# Faculty Fellowships 2000-2003

**TERRI BONEBRIGHT**
Assistant Professor of Psychology

# SONIFICATION FOR GRAPHICAL DATA PRESENTATION: CAN PEOPLE USE AUDITORY DISPLAYS EFFECTIVELY?

In the past five years, a group of researchers has begun to investigate the use of sound as an enhancement for visual displays of graphed data. This surge of interest has been fueled by the now standard practice of including sound capabilities as part of computer packages. Perceptual psychologists have been particularly interested in determining which characteristics of sound map best to specific aspects of graphs of univariate and multivariate data sets. Consequently, the bulk of the research in this area has focused on basic perceptual abilities in relation to simulated data sets.

The project I am proposing would extend this basic perceptual research on auditory display into the use of sound for augmentation of real data sets in educational settings. The key question to be addressed is whether the addition of sound increases comprehension of graphed data sets. If this technique is found to be useful, auditory displays could be applied as an aid in teaching students how to interpret large multivariate designs. In addition, auditory displays could be used to teach visually impaired students, who traditionally have relied on tactile displays of graphed data, which tend to be difficult and time consuming to use. Thus, the project would provide basic level research on the use of sound with real data sets, and it could also provide evidence for application in educational settings.

**CYNTHIA CORNELL**
Professor of English

BRINGING JEWISH LITERATURE INTO THE DEPAUW CURRICULUM

I will develop a substantial, new area of expertise in the area of Jewish Literature--more narrowly, medieval Jewish literature and Jewish American literature. During the first year, I would read widely in Jewish American literature, either as an auditor in a Jewish Studies course at IU or independently, attend Judaic fellows events and seminars at DePauw, and collaborate, as in the next two years, with other faculty on developing a collection of courses in Jewish Studies. In the second year, I would teach a trial version of a 100 level topics course in Jewish American literature, evaluate student demand and need and the success of the course, and read critical and historical scholarship on Jewish American literature. In the third year, I would read in medieval Jewish literature, with the expectation of integrating some of that material into my senior seminar "Reading Intolerance." Out of this project, then, would come at least one new course, Jewish American literature, and a modification of my medieval-renaissance course in "Reading Intolerance" to incorporate medieval Jewish texts. Both the new course and the modified one would serve not only general education at DePauw with a multicultural emphasis, but the English major and the interests of a growing number of "Judaic Fellows" students who are being recruited to attend DePauw. Also with this project would come my ability to work closely with other faculty and staff at DePauw interested in developing courses that would fulfill the need of Jewish students to find their history and culture somewhere in our curriculum.

**CARL HUFFMAN**
Professor of Classical Studies

ARISTOXENUS AND THE HISTORY OF PYTHAGOREANISM

My goal is to write a book-length study on the fragments of the Greek philosopher Aristoxenus which deal with the history of philosophy. Aristoxenus (370-300 B.C.) is not as famous a name as Plato or Aristotle, but he was an important figure in the golden age of Greek philosophy. He began by studying with Pythagoreans in his native Tarentum, a Greek city in southern Italy, but then came to Athens and joined Aristotle's Lyceum, where he became a leading candidate to succeed Aristotle as head of the school. He had a staggering output of over 400 books, although most only survive in fragments. In the modem world Aristoxenus has been most famous for his writings on Greek musical theory. He was also, however, a central figure in the development of Greek biography and in writing the history of philosophy. He wrote lives of Socrates and Plato and a series of works on ancient Pythagoreanism. One of the most interesting of these latter works is the Pythagorean Sayings which provides an outline of Pythagorean ethics. We are woefully ignorant about the history of Pythagoreanism, since Pythagoras himself (570-490 B.C.) wrote nothing, and we are particularly ignorant about Pythagorean moral philosophy, because the early Pythagorean writings which have survived deal mainly with cosmology and mathematics. I will carry out a book length study of the fragments of Aristoxenus' The Pythagorean Sayings, in order to determine what they can tell us about the Pythagorean ethical system and its relation to Platonic and Aristotelian ethics and in order to evaluate Aristoxenus as a historian of philosophy. This latter goal will also require me to study the fragments of Aristoxenus' other works in the history of philosophy: The Life of Socrates, The Life of Plato, The Life of Archytas, Pythagoras and his Associates, and The Pythagorean Life.

