

Tansei aims at sharing the latest developments at the University of Tokyo with everyone interested in education and research worldwide.

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# 淡青 tansei



1st H. Watanabe



2nd H. Kato



3rd, 8th A. Hamao



4th M. Toyama



5th D. Kikuchi



6th, 9th K. Yamakawa



7th N. Matsui



10th Y. Kozai



11th K. Onozuka



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13th Y. Hiraga



14th Y. Uchida



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20th K. Hayashi



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27th T. Sasaki

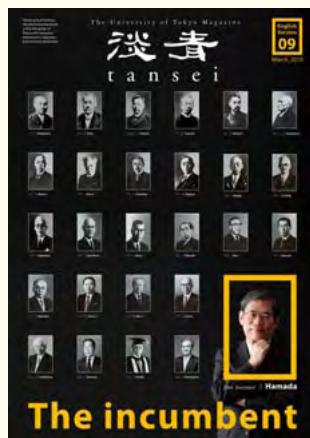


28th H. Komiyama



29th President J. Hamada

# The incumbent



TANSEI - The school color of the University of Tokyo is light blue (*tansei* in Japanese). It was initially used at the first rowing regatta between the University of Tokyo and Kyoto University in 1920.

The colors of the two universities were determined by drawing lots. Kyoto University drew dark blue and the University of Tokyo light blue. Since then, light blue has been the school color of the University of Tokyo.

Welcome to TANSEI 09. In April 2009, the University of Tokyo ushered in new leadership with the election of Professor Hamada Junichi as president. The first part of this issue introduces our new leader with a slogan, "Moving the Forest." In the roundtable discussion, the new president gives an overview of his thoughts on the present and future of the university, the relationship between society and the university, international awareness, and the situation today on the front lines of research, which hints at the direction in which he will lead the university for the remainder of his term of office.

The second part of this TANSEI highlights "Experimentation." A broad spectrum of experiments is conducted at the University of Tokyo. Due to space limitation, only a few of them are featured in this issue, but I hope these will give you a sense of the exciting work that, every day, keeps faculty and students enthusiastically engaged until late at night.

## **Takeda Hiroyuki Ph.D**

*Chairperson of the Public Relations Committee  
Professor, Graduate School of Science*

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# At the Threshold of a New Era

## Hamada Junichi Takes Office as President

The University of Tokyo installed its first president in 1886. Since that time, the university has made great strides forward in its search for knowledge under the leadership of its presidents. Hamada Junichi became the university's twenty-ninth president in April 2009. A new era has dawned for the University of Tokyo in its tireless pursuit of knowledge and its persistent efforts to fulfill its obligations to society.

### Hamada Junichi

*Dr. Hamada Junichi became the 29th president of the University of Tokyo on April 1, 2009, after serving in a number of leadership positions, including Dean of the Interfaculty Initiative in Information Studies and Dean of the Graduate School of Interdisciplinary Information Studies in 2000-2002, and Managing Director and Executive Vice President of the University of Tokyo in 2005-2009.*

*Dr. Hamada specializes in information law and policy, and received his BA, MA and Ph.D. from the University of Tokyo in law.*

The  
incumbent

# Moving the Forest

瀬戸純一

Hamada Junichi

The  
incumbent



**M**oving the forest. This does not refer to the world of Macbeth or The Lord of the Rings. Rather it speaks of the new era that the University of Tokyo is now entering.

Six years have passed since the university was incorporated as a national university corporation. Under President Sasaki Takeshi, we developed the systems and frameworks needed for the incorporation itself. Then, during the tenure of President Komiyama Hiroshi, we took bold measures to make the most of the potential inherent in the incorporation. The reforms related to incorporation have thus moved from the stage of preparing the soil and planting new trees to the stage of moving the forest based on the solid foundation developed. That is my sense of where we are today. The underlying principle of my term of office will be moving the forest — re-establishing the university on its new foundations so carefully prepared by my predecessors—making the most of the strengths that emerge from the University of Tokyo's very core and ensuring their sustainability by making good use of our post-incorporation frameworks and the potential they hold.

The University of Tokyo is called on today to further raise the level of its research and to play a central role in the advancement of Japanese and international scholarship as we aim to reach the highest levels of human knowledge. Through education, we will develop talented people who can lead humanity into the future throughout the world by applying the knowledge they master in their studies at the university. Moreover, through our broad partnerships with society the accumulated knowledge of the University of Tokyo can offer new vitality to the international community and lead, through fruitful exchange, to the creation of even more profound knowledge.

I believe that through the creation of knowledge, through education and through close association with society, now more than ever is the time for the University of Tokyo to fulfill its public responsibility towards the future of Japan and of the world. This year the university will implement “Action Scenario : FOREST 2015” to begin creating the University of Tokyo of 2015. With its abundant conceptual powers, and in its role of supporting the world through knowledge, the University of Tokyo is determined to forge ahead to that future.

## A Reliable Compass to the Future

The world today is facing a period of dramatic change. As a result of the 2008 financial crisis, global industry and the global economy are still experiencing instability, and the foundations of individuals' livelihoods are being eroded. I believe that society is searching for a reliable compass to the future. After overcoming the current challenge, it is unlikely that the world will return to the same state as before—the wisdom gained by humanity through this experience may give rise to a new form of society, more comfortable and more stable.

Academia is expected to draft the outline of this future society and draw up the path to that goal. At the University of Tokyo, we are carrying out fundamental research into the very existence of humankind, the mechanisms of life

itself and the structure of space and matter, the creation of new technologies and research on systems and theories to support social life and activities. On the basis of this broad and diverse research, the University is fostering the exceptional talent that will sustain humanity in the future as it treads that path.

The University of Tokyo, as a national university corporation supported by the Japanese people, is committed to fulfilling its public responsibility to provide a reliable compass to the future through academic research and by fostering new talent. Moreover, the university is dedicated to playing its role in raising the world's confidence in and respect for Japan by contributing to the well-being of people around the world.

## Educating Resilient Students

*Education at the University of Tokyo is unique in its attempt to effectively combine wide-ranging liberal arts studies with the mastery of specialized knowledge. We add depth to our education by ensuring the maximum synergistic effect among our programs as a comprehensive research university while continuing to enhance quality in both our liberal arts and specialized educational offerings.*

*We encourage students to refine their personal character and international awareness in addition to their intellectual abilities so that they become leaders capable of tough negotiation and bold action.*

## From the World to Japan, from Japan to the World

*It goes without saying that the problems we face today and in our daily lives exist within the context of our mutual relations with other countries. The education and research activities of the University of Tokyo cannot be sustained without the involvement of the rest of the world, and we hope that the benefits of that research will be widely enjoyed by humanity at large.*

*We will enhance our international exchange framework so that we can increase the number of international students and researchers that we accept. We will publicize the knowledge we have acquired to Asia and the rest of the world and promote diversity for the creation of knowledge.*

*It is critical that we further enhance the international awareness of our Japanese students. We will increase opportunities for language study, international exposure, and exchange with international students.*

# With Determination and Daring



## A Flagship University with a Wide Range of Partnerships

The University of Tokyo bears an important responsibility as a flagship university pioneering the future of academia and higher education in Japan. We will fulfill our key role mainly by drawing on our education and research activities in which we take great pride. Society faces a wide range of challenges today, which the University of Tokyo will address with new academic value and diverse education and research programs. The University of Tokyo spreads its academic wings not just to the present and the future, but to the past as well. A historically-tempered

awareness of the accumulation of wisdom combined with a determined effort to realize the future possibilities of knowledge is an essential prerequisite for the creation of human knowledge. It is by focusing not just on scholarship for acclaim today, but by ensuring the sustenance and continued development of diverse disciplines into the future, that we can enrich the foundations of knowledge and nurture new sources of creativity.

Needless to say, the University of Tokyo is not a flagship university solely through

its own strength. Our partnerships with society—with many Japanese national, public, and private universities as well as with industry, national and local governments, and citizens—are indispensable for the spread, diverse application, and creation of knowledge. Through the promotion of active collaboration with universities in Japan and overseas and with every segment of the international community, I aim to develop an environment where, guided by the principle of the “commonwealth of knowledge,” the University of Tokyo can apply its knowledge to the optimal benefit of society.

