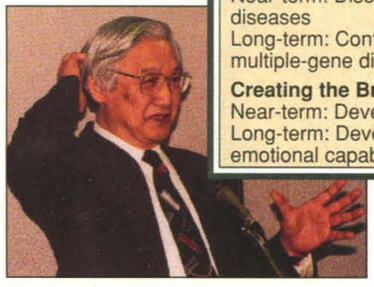
JAPANESE NEUROSCIENCE

New Institute Seen as Brains Behind Big Boost in Spending

TOKYO—Japan is joining the decade of the brain. As the 1990s began, the United States declared its commitment to neuroscience and backed it up with increased research spending, and Europe drew up its own plan in 1991. Now, it is Japan's turn. Government funding for a new neuroscience initiative will total $125 million this year and could increase sixfold over the next 5 years. At the center of the goals-driven research program is a $61 million Brain Science Institute that builds on an existing program at the Institute of Physical and Chemical Research (RIKEN) outside Tokyo. Officials hope the institute, which will open in November and could almost triple in size over the next 5 years, will help coordinate activities around the country and help Japan to become a global powerhouse in neuroscience.

Until now, says the new institute's head, RIKEN neuroscientist Masao Ito, Japanese neuroscientists "have all been frustrated" by the small scale of research groups, scant interaction among specialties in what is normally a very interdisciplinary field, and a lack of cooperation among the five ministries funding most of the work. "The institute is conceived as a key station for coordinating all activities in the university sector, the national-institute sector, and even industry," he says. Ito also hopes it will help Japanese neuroscientists stake out some unique research territory—e. g., theoretical neuroscience—as well as exploring applications in robotics and computer science. Other Japanese neuroscientists welcome the boost to their field, although some fear that the centralized effort will divert resources from universities.



SAM KITTNER

Heads up. RIKEN's Ito hopes his new institute will reveal the brain's secrets.

The increased investment in neuroscience comes in response to a call issued last year by an Ad Hoc Committee on Brain Science, which Ito assembled to raise the profile of the field. Ito was well placed to lead the charge as president of the Science Council of Japan, the nation's most prestigious association of scientists. That post also gives him a seat on the prime minister's Council of Science and Technology, the nation's highest science advisory body. Ito's campaign coincided with a broader effort to boost government support for research, and it meshed with plans by the Science and Technology Agency (STA), which oversees RIKEN, to expand its research portfolio.

This year's budget, for the year beginning 1 April, will provide STA and several other ministries with $125 million for neuroscience research. The spending comes on top of the tens of millions of dollars in small grants from Monbusho, the education ministry, to university researchers. That's a huge jump from the $83 million Japan spent on neuroscience research last year, although it pales in comparison with the more than $2 billion being spent on neuroscience research by U.S. agencies. A separate source of funding—a governmental economic-stimulus spending package—is bankrolling construction of a six-story building to house the institute.

Although the new neuroscience institute is expected to spearhead Japan's drive to catch up with the rest of the world, it is hardly starting from scratch. RIKEN already is home to a strong neuroscience team working under the Frontier Science Program, an international but largely Japan-funded scheme begun in 1986 to support high-risk research. The team's current slate of 10 neuroscience groups is expected to double by the time the institute officially opens, and Ito foresees a total of 50 research groups, each with 30 or more scientists and technicians, within 5 years. He would also like 30% of the research teams to be led by foreigners.

The institute's planned program, which closely follows the science committee's blueprint, is wide-ranging and ambitious, extending from fundamental research and theoretical work on the human brain to clinical neuroscience and applications in computer science and robotics. Targets for both the fundamental and applied aspects of the effort have been set at 5-year intervals over 20 years (see table). But because "we don't know from where the breakthroughs will really come," says Shigeru Tanaka, head of the frontier program's laboratory for neural modeling, which will move to the new institute, the strategic road map allows for shifting resources as needed.

