfare needs to be replaced, not reformed. Reform means a few new programs and requirements that will poor people with little or no support or protection. It needs to be replaced with laws that will delete the causes of poverty. There is a need for a welfare system that provides income support that reinforces principles of work, family, and independence.

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**AN OVERDUE PROMISSORY NOTE:
REPARATIONS, HISTORICAL DEBT,
RACIAL INEQUALITY, AND
ECONOMIC DYSFUNCTION**

**Nora Allen
Mentor: Dr. Alusine Jalloh**

ABSTRACT

Webster's New International Dictionary defines "reparations: as the "act of making amends or giving satisfaction or compensation for a wrong or injury". A second definition describes reparations as "compensation paid by a defeated nation to cover damages sustained by a victorious nation in time of warfare".

INTRODUCTION

The demand for monetary reparations is and has been called by several names. The late Whitney Young called it the domestic Marshall Plan. Dr. Martin Luther King, Jr. called it an overdue promissory note owed to African Americans by the United States government. James Forman called it by its accusatory name, pure and simple, "reparations" when he threw the gauntlet down the aisles of churches across America. The demand for monetary atonement from the U.S. government to its African American citizens is not new, but is becoming ever more strident and has gained considerable momentum since 1989 when Congress approved 1.25 billion dollars as reparations to Japanese Americans for their internment in camps during World War II.

In what many regard as one of the most callous and ill-planned acts in American history, approximately 4 million illiterate, high visible, totally unorganized ex-slaves were recklessly severed from their moorings and set adrift in a war-ravaged and economically battered region that was brimming with bitterness. In addition, it was an area engulfed in waves of hostility towards Blacks, and one in which it was inevitable that they would be heavily dependent for their very survival from the same repressive forces which had previously held them in bondage. Absolutely no effort was made toward restitution to the freedpeople for the crimes perpetrated upon them by white America. (1)

The call for reparations, however, is not a universal voice in the African American community. One voice is a loud wail of anguish, crying out that no amount of money is enough to alleviate the sins and horrors of slavery. Another voice calls for moral considerations, this voice pleads for justice and honor for Blacks in America. Still another voice is that of the Rev. Jesse Jackson. His voice calls for white America to apologize first, then at least make an honest attempt to right the historical wrongs done to Africans in this country. The last voice we hear is the most ominous, and it belongs to Minister Louis Farrahkan, leader of the Nation of Islam. His threat is veiled, but not very subtle. His voice accuses America of racial inequalities and economic oppression, saying that a historical debt is owed, that it must be paid or there will be serious consequences for not doing so.

I will examine the historical record in an attempt to understand and explain the fight for reparations by African Americans. This examination reveals immediately that the greatest sacrifice ever made was not by participants in the Civil War, as most historians would have us believe; instead it was made by enslaved

Africans in the Americas over the duration of three centuries. Millions of Black people toiled from dawn till dusk without compensation of any kind for their labor. These people were neither gullible, happy go lucky dupes, nor embittered and unreasonable victims. Our Black foremothers and forefathers who came out of bondage were both practical and cautious people. Made so based upon their terrible experiences at the hands of very cruel slavemasters. From the money and resources they could have amassed was built the foundations of the world's richest nation: the United States of America. Their free labor raises legitimate questions of racial equality, welfare, land and ultimately wealth distribution in this country between controlling whites and controlled African Americans. Even after the sectional conflict in which more than 600,000 people died, northern and southern whites found unity among themselves in their combined need to control Blacks. Old hatreds and wartime scars were quickly overshadowed by the element of racism. In less than a single generation, the dominant social classes among northern and southern whites had eliminated their major differences and were of the same mind toward Blacks. (2)

What did the United States government really promise the 4 million Black people freed from slavery? Again an examination of the historical record reveals facts that can not legitimately be disputed. The vision these newly freed Blacks sought to achieve was a freedom based upon their individual and collective independence from their enemy of all times: white supremacist Americans. They knew that whites had long held them in bondage, but they also knew that they lacked the capacity to mount an effective effort to punish them.

The freedpeople wanted a separate territory set aside for them somewhere, anywhere in the United States. Henry Adams, an African American soldier, testified before the U.S. Senate in efforts to persuade President Ulysses S. Grant and Congress to "help us out of our distress, or protect us in our rights and privileges". Adams' questioner had to ask: "You preferred to go off somewhere by yourselves?". Adams answered simply and clearly, "Yes:". (3) African Americans even in this time period did not want paper citizenship, the high ideas of the founding fathers, nor any integration into a social order that would not accept, love, and deal with them on terms of equal rights and justice. These freedmen wanted a nation where they could be a part of a family of men and women not social outcasts to be used and exploited for the betterment of another people's condition. History reveals also how ex-slaves viewed land and landownership. Their view differed from the dominate class. Authors Ira Berlin, Steven Miller, and Julie Saville explain in their introduction of their book, Freedom: A Documentary of Emancipation, 1861-1867, the distinctive way Black people felt and claimed land:

"Not even those Yankees most sympathetic with the aspirations of the former slaves viewed landownership precisely as they did. Land, ex-slaves and Northerners concurred, could provide subsistence and foster independence from former owners. But there agreement usually ended. Former slaves, like many of their contemporaries throughout the world, generally did not view land as property in the abstract or as a commodity whose worth was determined by market indicators. Instead, they viewed and valued it in proportion to labor expended and suffering endured ... Given a choice, they preferred to own or occupy not just any plot of ground, but land where they and their forebears had invested so much blood and sweat. Land was a link to generations past and future, and a foundation for family and community among the living".

(4)

Freed Blacks realized the difference landownership could make in their lives, both in the short and long run. Their white contemporaries must have had some reason for their certain reluctance and adamant refusal to allow the freed ex-slaves to become more of a landowning class. The reason that emancipation and the demise of the plantation did not destroy the planter class was that they retained firm control over the

primary form of productive capital in the southern economy. This commodity was land. The only way the dominance of the planter class might have been ended would have been through a sweeping redistribution of land wealth to the freedmen at the time of their emancipation. (5)

While enslavement in America was a living hell for Africans, it was a catalyst to the American economy, without which it seems hardly probable that the United States would have emerged as the pre-eminent industrial power of the twentieth century. Throughout the greater portion of the nineteenth century, labor was the vital factor of production. The scarcity of labor in early America impeded American economic development. The slave labor force not only relieved this scarcity but also made possible the development of the industry which was to spur America's spectacular economic growth. Although cotton is generally credited with providing the basis for the South's economy, in a broad sense it was a major contributor to the North's industrial growth as well; for the South's cotton, largely exported in the early years of the century, emerged increasingly as the vital element in the industrialization of New England. For much of the 19th century, cotton sustained the American economy and African slave labor was the foundation of the American cotton culture. African American labor, then, provided an integral - perhaps the - integral input into America's first major industrial mainstay and thus indirectly made possible the transformation of an agricultural economy into an industrialized one.

African slaves also provided substantial labor in the task of railroad building in this country. The great Southern Pacific railroad, for example, was constructed largely with slave labor. Any effort to access the importance of the contribution of African slaves to the American economy must reach the conclusion that America's emergence as a major industrial nation was possible only because of the massive input provided by slave labor at a time when labor was the scare factor in the American production function. (6)

But the question of what to do with the freed slaves still loomed on the horizon. In the final years of the war, the government took its boldest initiatives on behalf of Black freedom and independence. Abraham Lincoln died toying with the schemes to relocate the ex-slaves outside the United States. He had aborted his Chiriqui Plan to move Blacks to Panama after encountering strong opposition from several Latin American countries; but he then placed his hopes for appeasing northern whites on a pilot project to resettle 5,000 Black volunteers on Haiti's Isle of Vache. (7)

Meanwhile, General William T. Sherman issued his Special Field Order Number 15 on January 16, 1865, which offered military assistance to ex-slaves who wanted land to "establish a peaceful agricultural settlement". Lincoln made no move to countermand this order. Indeed, President Lincoln was probably beginning to see that relocation programs and projects were not the answer, as Blacks were in the south and they were there to stay. On March 3, 1865, Congress approved the original Freedmen's Bureau Bill which called upon the government to reserve land for the ex-slaves and to redeem the so-called Sherman titles with up to forty acres and a mule to every Black occupying abandoned or confiscated land. Although redistribution of these abandoned and confiscated lands was the official policy of the government, Blacks were never given the forty acres. As historian William McFeely noted:

"Later in 1865, and on down years since, it has been alleged that the ignorant, ex-slaves wasted time in pursuit of the myth "forty acres and a mule". The unfortunate omission of the mule notwithstanding, there was nothing mythical about Circular 13 or about the Act of Congress of March 3, 1865, on which it was based. That Howard and his men, unable to sustain their stated policy, spent the fall trying to make Negroes believe that forty acres was just "a la mode Santa Claus" was, in reality, just an admission that a group of white generals had failed their job and not proof that the ex-slaves were either foolish or superstitious". (8)

Another issue that warrants examination is how the freed Blacks felt about the government confiscating the land of former southern landowners and turning these parcels over to the freed slaves.

Although the acts were very few, it would seem this policy was sure to inflame further the hostilities already existing toward the ex-slaves. There were many Africans who wanted and deserved revenge, but ultimately the situation was viewed as political and Blacks treated the issue with much caution. Many of course wondered how they, a very small minority, without seeds, plows, manpower, or money would be able to work the confiscated lands, even if the government lived up to its promises.

African American soldiers felt cheated by the government too. The army attracted thousands of Black refugees to their camps. These troops, dramatically increasing their numbers after the Emancipation Proclamation, effected a fundamental alteration in the meaning of the sectional struggle. Participating in nearly every aspect of military service, 178, 895 persons of African descent became Union soldiers, most of whom were southern-bred. With a 40% greater chance of being killed than white soldiers, Black troops fought courageously. (9) Upwards of 38,000 gave their lives in the great cause of ending slavery.

The Freedmen's Bureau Bill offered ex-slaves at least an opportunity to earn a living. In Andrew Johnson's veto of the bill to strengthen the Freedmen's Bureau he articulated the dominant viewpoint of white America that existed then, and is present till this day: "A system for the support of indigent persons in the United States was never contemplated by the authors of the Constitution; nor can any good reason be advanced why ... it should be founded for one class or color of our people more than another". (10) What most Americans failed to realize then and now is that Andrew Johnson's veto of the reparation legislation would have afforded the former slaves economic wealth as well as a high degree of self-sufficiency. It makes one wonder today if perhaps some historians are too kind in just proclaiming Johnson a racist. Did he perhaps see the possibilities as threats to white society's status quo? His decision, along with other political events left 4 million freed African Americans with no means to determine their economic destiny.

The reasons for the government's tragic betrayal of the ex-slaves is both diverse and complex. There is no one simple answer to the questions of why, why? Part of the explanation lies in the fact that Blacks had very few allies in Washington, D.C. fighting on their behalf. Thaddeus Stevens, the senator from Pennsylvania, who made famous the call for each person formerly held as a slave to receive forty acres and a mule, showed some concern for Blacks, but he was more driven by his relentless desire to punish the South for what he felt was their betrayal to the United States. Outside the government, as well as in, some whites were sincerely moved by the plight of the freedpeople, but were caught in a tangle of regional conflicts, racial beliefs, gender issues, religious motives, clan ideas, and other factors that mediated their position. Few whites found it possible to break through the barriers of time, place, and condition to put themselves in the shoes of Black folks and do unto them as they would have anted done unto themselves. (11) Simply put, the empathy was not there.

Contrary to popular belief, not all whites are against the reparations movement. Just as once upon a time there were white abolitionists - committed to the proposition that slavery and the slave trade were wrong and evil, and these people actively engaged in the struggle to end both. (12) It is certainly fair to acknowledge that had not these whites been a part of the struggle to end slavery, this evil institution would have survived much longer. While we not longer have white abolitionists, we do have white reparationists. It is very important to seek support for reparations from outside the African American community. "When Japanese Americans fought for and won reparations for their World War II internment, their efforts had the support of Black, Jewish, and Latino organizations".