### **Leadership Style: Strong central organization, Strong departments, Strong individuals**

*The key to my leadership style lies in my ability to operate the university by harnessing to best effect the strengths of the university's academic and administrative staff and students. A flexible style of leadership is optimal for the University of Tokyo where every member of the community possesses his or her own unique forte. For this reason, I will create a strong central structure bolstered by strong individuals and strong departments.*

### **Successfully pursuing Two Hares**

*In academic areas, I will endeavor to expand education and research in basic disciplines as well as in state-of-the-art and integrative fields. In the area of administration, I will pursue consistent accuracy, flexibility, and innovation. By combining the university's strengths in new ways, I will seek out the synergies that will enhance the university's performance in both areas.*

### **A Streamlined Organization with Smart and Speedy Operations**

*I will further promote organizational reform and work restructuring and seek thoroughgoing compliance. By raising management efficiency through organizational streamlining, I will create time for academic and administrative staff to engage in creative activities and seek the smart and speedy operations expected of a national university corporation.*

### **Diversification of Financial Sources and Effective Management of Assets**

*By securing diverse sources of financial support and managing them flexibly, I will safeguard high-level education and research activities over the long term. I will seek to manage the university's assets, including our facilities and grounds, in a more effective and flexible manner by optimizing our asset management plan and introducing diverse development methods. I will also pursue the proper maintenance of facilities and other assets.*



**The  
incumbent**

The Roundtable Discussion

# The Commonwealth of Knowledge

## How the University of Tokyo can contribute to the world

What role should the University of Tokyo play in an era of radical change? Today, the ways in which knowledge should shape the future of humanity are being called into question.

On April 10, 2009, soon after the appointment of Hamada Junichi as president of the university, a special roundtable discussion was convened to address this issue.

The participants: President Hamada, Professor Gonokami Makoto of the Graduate School of Engineering, and Professor Yoshimi Shunya of the Graduate School of Interdisciplinary Information Studies. Their conversation points toward the university of the future, open to society at large.





**Hamada:** Contemporary society is being buffeted by the winds of change. I believe we have come to a point at which we should be reexamining all of the concepts built up in the course of human history—stitutions, cultures, technologies, the economic system, human consciousness itself—and go on to create a new era for humanity. In order to accomplish this, I think the role of academic knowledge will be of decisive importance, and to express this in the clearest possible way, I would like to revive the word “commonwealth.” It’s a slightly dated word, used to signify what was called in Latin *res publica*, the public welfare or common good. And despite its somewhat old-fashioned ring, I would like to propose “commonwealth” as the pivotal theme for this roundtable discussion aimed at reconsidering the role of knowledge in our society. And I have asked Professor Gonokami and Professor Yoshimi to join me in this conversation because I think they embody two aspects that characterize the University of Tokyo itself: a commitment to the fundamental principles of science and scholarship, and at the same time the capacity to flexibly apply these principles to the issues and needs of society.

## Todai's strengths: diversity and potentiality

**Hamada:** I feel the University of Tokyo, while grounded in the fundamentals, has the academic breadth and depth to respond freely to new challenges. This gives it an immense capacity to contribute to society and shape a new era. This solid foundation in the academic disciplines coupled with a flexible approach to new issues is what makes Todai<sup>1</sup> interesting, in my opinion.

**Gonokami:** When I was a freshman, I took a general seminar with Professor Hara Hiroshi (Emeritus Professor, Institute of Industrial Science). Professor Hara had many deeply interesting things to say. The seminar was fascinating; organized around the history of modern architecture, it expanded well beyond that to engage a truly diverse series of discussions on contemporary culture. At the same time, there was a project underway at Komaba Library to construct a replica of Marcel Duchamp's *Large Glass*<sup>2</sup>, a project in which my teacher for geometry and graphics, Professor Yokoyama Tadashi (Emeritus

Professor, College of Arts and Sciences), was passionately involved. The project began with a study of the philosophical jottings left by Duchamp; continued with an examination of several thousand photographs of details of the *Large Glass* taken at the Philadelphia Museum of Art, which owns the work, and a consideration of the technical and other issues involved in creating an accurate reproduction; and finally moved on to the actual process of reproducing the work. So I was exposed at first-hand to a truly deep cultural experience involving a masterful integration of the arts and sciences, and it really made me appreciate being at Todai. I went on to pursue a quite orthodox academic path, but I think this exposure to “deep culture” had an extremely powerful influence on me. It gave me a sense of the power that resides in the variety of people pursuing a diversity of intellectual enterprises at Todai, something I believe continues to be true today.

**Hamada:** Yes, I think the chance to experience that power can probably be found in many places throughout this university.

**Yoshimi:** The two years at Komaba (in the first half of the undergraduate program) are particularly rich in opportunities to experience that sort of power, and it seems to me this is one of Todai's most valuable assets. The period from age 18 to 22 or so is one in which we still don't have a clear idea of which way our life is headed. And during this decisive period, students from all disciplines in the humanities and from the sciences are brought together at Komaba and share a variety of experiences. The atmosphere at Komaba holds a diversity and potential that I think can be found only at Todai.

**Hamada:** And I think the question that confronts us now is how the power drawn forth from this diversity and potential can be constructively applied to the needs of society.



**Gonokami:** Yes. You know, a university of this scale and scope could not possibly have arisen spontaneously over the course of the last 130 years. In large part, it was consciously designed to contribute to building the modern Japanese nation-state. In 2004, national universities run by the state were changed to incorporated entities, which liberated us from much of this burden, in a sense giving us new freedoms and responsibilities. And I think society is demanding to know how we understand this and what we intend to do with it.

**Hamada:** From the time of its founding, Todai was certainly premised upon the ideals of service to the national community—and there is no doubt that initially it was “designed” to fulfill that purpose. But as time went by, there was no specific individual or particular political decision that shaped the university; rather, I believe it was created out of an interaction between the university and society or the state, a sort of synergy. And I feel that by very sensitively responding to the expectations placed by society upon the university, the role of the University of Tokyo in what, broadly speaking, we can call the “commonwealth,” has matured over time.

**Gonokami:** In the beginning Todai was the product of design, but the really great transformations that occurred at certain critical junctures—becoming an imperial university, undergoing the postwar reform of the school education system, the process of incorporation in 2004—these were not the result of a scenario someone created; rather, political, economic, and social forces triggered the change. And I think that the present form of the University of Tokyo is the result of the solutions arrived at as the constituent elements of the university struggled with the question of the core values that needed to be defended and nurtured in the wake of these great transformations.

<sup>1</sup>The University of Tokyo

<sup>2</sup>Common name for a work whose formal title is “The Bride Stripped Bare by Her Bachelors, Even.” Duchamp worked on the piece from 1915 to 1923, eventually leaving it uncompleted.

## Making a “declaration of intent” to respond to the expectations of society

**Hamada:** Let's shift to a slightly different subject. In thinking about the meaning of the commonwealth for these times, we confront such issues as the growing inequality of contemporary society. Economic inequality, differing levels of technological competence, the urban-rural divide—whether we should call this “disparity” or take a more charitable view and call it “diversity” is open to question, but it is definitely a sign of our times. How do each of you interpret this present era to which the University of Tokyo is compelled to respond?