At the same time, Ito and his colleagues believe the institute's emphasis on theoretical work might prove to be its distinguishing characteristic. One aspect of this concentration "is to study the basic principles of information processing and see how they apply to both the brain and computers," explains Tanaka. Ito, who has done pioneering work on the inhibitory action of Purkinje's cells in the cerebellum, believes neuroscience will reach an impasse unless its theoretical base is strengthened. As an example, he points to the basal ganglia, a major structure in the middle of the brain that has been studied extensively. "But we still don't know how it works," he says. "And the reason is very simple: We don't have a theory."

THREE WAYS TO EXPLORE THE BRAIN

Understanding the Brain
Short-term: Locate regions responsible for perception, emotion, and consciousness, and understand the mechanisms of memory and learning
Long-term: Understand self-consciousness and the role of language in thinking and intelligence

Protecting the Brain
Near-term: Diseases due to extrinsic factors and single-gene diseases
Long-term: Control developmental and aging processes; cure multiple-gene diseases

Creating the Brain
Near-term: Develop self-organizing memory systems
Long-term: Develop computer systems with intellectual and emotional capabilities

SOURCE: RIKEN

Although neuroscientists welcome the increased government interest in their field, some worry about RIKEN's dominant presence. Ichiro Kanazawa, chair of the department of clinical neurology and neuroscience at the University of Tokyo's Institute for Brain Research, says that one concern discussed by the ad hoc committee was that "young researchers might not remain at universities if RIKEN's progress proves particularly effective." There are also worries about concentrating power. Ito would like to see a successor to the ad hoc committee act as a steering committee to coordinate governmental spending on neuroscience. Yet, the committee was sponsored by the STA; Monbusho, which oversees the universities, did not take part, and it is now planning a new grants program of its own in neuroscience.

Ito emphasizes that RIKEN's new neuroscience effort is meant to complement—not compete with—university and other institute programs. He says the new institute won't be able to achieve its goals in isolation. For example, RIKEN has no clinical facilities and so will need to cooperate with clinical groups for work on neural diseases. Ito also

emphasizes that the plan is to establish the databases and experimental tools and techniques that are needed by the neuroscience community at the new institute.

Regardless of whether Ito's hopes for closer cooperation among the nation's disparate neuroscience efforts are realized, scientists both at home and abroad have high expectations for the new institute. Kyoto University neuroscientist Shigetada Nakanishi, for example, says he looks forward to the RIKEN scientists building on their strong record in cognitive neuroscience.

Neuroscience leaders abroad are also hailing Japan's increased commitment to neuroscience and the new institute. Steven Hyman, director of the U.S. National Institute of Mental Health, says, "The [worldwide] community will benefit from the investment." He adds that the emphasis on theory is "very unusual" and bears watching, and that U.S. officials have had preliminary discussions on possible cooperation with the new RIKEN institute.

Ito acknowledges that some of the goals for the institute, even at the 20-year mark, "may not be possible." But he and others are confident that Japan, by adding money and leadership to a strong scientific base, will be able to make major contributions to what many already see as a golden age of brain science.

–Dennis Normile

INTERNET

Domain Names Windfall Causes Flap

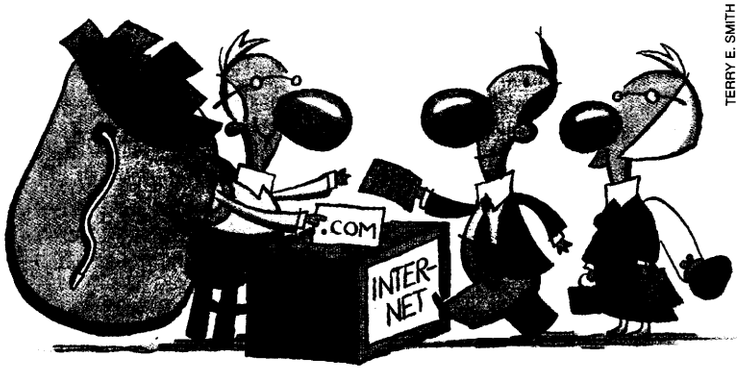
It began as an innocent attempt by the National Science Foundation (NSF) to save money and ease the burden on a beleaguered contractor. But a decision 18 months ago to charge $50 a year to register Internet domain names—the tail ends of everyone's Web site address, such as "sciencemag.org"—has turned into a free-for-all struggle for the future of the Internet. Along the way, it has created the possibility of a $60-million-a-year windfall for researchers—and an internal debate within NSF over whether the agency should continue to oversee a medium that it helped create.