Most reparations packages range from 700 billion to 4 trillion dollars (The Nation, July 1991). The funds would finance an infrastructure for education and economic development for African Americans rather

than distribute individual payments. While it is certain that Blacks do merit reparations or some form of restitution for almost 300 years of enslavement, it is much less apparent that monetary or educational verdicts, the most popularly cited means of redress, are indeed the appropriate remedies for the government's historical debt to the descendants of slaves in this country. With even Affirmative Action under attack from all sides, many believe the fight for reparations will take at least a single generation to accomplish.

When the reparations issue is raised, invariably the first question which arises is - **what do they want reparations payments to accomplish?** There are a number of possibilities to choose from. The objectives could be any or all of the following:

1. To punish or (expiate) the white community for the sins of slavery committed by its ancestors and oblige it to render retribution to the descendants of the slaves;
2. To provide the Black population with restitution for the unpaid labor of its slave ancestors;
3. To redirect to Blacks that portion of the national income which has been diverted from Blacks to whites as a result of slavery and post-Emancipation racial discrimination;
4. To provide the Black community with the share of the national wealth and income which it would by now have had if it had been treated as other immigrant communities were, rather than enslaved.

While there are many areas of disagreement among African Americans seeking reparations, the advocates all share one common belief: the only way to make the Black community whole is through reparations or restitution from the U.S. government. Others stress the need and importance of a formal apology from the government for slavery - they feel this would help in the healing of race relations in this country. Many African Americans, including myself, make the argument that this country has never faced up to its sordid past involving slavery at the national level. Others put forth the belief that a national monument should be erected as a reminder to never allow the enslavement of one race by another; lest we forget.

In conclusion, the consequences of slavery in these United States did not end with the Emancipation Proclamation, but continue today in the disproportionate African American presence in American jails, the disproportionate African American infant mortality rates, the disproportionate self-destructive juvenile Black violence against one another. Reparations granted or not, the African American community is chained to the bondage of its own tragic history. (13)

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ENGLAND: THE CATHAGE OF MODERN HISTORY”

Karen Aline Sarabia
Mentor: Dr. Sam Haynes

“Now she is in the Mediterranean, sinking fleets at the mouth of the Nile, or in the harbor of the Navarino, or bombarding some city of Palestine. Now, when not suspected to be within a thousand miles, she comes like a night robber, breaks open the gates of the Baltic, and despoils a nation of its forces. Now she is on the northern lakes, midway across our continent--up the Potomac, at the gates and within the gates of the American capital. Now she is in the West Indies, and now she has traversed a hundred degrees of longitude, and is present in the east, and anon she deploys her forces along the maritime frontier of China--at the very gates of the morning--and scatters to the winds the defenses of three hundred millions of people. All latitudes and zones are the witnesses of her might. She compasses the earth with her dominion. Her thunders break upon every shore. Like the Almighty, the great deep is her pathway, and the winds her chariot: Oh! would to heaven that she would imitate the Almighty in her beneficence as well as in her power!”¹

This was how Horace Mann described British power in a speech he gave during the early part of 1846. This sentiment at this period in history is significant to this research project.

In March, 1846, American troops under General Zachary Taylor occupied Point Isabel at the mouth of the Rio Grande, which Mexico believed to be her territory. The occupation of Point Isabel was considered by Mexico an act of aggression, and on April 25, 1846 the Mexican Army reacted. On May 13, President Polk declared war on Mexico. What prompted the United States to send its troops into this disputed territory, and thus begin a war with Mexico? Was it merely the desire for more territory? Was it to fulfill the destiny of the United States to see its land stretch from the Atlantic to the Pacific? Did the Mexican debt owed to the people of the United States give cause for invasion? Or was it the fear that if the United States did not seize this territory, England would?

It is not necessary to eliminate any of these possibilities to prove the others as motives. It is true that many historical events have multiple causes. However, in order to prove that one is acceptable, there must be significant historical evidence supporting the theory.

My research project for this summer was to look for evidence that supports the theory that the U.S. went to war with Mexico out of fear that if America did not acquire and control Mexican territory, Great Britain would. Mexico's government was in chaos, and it seemed that Mexico would not be able to hold all of its land. Great Britain was an ally of Mexico, and due to Mexico's enormous debt to Great Britain, it was easy for Americans to believe that Mexico was a protectorate of Great Britain. The fear of the Americans was that England could quickly assume a more dominant role over Mexico, and establish itself firmly in the southwest.. Since this is a very large project, and the possible sources so numerous, the evidence I found was limited compared to what Dr. Sam Haynes has collected and will collect. This paper represents only my findings from this summer's research.

The first part of the summer, was spent looking through the collections of war journals, diaries, and letters in the Special Collections at UTA. Many of these were of a personal nature, therefore politics was not a topic in most of the sources. However, when the writer did mention war politics, the British were invariably mentioned. Captain S.F. DuPont mentioned British activity in the Pacific several times. When he first arrived in California with supplies he wrote, “The ships were not stripped too bare, for some surmises existed that the English would interfere...”² At the end of the war he wrote of the territory ceded by the United States, “[w]e leave Lower California for England...”³ Thus showing Captain DuPont still believed the English were interested in gaining territory.

Of those who did write of England, most wrote either in terms of the role of the British in the

annexation of Texas, or the role the English were going to play, if any, in the war or in negotiations. On the issue of the annexation of Texas, one soldier wrote, “[t]he people conceived that as a matter of policy it became imperiously necessary to secure the acquisition of Texas to our territory, rather than let it fall into the hands of some of the European powers...”⁴ He also states that Texas “first made propositions for annexation to our government, but growing impatient at the delay caused by opposition to the measure in the United States, she made overtures to England which would have been accepted, had not the proposition made to the United States been acceded to.”⁵ This shows that there was some concern that England would have secured Texas if given the chance. If this were the case, England would certainly attempt to secure land elsewhere in the southwest. Another soldier, George C. Furber, writes, “[t]his act of annexing Texas to the Union, had been freely discussed in both countries, for some time previous to its completion. It was opposed secretly by the powers of France and Great Britain, and openly by the Republic of Mexico.”⁶

Zachary Taylor wrote a letter, in which he discusses the possible involvement of England and France in negotiations. He claims that if Mexico does not soon propose terms of accommodation, “England and France will do so for her unless the first should become a part of the war...otherwise the people of both these nations are too deeply interested in the trade with Mexico to abandon it without a struggle...”⁷ On the same subject, a war correspondent wrote, “Great Britain has wisely abstained from interference as arbitrator...If the English were supposed to under-work the Mexicans, this would call up the spirit of even the Yankees against them.”⁸

The second segment of this summer was spent reading short novels written during the period and set in Mexico. The purpose was to look for British characters, and to see if these characters were in some way unlikable. There were no British characters to be found in the selected novels, but there was mention of the British in two novels. One character, a soldier, in The Heroine of Tampico says, “I only wish ‘twas John Bull we was goin to wallop, instead of the Mexicans.”⁹ (John Bull was a common nickname for the British during this period.) In the second novel, Legends of Mexico, the British were not mentioned within the storyline, rather by the author in the introduction as he writes, “...England, hypocritical and ferocious, at once the fox and hyena, crouching on her trophies, -- the skulls of Irish starvation and the corpses of Hindoo Massacre--England, whom we hurled from our shores in the Revolution and chased, ignominiously from our seas, in the second war, England, that Carthage of modern History, brutal in her revenge and Satanic in her lust for human flesh, behold the American People in arms with trembling, and recognize their victorious march to the south...”¹⁰ This author, whom shows dislike for the English, even claims that Americans were not members of the Anglo-Saxon race, rather a new race made up of the exiles of all of Europe.¹¹

The next phase of this project was to look through a collection of songsters, which were little song books the soldiers carried with them during the war. Quite a few songs made direct reference to British involvement. For example,

“We’ll push our conquests on the land,
Bombard their ports upon the strand,
And with our force we cannot fail
To whip the enemy in detail.
And should old England interfere
To stop us in our bright career,
We’ll teach her, as we did of yore,

The final portion of this summer was spent looking through periodicals published during the period of the war. Though most of the periodicals were either satirical or non-political, I did have some success. Judy, a satirical magazine, had a print which related directly to the war. The drawing shows Brother Jonathan (a nickname for Americans) seated before a steaming pie, which represents Mexico. Beside him sits his poor dog, Vega, who begs in vain for a bite, and watches with tearful eyes as Brother Jonathan eats. "The howls of the dog call forth the spirits of England and France, who, fearful of disturbing Jonathan at his meal, respectfully hover at a distance from the scene of action, without even asking to throw the dog a bone..."¹³ The Aristidean: A Magazine of Review, Politics, and Light Literature had two articles devoted to the role of the British in Texas before and during annexation. One of these articles claims that "the government of England was engaged in a mean intrigue to prevent the annexation of Texas."¹⁴ An article in The Casket, addressing the possibility of American success in the war, claimed, "[t]he only difficulty that may attend the enterprise would be in the interference of Europe. England and France would, in all probability, send against us their armed hosts as soon as they suspected our intention of thus extending our territory."¹⁵

As stated earlier, this presentation is merely a summary of the evidence collected this summer. This alone by no means is enough to prove the theory that the fear of the British played a significant role in the cause of the Mexican War. However, I do believe that the evidence found does support that theory. Much of it emphasizes the Anglo-phobia that many Americans felt at the time. These Americans did feel that England was the Carthage of Modern History.

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THE SUPERHIGHWAY SPEED BUMP: HOW SECURE ARE CREDIT CARD TRANSACTIONS ON THE INTERNET?

Vonda Boone

Mentor: Ms. J. D. Mosley-Matchett

ABSTRACT

The general public is becoming more computer literate. Along with learning how to use the computer, gaining access to Internet to obtain information is inevitable. There are many options available on the Internet. One option becoming more popular is purchasing products over the Internet with credit cards. The security involved with this type of transaction is essential to potential consumers. By researching the potential for offering totally secure transactions to consumers who make business or personal transactions on the Internet, the need for such security can be established, addressed, and possibly fulfilled. My methods for researching this project include literary reviews, consumer surveys, and an analysis of procedures for purchasing products through interaction on the Internet.

INTRODUCTION

I spent this summer researching the implications of the Internet on credit card purchases. The purpose of this study is to determine the potential for offering totally secure transactions to consumers. The tools used for gathering information include secondary data, the Internet, and a consumer survey's. The survey respondents were contacted over the phone and by personal interviews. With our small sample size of 50, it took less than a week to obtain all responses.

HYPOTHESIS

Consumer perceptions of the Internet security are not as high as merchants proposed it would be. Consumer perceptions influence the low rate of acceptance of the Internet based commerce.

SECURITY

The idea of security gives a false sense of safety. People want to feel safe and secure within their communities, their work environment, their home life and when they do other activities outside the home. Generally, people try to establish a sense of security in all situations. The recent explosion at the Olympics so vividly reminds us of how potentially unsecured a situation maybe. If we are honest with ourselves we know there are no real guarantees in life. From the big picture to the little screen, the Internet offers a false sense of security. The probability of securing Internet transaction is possibly beyond reach. Only those people who can afford to take the chance of transferring money over the Internet will use it. An examination of the different areas connected with the attempt to secure Internet transactions will further establish the above statement. The topics include privacy, access control,

authentication, integrity and non-repudiation. These five areas of discussion make using electronic commerce a Virtually Private Internet (VPI). For purpose of this research we will primarily investigate the privacy, access control, and authentication attributes.

PRIVACY

Seclusion or isolation from others is the definition for privacy according to Webster's dictionary. Encryption is the Internet's way of trying to secure a level of privacy for its customer. Encryption scrambles the messages sent through an unsecured network. This is an attribute that Internet users desire most. Internet suppliers are working toward the goal of securing the transaction from consumer-to-business as well as business-to-business dealings over the net.