**Yoshimi:** Personally speaking, I think we're faced with a situation that might be called a “hollowing out.” From about the end of the 1970s onward, there has been an acceleration and broadening of flows of capital and people throughout the world. It's a process of transformation from the welfare state to globalization, and the shift to a floating exchange rate has played a major role in this. Capital has become able to flow freely across national borders. And because capital seeks areas where labor is cheap, Japanese corporations have gradually expanded overseas. First to Southeast Asia, then eventually to China. Our backbone industries have been shifting their centers of production overseas. “Hollowing out” on an economic level begins with this. And so we see an increasing number of “marginal communities” in Japan's rural areas, and growing economic disparity in the cities. And as a result, Japan has shifted from a national model of “let's all become affluent together” to one of “let's allow for inequality, and let the winners really win.” This major trend began to be recognized during the course of the last decade, as the attention of Japanese society began to be focused upon the parts of society that were being left behind, or hollowed out. One

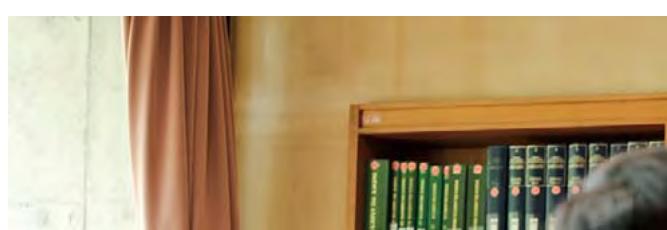
outider of this was the major expansion of temporary employment in the labor marketplace. How did “knowledge,” especially at the universities, respond to this situation? The universities have been ten to fifteen years behind developments in the society at large, not engaging in major institutional change until the transition to incorporated status. Even so, universities have to respond to social change—I think that is the biggest challenge facing the contemporary university. For example, in order to respond to globalization we must internationalize. In the sciences we are rapidly establishing an international presence, but in the humanities there is still little change. On the other hand, in the process of producing and outputting “knowledge” in response to global developments, there is the danger that the content of our “knowledge” will itself be hollowed out. There is a need for some sort of safety net to ensure that what has happened in the economic sphere does not happen in the academic sphere. Perhaps this is what “the commonwealth of knowledge” really is. In any case, I feel that unless we can come up with effective countermeasures to prevent the hollowing out of knowledge, we cannot guarantee the future development of our universities.

**Gonokami:** I share Professor Yoshimi's feelings about the changes taking place in the world. Since the 1970s information-sharing and distribution systems have made astonishing progress, producing a situation in which, when something happens, its effect is felt overnight on the other side of the globe. The speed of information has surpassed the capacity of human beings to control it, and this has created tensions

with the social system constructed in the course of the twentieth century. To cope with the speed of our times, scholarship is required to develop the insight to conceive of policies with a view to the distant future, while at the same time making those policies reflect contemporary concerns. Yet even if the speed of progress increases tenfold, I do not think there is any need for the university to panic. And that is because I think society looks to the universities to explore the future with universal values as their watchword and shield. We need to return to the roots of scholarship—shared intellectual values that transcend time—and contribute to refining them. I believe that we must create a type of scholarship that can express a vision of a distant future without losing sight of its own essential nature. Moreover, in the application of science and technology to society, the old division of labor between the humanities and the sciences is no longer functional; there is a need to grasp this process from an integrated perspective. The division between the sciences and humanities is merely one of phases, I think. In the early Meiji period (the late nineteenth century



a commitment  
to scholarship



in Japan), when the physical science laboratory was first established at Todai, “physical science” was an expression shared throughout the world. In other words, the physical sciences were, *a priori*, a global discipline. At present, however, not only the natural sciences but the social and human sciences have expanded into global fields of activity. And so I think that Todai must transcend the division between the sciences and the humanities to propose a comprehensive scholarship in service to society.

**Hamada:** I believe what Professor Gonokami was just talking about could be expressed in slightly different terms as a declaration of intent by scholarship vis-à-vis society. Traditionally, academic knowledge has largely been used in its predictive or confirmative capacity, but I think we have entered an era in which we must look carefully at the future direction of society as a whole, and define the place of scholarship within it and be very clear about our intentions. And this is what I think will support the university’s contribution to the commonwealth.

**Gonokami:** As scholars and researchers we have always taken a humble and modest attitude toward the pursuit of truth. And I think we should continue to do so. But I do not think that expressing a concern for why we are engaged in scholarship or what forms it should take is incompatible with this humility in the pursuit of truth. In the past, scholarship may have rather tended to avoid such declarations of intent, but I think we need to be forthright about expressing them. To that end, we should place expressing our intentions at the core of what we are doing.

### Expressing a vision for the future of scholarship

**Yoshimi:** A few minutes ago Professor Gonokami spoke of keeping an eye on the distant future while reflecting on what is close at hand, and I think that attitude is certainly becoming necessary in a variety of contexts in contemporary society. Yet if you take a look at the realities that surround us—for instance, the issue of educating students at Todai—I am not so sure

that we have actually achieved such a perspective. Students, especially our graduate students, are getting worn down by the extreme uncertainties of their future career paths. It is very difficult for them to see what the future holds in store for them if they choose to continue their current studies and research. And it is not only their career path that is difficult to envision; it is also difficult for them to see how their present research will connect with future science and scholarship. Therefore our commitment to scholarship and our expression of intent must be directed not only towards society at large, but

to our students as well. We have to show them a career path, and at the same time point the way to the scholarship of the future.

**Hamada:** For example, we’ve been hearing great demand from society for broadly educated, highly adaptable postdocs. There’s a demand for education that can open a variety of career paths.

**Yoshimi:** I think in many respects a diversified education is becoming necessary. But beyond that, I think we need to progress to a stage in which society and the universities collaborate in the creation of new values. We need to appeal to society with a vision of what sort of society we want to have 30 or 50 years in the future, and work to build a social consensus around what sort of mechanisms we must establish to train the people who will create that future.

**Hamada:** You are talking about choosing a sort of third path, aren’t you?—neither simply accepting the opinions of society nor making a one-sided assertion of the university’s point of view. I think the very act of putting such a process to work is one aspect of the commonwealth as it is realized in the university.

### Strengthening Todai’s international strategy in order to serve the planet

**Hamada:** The University of Tokyo considers its response to internationalization to be an extremely important theme for university management. And it seems to me quite natural to think about the commonwealth that is the theme of this roundtable from a global perspective. In my inaugural address as president of the university in April 2009, I included a phrase describing Todai as “supporting the world through knowledge.” Former president Komiyama Hiroshi spoke of “striving to reach the pinnacle of global knowledge,” and that, too, is quite



**scholarship  
in service  
to society**



**a perspective  
rooted in Asia**



important. And it got me thinking, for what purpose should we reach “the pinnacle of global knowledge.” The answer, it seems to me, is in order for the University of Tokyo to serve the planet. What do I mean by that? Of course one aspect of this is to make knowledge at a very high level, gained through the fruits of our research, available to the world at large. But at the same time, I am also hoping to see Todai graduates active throughout the world in ways that will serve the future of humanity. In other words, I want to emphasize that we should be serving the world not merely through research, but in terms of human talent. And in fact, Todai graduates are active throughout the globe in business and cultural activities, research, and other areas. I’d like these activities to be better known to the public, to build networks to support them, and to give them every possible encouragement. Making today’s students aware of these activities of Todai alumni will also be an encouragement to them to follow this path.



**Gonokami:** If Todai is to “serve the world,” I think it has to take the form of service to the world that is based on a consciousness of Japan’s individuality. After all, Japan is a rather unique presence globally, with its highly developed economy and culture, and the Japanese linguistic environment we all live within. And I think it is important to have our students experience that uniqueness. At the same time, we must give them the chance to become aware of Japan’s place in a global context. For example, at Todai we are planning to create an International Lodge at the Kashiwa campus as a residence facility for foreign students and visiting researchers, and I think it would be a fine idea to create a village there in which Japanese students could live communally with overseas students. The Japanese students could provide support to foreign students arriving

with limited knowledge of the Japanese language, and the experience of sharing daily life and chores with people from other countries—taking out the garbage, cleaning, doing yard work—would help them become aware that the world is full of people from other cultures, with patterns of thought and behavior different from their own.

**Yoshimi:** I think there is something that is extremely important to consider in terms of Todai’s service to the world, and that is the fact that Todai and other top-level Japanese universities are practically the only universities in the non-Western world that have the capacity to nurture world-class talent solely within their own academic system. For example, the top-level universities in Korea, Taiwan, and Southeast Asia have established a pattern in which their graduate students go abroad to the United States or the United Kingdom to earn their PhDs and then return to teach at their alma maters. For better or for worse, the American academic system has been used as a structural element of their own. But the academic system at Todai has managed to maintain its autonomy in terms of training the next generation of scholars. At the University of Tokyo, we can approach service to the world in a different way from that of the American or British universities, from a perspective rooted in Asia. And I think contributing to global scholarship from Asia is also an important thing from the perspective of academic diversity. So what is it that Todai should do in service to the world? I think, first of all, it should team up with the other top universities of Asia to establish an academic system with an Asian basis. This is an initiative that would make a contribution not only to Japan, but to the world as a whole. The second thing Todai should do is to create mechanisms that encourage the world’s leading talent to study abroad at Todai. Specifically, Todai should create a strategic scholarship system that encourages the world’s top students to come here. The year before last, the Graduate School of Interdisciplinary Information Studies with which I am affiliated, created a program called the Information, Technology and Society in Asia, taught in English. It’s a quite interesting program engaged in research in how information technology is changing Asia, and we are getting applications from extremely talented students throughout the Asian region. But many of these exceptional students

are also applying to famous American universities, and if they are accepted in both places, the first question they will ask is “Can you offer me a scholarship?” Our present scholarship systems are primarily need-based, but I think in order to attract exceptionally talented Asian students to Todai we need to create a strategic scholarship system.