**CLEVELAND JOHNSON**
Associate Professor of Music

BRINGING WORLD MUSIC TO DEPAUW

DePauw, as suggested in recent guidelines of National Association of Schools of Music, must ensure that music from non-Western cultures is given adequate attention in its curriculum. With its current faculty structure, however, DePauw does not have a trained ethnomusicologist, nor, with its many staffing needs, can one expect DePauw's School of Music to be adding such a position in the near future.

Through this project, I will retool my skills as a musicologist in such a way that, at the end of the Fellowship period, I can offer a full, introductory course in non-Western music with a solid ethnomusicological foundation. I will take several graduate courses at Indiana University, which will ground me well in this related discipline; I will develop performing skills (adequate for demonstration) in several non-Western instruments; I will pursue opportunities for expanding the presence of "World Music" outside the DePauw classroom; and I will cultivate relationships with performers and scholars throughout our immediate region who can bring their special skills and knowledge into my classroom at minimal cost.

I anticipate that, as a result of my Faculty Fellowship, DePauw will be able to boast of a more diverse Music curriculum, an enriched environment for non-Western music on campus, an increase in new foreign students who bring unique performing skills to our community, and a presentable collection of non-Western instruments for teaching use. Outside of Greencastle, DePauw will have established itself as an institution where global connection across the curriculum is a serious endeavor. Beyond DePauw, the many worldwide University "friendships" that are forged through my work - not to mention the activities of our future graduates who take this global perspective with them into future careers - have the potential to make a significant impact in a new and changing world.

**MARY KERTZMAN**
Associate Professor of Physics and Astronomy

INVESTIGATION OF THE VHE GAMMA RAY EMISSION FROM SUPERNOVA REMNANTS

Very high energy (VHE) gamma rays are the most energetic form of electromagnetic radiation observed in the universe. The field of VHE gamma ray astronomy is relatively young, and the first confirmed source of VHE gamma rays was detected just a decade ago. VHE gamma rays have been observed coming from galaxies with unusually energetic and bright centers ("Active Galactic Nuclei" or "AGN") and from isolated neutron stars such as the Crab pulsar. Other

objects suspected of harboring VHE gamma ray sources are certain supernova remnants (SNR).

Supernovae are among the most energetic phenomena in the universe. A supernova is an explosion of a massive star when it runs out of fuel for the nuclear reactions which sustain against gravitational collapse. In a process that is not well understood, the inner parts of the star collapse, and the outer layers are ejected out into the interstellar medium. The outer layers form an expanding gas cloud surrounding the remains of the stellar core. This gas cloud is called a supernova remnant or SNR. As this debris from the stellar explosion moves out into the interstellar medium, it sweeps up material and forms a shock wave. It is suspected that near the shock wave, the physical conditions are right for the production of both gamma rays and cosmic rays.

I will analyze and interpret observations of VHE gamma rays from selected supernova remnants (SNR) taken with the Whipple 10 m gamma ray telescope. I will make use of my previous work on detector design to develop improved data analysis techniques. I will interpret the observations in light of current theories of gamma ray production, and, if possible, develop computer models of these theories.

**DARRELL LALONE**
Professor of Sociology and Anthropology

# WORLD-SYSTEMS PERSPECTIVES ON INCA CIVILIZATION

The Inca Empire was the largest conquest state of the Pre-Columbian world, and one of the largest of all world empires. It was the culmination of four thousand years of Andean civilization, the successor to earlier states that had risen and fallen in the Andean region.

How and why did states rise and fall throughout the course of Andean civilization? How and why did the Inca state rise when and where it did? Why did it succeed when so many of its predecessors had failed? Cuzco, which was to become the Inca capital, had never been a center of power nor was it rich in resources. It was instead a relative backwater, so that it is not at all apparent how it could rise to dominate such a vast realm.

A world-systems perspective on Inca civilization will offer insights into some of the enduring mysteries of Inca civilization by refraining some of the long-standing problems in Andean studies in terms of new research in world-systems analysis. New understandings of Andean civilization will also advance understanding of comparative civilizations.

For example, my most recent research traces the rise of several earlier Andean states in regions that were at the edge of previous power centers (commonly termed "cores" in world-systems analysis). New states emerged neither in the core, nor in the hinterlands ("periphery"), but in intermediate niches we term "semi-periphery." Why do so many cultural and political innovations in the Andes come from semi-peripheral development? How might our understanding of the Inca Empire be advanced by reconsidering it in the light of what we are learning about semi-peripheral development in world-systems analysis?