Encryption suppliers usually offer two types of signature. Information is secured through a private or a public key. The private key, as defined by Dr. Alexander Cavalli is an asymmetric-key security, this is a security mechanism based on both parties having the same encryption key, as in secret-key cryptography. The client and server share a key to encrypt and decrypt information on a network. A common implementation of private-key security is the Kerberos distributed security system. The public-key system is "an asymmetric-key security or public-key encryption technology. This is a security mechanism for securely distributing encryption keys that are used to 'lock' and 'unlock' data across an unsecured path. Public-key security is based on encryption key pairs in contrast to private-key security, which is based on having a single, shared key" (Cavalli, p.19).

Privacy is a critical issue, and it is becoming less and less available to Americans. Government policy is in part responsible for the lack of privacy American citizens have. A recent article in *Web Techniques*, (Your Electronic Right to Privacy), addresses the issue of government involvement in establishing security guide lines. The article states that, "the White House-sanctioned Clipper III proposal to hit the street. The draft proposal entitled, 'Achieving Privacy, Commerce, Security and Public Safety in the Global Information Infrastructure,' offers to lift the current restriction limiting the strength of encryption software". The article also notes that, "While this sounds like the government has finally come to its senses, Clipper III may be the proverbial lion in sheep's clothing. The problem is that secure communication over the Internet and Web requires (among other things) a method of guaranteeing that you are whom you claim to be. To do this, you need a digital certificate issued by a responsible agency that's willing to vouch for you. At the moment, however, there's no infrastructure in place to support such a scheme. So, Clipper III proposes that the U.S. government take on this role. The snag lies in the fact that as a precondition of using the government-sponsored program, you must surrender your private key to the certification authority (Floyd, p. 5)."

The underlying reason for the Government's involvement is associated with a high level of control over all information transmitted.

Ron Rivest, Adi Shamir, and Len Adleman are the developers of RSA (representing the first initial of each developer), which is an encryption mechanism that uses both a private and a public key (a digital signature). It is also used for authentication purposes. RSA has an extremely secure algorithm, which is a sequence of instructions that tell how to solve a particular problem. Data Encryption Standard (DES)

and International Data Encryption Algorithm (IDEA) is a comparative security service. It is worth noting that one other companies, Atalla's hardware-based encryption products start at \$12,000 (Vijayan, p.2). RSA is considered to be the pace setter in electronic commerce security.

ACCESS CONTROL

Access control involves determining who is given access to a system or network, as well as which and how much information someone can receive (Cavalli, p. 7)

Physicians are finding it mandatory for patient records to be on the Internet and the consequence of not using the Internet is high! Insurance companies (HMO, Sanus), for example, require that patient records be accessible from the Internet. My family doctor shared with me that he had recently been a victim of Internet fraud. His credit card numbers were used to purchase more than 25,000 dollars worth of merchandise. Information was gathered through a one time visit to the Dr.'s office. The patient obtained and insurance form from the Doctor's office to be turned in at a later date. The information to access medical record as well as personal (credit card) records belonging to the Dr. The culprits, who were identified as a foreign Mafia, were eventually captured and will remain nameless here. It took the doctor three year's to clear his well-known name.

Theft of such information is certainly a concern of Internet users. Several large companies with a false sense of security have had the systems ravished, and information accessed by a hacker. The August 1996 issue of Windows Magazine featured an article, "Safety on the Net: Protect yourself from Hackers, Crackers and Outlaws." The article talks about how people are out to "unleash viruses, steal or destroy data and break into Web sites. "Window Magazine editors were able to gain unauthorized access to the Web sites of companies like Price Waterhouse, Fidelity Investments, Marriott, Corel and Zenith Data Systems, getting in through common security problems that were documented months ago" (Methvin, p 164+).

This affirms that even companies with great technology are susceptible to a sense of false security. The problems in the system can be avoided, but instead these problems that were apparently ignored or over looked. This is what constitutes a hole in the net. Hackers get access through relaxed security measures as well as by beating some of the current firewall systems in place. "Internet firewalls are computers-sometimes routers- that run specialized software with user specified rules for blocking certain services or kinds of traffic between the public Internet and the private corporate network"(Anthes, p.30).

AUTHENTICATION

Authentication verifies the identities of the two parties executing a transaction (Cavalli, p. 7).The publication of Web-Access Authentication Using RADIUS appeared in the August 1996 issue of Web Technologies. Christopher King, the author, explained that currently Web applications only require an account name and password. The extreme in comparison is sending authentication data with every click of the mouse button. King states that this would cause significant performance and bandwidth problem

(King, p.41). RADIUS, an acronym for Remote Authentication Dial-In User Service, is one of the many suppliers of authentication mechanisms poised for middle ground procedure. "The RADIUS is defined as a client/server-based protocol for transporting authentication, and configuration information between a Network Access Server" (King p.42). It verifies that you are who you say you are.

The main threat to authentication is eavesdropping. Ron Rivest, one of the developers of RSA, is also responsible for MD5 that is the mechanism the wills help to alleviate the forestated problem. Integrity, ensuring that files or messages have not been altered in transit (Cavalli, p. 7). Non-repudiation prevents companies from denying that they sent or received a file(Cavalli, p. 7).

CONCLUSION

The Internet obviously opens up many opportunities for new business. The perception of the consumer is one of caution. As stated in the hypothesis, Consumer perceptions of the Internet security are not as high as merchants proposed it would be. It is my belief that consumer perceptions influence the low rate of acceptance of the Internet based commerce. Our survey shows no conclusive results. This is a hot topic in the computer world. In talking with several respondents I found that many of them were in the process of getting their business connected to the Internet. Also, some are thinking about the option of using the Internet for credit card transactions or had recently become an on-line subscriber. Overall, I think the consumers are still weighing the odds of using the Internet for credit card purchases. No unanimese decision has been confirmed.

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**MATCHING CULTURAL VALUE
ORIENTATIONS TO AD APPEALS:
EXPLORING THE ROLE OF
INDIVIDUALISM-COLLECTIVISM
IN THE USA VERSUS MEXICO**

**Michael Mosley
Mentor: Dr. James Munch**

ABSTRACT

Past research suggests that the cultural value orientation, individualism-collectivism, should be considered when developing global advertising campaigns. Although numerous studies have examined cultural differences between foreign markets, few studies have measured how inconsistencies in value orientations presented in global advertising messages may affect consumer behavior. In research reported here, we examined how certain aspects of individualism-collectivism may affect attitudes and behaviors toward advertised products within the USA and Mexico. The data provides little support that individualism-collectivism matters across cultures, but it could matter within cultures. Interestingly, product category appears to be an important issue for future research on individualism-collectivism in consumer behavior.

As multinational firms race toward globalization of markets, the issue of standardized versus customized advertising messages remains unresolved. Some marketers believe we should consider standardizing ads to improve long-term profitability (Szymanski, Bharadwaj, and Varadarajan, 1993). Other researchers suggest that since no two cultures are exactly alike, the most effective ads are those developed for each individual market (Jain 1989; Wills, Samli, and Jacobs 1991). In the research reported here we explore this basic issue by investigating the role cultural values may play in cross cultural advertising.

Cultural values may play an important role in the perception of marketing communications. Studies examining message content indicate that one very important dimension of culture to consider when developing advertising and promotional messages is that of individualism-collectivism (Han, 1990; Kale, 1991; Zandpour, 1994). Past research also suggests that advertising themes that are consistent with cultural values of the intended audience are more desirable than ads that reflect values that are inconsistent (Belk, Bryce and Pollay, 1985; Munson & McIntyre, 1978). In summary, consumers who possess collectivist values should favor ads which appeal to collectivist values, while individualist consumers should opt for individual ad appeals.

LITERATURE REVIEW

The Individualism-Collectivism Construct

One dimension of culture that closely relates to social behaviors within a society is that of individualism versus collectivism. The individualism-collectivism dimension at the cultural level relates to how one values the individual relative to the group. Individualist societies (U.S., U.K., Germany) emphasize values such as achievement, recognition, etc (McCarty & Hattwick, 1992); collectivist societies (Mexico, Peru and Chile) emphasize values such as family security, responsibility, conformity to societal norms, etc (Hofstede, 1980). Based on factor analysis, Mezei (1974) found that individualism-collectivism

was the most important cultural dimension from a list of values studied by Kluckhohn & Strodtbeck (1961). This suggests that individualism-collectivism may be an important dimension to consider when communicating across cultures.

Although a culture may be largely individualist or collectivist, it is important to note that at the individual level a consumer may exhibit either individualistic or collectivistic tendencies. Prior research examining individualism versus collectivism at the individual level identifies persons who display individualist tendencies (e.g., emphasize personal goals over ingroup goals) as idiocentrics; and persons who display collectivist tendencies (i.e., emphasize ingroup goals over personal goals) as allocentrics (Triandis et al., 1990). American, as well as Mexican, cultural groups contain individuals that display both idiocentric and / or allocentric tendencies, depending on the behavioral context. On the other hand, Mexicans place a strong emphasis on family unity and cohesiveness. Mexicans tend to be more cooperative in interpersonal activities compared to their American counterparts (Diaz-Guerrero, 1982). A recent review of literature by Diaz-Guerrero & Szalay (1991) on Hispanic / Latin family values suggests that Mexican parents place a greater emphasis on parental authority, respect, obedience, affective interdependence and discipline in their children when compared to American parents. Consistent with general findings by Triandis (1989), Diaz-Guerrero (1967) found that Mexicans (as a collectivist society) displayed more unity Americans (as an individualist society) with respect to the family, and are more willing to subordinate their individual priorities and interests to those of the family ingroup.

HYPOTHESIS

Based on review of the literature examining individualism-collectivism, we expect that consumers' cultural value orientations differ across cultures and these differences should affect their ad liking. Specifically, we hypothesize:

H1: Consumers in an individualist culture (USA) will prefer individualist relative to collectivist ad appeals. For consumers living in a collectivist culture (MEXICO), the reverse will be true. That is, collectivists will prefer collectivist ads compared to individualist ads.

The research examining idiocentrics and allocentrics suggests that irrespective of the overall cultural value orientation, differences in ad liking will be most evident when cultural values are considered at the individual level within one's culture. Therefore, consistent with H1, we expect:

H2: Individualistic consumers will prefer individualist relative to collectivist ad appeals. This should be true for both the USA and MEXICAN individualist. For collectivists, the collectivists will prefer collectivist ads compared to individualist ads.

METHODOLOGY

One hundred eighty-four undergraduate college students (USA, 112 UTA subjects; MEXICO, 72 Northern Mexico University subjects) were assigned randomly to a treatment. They were then asked to evaluate an ad and complete a questionnaire. The questionnaire contained the following set of measures.

Attitude toward the Advertisement

Ad Attitude measure was measured first and was assessed using three 9-point semantic differentials: good/bad; like/dislike; positive/negative. The coefficient of reliability was quite acceptable

For the sunscreen ad H1 was also not supported ($F(1,181) = .02, p = .875$). Again, there was no evidence that matching the predominant culture orientation (individualism or collectivism) with ad appeal (Individual or collective appeal) influences ad liking. Interestingly, however, for the sunscreen ad an ad appeal effect was found ($F(1,181) = 4.75, p = .031$). Irrespective of one's cultural value orientation, the collectivist appeal ($X = 7.17$) was preferred to the individualist appeal ($X = 6.65$).

The same approach was used to test H2. Namely, we expected an interaction effect to occur between idiocentrics / allocentrics and ad appeal (individual / collective). We expected that both USA and MEXICAN idiocentrics would like the individualistic ad better than the collectivist ad and, for USA and MEXICAN collectivists the reverse should be true.