**Gonokami:** Last year, the Graduate School of Engineering inaugurated the Photon Science Center, which we hope to use as a special zone for a variety of schemes for collaboration between academia and industry and the training of new talent. One of the plans is to offer training to more foreign students. But for outstanding Korean and Chinese students, American graduate schools are their first choice. So in order to attract them to Todai, I think first of all we should introduce a graduate school application process identical to that in the U.S. And we are thinking of allowing Japanese students to apply using this system as well. We think we can energize our Japanese students by putting them in contact and competition with foreign students who have worked hard to come and study in Japan and who have a clear sense of purpose motivating their studies. In the long term, I could see this system becoming the model for training doctoral candidates.

**Yoshimi:** Scholarships and accommodations are two issues that must be surmounted to make such a scheme work.

**Hamada:** Yes, that’s true. Scholarships and residential accommodations are likely to be clear criteria by which prospective students rank universities, when we are offering conditions and an environment more or less equivalent in all other respects to European and American universities.

### Nurturing a “Commonwealth of Knowledge”

**Hamada:** Today we’ve had some wide-ranging discussions on the theme of a “commonwealth of knowledge.” To me, what this “commonwealth of knowledge” signifies is Todai’s mission to respond to the needs of our era by refining our academic offerings with a commitment to putting the diversity and potential that are the strengths of this

university to work in service to society.

**Gonokami:** At the time of the radical transformation brought by the university's incorporation, we needed a banner to fly to keep us from losing sight of our goals. Former president Komiyama's challenge to us to "strive to reach the pinnacle of global knowledge," clearly served as such a banner. Now, four years later, I think we have come to see that aiming at that pinnacle is not enough; we need to participate in a "commonwealth of knowledge." The University of Tokyo is home to almost 10 percent of all the doctoral students in the country. I feel it is incumbent upon us to make full use of the value that arises from operating on this scale.

**Yoshimi:** I mentioned this earlier, but the world has gone from the era of the welfare state through a period of neoliberalism and an emphasis on market economics, and is now entering a new phase I expect will last for several decades. In this new phase, I think it is very likely that the "commonwealth"—in a quite different sense than that envisaged during the era of the welfare state—will become a key concept. And the "commonwealth of knowledge" that we will be responsible for will be the academy's answer to the challenge of this new concept of the general commonwealth.

**Hamada:** I think the University of Tokyo's mission will become increasingly significant as time unfolds. I always say that the leadership of the university president is the capacity to fully mobilize the power of the faculty and students in order to effect change in the university itself, and the valuable conversation I have had with you both today has confirmed my sense that this is true. Thank you so much for taking the time to join me here today.

April 10, 2009  
In the Fubunkan Meeting Room, Faculty of Letters Building No. 3, the University of Tokyo



### Gonokami Makoto

*Gonokami Makoto became a professor in 1998 at the Department of Applied Physics, the School of Engineering of the University of Tokyo. He served as an Executive Advisor to the University President in 2006-2007. He is currently Director of the Photon Science Center of the University of Tokyo.*

*Professor Gonokami received his B.Sc., M.Sc., and Ph.D. from the University of Tokyo in the field of Physics.*

### Yoshimi Shunya

*Yoshimi Shunya became a professor in 2000 at the Institute of Socio-Information and Communication Studies, and in 2004 at the Interfaculty Initiative in Information Studies of the University of Tokyo. He has been a visiting fellow at El Colegio de Mexico, Ecole des Hautes Etudes Sciences Sociales, the University of Western Sydney, and Queensland University.*

*Professor Yoshimi specializes in Sociology, Cultural Studies and Media Studies.*

# Experimentation Creating new knowledge

Throughout history, humanity has experimented constantly.  
 That experimentation has taken a variety of forms, in the natural sciences  
 and in the social and human sciences.  
 History has been one long challenge to create knowledge.  
 That challenge continues today.  
 Day and night, experimentation is in progress at the University of Tokyo.



**The University Forest in Chichibu,  
 Graduate School of Agricultural  
 and Life Sciences:**

## A grand observation experiment follows the life of a forest over centuries

In its seven University Forests in various parts of Japan, the Graduate School of Agricultural and Life Sciences is conducting long-term observation experiments that amass data in hundred-year units.

A grand experiment on a scale beyond a human lifespan....  
 This time, we visited one of the experiments, at the University Forest in Chichibu.



**Akio FUJIWARA**

*Assistant Professor,  
 the University Forest in Chichibu,  
 Graduate School of Agricultural and  
 Life Sciences*

A large tree in a forest gives the impression that it has been there for ages and will be there forever. Even when one notices the smaller trees beneath it, one doesn't often think about the incredibly low odds of any one tree surviving to maturity. But the fact is that, in a forest, over a period of many years, old trees rot and die for various reasons, while the relatively few seedlings that grow into young trees do so against the odds, by surviving dangers such as browsing animals and lack of adequate sunlight and water. These small, incremental changes are always going on somewhere in a large forest, but at times a rare event

like a typhoon brings sudden sweeping change.

The only way to observe low-frequency events occurring somewhere in a large forest is to closely monitor a sufficiently large forested area over a sufficiently long period. A grand experiment of this type is called a large, long-term ecosystem observation plot. At a plot established in 1994 in the University Forest in Chichibu, we accumulate the basic data we need to monitor the forest ecosystem's dynamics by repeating our observations every 5 years.

The large, long-term ecosystem

observation plot in Chichibu consists of 6.9 hectares of forest. The main tree species are the beeches *Fagus crenata* and *Fagus japonica* and the conifers *Abies firma* and *Tsuga sieboldii*. Every one of the 10,000 or so trees has been numbered and its position recorded, and their size is measured every 5 years. We also set out nets known as litter traps to monitor the quantities of seeds, dead twigs, leaves, and other material that falls from the trees. We sort the trapped litter meticulously in the laboratory, taking care not to miss a single leaf or tiny seed. Measuring the girths of 10,000 trees and counting tiny seeds is humdrum work



that takes patience and stamina. And the data collected so painstakingly in each survey represent merely one point in the time series that we are building up over the long term. But after decades and, eventually, a century or more, these observations will make clear the fate of individual trees, revealing the gradual succession of generations in the forest. Thus, we will develop a picture of the forest's dynamics as it changes slowly and steadily on a time scale far longer than human history, a scale measured in hundreds and thousands of years.

The University Forest is an educational and research facility for the scientific study of forests. The University of Tokyo's Graduate School of Agricultural and Life Sciences has forests in Hokkaido, Chiba, Chichibu, Aichi, Yamanakako, Arboricultural Research Institute, and Experimental Station at Tanashi, which together constitute the University Forest (Forest Education and Research Center). On these lands, we watch as trees in the natural habitat where they have long flourished continue their hardy lives.

