INSIGHTS

Rutgers researchers uncover new knowledge in the sciences and humanities.

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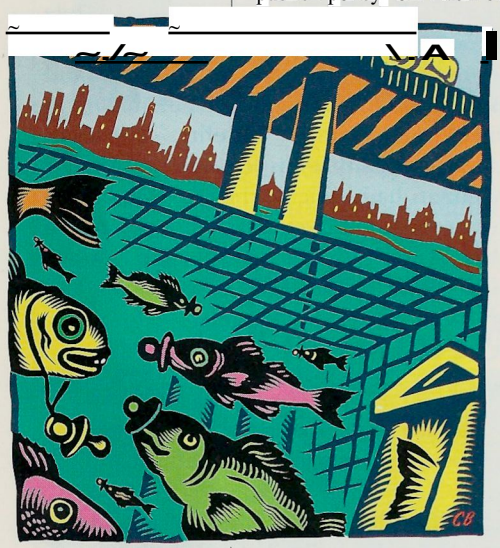
FISH CALL THE BIG ApPLE HOME

As unlikely as it seems, in the ongoing battle over responsible development of a prime piece of Manhattan real estate-the Hudson River waterfront-even fish have a place on the bargaining table. After all, two-thirds of the commercial catch harvested off the East Coast originates in protective estuaries like this urban waterfront. The Hudson River Foundation, a nonprofil group that supports scientific research and sound public policy on river-related issues, was concerned that plans to reshape the waterfront with landfills, platform construction, and other structures might damage the urban habitals of fish.



Although the Foundation was eager to study the effects of man-made structures on fish populations in urban areas, experts were not encouraging. "Marine scientists told us that it was almost impossible to correlate the presence or absence of fish to a specific habitat because they are continuously moving," says Dennis J SuszkolVski (CC'71), science director for the Foundation. "As a result, no one had ever conducted a definitive study, and we were left scratching our heads."

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But Ken Able, a professor at Rutgers' Institute of Marine and Coastal Sciences and director of Rutgers' Marine Field Station in Tuckerton, and colleagues at the National Marine Fishery Service in Sandy Hook had developed a method to conduct such studies in the natural estuaries ofthe Delaware River Basin; they thought it would work just as well in the Hudson River. With a $250,000 grant from the Foundat.ion, Able set out to det.ermine if such urban fish species as winter flounder, toutog, and striped bass can thrive in man-made environments.

Able and his colleagues tested six locations on both the New Jersey and New York sides of the Hudson where fish congregated. In each of these six habitats, he placed three-foot-square, screened cages containing three young fish. Each fish had been marked, weighed, and measured before entering the water. Every 10 days Able pulled the cages and charted the growth of the fish. "vVe found that although fish may be found under a pier, they do not do well there," says Able. "Compared with fish living in natural estuaries, these fish grow much more slowly; as a result, they are more likely to be eaten by predators and have a harder time surviving the winter. So when you build a large pier, you are essentially removing a fish habitat.

"Estuaries are critical to fish survival, especially during the first year," continues Able. "If we eliminate or further degrade urban estuaries, there will be a significant drop-off in the number of fish."

Able's study will influence the management and development of fish estuaries along the Hudson River, says Suszkowski. "Development is cyclical, and you can be sure lhere will be other proposals to reshape the waterfi-ont. Able has framed the issue for us."-BilL *Glavin*

Fault Finder

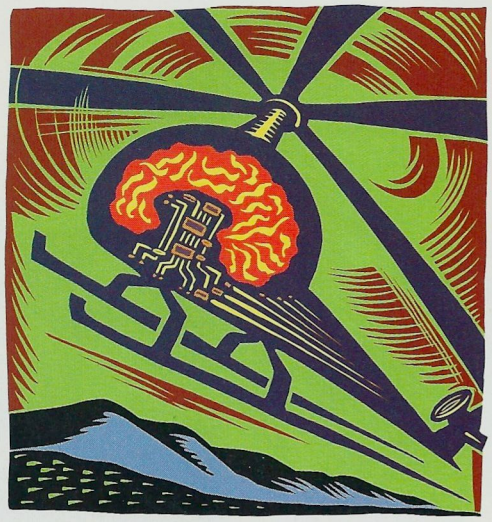
PROGRAM "KNOWS" THE RIGHT STUFF

Last summer, after performing flawlessl), in a major Nav)' training exercise, a Marine Corps CH-46 helicopter was puUed out of commission and overhauled. Despite the apparent success of the flight, a computer program had turned up major flaws in the copter's transmission. ""hen the transmission was dismantled, technicians found serious faults in the gears that had gone undetected by conventional testing methods.