First, we considered the USA subjects for the auto ad. H2 was not supported ($F(1,108) = .93, p = .336$). No other significant effects occurred. H2 also received no support from the sunscreen ad in the USA ($F(1,108) = .01, p = .997$). There was however, some tendency for both idiocentrics and allocentrics to prefer the collectivist sunscreen ad appeal ($X = 7.1$) to the individualistic approach ($X = 6.6$) ($F(1,108) = 2.88, p = .092$).

Next, we considered the Mexican subjects for the auto ad. Once again, H2 received little support ($F(1,69) = 1.85, p = .178$). No other effects were found. The test of the sunscreen ad like Mexico also disconfirms H2 ($F(1,69) = .93, p = .339$). Some weak evidence does suggest an allocentric / idiocentric effect on ad liking. Allocentrics liked the sunscreen ad ($X = 7.2$) somewhat more than did idiocentrics ($X = 6.55$) ($F(1,69) = 2.53, p = .11$). Also, the pattern of means suggests that allocentrics in Mexico do favor the collectivist ($X = 7.6$) over the individualistic ($X = 6.8$) ad appeal ($t = XXX, p = .07$).

DISCUSSION

- 1.) No evidence of individualism / collectivism matchup effect.
- 2.) Only weak evidence of allocentrics / idiocentrics match in Mexico.
- 3.) So what does this tell us? Well,
 - Individualism / Collectivism may not matter in advertising appeals?
 - Individualism / Collectivism is not used to evaluate ads.
 - Ad liking has little to do with Individualism / Collectivism.
- 4.) Perhaps more interesting to begin to consider why we had differing effects across products. That is, the auto and sunscreen ads did generate different effects -- one showed culture effects one showed ad appeal effects. This may suggest that these cross cultural values do matter but somehow influenced by product type. Future studies should consider these possibilities.

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ON THE STEINER PROBLEM OF THE MINIMAL TREES

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ABSTRACT

The study of graph theory has been expanding at a very rapid rate during recent years because of its wide applicability. Graphs are met with everywhere under different names: “structures” in civil engineering, “networks” in electrical engineering, “sociograms,” “communication structures” and “organizational structures” in sociology and economics, “molecular structure” in chemistry, and so on. The theory, however, rooted from old problems proposed by mathematicians such as *Fermat* and *Euler*. We will consider such a problem: Given N cities, construct a network of roads of minimum total length so that a traveler can get from one city to any other.

INTRODUCTION

This general problem began with a well-known problem posed by Fermat early in the 17th century.

Fermat's Problem

In a given triangle ABC , locate a point P whose distances from A, B, C have the smallest possible sum.

Proof

First suppose all angles of the triangle are less than 120° . Consider an arbitrary point P inside the triangle. Join it to A, B, C and rotate the inner triangle APB through 60° about B to obtain $C'P'B$, so that ABC' and PBP' are equilateral triangles, as in Fig.1. Then $AP + BP + CP = C'P' + P'P + PC$, which is a path from C' to C , usually a broken line with angles at P' and P . Such a path (joining C' to C by a sequence of line segments) is minimal when it is straight, in which case:

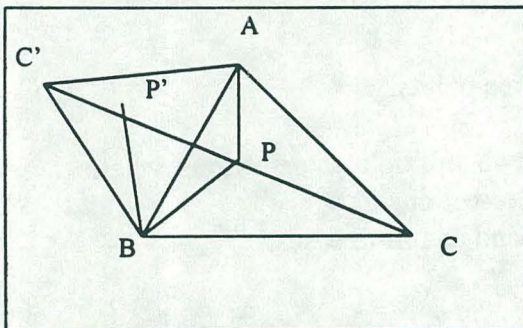


Fig.1. Fermat's problem

$$\angle BPC = 180^\circ - \angle BPP' = 120^\circ$$

and

$$\begin{aligned} \angle APB &= \angle C'P'B = 180^\circ - \angle PP'B \\ &= 120^\circ. \end{aligned}$$

Thus the desired point P , for which $AP + BP + CP$ is minimal, is the

point from which each of the sides BC, CA, AB subtends an angle of 120° . This “Fermat point” is most simply constructed as the second intersection of the line CC' and the circle ABC' .

If, however, an angle of ABC, e.g., the angle at A, is equal to or larger than 120° , then the point P coincides with the vertex A.

Steiner Problem

Steiner later extended this Fermat's problem by considering four or more points and asking for the shortest route which connected all of them. We will give some examples of the "shortest route." The appearance of the solution will, of course, depend on the arrangement of the given points.

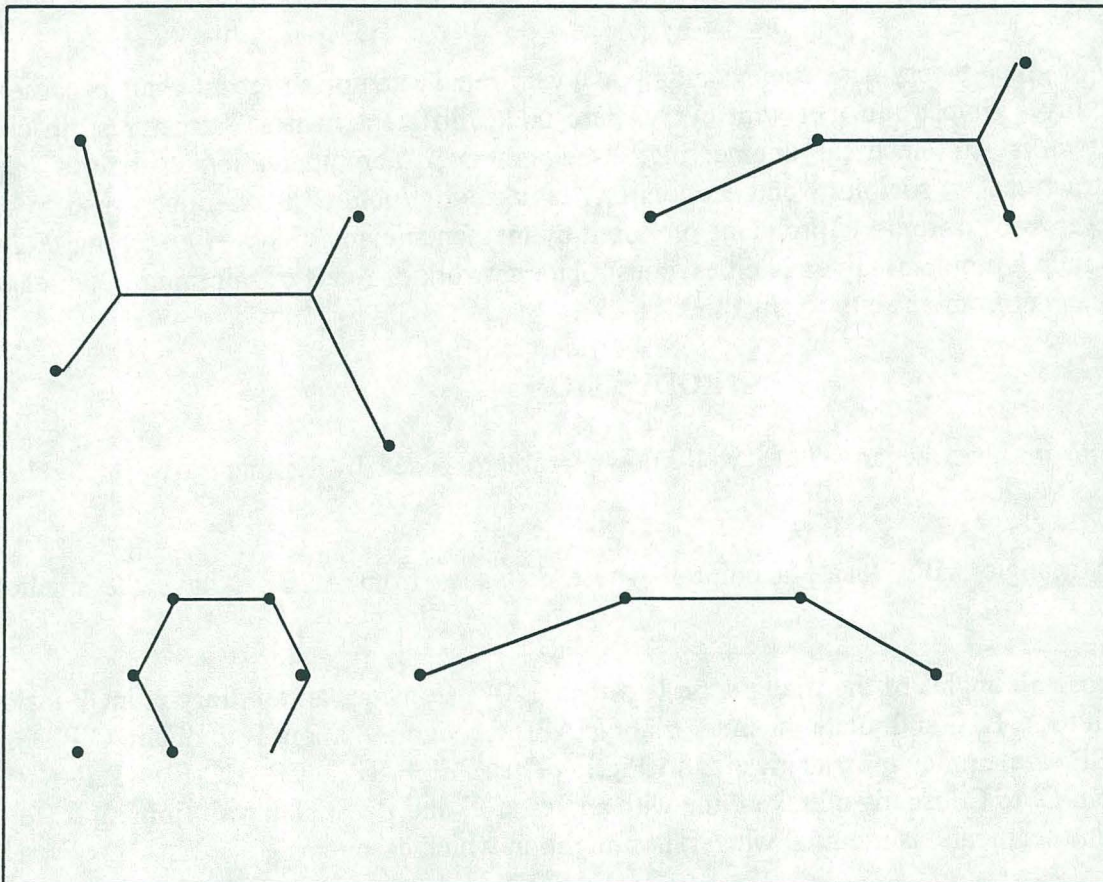


Fig. 2. Examples of the "shortest route" for more than three points.

In the first case the solution consists of five segments with two multiple intersections where these segments meet at angles of 120° . One or more of the multiple intersections may be replaced by one or more of the given points, as in the second and fourth cases.

The solution of the problem is not always uniquely determined. For four points A, B, C, D forming a square we have two equivalent solutions shown in Fig. 3.

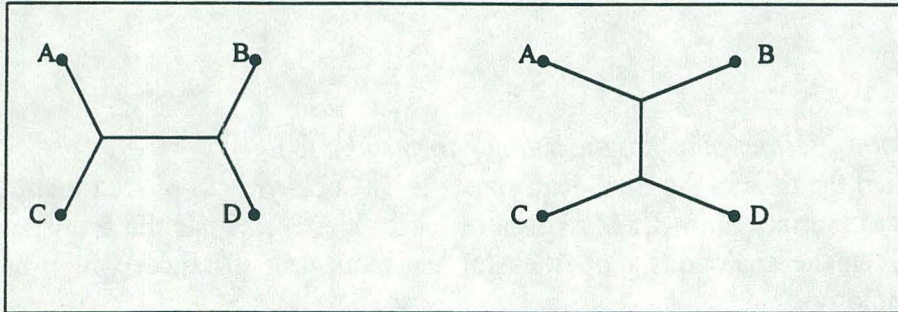


Fig. 3. Shortest routes for four points forming a square.

To accurately state the general Steiner problem, we need the following definition.

Definition

Given N points b_1, b_2, \dots, b_N in the plane, a *tree* U on the vertices b_1, \dots, b_N is any set consisting of some of the $\binom{N}{2} = N \times (N - 1) / 2$ closed straight segments $b_i b_j$, with the property that any two vertices can be joined by a segment belonging to U in one and only one way. A segment $b_i b_j$ in U is called a branch, the length $L(U)$ of U is the sum of all the lengths of its branches, $\{b_i\}$ is the set of all vertices sending branches to the vertex b_i , and $w(b_i)$ is the number of such vertices.

A generalization of the Fermat's problem is the following problem.

Steiner Problem (S_n)

Given n distinct points a_1, a_2, \dots, a_n in the plane, $n \geq 3$, to find the shortest tree(s) whose vertices contain these n points.

A problem related to the Steiner problem is:

(P_n) Given n distinct points a_1, a_2, \dots, a_n in the plane, to find the point p which minimize the sum $f(p) =$

$$|pa_1| + |pa_2| + \dots + |pa_n|.$$

In [10], H. W. Kuhn had studied this problem and given some results.

(1.1) If the vertices a_1, \dots, a_n are not collinear then $f(p)$ is a strictly convex function of p . If the points are collinear, then $f(p)$ is piecewise linear and convex on the line through them and strictly convex elsewhere.

(1.2) If the vertices a_i are not collinear then $f(p)$ has a unique minimum p .

(1.3) The minimum point p is in the convex hull of the vertices a_i .

Back to the Steiner problem, two questions come out: (1) Does there exist such a "minimal tree" and (2) How to construct such a tree? The first question is fairly easy and the answer is yes. A proof by induction can be found in [6]. The second question in general very difficult. However, some properties of the shortest tree are known due to [4], [5], [8], [9].

Let U be a minimizing tree of (S_n) , then

(2.1) U has the vertices $a_1, \dots, a_m, s_1, \dots, s_k$

(2.2) U is none self-intersecting,

(2.3) $w(s_i) = 3, 1 \leq i \leq k,$

(2.4) $w(a_j) \leq 3, 1 \leq j \leq m,$

(2.5) $0 \leq k \leq n-2,$

(2.6) each $s_i, 1 \leq i \leq k,$ is the S -point (Fermat point) of the triangle formed by $\{s_i\}$.

Z. A. Melzak [4] had studied the case in the Euclidean space; E. J. Cockayne [8] proved that the minimizing tree S_n in certain spaces (surface D in R^3 , Minkowski Metric Space) also has the properties (2.1)-(2.6); M. Hanan [5] had given the analogous properties for the rectilinear distance (which has application in printed circuit technology).

Even with the above properties, which reduce greatly the number of construction, a sufficient algorithm to construct a Steiner tree is still unknown. However, there are methods for finding trees which approximate Steiner trees, one of which is given by S. K. Chang [7].