My own niche in world-systems and Andean scholarship has come to be the study of often startling changes originating in semi-peripheral settings. As my contributions in this area join that of scholars in other areas, we begin to find similar patterns in semi-peripheral development in other civilizations as well.

This project is then a contribution toward new understandings of Inca civilization as well as toward ongoing research in comparative world-systems analysis.

**NOAH LEMOS**
Professor of Philosophy

PROBLEMS AND METHODS IN ETHICS AND EPISTEMOLOGY

There are certain similarities between ethics and epistemology (the theory of knowledge). Each is a normative discipline. Ethics is concerned with what makes actions right or wrong. Epistemology is concerned with what makes beliefs justified or unjustified. Ethics is concerned with how we ought to act. Epistemology is concerned with how we ought to form beliefs. Each attempts to formulate general evaluative principles or normative criteria. Ethics seeks to formulate criteria that tell us under what conditions an act is right. Epistemology seeks to formulate criteria that tell us under what conditions a belief is justified. Both disciplines face similar methodological problems. Among these are (1) what may we take for granted in trying to formulate these general evaluative principles, and (2) how will we know if we have the correct principles. Philosophers in each discipline seem to fall into one of two main groups. Those in the first group assume that we may take for granted what we ordinarily think we know and then use that knowledge in order to formulate general principles. So, for example, they assume that we can pick out examples of right action and justified belief and use these examples to formulate and assess general principles. Those in the second group reject this approach for a variety of different reasons. They point out, for example, that people often disagree about what to take for granted. They would ask why should it be assumed that what we think are examples of right action or justified belief actually are such. They insist that one cannot simply assume that what one ordinarily thinks one knows is true or reasonable. This debate about procedure is central to both disciplines and of fundamental importance for their conduct. My sympathies lie with the proponents of what is called "the common sense tradition." These philosophers fall squarely into the first camp. In my book on the common sense tradition and in the chapter that I have been commissioned to write for the Oxford Handbook of Philosophy, I will examine the pros and cons of each view, yet defend the approach of the common sense tradition.

**NACHIMUTHU MANICKAM**
Associate Professor Mathematics

# NAVIGATION OF ROBOTS IN AN UNKNOWN TERRAIN

As the robot and computer technologies progress into the next century, more and more tasks are likely to be performed by autonomous machines. In particular, mobile robots could be employed to perform a variety of operations including (a) tasks in environments that are not suitable for human operation, e.g., nuclear plants and waste sites, chemical and toxic industries, (b) monotonous and tedious tasks such as parts delivery and movements in manufacturing plants, and (c) operations such as extraterrestrial and underwater explorations, etc. One of the basic components in the operation of such robots is the capability to autonomously navigate in terrains; particularly in exploratory applications, the robots must deal with terrains whose models at best are partially known. Advances in various areas such as applied mathematics, engineering, computer science, etc., are required to fully achieve such autonomous navigation capabilities.

The area of robot path planning and navigation has been studied by various researchers in recent decades, resulting in a large number of publications. There are two basic formulations of the path planning and navigation problems based on the availability of the terrain model. In a known terrain, the terrain is given as input, and the motion planning problem becomes one of geometric programming; there are a large number of techniques proposed to solve this problem. In an unknown terrain, the terrain model is not known but the robot obtains ideal terrain information by employing a sensor (vision or touch) system. One of the fundamental differences between the motion planning in these situations is that a path can be preplanned in the former, whereas in the latter a path must be incrementally computed as newer parts are explored.

In this project, I will work on the terrain model acquisition problem (TMAP). TMAP deals with robots acquiring a complete model of a terrain by systematically visiting portions of it. The four papers I have written so far on this topic deal with a team of two, three, or four robots obtaining the model. In these papers, only the sensor time is considered as a measure of performance and the estimates are conservative; we completely ignored the distance traversed by the robots. Also our proof method does not seem to work for a team of five or more robots.

In this project, I will: (i) discover new technique(s) to deal with a team of five or more robots; (ii) create some efficient algorithms which will take into consideration both sensor time and distance traversed; and (iii) develop new methods to replace the visibility graph method.