At the center of the controversy is the fate of a rapidly growing pot of money being collected by Network Solutions Inc. (NSI), a northern Virginia company that has a 5-year agreement with NSF to manage the registration process. With registrants piling up at the rate of 90,000 a month, last week the number of domain names at NSI hit the 1-million mark. Some 70% of the fee is used to pay NSI's operating costs, while 30% goes into a fund intended to enhance the "intellectual infrastructure" of the Internet.

With that total projected to grow to 4 million registrations by mid-1999, the pot could reach $60 million a year. Not surprisingly, those dollar signs have attracted attention and spawned debate on the larger question of who should manage the Internet—the government or the private sector. And if it's the government, which agency should do it, and how should the money be spent?

A new report from the office of NSF's inspector general, the agency's in-house financial watchdog, makes the case for a continued NSF role in managing domain names, with the money being used to upgrade the Internet and, more generally, for research of all sorts. That idea also seems to be winning favor with the House appropriations subcommittee that oversees NSF's budget, which last week discussed the still-confidential report at an open hearing with the president's science adviser, Jack Gibbons. "The government retains an interest in the Internet" for everything from electronic tax filing to processing data from environmental satellites, says a committee aide, and the money should be handled by an agency with links to the community it serves. "The greater the distance between the agency collecting the money and the ultimate user," says the aide, "the less likely it is that the money will go toward upgrading the Internet."

But other senior NSF officials say the Internet is no longer primarily a research tool, and overseeing it shouldn't be their job. They even seem willing to give up the money. "We've got a tiger by the tail, and we're trying to figure out how to let go," says George Strawn, head of NSF's networking division, which has proposed ending the cooperative agreement with NSI before the contract runs out in September 1998. Adds NSF spokesperson Joel Widder, "The nature of the beast has changed dramatically in the last 4 years. It's no longer a research function, and overseeing a largely commercial operation is not what we should be doing."



TERRY E. SMITH

Supporting that view is the Internet International Ad Hoc Committee,* a nongovernmental body of technical, legal, and business experts. This winter, it proposed creating an international, self-governing body of service providers, businesses, and other users to manage domain names. Such a group, dubbed the Committee of Registrars, would manage a centralized database of domain names and set policy on any registration fees.

As for what to do with the money already in the pot, NSI itself has proposed to NSF that it be allowed to create a nonprofit Internet Foundation to manage the share of revenues intended to enhance the Internet. Such a foundation "would be run by representatives of the Internet community and be independent of both NSI and NSF," says David Graves, the company's Internet manager.

Resolution of the issue may await the findings of an internal White House panel that convened last week to consider a broad range of topics, including the current registration fee, according to an Administration official familiar with the matter. The task force plans in the next few months to consult with all stakeholders, says the official, adding that no changes are planned in the meantime. Testifying last week on his office's budget, Gibbons refused to be pinned down on what might happen, saying that the money "should go toward a purpose related to its source—improving the Internet. But NSF sees it as a distraction from its mission."

Whatever the outcome, Widder says NSF welcomes the debate about where the Internet is headed. As for the fund itself, the Administration official responsible for developing an overall federal policy toward the Internet says that it is "not the driving force." But the appropriations staffer holds a narrower view. "We're following it with interest, because the potential revenue is a way of easing pressure on the NSF appropriations," the aide says. "For us, it always comes down to money."

–Jeffrey Mervis

* http://www.iahc.org