CONCLUSION

This is a very interesting problem even though it dated 350 years ago. It is still studied extensively because of its many applications in many fields. It also creates many open questions that create new methods and theorems in the process of answering them.

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NUTRITION DURING PREGNANCY IN ADOLESCENT MICE

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ABSTRACT

Female Rockland-Swiss (R-S) albino adolescent mice weighed significantly less than mature females during pregnancy. Adolescents failed to double their body weight over the course of pregnancy, unlike mature females. Gestation Day (days 1 - 18) patterns of relative food intake among water exposed (peak at GD 4) and saccharine exposed (peak at GD 10) females significantly differed. Adolescents exposed to saccharin consumed significantly less food during the first half of pregnancy compared to adolescents exposed to water. This difference discontinued in the later half of pregnancy, suggesting some compensatory feeding occurred in the saccharin exposed groups. The treatment of saccharin as a nutritive item by the adolescents was not due to the volume of fluid consumed nor a higher preference for saccharin.

INTRODUCTION

Why study adolescent nutrition during pregnancy? Three significant reasons are addressed here, yet there are many more that are just as important. First, the proportion of pregnant adolescents in America has been growing at a staggering rate over the past 20 years. As of 1990, there were 118 pregnant teenagers per 1000 women aged 15-19, according to the *Statistical Handbook on Adolescents in America*. A body of research on various social issues relating to this phenomena has been growing in response. Second, the mother's diet during pregnancy greatly influences fetal development. It has been known for some time that the general health of the mother correlates with the general health of the fetus (Frisancho, Matos, & Flegel, 1983; Dobbing, 1985). The diet, whether this refers to the imbalance of nutrients, the addition of nonnutritive substances, or even the presence of environmental toxins can profoundly impact developing fetuses. Third, nonnutritive substances are becoming increasingly represented in our diets. It is well known that there are many sugar substitute sweeteners now on the market which are widely used.

Pregnancy is a very energy demanding state for any mammal. Evolution has provided animals with strategies for choosing between sources of food that are optimal in any state (e.g. feast or famine, pregnant, lactating and nonpregnant status). During pregnancy, the fetus imposes additional caloric requirements on the female. Therefore, one would expect an increased preference for high-calorie foods and liquids. Many species appear responsive to the consequences of their diets and appear good at selecting nutritious foods. Are adolescents as good at this as mature females during pregnancy? Many factors contribute to the dietary intake of mammals during the state of pregnancy. One of

the main factors is body weight. Pregnant mammals, including mice, must maintain their body weight as well as that of the fetus, thus directly influencing how much and what an animal takes in. Recent research supports the fact that nutritional requirements for rapidly growing adolescents is much greater than those for older females (Biggerstaff & Mann, 1990).

However, body weight is not the only index of nutritional status during pregnancy. Hormones are a significant element which can be attributed with controlling some aspects of dietary intake. Endocrine events during pregnancy influence the predisposition to accept and/or reject foods having particular tastes (Wade & Zucker, 1969). This accounts for changes in food selection behavior during pregnancy.

Dietary intake also depends on the sensory and physiological state of an animal. Several researchers have described specific neuroendocrine changes that occur as a mammal matures (Gandelman, 1983). This includes the sensory and physiological changes in the central and peripheral nervous systems which contribute to dietary intake. These structures are not as well developed in adolescents as they are in mature females. These are some of the pertinent studies which address the influences on dietary intake.

Using an animal model, female mice, this study addresses the question Do adolescent female mice show quantitative and qualitative differences in their diets as compared to mature female mice during pregnancy? We tested the hypotheses that a) adolescents should weigh significantly less than mature females, b) adolescents should consume significantly more food than mature females and c) the addition of nonnutritive items such as saccharin should have negative consequences for food intake and body weight for both groups. Our independent variables included food type, fluid type and day of gestation. We measured on a daily basis the dependent variables of body weight, total fluid intake, relative food intake and saccharin preference.

METHOD

Subjects

Twenty-four nulliparous Rockland-swiss (RS) female mice served as subjects in this experiment. After weaning, females were maintained with the same-sex littermates ($n = 2-4$ / cage) before they were assigned to experimental and control groups. Each one of the females was time mated nightly with a single sex experienced male. Twelve females were adolescent, 29-34 days of age (DOA) and twelve were adult, 54-59 DOA at the start of the experiment. Time mating occurred nightly for 6 consecutive nights until a copulatory plug was observed in the vaginal canal, at which time each female was isolated and provided with cotton nesting material. Thus, plugs were observed when adolescents were between 30-35 DOA and adults were 55-60 DOA. The group of twelve adolescents and the group of twelve adults were subdivided into two groups of six, yielding four groups of six females. One group of adolescent (YOUNGSAC) and one group of adults (OLDSAC) received Purina 5001 powdered food and 2 graduated Richter drinking tubes; one containing a solution of 0.25 % saccharin, one containing tap water alone. The other groups of adolescents (YOUNGH2O) and adults (OLDH2O) received Purina 5001 powdered food and two graduated Richter drinking tubes, both containing tap water.

Housing and Maintenance

At all stages of the experiment, animals were housed in standard (29 x 19 x 13 cm) tan polycarbonate cages. A cup of Purina 5001 powdered food was substituted for pelleted chow and two

Richter tubes were provided to each female in each group beginning gestation day 0. Animals were maintained with food, water, and/or saccharin *ad lib*.

Temperature and humidity were held constant at 72 +/- 2 dg F. and 40 - 70%, respectively. The vivarium was maintained on a 12/12 hour light/dark cycle with lights on at 0700 hr. CDST.

Assessment of Food and Fluid Intake and Body Weight

Daily measurements of food, water and saccharin intake to the nearest milliliter (ml) were taken between 0900 - 1200 hours. The saccharin solution was prepared fresh daily using tap water. Body weight and food weight measurements were obtained to the nearest 0.1 gram. After amounts were recorded, the contents of the Richter tubes containing saccharin were replaced with fresh solutions. The contents of the Richter tubes containing water were replaced with fresh tap water weekly. Positions of the two tubes were reversed each day to prevent position preference effects. The food cups were also replenished with fresh powdered food daily. Body weight measurements were performed daily to the nearest 0.1 grams. On gestation day 19 or the day of birth, litters were weighed, sexed, and adjusted to six pups of three males and three females. The body weight of one pup, randomly selected, was also recorded for each litter. Culling occurred only for larger litters (greater than six pups); smaller litters (five pups or less) were not culled. The number of stillborn pups was noted in each litter. Stillborn pups were not sexed nor weighed with the rest of the litter.

Cages were changed as needed, on the day of birth, on postpartum (PP) days 7, 14, and on weaning day 21. New nestlets were also given on days cages were changed. Measurements of the adult and adolescent mothers continued through lactation (PP days 1-10). Litters were weighed again on the final day of testing, PP day 10. Daily inspection of the litter and informal assessments of maternal care (crouching, licking pups, etc.) were made and incidences of infanticide and culling of litters were noted.

Statistical Analyses

One hypothesis is that adolescent females will not regulate their food and fluid intake or their body weight during pregnancy and lactation in the same way that mature females do. For example, it may be that adolescent females exhibit hyperphagic feeding in response to their own metabolic demands coupled with the demands of pregnancy. Alternatively, hypophagic feeding may be evident if the adolescents experience food aversions and altered taste perception during pregnancy. Therefore, two-tailed tests of significance were performed and the data was considered significant if $p < .05$.

A repeated measures two-way ANOVA was performed on the dependent variables. When significant effects were found, one-way analyses were done followed by post-hoc group comparisons (t-tests) when appropriate. The incidence of resorption (resulting in attrition) was tested with Chi-square tests. Amounts of food consumed was analyzed first by tabulating cumulative amounts consumed with separate one-way ANOVAs performed on specific days of pregnancy and lactation: the day following insemination (GD 1), the day of implantation (GD 4), on GD 10, when the maintenance of pregnancy comes to depend on the placenta rather than the pituitary; GD 18, the last day of pregnancy, 24 hours after delivery (PP 1) and PP day 10, the last day of the experiment. When cumulative amounts consumed differed between YOUNG and OLD groups on these days, we concluded that feeding patterns may be linked importantly to the endocrine phases of pregnancy and lactation. When analyses of cumulative consumption did not yield significant findings,

then day-by-day analysis was performed on gestation days, and separately, on postpartum days.

Total fluid intake and saccharin preference were analyzed on the 6 days noted above. Correlation coefficients (Pearson product-moment) were computed to determine if amounts of food consumed (noncumulative daily averages) were significantly related to amounts of fluid consumed.

Finally, separate analyses of body weight data (noncumulative) were performed on the 6 days' data noted above. Correlational analyses were done to determine if attained body weights were related in any systematic way to cumulative amounts of food consumed.

RESULTS

Body Weight

Our analyses 3 Factor Analysis of Variance revealed that the mature females weighed significantly more (35.04 grams) than their adolescent counterparts (30.72 grams) at the .05 level of significance. While increasing their body weight, the mature females more than double their body weight over the course of pregnancy. Adolescent females fail to double theirs. Comparing water exposed with saccharin exposed groups, the water exposed adolescent females weigh significantly less than mature females during the last half of pregnancy, $t(8) = 4.36, p < .003$. With respect to saccharin exposed groups, body weight deficits in adolescent females are already evident in during the first half of pregnancy, $t(8) = 3.57, p < .008$.

Relative Food Intake

Given that body weights varied with the type of fluid consumed and varied with the phase of gestation, we required a measure of food intake so that we could index body weight to the amount of food consumed. Relative food intake was computed by dividing the amount of food consumed by body weight and multiplying by 100. This made for group comparisons. Contrary to our predictions, adolescent females did not consume more food compared to mature females on any day of gestation. What distinguishes saccharin groups from water groups is the pattern of food intake over gestation. The water exposed groups peaked in their food intake on gestation day 4 while the saccharin exposed groups peaked on gestation day 10. On closer inspection of the data from adolescent females, we found that water and saccharin exposed groups were statistically different on gestation days 1 and 4, with saccharin exposure leading to significantly lower relative food intake scores, $t(8) = p < .009$ and $t(8) = p < .06$, respectively. In the latter half of pregnancy, on gestation days 10 and 18, relative food intake scores of water exposed and saccharin exposed groups are statistically equivalent. Mature females never showed this patterned deficit in food intake.

Fluid Intake

There were no significant differences between the age groups nor the fluid types with respect to the amount of fluid consumed. This was true for each day of gestation.

Saccharin Preference

This factor was determined dividing the amount of saccharin consumed by the total fluids consumed, that is saccharin plus water. There were no statistically significant differences between the age groups. Again, the groups were equivalent on each day of gestation.

DISCUSSION

The crux of the findings lies in the relative food intake scores. Adolescents exposed to saccharin appear to forego the consumption of food on gestation days 1 and 4. This occurred during the critical phases of embryo formation and the pre-implantation and post-implantation phases of pregnancy. In the latter half of pregnancy, on gestation days 10 and 18, relative food intake scores of saccharin exposed groups were equal to those of the water exposed groups. This suggests that in the saccharin exposed groups, some compensatory feeding occurred with the advancement of pregnancy. At the same time, the adolescents are exhibiting weight dysregulation. That is, the adolescents weigh less than mature females at the outset of pregnancy and fail to double their weight over the course of pregnancy. Importantly, adolescents consume saccharin as though it is nutritive. The consumption of saccharin in lieu of caloric food was not due to dehydration (recall their fluid intake was equivalent to that of mature females). Moreover, saccharin consumption by adolescents was not due to a higher preference for saccharin (saccharin preference ratio scores were equal as well). Although adolescents did not consume significantly more food than mature females, they did consume enough to a) maintain their own body weights and b) maintain their pregnancies to term.

