The Honors Program at Bridgewater

The Honors Program at Bridgewater provides an opportunity for gifted and highly motivated students to reach their full academic potential. The senior Honors Thesis, completed under the guidance of a faculty mentor in the student's major field, is the capstone of the program. Three recent Honors graduates, James Connell, Karen Jackson and Zachary Pelchat, describe their projects at right.

JIM CONNELL, '93

Jim has received a Fulbright Scholarship to study Neuroethology at the Max Planck Institute for Psychiatry in Germany beginning in the spring of 1995. He is currently in the Ph.D. program in neuroscience at Princeton.

My honors thesis has a somewhat unwieldy title: "The Topographic Organization of the Prefrontal Cortex of the Rat with Behavioral Correlates." I focused on two parts of the brain, the prefrontal cortex and the superior colliculus. Even though they are located at opposite ends of the brain, I believe that these two areas are in constant communication.

The neocortex, that outer convoluted portion that resembles a walnut, can be divided into two main areas, the primary areas and the secondary areas. Primary areas are the area of one specific sensation; for example, one primary area, the striate cortex, is devoted to vision. In these primary areas, the nerve cells are organized into very orderly maps. Secondary or association areas, however, are multimodal (i.e., deal with more than one sense) and have up until recently been thought of as seemingly disorganized tangle. Although the prefrontal cortex has been traditionally classified as an association area, my research suggests that highly ordered maps exist within the prefrontal cortex and perhaps in all association areas.

The experimental work for my project was carried out at a Harvard University laboratory where I worked for many years as a research assistant. My method involved injecting a fluorescent tracer of two different colors in one of the colliculi which make up the superior colliculus. Fluorotracers are taken up in retrograde fashion, from the terminus of the axon back to the cell body, which in this case was often located in the prefrontal cortex. I found very specific maps of cell bodies in the prefrontal cortex projecting to the reciprocal maps of the superior colliculus. The patches of color were very distinct and separate and in some areas overlapping. What does this mean? To summarize briefly, it suggests that there are no such things as association areas as they have been previously defined, at least as far as the prefrontal cortex is concerned.

The connection between these two parts of the brain can be seen in the link between eye movement, which is governed in part by the prefrontal cortex, and the vibrissae, in which the superior colliculus plays an important role. The behavior of cats is one illustration of the interactions involved: the cat intensely fixes on its prey, focusing on its every move. But at the same time a corona of whiskers which surround the cat's face provides information about events on the periphery, just outside its visual range.

Each whisker inputs directly into the superior colliculus. Within the circuitry of the prefrontal cortex and the superior colliculus and in the connections between the two we may find some of the mysteries of both attention and intention.

Understanding this circuitry, which probably exists in the brains of all higher animals including man, may provide us with insights into psychiatric illness. While I was working on my thesis I was fortunate enough to do an internship studying patients suffering from schizophrenia in the psychiatric ward of the Brockton VA. The psychiatrist with whom I was studying believed that dorsolateral lesions in the prefrontal cortex might be a causal factor in schizophrenia. Serendipitously we were able to apply some of the data from my studies on rats to our publication on research in human subjects.

ZACHARY PELCHAT, '94

Zachary Pelchat is a Second Lieutenant in the 383rd Military Intelligence Company of the U.S. Army Reserve at Ft. Devens, MA. While serving as an Army Reservist, he will also pursue an M.A.T. in History.
I was introduced to the subject of health care reform in Dr. Shaheen Moazzafar’s Public Policy class. Before that time, I hadn’t realized that health care is a huge industry, the third largest component of the Gross Domestic Product. In recent months, health care has become a major national issue; the Clintons’ health plan and several competing proposals have inspired spirited public debate.

My thesis examines whether or not a nationalized health care system is compatible with the U.S. market structure. A study of the health care programs of other western countries (such as Canada and Germany) and of the successes and failures of Medicare and Medicaid has led me to believe that a big government-run program won’t work here. To be successful in the U.S., a health care system must fit with the values of our society, which is based on a free market economy and values the entrepreneurial spirit.

The most sensible approach for the U.S., I believe, is to work within the framework of the system we have in place. We have been reminded many times during the past year that 36 million Americans don’t have access to health care because they cannot afford it. I believe that we can change the incentives within the existing system to decrease costs and increase access.

One example of a proposal that could bring down health care costs is regionalizing the purchase of expensive, high tech medical equipment. When, for example, Magnetic Resonance Imaging (MRI) scanners came on the market, every hospital wanted one of these systems, despite a capital investment of $25 million and a cost of nearly $1,000 per use. Hospitals compete for patients and prestige, and while competition usually brings costs down, in the health care field the opposite often occurs. Duplication of effort and equipment leads to waste, not efficiency. Thus it is necessary to change financial incentives in order to increase access to medical care and decrease costs. An autonomous board, composed of medical professionals (not political appointees) could be empowered to determine whether or not a hospital needs to purchase an expensive piece of equipment, taking regional assets into account.

Reversing incentives might also help to reduce the number of unnecessary tests doctors perform. Under the current system, there are powerful incentives to perform tests: insurance companies pay for the tests and physicians fear being sued for malpractice. This combination of retrospective payment and defensive medicine is a major force behind skyrocketing costs. Rather than completely dismantling our existing health care system, I believe that taking small, concrete steps could greatly improve it.

KAREN JACKSON, ’94


The research and writing of my Honors Thesis was the highlight of my undergraduate years at Bridgewater. As an English major with a minor in History, I combined the two disciplines by applying Frederick Jackson Turner’s “The Significance of the American Frontier” (1893) to the literary representations of the frontier created by James Fenimore Cooper and Willa Cather. Written nearly a century apart, Cooper’s Leatherstocking Tales and Cather’s prairie novels chart personal impressions of the American frontier from its early exploration to the development of farms and provincial towns. Although their landscapes differ, their concept of the frontier allows for common individuals, an unlearned hunter and immigrant women, to become heroic Americans. I explore the heroism of their characters who, by meeting the demands exacted by the wilderness and maintaining the virtues of “civilization,” reach heroic dimensions. In essence, the thesis suggests that the heroism of both Cooper’s frontiersman and Cather’s immigrant woman farmer is a result of their struggle to balance the unique characteristics ascribed to the frontier of the New World with those associated with the Old World or “civilization.”

These heroic characters are, in part, a product of their environment and consequently, they have cultivated the rugged individualism, pragmatism, and other traits proposed by Turner. Yet they also possess the characteristics generally regarded as Old World attributes such as Christian moralities, culture, and intellect. By combining the best qualities of both worlds, the characters are placed upon a mediating ground exalted by both novelists. Cooper’s Leatherstocking (Hawkeye in the Last of the Mohicans) is perhaps the most famous fictional representation of the rugged individual. But even Hawkeye, who considered himself “formed for the wilderness,” also “always thought of himself as a civilized being compared with even the Delawares.”

In its simplest form, Hawkeye’s transcendent and intermediary quality is exemplified by his unique costume. A combination of Indian wear and the garb of the frontiersman, Hawkeye’s dress modestly protects him from the elements while enabling him to perform his heroic feats with a dexterity comparable to the Indian’s. By incorporating elements of both worlds, he is permitted, even welcomed, to enter both an English fort and an Indian village. Yet in its entirety, Hawkeye’s costume distinguishes him from the white man and the Indian. Wearing neither the scanty garment of the Indian nor the white man’s cloth, Hawkeye is empowered to transcend the limitations and restrictions imposed upon each, but peerless, he stands upon a solitary ground between the two worlds.