*A robot camera records videos of the crown layer as fixed-point observations. The camera picks up data that cannot be obtained with sensors alone, such as the state of bud-flush.*



*A litter trap to collect all flowers, leaves, seeds, and other materials that fall from above. Twenty-five litter traps have been set up in the observation area.*



*Trapped litter is carefully sorted in the laboratory. In the University Forest in Chichibu, we intend to continue this monitoring indefinitely.*



*Every tree in the observation area has been numbered using a plate or paint so as not to injure the trunk.*



*The office of the University Forest in Chichibu, near Seibu Chichibu Station on the Seibu Ikebukuro Line. The wooden building has character, evoking its history.*



*The University Forest in Chichibu is composed of two sections: Ohchigawa and Tochimoto. The photograph shows woodlands in the Tochimoto section, about an hour's drive into the interior from the office. It is not an artificial plantation but a natural forest several centuries old. Dr. Fujiwara is standing beside a canopy observation tower. Since the environment differs between the upper and lower layers of tall trees, the tower was built to allow observers to climb to a height. In forest observation experiments, a time span measured in centuries becomes important. In other scientific fields, individual researchers design and complete experiments and obtain findings from their own data, but forest research departs from this basic style. Only now, in the twenty-first century, are we learning the final outcomes of experiments begun in the Meiji Period (1868-1912), and researchers several generations younger than those who set them up are writing the papers. A grand observation experiment, on a scale exceeding even social experiments: it amounts to no less than a dialogue with Nature.*

**Kamioka Observatory, Institute for Cosmic Ray Research**

## **Super-Kamiokande: A giant water tank holds clues to the mysteries of the Universe**

A giant water tank, its walls lined with large detector tubes, lies buried beneath a mountain.... Super Kamiokande, an experimental facility built to seek clues to the mysteries of the universe, has drawn scientists from all over the world. Today and every day, step by step, they face the challenges of a great experiment that is entering territory where no human has ever gone before.



**Itoh Hideo**

*Project Assistant Professor  
(in charge of public relations),  
Institute for Cosmic Ray Research*

Neutrinos (denoted by the Greek letter  $\nu$ ) are a type of elementary particle, the most basic building blocks of the universe. In an attempt to capture neutrinos, at this very moment a  $\nu$  detector belonging to Kamioka Observatory of the University of Tokyo's Institute for Cosmic Ray Research (ICRR) is operating 1,000 meters underground in the Kamioka mine, Gifu Prefecture. The Super-Kamiokande (SK) is a giant cylindrical water tank containing approximately 50,000 tons of pure water and some 11,200 sensors capable of detecting very faint light (photomultiplier tubes) mounted on

its inner walls. The elusive neutrinos, which can pass through even very massive objects with ease, interact at an extremely low probability with water molecules; as a result, weak light known as Cherenkov light is emitted along the direction of the neutrino's motion. As the Earth is constantly showered by myriad neutrinos arriving from outer space, if a sufficiently large mass of pure water is placed in their path about 20 such interactions will occur per day, giving off Cherenkov light which enables the neutrinos' presence to be detected.

But why are particle physicists so intent on capturing  $\nu$ ? The answer has to

do with neutrinos' properties. They have been found to undergo a phenomenon known as  $\nu$  oscillation, which, in theory, can be utilized to obtain information about the internal structure of the Sun and Earth, as well as to study various celestial phenomena. We cannot penetrate the Earth's core—let alone the Sun's—to see it at first hand; thus, to be able to explore its structure while remaining on (or just below) the Earth's surface would obviously be an exciting breakthrough. But while this is theoretically possible, we are not yet able to do it in practice. First, we need to know the properties of neutrinos in

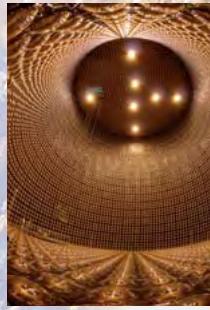
minute detail. These properties are also very important to particle physicists, who study what the universe is made of and how it was formed. Thus, SK is running experiments at this moment to obtain the desired information.

In fact, it was SK that confirmed the occurrence of  $\nu$  oscillation about ten years ago. Oscillation was theoretically predictable only if  $\nu$  had non-zero mass, but before SK the experimental results could be convincingly explained even by then-current theories that said they had zero mass. If particle physicists had ruled out the possibility that neutrinos possessed mass, however infinitesimal,

not only the discovery of  $\nu$  oscillations but also the wealth of information on neutrinos that SK is yielding today would never have been obtained. The researchers succeeded because they were determined to seek experimental verification rather than accept a theoretical uncertainty (in this case, whether or not neutrinos possess mass).

As the researchers continue to work with the same determined spirit, SK will yield many more fascinating experimental results leading to important insights for humanity. I hope you will kindly support this work with your interest.

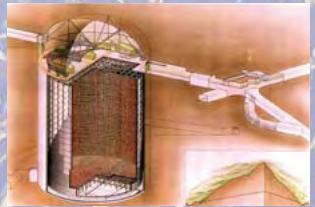
*The interior of SK on April 7, 2006, as installation of the sensors to detect weak light (photomultiplier tubes, PMTs) neared completion. The PMTs, 50 cm in diameter, are among the largest in the world.*



*The interior of SK filled with pure water. Engineers aboard a boat are checking the PMTs on the walls. A slightly surreal scene. They could almost be working on a lake.*



*As the figure shows, SK is located under a mountain. A tunnel runs horizontally about 2 km from the minehead at the foot of the mountain before arriving at the laboratory on top of SK. The lab is 1,000 meters underground, as measured from the summit.*



*The 50,000-ton Super-Kamiokande (SK) observatory, a large water Cherenkov detector for astroparticles, is an enlarged and more sensitive successor to Kamiokande, the observatory that detected Cherenkov light. SK's observations of atmospheric and solar neutrinos were the first in the world to detect  $\nu$  oscillation and reveal that neutrinos have mass. This forced a rethinking of particle theory, opening the way to the new physics.*

*Led by the Kamioka Observatory of the University of Tokyo's Institute for Cosmic Ray Research, experiments continue today at SK in collaboration with 28 universities and research institutes in Japan, the U.S., South Korea, China, Poland, and Spain. Thus, the giant experimental facility operates on a truly global scale.*

**Department of Philosophy,  
Graduate School of Humanities and Sociology**

# A New Current of Social Engagement in Philosophy— The Experiment of Experimental Philosophy

At present, “experimental philosophy” is beginning to attract attention as the latest development in this field.

A new type of socially engaged philosophy is coming into being, transcending the framework of traditional philosophy based on intuitions of philosophers.

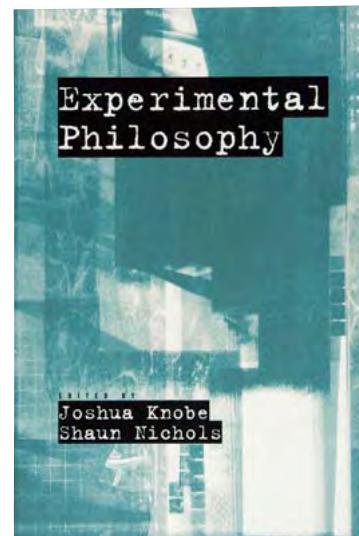
In the academic world, this itself could be seen as an experiment.



**Ichinose Masaki**

Professor, Graduate School of  
Humanities and Sociology

Experimentation is difficult to posit as a basis for philosophical reasoning. This is because of philosophy's tendency to pursue certainty. Philosophers tend to think of experimentation and observation as dealing with unique, ephemeral events, and therefore offering no certain proof that identical results will be replicable in future. If this is the case, then what criterion can one posit to establish the veracity or falsity of a proposition? To speak bluntly, it is nothing more than the intuition of the philosophers. But sometimes their intuitions are in conflict. And when this conflict involves matters of morality and ethics, this is no longer a purely academic discussion—because philosophical theories can have a real influence on issues of people's responsibilities and interests. In this context, the philosophical movement known as “experimental philosophy” arose in the early 21st century, suggesting the possibility of deconstructing traditional philosophical approaches. In contrast to traditional philosophy, grounded in the speculative and intuitive reasoning of the philosopher in his study, “experimental philosophy” represents a new movement to go out into society to seek verification for the philosopher's intuition through empirical methods such as the collection of statistics from ordinary people. While it is questionable whether the methods employed really



*Further reading on experimental philosophy*

The screenshot shows a website titled "Experimental Philosophy". On the left, there is a sidebar with a menu titled "AREAS OF RESEARCH" containing links to topics like Causation, Consciousness, Cross-Cultural Intuitions, Epistemology, Folk Morality, Folk Psychology, Free Will and Responsibility, Intentional Action, Metaphilosophy, Other Topics, Critiques and Responses, and Books. Below this menu is a note: "If you have any questions about the site, or you want help adding a paper, contact JUNIUS@YALE.EDU/PS". The main content area features a large image of a chair with the word "EXPERIMENTAL PHILOSOPHY" written on its backrest. The text in the main area reads: "Welcome to the experimental philosophy page. Experimental philosophy, called x-phi for short, is a new philosophical movement that supplements the traditional tools of analytic philosophy with the scientific methods of cognitive science. So experimental philosophers actually go out and run systematic experiments aimed at understanding how people ordinarily think about the issues at the foundation of the philosophical discussion. To see some of the research that has been done thus far, use the links to the left, which take you directly to the work done in that area. The site makes use of a wiki format, allowing you to add and edit the content, just like Wikipedia. So if you do research yourself or if you have additional information to add, please help by contributing; it is the only way this resource will continue to be useful. Or, if you are looking for a brief overview of experimental philosophy, you could try reading the New York Times Article. And if you want to see what is currently going on, feel free to visit the Experimental Philosophy blog. The site also has other x-phi related information, e.g., which journals have been publishing x-phi papers, and a list of experimental philosophy labs and organizations. Or, if you want to watch x-phi take over the world, keep up with x-phi through social media and check out all of x-phi's press coverage."