This topic, with adolescents as the subject, is not discussed in any of the extensive reviews on nutrition during pregnancy and lactation. Obviously future research is greatly needed to understand all aspects of nutrition during pregnancy in adolescents. A fruitful area for future research will be to document dietary selection behaviors and determine what effect self selection of dietary items has on health during pregnancy. Studies with other sweeteners and fat substitutes like Olestra would be beneficial. Also, by examining nonnutritive diets prior to pregnancy, we might obtain a better understanding of the full impact of nonnutrients on the physiology and behavior of mothers and their young.

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MEASURING AEROBIC METABOLISM

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INTRODUCTION

Section 504 of the Rehabilitation Act, 1973, states that:

"A recipient of federal assistance shall place a handicapped person in the regular educational environment separated by the recipient unless it is demonstrated by the recipient that the education of the person in the regular environment with the use of supplementary aids and services cannot be achieved satisfactorily." This public law sent students with disabilities to "regular" public schools with their able bodied peers. The least restrictive environment doctrine within Public Law 101 - 476, Individuals with Disabilities Education Act, (IDEA), required that:

"To the maximum extent appropriate handicapped children, including children in public or private institutions or other care facilities, are educated with children who are not handicapped and that special classes, separate schooling, or other removal of handicapped children from regular education environments occurs only when the nature or severity of the handicap is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily."

The above are the two major pieces of legislation which are the real driving force behind total inclusion- the issue at hand in public education.

While total inclusion is not a novel idea, it is not a well understood one either. Often confused with mainstreaming and integration, inclusion is not a clear subject defined in black and white. The true meaning of total inclusion seems to get lost in the emotional implications of the issue, as well as in the legislation surrounding it. The content area of physical education is especially garbled by the total inclusion issue. The main component of PHYSICAL education is PHYSICAL activity. Whereas a disabled student may be able to function adequately in a general education class, their disability may hinder them from succeeding in physical education.

The inability to clearly define total inclusion by the physical education and adapted physical education profession has led to confusion about its parameters. What IS total inclusion? How should it function? Is it more similar to mainstreaming or integration? Does it affect all students or only those with less severe disabilities? Such are questions being addressed by many professionals in the field of adapted and non- adapted physical education. The following is a compilation of articles whose intentions addressed presenting some of the main issues being dealt with by the profession. Principles of total inclusion, integration, and least restrictive environment (LRE) are explored in their relationship to the goals behind physical education.

DEFINITIONS

To begin to understand the implications of total inclusion, it is necessary to define some of the terminology surrounding the issue:

Inclusion - Based on the philosophy that "separate is inherently unequal," as stated in Brown v.

Board of Education, (Craft, 1994). It requires that all students are educated together in a heterogeneous setting with supplemental support and resources provided to students as needed.

LRE- Least Restrictive Environment; This doctrine was designed to ensure that children with disabilities are to be included into classrooms that offer the most normal setting for the student within the parameters of their disability. This concept involves "placing students in environments most conducive for them to achieve their optimal potentials," (Murata & Little, 1995).

Mainstreaming- Often thought synonymous to inclusion, mainstreaming is based on the philosophy of including all students into one learning environment. However, differing from inclusion, mainstreaming does not call for the introduction of supplemental aids and support into the classroom setting, but rather implies that little or no change from what normally occurs in the classroom is evident, (Block & Vogler, 1994).

Integration Continuum- Integration, or an integration continuum, is the marriage of inclusion and LRE. It is based on the premise that the eventual goal is to have students placed in an included setting, however it must be recognized that total inclusion may not be congruous to a student's LRE. It may be necessary for the student to begin in a segregated setting before progressing to a more included setting. The Block/Krebs model is a continuum which proposes five levels of support--Level 1 - No support needed; Level 2 - adapted physical education consultation; Level 3 - adapted physical education services in regular physical education 1-2 times per week; Level 4 - Part - time adapted physical education and part - time regular physical education; and Level 5 - Reverse mainstreaming in a special school, which is segregated schooling. This model initially places all students at level 5, and then the student progresses through the model with the eventual goal of level 1.

The preceding definitions are the major components to the debate of total inclusion. Understanding the definitions will help understand the underlying issue; that is all students, with or without disabilities, need to be educated together.

TOTAL INCLUSION: PARAMETERS

Total inclusion has been defined using these parameters as presented by Block, 1994: (a) placing students with disabilities in their home schools (schools they would attend if they did not have a disability); (b) basing these students in age-appropriate, regular education classrooms, as opposed to special education classrooms; (c) placing these students in regular classrooms following the principle of natural proportions (i.e., in general, placing no more than 1- 2 students with disabilities in any one regular class); and (d) providing supplementary aids and services in the form of individualized programming, support personnel, special instruction, and adapted materials within the regular setting.

Total inclusion does not require a criteria for placement, as does segregated classrooms, (Craft, 1994). All students will be educated together. Students with disabilities and need for additional instruction will receive such as a supplement to, but not a substitute for regular classroom teaching. Supplementary aids and services, individualized programming, support personnel within the school, peer tutoring, and adapted equipment and materials must be provided by the school, (Stein, 1994). These special services should be taken to the student in the regular classroom rather than requiring the student to leave the integrated setting.

TOTAL INCLUSION : RATIONALE

Why? Why is there a need for total inclusion? What are the reasons for this sudden change? Special needs classrooms like adapted physical education were designed for a reason. What is so different now that some professionals and legislators want to throw out such plans in favor of segregated classrooms?

Special education and adapted physical education were adopted out of necessity some 40 years ago. The needs of students with disabilities were not being met in the regular classroom environment. However, with advances in technology and medicine, the needs of disabled students can be more readily met today than in the past. The goal of education today is to prepare students to live, work, and play in a variety of integrated, community-based settings, (Block, 1994). Hence, segregated classes are obsolete and no longer necessary.

Or are they? Such blanket statements pay little attention to the implications of the LRE philosophy. Taken in fully, it can be seen that total inclusion does not always yield the least restrictive environment in all cases. Sometimes, total inclusion will pose more limitations on disabled students than an adapted education class. Some students may need a more restrictive environment in order to receive the support and direct instruction that they need in order to achieve academic success. Furthermore, attempts to integrate such students into a regular classroom could, in fact, compromise the integrity of that classroom, (Stein, 1994).

Through inclusion, students will have a better understanding and appreciation for one another. Social skills and self-esteem of disabled students will benefit tremendously from being in a more integrated, and more natural environment, (Block, 1994). Student with out disabilities will learn how to counteract with varying populations. The social implications of inclusion are, for the most part, all positive. "Problems can arise when a child with a disability interacts only with other individuals with disabilities; such homogeneity can limit and restrict growth and development," (Stein, 1994).

The major question asked by those who oppose total inclusion is whether or not the concept of total inclusion is based on objective or subjective rationale? Is total inclusion more beneficial to the academic growth and development of students- those with and without disabilities? Or is total inclusion more of an appeal to the emotional growth and development of a student? Whereas not placing an individual in a regular class when they have the ability to function in such is criminal, placing a student in a regular class for which he or she is unprepared is cruel, (Stein, 1994).

The emotional undertones of total inclusion are fairly obvious. And often times, they tend to cloud the issues. It is easy to loose the scientific implications of total inclusion in the emotional debate that surrounds it. It is perhaps for this reason that the argument against total inclusion is so strong and the argument for total inclusion can seem so jaded.

TOTAL INCLUSION: PREPARATION

Total inclusion is consistent with the philosophy that students shall receive additional instruction as needed to supplement instruction being received in a regular classroom, (Craft, 1994). Such additional instruction includes everything from adapted equipment to peer tutors and part time teachers

who assist in a child's learning. Criterion-referenced physical fitness standards for adolescents with disabilities have been designed to establish targets for youngsters with disabilities in attaining healthful living through physical fitness activities. (Palaestra, 1994). Continuum have been presented in lieu of total inclusion.. Adequate funding is necessary in order to allocate proper resources in order for total inclusion to occur successfully.

The included classroom will be taught by a "regular" educator rather than a special needs or adapted educator. Although a trained adapted educator will be available as a support service to the regular classroom teacher, they will not be in direct contact with the students. Therefore, it will be necessary for regular classroom teachers to receive some sort of training or certification in order to adequately teach to the needs of included populations. There is, at present, no set national standards to train teachers in adapted or special needs education unless special education is the educators major course of study. Most educators with non-specialized degrees are required to complete as few as 1 and as many as 4 three-hour courses in special education. Are these teachers truly qualified to monopolize all of a special needs student's formal classroom instruction?

Standardized exams, additional course work, teacher training and in-service are the main ideas being addressed in solving the problem of qualifying non-specialized teachers to instruct students with disabilities. Program accreditation has also been considered. However, it was negated because it would limit the impact of total inclusion solely to teachers just entering the profession and would pay little attention to teachers already in the classroom, (Kelly, 1993).

Preparation for total inclusion will be largely the responsibility of the teacher. They will be required to seek the professional instruction necessary to successfully adapt to an included classroom and included instruction.

In order for total inclusion to occur successfully, a number of measures must be taken to modify the regular classroom environment. Special equipment and aids may not be necessary, however, in almost all cases, special human resources will be required. Teachers must have a support group of administrators, classroom teams, volunteer, physical therapists, resource specialists, and a host of parents- regardless of their child's needs- in order for total inclusion to be a positive experience.

Curricular adaptations must be made to facilitate meaningful inclusion of children with disabilities, (Block, 1994). Instructional modifications made to the presentation of curriculum must also be evident in order to accommodate for individual differences, (Block, 1994). Teachers must be ready to collaborate with their support groups in order to meet the needs of all of their students. The role of the teacher will evolve from one of a direct service provider to more of a consultant. Teachers will be required to attend in-service and perhaps even more undergraduate and/or graduate course work periodically in order to stay abreast of the total inclusion experience.

One of the most important influences on inclusion will be legislation. Total inclusion is not mentioned in IDEA. In fact, the concept of total inclusion can in some cases be in direct conflict with the Federal statute and regulation of least restrictive environment, (Huber, 1993). At federal, state and local levels, there needs to be a legislative infrastructure devoted to the total inclusion of public education. As changes in lifestyle create new social needs, public policy responsible to meet social needs, must change also, (Auxter, 1993). Legislation addressing teacher certification, funds, disability policy, community and school collaboration, and authorization of existing laws are all part and parcel of notable inclusion.

Institutions of Higher Education (IHE) also have a liability in the total inclusion revolution. If

through inclusion teachers will be responsible for teaching all students, then they are also to be responsible to adequate and proper presentation of information to all students. It is necessary that aspiring teachers receive information regarding adapted and special education throughout all of their undergraduate and graduate course work, (Craft, 1994). As of 1991, the United States department of education estimated that 93 percent of all individuals with disabilities receive their education in regular education, (DePauw & Karp, 1994). A major concern of regular educators is that they will be unprepared to meet the needs of their special needs students. They feel inept at determining LRE procedures through the preparation and discussion of the student's Individualized Education Plan (IEP), (Block, 1994). IHE need to re-create their teacher preparation programs so that information regarding educating all students- able and disabled- be addressed thoroughly and completely. For the benefit of the teacher, and especially the benefit of the children they will instruct, teachers must be prepares and adept in the area of providing special and/or adapted education.

TOTAL INCLUSION: IMPLEMENTATION

The process of implementing total inclusion is complex. Before the implementation cen take place and total inclusion can become a reality, the measures mentioned above for preparation must be in place. And while total inclusion is possible, at present it does not seem that public education has the bureaucracy, resources, or economic support necessary to affectively implement total inclusion, (Sherrill, 1994). Claudine Sherrill (1994) presents nine barriers to total inclusion:

- * Scarcity of inclusive education programs at secondary school levels;
- * Limited attention to factors necessary for effective inclusion of students with particular disabilities;
- * Little district and state- level data concerning costs of the current system of inclusion;
- * Inadequate students and programmatic evaluation designs and measures;
- * Lack of teacher training materials addressing needs of students with disabilities who are being served in inclusive settings;
- * Limitations of evaluation processes and development of inclusive IEPs; and
- * Absence of administrator and school board training.