The com purer program that detected these faults originated in the basic research of Mark Gluck, an assistant professor at the Center for Molecular and Behavioral Neuroscience at Rutgers-Newark. As a postdoctoral student at Stanford University, Gluck used Navy funding to stud), the learning patterns of rabbits as they were taught to blink t.heir eyes on cue. From this basic research,

Illustrations by Cathie Bleck

Cluck was able to map the neurological processes that control memory formation and recognitjon in the hippocampus of the human brain. Finally, at Rutgers, Cluck used the principles of these neural networks to devise a computer programming system that could "learn" normal function in mechanical equipment.



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In the case of the helicopter, for example, the system works by analyzing the vibrational signals given off by the transmission and comparing them with the known signals of a correctly functioning transmission. If the signals deviate from normal patterns, the computer knows that something is amiss. "It's the same principle as someone knowing what his car engine sounds like and being able to idenrify when something is wrong because the engine sounds different," says Cluck.

"This is a whole new approach to fault detection with tremendous commercial applications," says Rear Admiral Marc Pelaez, the chief of naval research, who points out that the military has also used the system to detect faults in aircraft carrier fire pumps and to identify sonar signals. Cluck thinks that there are medical applications for it as well. Says Pelaez: "The Navy has taken a lot of hits for supporting basic research [like Cluck's]. But this research creat.es knowledge that allows us to develop solutions to real *problems*."-*Kathleen Bmnel*

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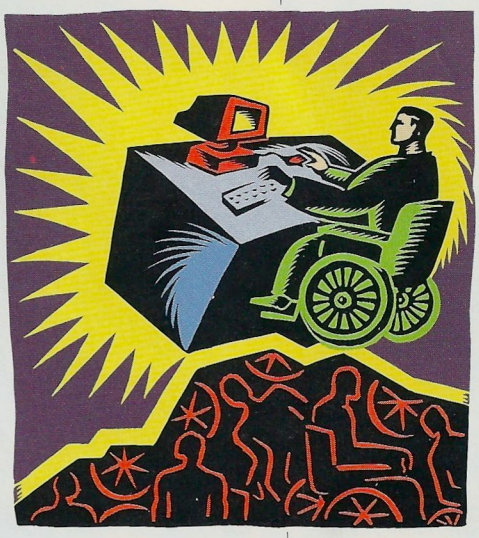
COMPUTERS HELP THE DISABLED WORK

After the shock of the initial trauma and the ordeal of rehabilitation, the estimated 200,000 Americans with spinal-cord injuries are faced with the daunting reality that they must somehow support themselves and their families. For many, these injuries preclude a return to their accustomed career, but for those with computer skills,job prospects are enhanced. That's the conclusion of a new study-believed to be the first of its kind-which found that the $2.2 billion in wages lost to spinal-cord injury in the United Slates each year could be offset by computer training.

Conducted by a research team that included Douglas Kruse, an associate professor in the School of Management and Labor Relat.ions at Rutgers-New Brunswick, the study found that among people with spinal-cord injuries, those who have computer skills enjoy a distinct advantage in the marketplace. These individuals return to work more quickly than those without such skills, and they also earn almost $500 more per week than those who return to work but do not use computers. "It's also important to note that people with such injuries who use computers at work earn just as much as workers without disabilities who use computers," says Kruse, who became interested in disability research after he sustained a spinal-cord injury. "Among those who don't use computers at work, there is a large pay gap."

While the enhanced job prospects offered by computer skills is good news for those with spinal-cord injuries, a harsher finding is that both computer use and employment decline after injury. Although 81 percent of respondents had been employed at the time they were injured, at the time of the survey, only 30 percent held jobs. And although more than half used computers at the time they were injured, considerably fewer continued to do so. "This may be because most people learn computer skills at work, and those with spinal-cord injuries are much less likely to work," says Kruse .



"People with spinal-cord injuries who use computers at wOTk earnjust as much as workers without disabilities."

The study, which was funded by the Disability Research Consortium at Rutgers and the Industrial Relations Section at Princeton University, was based on a survey of 391 people, mostly New Jerseyans, who had suffered spinal-cord injuries in the past 10 years. Other factors enhancing employment prospects, according to the study, were level of education and the abilit.y to drive. These findings, says Kruse, may lead to new opportunities in employment and independence for all Americans who use wheelchairs.-BiLL *Glavin*