*A website related to experimental philosophy*

deserve the term “experimental,” this is certainly a fresh approach that sets aside the pursuit of certainty in favor of attempting to construct philosophical arguments grounded in human realities. As an example, “experimental philosophy” uses statistics to address the issue of “intentional action” in the following manner. When a certain company performs the action (a) in pursuit of corporate profit, realizing that it causes the side-effect of harming the environment (b), the majority of people believe that the company in question intentionally harmed the environment; however, when the company performs

the action (c) in pursuit of corporate profit, realizing that it causes the side-effect of helping the environment (d), the majority of people do not believe that the company in question intentionally helped the environment. Thus, we see that the concept of “intentionality” subsumes moral considerations. It is quite remarkable the way this approach reveals such an asymmetry of blame and praise. At the same time, how fantastic it is to see philosophy being subjected to statistical surveys! That in itself is an “experimental” movement. What will come of it? I myself intend to conduct “an experiment” to find out.

# Graduate School of Public Policy “Negotiation and Consensus Building” Course

## Enabling Students to Improve their Skills through “Negotiation Experiments”



**Matsuura  
Masahiro**

*Associate Professor,  
Graduate School of Public Policy*

The “Negotiation and Consensus Building” course, offered by the Graduate School of Public Policy, covers a wide range of issues, from the introduction to negotiation theory to the analysis of public policy-making processes. It provides students with an analytical framework and practical tools for negotiation and consensus building. Although still largely unknown in Japan, many North American professional

graduate schools offer negotiation training courses, and the field has attracted a number of researchers. The study of negotiation focuses on analysis of negotiations that lead to mutually beneficial outcomes—so-called “Win-Win” outcomes—through reasonable judgments by involved parties in respect to their interests as well as on development and analysis of strategies for achieving win-win solutions. These analyses draw on case studies in various fields of practice, such as public policy, business, and urban planning.

In my lectures I often compare negotiation training to preparing

Negotiation theory, in an academic sense, examines better ways to achieve mutual gains among interested parties through reasonable judgments in respect to their interests.

At the Graduate School of Public Policy, negotiation training is offered in a course which involves students in one-on-one simulated negotiation exercises—giving them a personal opportunity to experiment with their own negotiation approaches.

### Instruction on ground rules and precautions



*The students representing the two parties to the negotiation—Koike and Sakurai—are divided into two separate classrooms, and are checked whether they have fully understood the rules and informed of matters that demand special attention for the simulated negotiation. This is an important step, for if rules and matters that demand special attention are not faithfully observed, their simulated experience will be jeopardized.*

### Negotiation simulations



*The negotiation simulations proceed between pairs of students. In a 30 minute negotiation session, the price for a parcel of land is negotiated for an agreement.*

### A simulation in progress: Sakurai vs. Koike

*In the simulation, the students form pairs, with one student representing a client named Sakurai, the other representing the client Koike. The simulated negotiation concerns the price of a prospective sale of a piece of land that lies between two parcels each of which is owned by one of these parties.*

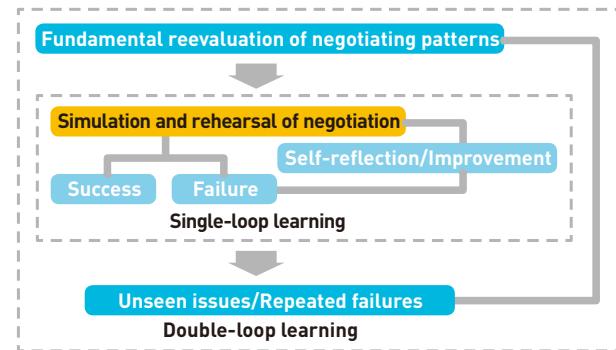


### Reporting and evaluating the terms of agreement



*When the simulations are completed, the class gathers in one room. Each pair of negotiators reports on the sale price of the land they have arrived at, and Professor Matsuura gives an evaluation.*

### Two “loops” in the negotiation learning process



*The study of negotiation requires not only reflecting upon and correcting failures in individual negotiations, but also what is termed double-loop learning—the analysis of recurring problems and a fundamental reevaluation of negotiating patterns.*

for your driver's license test, because negotiation involves both intellectual knowledge and practical skills. In this course, students learn the methods of analysis through classroom lectures, and then polish their practical skills through negotiation simulations. The negotiation simulations are sort of like student driver training. Mistakes are tolerated as material for reflection and improvement, preparing students for real negotiating situations (the equivalent of highway driving). This class teaches students an analytical framework that they can continue to use on their own after graduation to evaluate and study negotiation. I also stress the importance of developing the capability and the habit of “double-loop” learning—cultivating an awareness of underlying structural problems or issues that affect negotiations implicitly. With “Negotiation and Consensus Building” my goal is to train skilled individuals who, once they have entered the workplace, can objectively review and reflect upon the negotiations they encounter in their daily work, using this process to refine and improve their performance, and when the need arises, be able to propose fundamental reevaluation of established strategies.

**Hiraki Laboratory, Interfaculty Initiative in Information Studies  
and Graduate School of Arts and Sciences**

## BabyLab: Exploring Fundamental Properties of Human Beings



**Hiraki Kazuo**

*Associate Professor, Graduate School of Arts and Sciences / Interfaculty Initiative in Information Studies*

**Interview**

### Infants are equipped with a number of innate abilities

BabyLab is a research and experimental facility for the study of cognition in very young children, with the support and cooperation of Center for Evolutionary Cognitive Sciences. We conduct experiments with infants three or more days a week, and have already amassed empirical data on a total of more than 2000 infants. The purpose of the research is to investigate the ways in which infants perceive and understand the world. A primary focus of this

effort is investigating, from a variety of perspectives, how infants perceive human beings and man-made objects.

One specific experimental method is to expose infants to images and sound on a TV monitor and record a variety of experimental data. For example, we've all heard anecdotes about the early days of television relating that some people, seeing it for the first time, had the misperception that there were actually people inside a box. Perhaps

that is how infants perceive it. So one of our experiments is concerned with investigating how infants distinguish between images of people playing on the TV monitor, and actual people in the world in front of them. The method involves analyzing the infants' gaze, and whether or not they try to touch the screen of the monitor. In addition, we use an electroencephalograph (EEG) to measure their brain waves, and near infrared spectroscopy (NIRS) to identify

Can infants be aware of the gaze of other people? Can they distinguish between "good" and "bad"?

Clarifying these and other questions concerning infants is a first step toward understanding the origin of human cognitive abilities.

BabyLab, with the support and cooperation of many infants and their parents, conducts cognitive science experiments aimed at better understanding the mind and behavior of infants.

the areas of activity within the brain. From the NIRS data, we have learned that different areas of the brain are activated depending upon whether the infant is looking at someone on TV or looking at a real person.

Over the past thirty or forty years research on infants has expanded considerably in the United States and Europe. As a result, we have come to understand that infants possess a variety of innate abilities. One example is the capacity to perceive numbers. Four-month-old infants will display a reaction when one thing suddenly becomes two. In other words, they have a concept of and a sense for numbers. There also studies that indicate that infants have an innate moral sense. In one, infants were shown a simple animation in which Object A is trying to go up a hill, while Object B is obstructing it from above and Object C is supporting it from below. When the physical objects were then placed in reach of the infants, they tended to choose Object C, which is interpreted as indicating their preference for altruistic behavior. So before they have been taught anything about morality, infants already have such an inclination or tendency. I think two major currents in future infant research will be research on brain science and research on design of man-made objects. I think this could eventually lead to the development of a wide range of devices that could be intuitively operated by small children.