These nine factors alone will continue to make total inclusion a "dream deferred" rather than a reality.

TOTAL INCLUSION AND PHYSICAL EDUCATION

Total inclusion of students into physical education has proven a very controversial debate. Both sides prove to have valid reasoning as to why total inclusion should or should not take place. While most physical educators agree that all students need the value of meaningful physical education opportunities, not ll can agree the total inclusion is the best means to that end.

The Research Base

Semmel, Gottlieb and Robinson (1979) concluded that there is a lack of research to support self-contained, special education classes over total inclusion for children with mild disabilities. Furthermore, total inclusion of such students into regular physical education classes did not prove to have any adverse

effects on classroom management skills of teaching styles in general. Wang and Baker (1986) analyzed a research base and showed that, in well controlled studies, included students consistently outperformed their non- included peers in academic achievement and social adjustment, (Block & Volger, 1994).

Including student with severe disabilities into regular classes is driven more by moral issues than by research. Stainback and Stainback (1990) wrote that "the decision to include children with disabilities should be based on what is right, just, and desirable rather than on research demonstrating popularity or ease of implementation." Hence, studies involving the inclusion of students with severe disabilities is focused on social acceptance, peer interaction, meaningful outcomes, and other variables that may predict successful transition from school to work place, (Block & Volger, 1994). Taking into account their empirical nature, studies have proven that socially and affectively, students with severe disabilities are included favorably into a more integrated environment.

However positive the research may seem, the truth of their findings is that while students with disabilities are engaged consistently in regular physical education classes, their involvement is by no means substantial in comparison to their able bodied peers. It is this that drives the counterpoint argument of total inclusion.

Most opposed to total inclusion base their claims in the shaky validity of total inclusion. While the ideal of total inclusion is internally sound, externally, it has not addressed all of the issues. The goal of physical education is successful psychomotor engagement. The goal of total inclusion is to fulfill social and affective aspects of student development, (Murata & Little, 1995). The two definitely conflict. While students are interacting with one another and socializing in an included physical education setting, are they receiving the best opportunities to learn age- appropriate physical education skills? Are the goals of physical education being compromised? Research in the area of physical education in regards to inclusion has done little to address these issues.

Implementation of Total Inclusion in Physical Education

Special adaptations and accommodations based in individual assessment will be necessary in order to best serve the needs of the student. However, this should not be too difficult because good physical education IS adapted physical education, (Sherrill, 1994). Physical education classes should already be designed to serve the needs of various levels of physical fitness and the varying styles and rates of performance of students. Physical educators should already have an understanding of modifying rules, games and procedure in order to accommodate the various learning styles present in their classrooms.

Nichols (1990) suggested a model for accommodating student with varying abilities by presenting; (1) a wide range of activities that fit the varied abilities of each student; (2) a progression for learning to guarantee the success of each student; and (3) present information specific techniques for accommodating varying abilities, (Sherrill, 1994). Teachers should be knowledgeable about a student's disability and how it will affect their abilities. Peer helpers, classroom teams, and volunteers will prove to be vital to the physical educator. Developing support groups in the district and in the community will provide an outlet for ideas, frustrations and successes, (Palaestra, 1994). Planning, anticipating and creative thinking will become increasingly important with the onset of total inclusion. These factors can help lead to a successful inclusion process.

Collaborating with specialists (which are nonexistent), negotiating with restraint administrators

about class size (in already overcrowded schools), asking for assistance from para- professional help (which is not available), organizing development of a corps of parents and other volunteers to help out in physical education classes (when time for planning such is nonexistent), providing more individualized instruction (when individualized instruction in physical education has always pretty much been a myth), and writing grants (where no grant ship training and support is evident) are all very good ideas that would, no doubt, revolutionize total inclusion. The sentiment expressed in the Declaration of Independence (1776) "that all men are created equal, that they are endowed by their Creator with certain unalienable rights," is very appealing to us all. However, those opposed to total inclusion point out that the sanguine philosophies of total inclusion do not always coincide with reality. In today's reality, total inclusion is a lofty goal.

Integration, Not Total Inclusion

Integration is a good thing. Physical educators, in their best American spirit, agree that students should not be kept from socializing with their peers and improving their own self- concept in the process. However, while the affective aspects of physical education, (peer socialization, learning to get along with others, team work, and improving self- concept), are important to the total physical education experience, so is the goal of P.E. - to promote health and fitness through physical activity. If students are in physical education classes for which they are physically unprepared, then they are receiving only half of the intentions of physical education.

The philosophy of total inclusion should be an offering on the LRE continuum, not a replacement of it (Sherrill, 1994). The Block/Krebs model is one proposed continuum. It offers five levels of support to all students:

Level 1 - No support needed;

Level 2 - adapted physical education consultation;

Level 3 - Adapted physical education services in regular physical education 1 - 2 times per week;

Level 4 - Part- time adapted physical education and part- time regular physical education;

Level 5 - Reverse main streaming in a special school (segregated schooling).

This model initially places all students at level 5, and, based on their ability, the student progresses throughout the continuum with the eventual goal of reaching level 1. By using such a model, all students will have the opportunity to be in the most normal environment possible while still ensuring that they physical aspects of P.E. is being met adequately. The student will be in the least restrictive environment based on their abilities, and will be able to continue to progress through the continuum at their own pace.

Advocates of total inclusion agree that the LREs of students are vital and need to be appropriately met. However, some professionals feel that, in practice, the continuum of least restrictive environment placement has led to too much placement in separate adapted physical education programs, (Murata & Little, 1995). While in theory, LRE is effective, in practice it is restrictive and unfair. Many more students with disabilities can be successfully placed in regular physical education is they are given proper support (Block, 1994). There is no longer a need for adapted physical education classes.

Retrospect

Both sides present appealing arguments. The issues mentioned above are just a few of the items

on the agenda of physical education and its stand on total inclusion. Other topics of interest, such as modifications, the role of the adapted physical educator as a resources specialist, standardized testing for prospective adapted physical educators as well and for special needs students, and the liability of administrators on federal, state and local levels, are still waiting on the side lines of the total inclusion issue and have yet to be formally addressed. As of now, the stand of physical education in regards to total inclusion is divided and undecided.

CONCLUSION

Total inclusion's longevity has proven that it is not just a whim. It is not an ideal that will soon be dissipating. Nor, do I believe, that it is a debate soon to be resolved. The laws supporting total inclusion were mandated 20 years ago, and they are still being defined and re-defined today.

Total inclusion is a genuinely humanitarian idea. It has grassroots deep within the heart of the "American Dream" and the theory underlying civil rights. All individuals have the right to public education. And all students within the United States public education system have the right to receive the aid and services necessary to supplement the information they receive. However, the public school system is only mandated by law to deliver the "most integrated setting feasible", (Section 5604 of the Rehabilitation Act, 1973). So long as appropriate support is given and the opportunities for students to be involved in the least restrictive environment is available, adapted schooling is legal, and, by law, just.

The debate will continue, as it should. Continued research and experimentation should be done concerning the influence of an included school setting as opposed to a separated one. The goal of education is to reach the students and produce well adjusted, functioning members of society. The target of education, whether totally included or otherwise, must not forget its influence on the lives of all of society- present and future.

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DETERMINING A SPECIALIZED AND COST-EFFECTIVE MARKETING PLAN FOR AN INTERNATIONAL, TECHNOLOGY ORIENTED FIRM

Case Study: *Macrex Indexing services of the UK*

C. Aaron French

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INTRODUCTION

INTERNATIONAL MARKETING--THE NEED FOR A TWO-WAY STREET IN "THE GLOBAL VILLAGE"

In the pursuit of international commerce there are many avenues one can take, not all of them are a "one-way street". However, in the US, the aggregate [commercial] focus is currently very 'unidirectional', and unfortunately in the long term--self-defeating. Take heed, the road map does indicate that we can actually choose a new direction, and stay on course for future economic growth. As individuals in international business, we should concentrate on establishing trading 'partnerships' with foreign nationals, and devote less thought towards pure exploitation of global resources. Why care? Anyone ever heard of the theory "what goes around comes around?" Or how about, "All good things must come to an end?" Take for example, in the popular press, the majority of US/international business articles focus on American entrepreneurial efforts [reaching out] from the US, into new or existing markets. This is indicative of mainstream business philosophy today. For example, major corporate strategies center around US commerce exploiting cheap foreign labor. Companies play "annual-island-hop" for the cheapest labor markets. Exploitation is a great situation to be in as long as you can stay on the winning side, and in this case—only as long as more and more people can continue to afford what [we] "produce", or as long as our present economic advantage holds-out. However, we are increasingly the only nation buying our own domestically produced products, and what is worse, at a diminishing rate. Economic principles suggest that as the US' standard of living rises, so too must the rest of the world's, or else the US will ultimately price itself out of the foreign trade market altogether. If the US were forced out of international trade, (or even disallowed in certain areas of trade) consumers would miss out on other industrialized nations production efficiencies, resulting in higher costs for the US and ultimately lowered GNP.

As evidence of the growing problem, examination of the continuing US trade deficit indicates as a nation, our desire to purchase [cost effective] (or "cheap") imports exceeds our ability to sell abroad--at an ever increasing rate. Unfortunately it looks as though we might ultimately price our goods and services out of the game and/or spend our way into oblivion (in view of the continuing rising credit card and national debt situation).

Moreover, economically speaking, developing countries will ultimately catch-up to the US, (or maybe even surpass us one day)--thus taking away our current economic advantage.

The US might avoid a major trade-crash by establishing sound partnerships now. We might someday benefit from our charitable efforts. However, current corporate exploitative philosophy is not helping matters. One would think that more business leaders would act with these thoughts in mind, but all one has to do is look at the level of resistance to the passing of the North American Free Trade agreement. "...they'll steal American jobs!" In the short-term yes, but in the long-run [they] will help fuel the global

economy. Attitude is further evidence of the growing problem in international commerce.

It all boils down to “trade philosophy”. The US will continue to buy more abroad than it sells as long as it continues to promote “anti-model-T” economic policy. I like to think of the “T” standing for Trade. Remember the father of Industrial Revolution, Henry Ford’s philosophy? Ford introduced new manufacturing, “conveyor-belt” assembly techniques that enabled lower manufacturing costs. The result of which enabled much lower auto prices. Possibly of even more significance, he took the industrial revolution a step further. Rather than keep all the profits for himself, Ford realized he needed to create a situation for perpetual growth, and future sales. Ford also introduced the radical idea of paying employees enough to afford to buy the products they produce. This enabled cash to flow in more than one direction, and the economic two-way street was invented. As a result, major growth ensued! It is amazing how well these principles boosted our newly industrialized economy. These techniques helped fuel demand for the newly created ample supply. As Adam Smith pointed out, there must be ‘demand’--first and foremost. Simply supplying the world with commodities does not provide for a means to sell them. Ford helped out demand substantially by making autos more affordable via cheaper production techniques, and then making it possible for non-affluent people to buy them by paying them higher wages. For a future healthy domestic economy, the US should practice a new trade philosophy, “Model-T Economics”; or rather—the US should promote multidirectional trade, thereby further ensuring our own economic stability.

As a country with comparatively expensive offerings we should help develop other economies to levels nearer our own, for similar model-T economical reasons. For example, the US average wage is [much] higher than most other nations, in turn our products and services are [much] more expensive to produce (when we produce them domestically) and therefore usually carry a higher price tag. Thus individuals look elsewhere—abroad--for more cost-effective purchases. As a result our trade deficit and economy suffers. Why buy American when you can get “better, cheaper, elsewhere”? Or in other words, the economic principles of “supply and demand” and price level pressure changes are paramount!