**JOHN SCHLOTTERBECK**
Professor of History

HISTORICAL MUSEUMS, MATERIAL CULTURE AND PUBLIC MEMORY

I will apply my professional work as a consultant for the National Trust for Historic Preservation (NTHP) to develop several courses that examine three interconnected areas: historical museums and historic sites, material culture, and public memory. These include two new courses, History 300, "Topics: Material Culture," and History EXP, "Public History: Museum Studies," a unit on material culture and/or public memory in a new department course for history majors, "Junior Colloquium," and a strengthening of the use of material culture in a survey course History 263, "Founding of U.S. Civilization."

The fellowship will enable me to include new areas of the discipline more fully into the history curriculum at DePauw. For many years some historians have called for closer partnerships with museum professionals, not only to improve the quality of historical exhibits and museum interpretations, but also to bridge the gap between academic and public history. Physical artifacts, the core of museum collections and exhibits, provide another way to understand everyday life in the past and expand the range of historical sources students can use. Because museums and historic sites shape public memory of the past, they are increasingly subject to critical scrutiny. Finally, with the continued limited employment opportunities for academic historians, students who desire to continue their work in history after graduation need to learn about career possibilities in public history.

During the faculty fellowship I will strive to develop these new areas through reading, visiting historical sites and historical museums, consulting with museum professionals and experts in material culture, attending professional conferences, participating in an archaeological field experience, and serving as an intern at NTHP headquarters in Washington, D.C.

**DANIEL SHANNON**
Associate Professor of Philosophy

THE TRANSCENDENTAL AND HISTORICAL FOUNDATIONS OF HEGEL'S "PHENOMENOLOGY OF SPIRIT"

During this fellowship, I will prepare a book-length manuscript The Transcendental and Historical Foundations of Hegel's "Phenomenology of Spirit" in which I will attempt to show that the two most common interpretative methods for evaluating Hegel's Phenomenology have to be rejected because of their incompleteness and partiality. Hegel's argument in his book combines both transcendental and historical methodologies, which were prevalent in German philosophy after Kant. His method should be seen as a "transcendental history" on the levels and activities of Reason. In Book I of my work the traditional interpretations will be presented and criticized, and a detailed account of how Hegel faced the problem of transcendental knowledge during his Jena period (1801-06) will be documented. The work of Hegel's idealistic colleagues at Jena, focusing on the problem of transcendental knowledge as well as his own early systems at Jena, will be presented in order to show how Hegel understood that the problem of transcendental knowledge is solved through philosophical history. Book I will continue with my proof that in the first five chapters of Hegel's Phenomenology of Spirit he presents a Transcendental History. The arguments will be reconstructed to offer the proof. The arguments en toto will be presented in detail and analyzed for their historical content and philosophical import. In Book II I will offer objections and criticisms of Hegel's method and argumentation. The views of the historicists will be considered and objections will be offered against them. The book will conclude with my showing that although Hegel's philosophical argument is justified as a philosophical argument, this project fails to be the beginning and first part of the philosophical system.

**BARBARA STEINSON**
Professor of History

RURAL WOMEN IN INDIANA, 1870-1980

During this fellowship, I will complete a monograph which explores the history of rural women in Indiana from 1870 to 1980. The study will provide a long term assessment of the impact of the social, economic, religious, educational, governmental, and technological factors that have shaped the experiences of farm and rural women and their families and communities. Much of the narrative, however, will recount the ways in which individual women and their families lived through, resisted or adapted to these changes in their lives. Although considerable continuity exists in the home lives of "middling" rural Hoosiers from the 1870s to 1910s, the period from the late 1910s through World War II was one in which technology, educational reforms, and government programs transformed not only farming methods, but also the daily household routines of farm families. The second half of the century has also witnessed profound changes in the lives of rural Indiana women and their families. By the 1980s, a majority of rural women in Indiana earned wages in off-farm employment, but most of them sought employment so that their families could remain in farming. For many, this was a losing proposition: agriculture dominated the state in the 1870s; by the 1980s, only a small percentage of Hoosiers earned their livelihoods through farming. Since Indiana is a state rich in geographical diversity, its distinctive agricultural regions require an examination of the entire state, rather than a particular county or certain region. The study will provide valuable information for comparisons with other states and regions, but it will also reveal marked differences in rural experiences within the state. The manuscript will make significant contributions to women's history, rural history, Indiana history, and Twentieth Century U.S. history.