BabyLab  
Center for Evolutionary Cognitive Sciences, Building 17, Komaba Campus I University of Tokyo



### What is BabyLab?

*BabyLab is an experimental laboratory for research on infants. The lab is equipped with TV monitors, computers, electroencephalograph units, and other equipment, and the room is unified with a pleasant pastel color scheme. There is a plentiful supply of toys, to help put the children in a playful mood. Great attention has been paid to creating a relaxed, happy, tension-free atmosphere for the experiments.*

### Experiments with infants

*In the photograph above, we see an experiment based on displaying moving images on a TV monitor and tracking the eye movement of the infant in response. One experiment involves displaying random photos of faces looking in different directions—left, right, up, down—while monitoring the infant's gaze. The tendency is for the gaze of the infant to follow the gaze of the person displayed in the image, and the conclusion drawn from these results is that infants are aware of the gaze of other people. The photograph at the right shows a researcher manipulating the images being shown to the infant. Screened from the booth in which the mother and infant are sitting, the researcher controls the audio and video stimuli while monitoring the infant's response. Among the other experiments being conducted on a daily basis at the lab is the use of an electroencephalograph to monitor and record the brain activity of infants with the aim of examining their information processing mechanisms.*

# Translation—Hands-on Research Illuminating the Future of Language



**Kageura Kyo**

Professor, Graduate School of Education  
<http://panflute.p.u-tokyo.ac.jp/~kyo/>

When did the Japanese that we speak today first emerge? Think about it, and you will see clearly that it emerged during the second half of the nineteenth century. After all, no one today speaks the way people did in the Edo period (1603–1867), and the language that was used up until the middle of the nineteenth century is commonly referred to as *kogo* (or “Old Japanese”) and treated as a separate discipline. During that period, one of the major forces shaping not only the vocabulary but even the structure of modern Japanese was translation. This is not a situation unique to Japanese. Modern German, French, and many other major languages developed into their present form with the help of translated texts. With the rise of the modern nation, a standardized form of these languages spread through the population in a consistent form thanks to dictionaries, newspapers, magazines, and books that circulated throughout the country and provided fixed “reference axes,” as well

as to education systems that taught the language consistently.

Prior to that, languages were far more diverse and variable, forever merging and splitting off and merging again. Languages tend naturally to cross-breed, so without fixed axes to anchor them, they are constantly metamorphosing.

What about now? People are reading newspapers, magazines, and books less and less. Meanwhile, the Internet has opened the floodgates to cross-border circulation of multilingual information. The Internet has also made machine translation available, and more and more people are reading about the subjects that interest them in various languages. I know of an elementary-school girl who has become multilingually literate in her favorite subject, mushrooms, just by accessing mushroom websites from all over the world. One wonders if she is even conscious of the distinction between those languages. With the spread of advanced information technology, the reference axes that

preserved the boundary between languages like Japanese and Swahili are dissolving, at least to some extent. How will Japanese, language throughout the world, and communication itself evolve in the years ahead? Here, once again, translation comes into play. At a superficial level, translation may seem an essentially conservative activity, predicated on clear-cut boundaries between languages. But recalling the role translation has previously played in language development, we are approaching it as the leading edge in linguistic trends, providing a glimpse of the shape of things to come amid these ongoing changes in the ecology and circulation of language. We are focusing particularly on translation on the Internet, since it is the Internet above all else that has made this new circulation of language possible.

To better understand the translation process as it illuminates new developments in language and communication, we have developed our own open translation-support and hosting website, “Minna no Hon'yaku” (<http://trans-aid.jp/>), an experimental Web 2.0 site that makes use of advanced language processing technology. Well aware that such a site is meaningless unless people use it, we have designed it to be user-friendly and convenient for anyone trying to translate or read online text. (The site is already used by a number of nongovernmental organizations, including Amnesty International and Democracy Now!) Why not register and give it a try?

Language does not lend itself to controlled laboratory experiments, and since linguistic change occurs over a long period of time, we realize our research may not yield dramatic findings during the space of our own careers. Still, for us, there is something irresistibly exciting about translation as a window to the future.

## “Minna no Hon'yaku”

One of the independent multilingual news sites that have been proliferating worldwide



# A Blood-Sugar Warning Light in Your Ear?!

## Developing an Implantable Continuous Glucose Monitor

**D**iabetes is a serious lifestyle disease affecting some 250 million people worldwide. In Japan alone it affects about 20 million, including those with pre-diabetes. Left untreated, it can lead to serious complications, including stroke, heart attack, and blindness, which is why diabetics need to maintain careful control of their blood sugar. Currently millions of diabetics have to prick their fingers or other parts of their body with a lancet several times a day to check their blood glucose. But since blood glucose levels fluctuate continually throughout the day, in response to meals, exercise, and other factors, a few tests each day are insufficient to monitor all the subtle changes. For this reason, a simple way to monitor blood glucose around the clock has long been dreamed of.

Our research team hopes to meet this need by developing an implantable blood glucose sensor. Being implanted inside the body, it would eliminate the need to draw blood, thus improving patients' quality of life. Moreover, automatic measurement would allow the device to quietly check the patient's blood for abnormal glucose levels even while the patient was sleeping or unable to check his or her own glucose for some other reason, enabling continuous, round-the-clock blood glucose management.

One of the avenues of research we've pursued is the use of fluorescent hydrogel microbeads that glow brighter at higher glucose levels. The most common means of testing for blood sugar today is an electrochemical method that calculates the concentration of glucose by measuring the charge passing through an electrode. But this requires an electric power source and circuitry that can pose problems for an implanted device. To ensure reliable monitoring over a long



**Takeuchi Shoji**

Associate Professor, Institute of Industrial Science  
<http://www.hybrid.iis.u-tokyo.ac.jp/>

*Implanted fluorescent microbeads respond to the addition of glucose by glowing brightly enough to be observed through the skin. By placing a detector near the ear, it should be possible to create an ultra-compact system for round-the-clock glucose monitoring.*

period of time, we decided to focus on optical glucose sensing technology as a means of wirelessly monitoring blood glucose levels from outside the body. The goal was a sensor that would emit a strong light from inside the body when blood glucose rose too high.

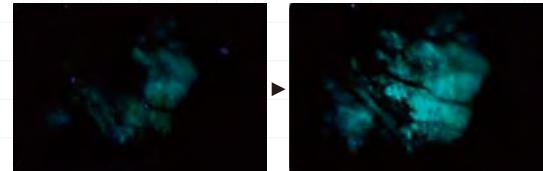
The material we chose for this purpose consists of a soft polyacrylamide "hydrogel," a substance with the texture of gelatin, that is chemically bound to an anthracene derivative containing boronic acid, which fluoresces when it binds to glucose in the blood. With the help of microfluidic device technology geared to the manipulation of tiny volumes of fluid, we succeeded in processing this material into uniform beads approximately 0.1 millimeter in diameter. Because the beads are uniform in diameter they can travel to every part of the body. Implanting these beads in the thin-skinned ear of a lab mouse (see photo) enabled us to observe from the outside changes in the brightness of the beads as they reacted to changes in glucose concentration. We also succeeded in measuring peripheral blood glucose concentrations by observing the changing fluorescence of the beads through the skin.



*These polyacrylamide microbeads contain a glucose-sensitive fluorescent substance that glows more intensely as blood sugar rises. Here the beads are seen glowing brightly under ultraviolet light in reaction to the application of a glucose solution.*

Why is that mouse's ear glowing?

Because it's been implanted with gelatinous microbeads that glow brighter the higher blood glucose rises. This technology would allow diabetics to monitor their blood sugar around the clock, without drawing blood. Our research is aimed at developing the technology for commercial use.

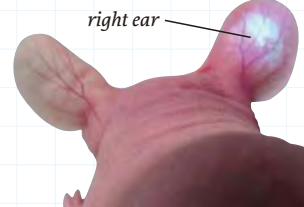


Further development of this sensor technology could turn the dream of round-the-clock continuous blood glucose monitoring into a reality. Before that can happen, however, we will need to overcome a number of challenges, including the problem of long-term stability. Polyacrylamide is already used for medical purposes, but a number of questions remain regarding the ability of our compound to fluoresce consistently over an extended period of time, the optimal diameter of the implantable beads, and the best place to implant the device without adding to the patient's physiological burden. Each of these issues must be addressed one by one.