One alternative to combat price pressures is to hire cheaper [outside] labor, and continue to sell at the same price level as before. However, it should be noted that this ultimately limits the potential, total market size--as with a [non]-Ford-model-T theory; i.e. limiting the size of auto-sales to only affluent people. On the other hand, another (perhaps less obvious) possible solution to increase corporate sales is to pay those Malaysians enough money to afford to buy those tennis-shoes they make. The end result might be somewhat higher expenses, (however, probably still lower than the average US wage), but the number of sales could go up hundreds of times more, offsetting any increase expenses

“At any rate”, what contributes to the continually increasing trade deficit is the resistance to increasing [purchasing power parity] of all nations. It is important to realize that, the closer major economic entity’s national production expenses match one-another, the closer prices will resemble one another between global producers. In addition, the closer average wages match one another, the closer GNP rate increases will match annually. These economic resemblance’s will enable “Trade” to begin to “balance-out “as price levels and purchasing power (wages) equate; thus ultimately helping to achieve purchasing power parity.

These pressures will occur naturally, regardless of US resistance. As a nation with current economic superiority, we should “aim” our efforts in a mutually beneficial direction. Our future economic growth requires participation in the new global village. Hopefully, we learned from the Great depression that the US cannot exist alone under isolationist tendencies. And to be truly apart of the “Global Economy” we must

look to bringing outside trade, inside the US thereby establishing trading 'partners'; and not merely viewing the world as a big basket of goods for our selection. Model-T economics yields positive trade relations, increased competition, selection and efficiencies--all of which are good for the consumer in the end.

GOAL OF THE RESEARCH AND RELEVANCE

In pursuit of marketing objectives crossbred with global economics, this on-going research project will focus on promotional ideas for a non-US company wanting inside the US Advertising "loop". On a small scale, but on an individual level, these efforts benefit both international business relations between the two parties involved and economic prosperity in general.

The main goal of this research is to make recommendations regarding the promotional choices available for a niche company with a limited ad-spend available. And to narrow it down even further, the research project will pursue a case study involving one small firm's needs. The case study will also provide valuable 'feedback' in the form of effectiveness. As the paper's title suggests, this topic is focused on a small technology firm with a typically small marketing budget available, i.e. "cost-effective" being the catch-phrase.

The topic of the paper is relevant to business interests in general. Most any business person will find this material applicable to their specialty. After all, with most firms therein lies a common thread--the 'need' for marketing. However, firms with a particular interest in targeting [specific] user groups via the Internet or direct mail would benefit the most from this ongoing research. Additionally, cost-effective promotional suggestions regarding any medium are of obvious significance to small business owners "full-stop"; i.e. "I've got a great product, but how do I begin to advertise it abroad to increase my total market penetration with little or no money? And "What about the "Net"—is it worth putting up a web-site to promote my products and services?" ...Well, maybe.

CASE STUDY BACKGROUND MACREX COMPANY BACKGROUND

Macrex Indexing Services of the UK, is a specialized software provider for writers and publishers. The software company's main product is a sophisticated database, or 'indexing' program. Among other uses, the program enables publishers, editors and writers to enter data of *any* kind, organize that data, and maintain volumes of cross-referenced information for insertion of books, journals and encyclopedias. It has been moderately successful in its domestic market, but at this point has not been marketed beyond the UK. As a small niche company, Macrex needs a specifically designed marketing strategy developed for the most cost-effective global positioning of their products and services.

HOW THIS PROJECT CAME TO BE:

The author of this paper has been involved with Macrex Indexing Services since 1995, originally acting as account manager for marketing concerns, and representing Martin Tait Redheads Advertising Ltd.

of Newcastle England. Initial involvement was in the form of a 'cooperative-effort' (donated time) between a local economic development agency, the Tyne and Wear Development Company, and MTR Advertising. Upon returning to the US, the author was allowed to work with Macrex separately from the agency on his own time. Further support has been provided by the UT Arlington, R.E. McNair Scholar's Fellowship.

RESEARCH METHODOLOGY

BRIEF DISCRIPTION OF METHODOLOGY:

I. Information Gathering Phase

- 1.0 Gain an in-depth understanding of the firm by researching the company, its products and services offered, history/background, financial and marketing information.
 - (1.1) Past sales figures are needed to measure relative performance.
 - (1.2) Past advertising/marketing spend information are needed to monitor relative effectiveness.
- 2.0 Gain an in-depth understanding of the environment Macrex operates within by researching the appropriate industry and markets; competitors, suppliers, customers, etc.
- 3.0 Determine Macrex' current product positioning and market share
 - (3.1) Define Macrex' user grouping.
 - (3.2) Estimates of the competitions sales are required.

II. Analysis Phase

- 1.0 Group and define all information for analysis, labeling opportunities, threats, strengths and weaknesses facing the company.
- 2.0 Assess past financial performance and past marketing efforts of the company [determine any trends and/or correlation's between the two] sales performance/marketing correlation'.
- 4.0 Attempt to compare competitor's performance/marketing correlation (based on information availability) with Macrex.
- 5.0 Attempt to define any immediate major concerns for the Macrex.
- 6.0 Attempt to define core-competencies of the firm.

III. Report Conclusions

- 1.0 Summary - Based on the analysis of the information gathered, determine and/or forecast the most logical course of action for each individual grouping--and the most appropriate ways to meet the needs of each grouping--thereby establishing [objectives]-- towards accomplishing the four stated company goals.
- 2.0 Opportunity Objectives - Explore new ideas for the company. How should Macrex respond to marketing needs and global participation?
 - (2.1) New ways to distribute product/company information.
 - (2.2) New markets to explore.
 - (2.3) New services.
- 3.0 Threats Objectives- How should Macrex deal with competition and new entrants to the market place?
- 4.0 Strengths and Weaknesses Objectives - Set specific objectives for the company (short-term--

- with-in the year). Make suggestions for future strategic planning (longer term--five/ten years).
- IV. Action Phase
- 1.0 Create necessary documents and materials needed to accomplish the objectives.
- (1.1) Marketing plan
- (1.2) Company identity: logo, brochures, Internet Home page, etc.
- V. Marketing/Sales Results Collection Phase---Make date recommendations.
Monitor financial and marketing spend levels for comparative analysis.
- VI. Re-evaluate Plans Based On Past Effectiveness And Re-initiate Phase One---Make date recommendations

WHAT IS THE BEST WAY TO EXPAND THE BUSINESS?

Initial conversations with the owner of the company reveal underlying interests and ideas she has towards accomplishing growth in revenues for the firm. The English company wants to cost-effectively promote its software and services beyond the UK. What is the best way to accomplish this goal: the Internet?; direct mail?; both?; exhibitions and trade shows?; free disk samples?; user-targeted color brochures?; demos?; a user stratified combination of all of the above? The owner has some very good ideas in mind for promoting the company, however some are more expensive than others, and some potentially less effective. The first steps toward answering the above question is to establish a plan of attack by setting specific goals and objectives and then determining the best way to achieve them. However, what are the most appropriate [objectives]? Firstly, one must examine the companies main [goals] before setting objectives. This study will determine the most efficient and effective means by which to accomplish the company's three main goals in achieving new sales growth:

- (1) Cost Effective International Promotion
- (2) Discovering New Markets
- (3) Planning New Offerings

COSTING EXCLUSIONS:

Television and radio have been excluded for inappropriateness of advertising vehicle for the subject matter. Available print media (journals, magazines, newspapers, etc.) , have been excluded for lack of direct catchment versus cost effectiveness. Trade-shows have already proven their limitations in recent efforts at a Munich exhibition—the cost/visibility trade-off being the main factor amongst many high level competitors.

RESEARCH FINDINGS TO DATE:

After researching the history of the company and delving into the financial aspects of the company's records the following information was collected (or not immediately available). From the information gathering phase:

Financial Information:

Current sales information were not available (to be compiled by the owner of the company).

Products and services:

(were described earlier under section: MACREX COMPANY BACKGROUND)

Marketing Information to Date:

There is an existing sales brochure that will be reworked to fit the new look of the company. The new look of the company will include less emphasis on the fact that Macex is a British company. New positioning will focus on ease of product use over the competition, and longer product existence over that of the "copycat knockoffs".

Environment:

The Macrex environment involves an industry whose users operate in the "publishing, writing and professional librarian" categories. Specific customer lists have been obtained, and specific groups include: the British Librarians Society, the British Government and many public and private libraries throughout the UK.

Competitors:

The Main competitor is a relatively new company named Cyndex, and has been in operation since 1989. Note, Macrex wrote the first version of their program in 1972. Cyndex' estimated market share is around 10%, with Macrex possessing around 85%, the other 5% is comprised of several very limited in-house programs really to small for direct comparison. It is however noteworthy to mention that some shops do have their own privately written versions. A major marketing advantage, Cyndex, lacks several features and benefits by comparison to Macrex, including ease of use and ability to learn faster. However, Cyndex is priced around 20% less than Macrex, thus posing competition on a price bases only. In summary, the main marketing selling points are: Macrex was the first program of its type in existence, has all the features its competition has [and more], in addition to being much easier to use and learn.

Information collection:

This information was gathered in a joint survey between Macrex and the British Librarians Society (by far Macrex' main customer). Estimates of the competition's sales will have to be extrapolated, using an algebraic calculation, utilizing the percentages listed above, against Macrex' Annual sales figures, but using Cyndex's pricing. Macrex will have the company financial information compiled later this year. Macrex' product positioning has already been described as a "specialized software provider" category. However the companies main product does have the potential for an even wider catchment of users, thus increasing total market size potential. For example, specialized database applications could be directly marketed in several new fields such as the academic community, and the corporate world, were information-organization and cross-referencing are vastly important to operations.

Competitor's Future Performance:

Competitor's future performance relative to Macrex' performance is of [limited] concern. This is true largely because Cyndex has in the planning stages ideas for developing a Windows based version of their

software. If this were developed, Macrex' Market share could suffer substantially. However, Cyndex promised to have a beta-test version ready for initial trials by January 1996. Nothing has been released to the expected beta-test group, the British Librarians Society. The Society has been extremely cooperative in yielding information; as they would like a windows based version, and do not believe Cyndex will produce one--thus placing Macrex in a valuable position. Cyndex would constitute Macrex' main concern for threat of competition. However it appears rather unlikely that Cyndex will actually produce a new product any time soon. No new software updates have been published, and contact with Cyndex regarding new release dates results in an unofficial response of "At this time we are undecided as to whether we will be able to begin that project..." (source requesting to remain anonymous).

Market Opportunity:

Cyndex' evident lack of ability to produce new software updates, combined with the demand for a Windows based application, generates the major opportunity for Macrex. The long-term goal of the company should obviously be to write such an application. A Windows based program would probably more than double current sales. However, possibly even more accurate sales estimates, forecast increased sales around ten times current levels, based on BLS comments surrounding increased usage due to ease of use via Windows compatibility.

Objectives & Goals:

"Opportunity-objectives" and short-term immediate goals include: new ways to market Macrex company product information (avoiding the previously listed advertising medium exclusions); targeted direct mail; and the Internet--remain the most cost effective means by which to produce the desired effect. The short term marketing objective will be to begin an Internet home page, to later tie-in with brochures for targeted direct mail campaigns. These brochures will include reference to the web page, and hopefully generate further interest in Macrex' products, thus soliciting a "potential user response". New offerings are to include monthly retainer oriented, custom programming services. New services will be listed in the new marketing literature. Short term goals should be implemented as soon as possible to take advantage of the [current] advantage over Cyndex; being that they do not appear to be in a position to meet the new demand for an improved product.

This study will continue, as further developments occur and as further financial information can be collected for comparative promotional measurements. Recommendations for the research are to include development of a formal marketing plan, new brochures and Internet home page. A re-evaluation phase will be instituted as soon as performance evaluation material is collected, and upon agreement with Macrex to continue work beyond this study.