This research is currently being conducted as part of the Hetero-functional Integrated Device Technology Development Project (commonly referred to as BEANS Project), a joint industry-academia project sponsored by the New Energy and Industrial Technology Development Organization (NEDO). We plan to forge ahead as a well-coordinated team, our engineers working closely with medical device manufacturers and physicians, with the goal of perfecting a commercial technology in the next 10 years.

*Microbeads have been implanted into the right ear of this mouse (photographed from the rear). Although invisible under ordinary conditions, the fluorescent glow of the beads can be clearly observed through the skin under black light and ultraviolet light.*

*Fluorescent microbeads implanted in the mouse's right ear*



# News in Brief

## 2009

**April to December**

# 04

**April**

**President's inauguration**

Professor Hamada Junichi was inaugurated as the twenty-ninth President of the University.

**Matriculation ceremony**

University Matriculation ceremony held.

**Todai Forum 2009 in the UK**

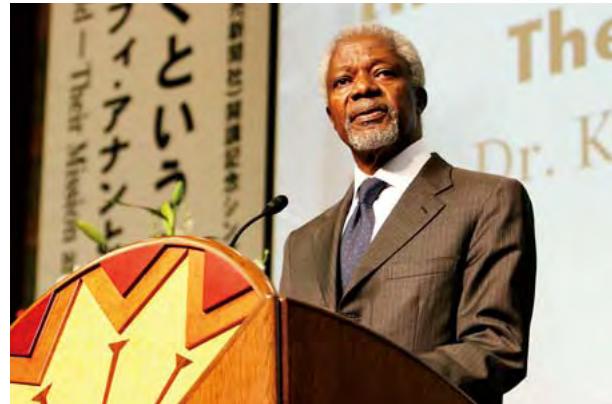
The seventh Todai Forum was held in the UK from April 27 to 30. Individual forums were held at the University of Cambridge, Imperial College London, City University London and Manchester Metropolitan University. About 70 students, academic and administrative staff from three graduate schools and faculties of the University of Tokyo accompanied President Hamada and Vice President Tanaka, deepening academic exchange with students and researchers at the United Kingdom's top universities.

# 05

**May**

**Gogatsusai**

The 82nd May Festival (gogatsusai) held at the Hongo Campus.



# 06

**June**

**Global Leadership Symposium**

On 3 June, the Graduate Schools for Law and Politics, the Faculty of Law and the Yomiuri Shimbun jointly sponsored the Global Leadership Studies Commemorative Symposium. This program has been offered since 2009, and is designed to foster leaders active in the international arena. The Commemorative Symposium welcomed former UN Secretary General Kofi Annan as speaker, and President of the Japan International Cooperation Agency and former UN High Commissioner for Refugees Ogata Sadako as commentator. The Yasuda Auditorium was packed with nearly 1,200 students.

# 08

**August**

**Open Campus**

7,200 participants visited the Hongo Campus and 2,200 visited the Komaba Campus for the university's annual open campus event.



*Open Campus demonstration of mobility robot*

# 07

**July**

**Town meeting with UN Secretary-General Ban Ki-moon**

On July 1st, a "Town Hall Meeting between UN Secretary-General Ban Ki-moon and Todai Students" was held at Koshiba Hall at Hongo Campus with about 160 students attending. The Secretary-General touched on various topics including climate change, nonproliferation, the current economic crisis, and reform of the United Nations in his address on the theme "United Nations: Facing Today's Global Challenges." After his speech, the Secretary-General answered questions from students.



# 2010

## January to March

# 11

**November**

### Komaba Festival

The 60th Komaba Festival held.

### Homecoming day

The University of Tokyo Homecoming Day was held at the Hongo and Komaba Campuses.



# 12

**December**

### Agreement on academic exchange with Berkeley

On 17 December, UC Berkeley and the University of Tokyo signed an agreement to enhance exchange both for educational and research purposes. The Institute for the Physics and Mathematics of the Universe (IPMU) will set up a satellite facility in the Department of Physics on the Berkeley campus based on this agreement. It is hoped that this facility will become the core from which the entire Todai community can interact with Berkeley scientists and students.



# 01

**January**

### Study in Japan Fair

From January 11 to 14, studyabroad fairs centered on member universities of the Project for Establishing Core Universities for Internationalization "Global 30" were held in Delhi, Chennai and Madras in India, and in Singapore. From 26 to 29 January, the University of Tokyo was invited and attended the International Exhibition for Higher Education held in Riadh, Saudi Arabia, where Vice President Tanaka gave a lecture and the university was introduced to interested students.



# 03

**March**

### Honorary Degree awarded to Sir Anthony James Leggett

Professor Sir Anthony James Leggett of the University of Illinois at Urbana-Champaign became the recipient of the fifth honorary degree awarded by the University of Tokyo. Professor Leggett was awarded the 2003 Nobel Prize in Physics "for pioneering contributions to the theory of superconductors and superfluids." Part of his research in this area was conducted at the University of Tokyo when he was a visiting associate professor at the Faculty of Science from 1973 to 1974. Professor Leggett has made significant contributions to physics research at the University of Tokyo and in Japan in general.

# 02

**February**

### IPMU building completed

The opening ceremony of the new research building of the Institute for the Physics and Mathematics of the Universe (IPMU) was held. The internal space has been designed to promote exchange between researchers, as is exemplified by the atrium cafe, a meeting place modeled on a European style. On the column in the center of the third floor interaction space in old Italian are the words of Galileo Galilei, which underlay the research of the IPU: "l'universo è scritto in lingua matematica" (the universe is written in the language of mathematics). The exquisitely designed research building provides an excellent environment for researchers to focus on their work.



# 27,821 →

**Students**

**Academic and administrative staff**

## 7,637

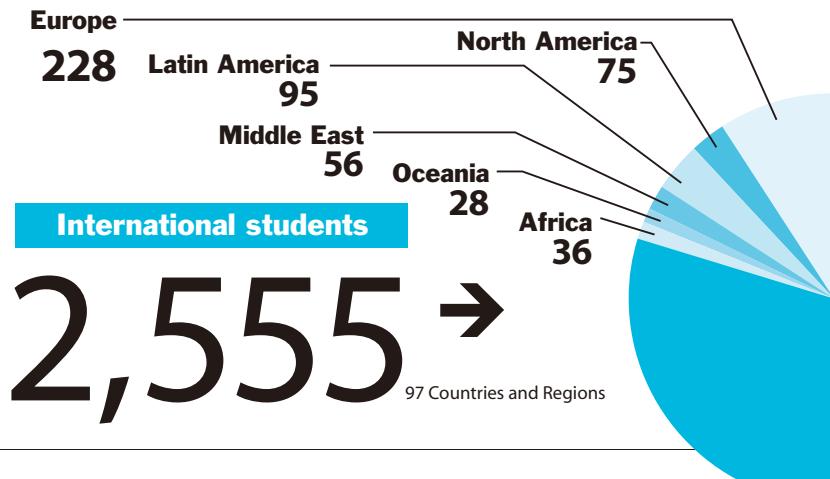


Fixed-term contract staff

## 1,886

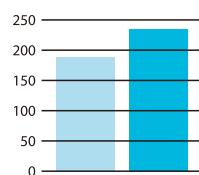
<b>Undergraduates</b>	14,057
<b>Master's students</b>	6,719
<b>PhD students</b>	6,046
<b>Professional degree students</b>	999

<b>Foreign researchers visiting Todai</b>	3,570
<b>Todai researchers dispatched overseas</b>	9,130

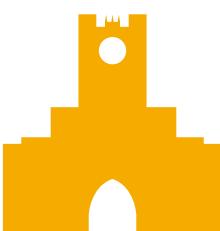


**Books at Todai** 8,699,292 books → 8,803,707 books

**Patents held by Todai** Domestic 189 → 235



International 197 → 236



**Floor area of buildings owned by Todai**

## 1,593,477 m<sup>2</sup>

As of 1 April 2009

**Area of land owned by Todai**

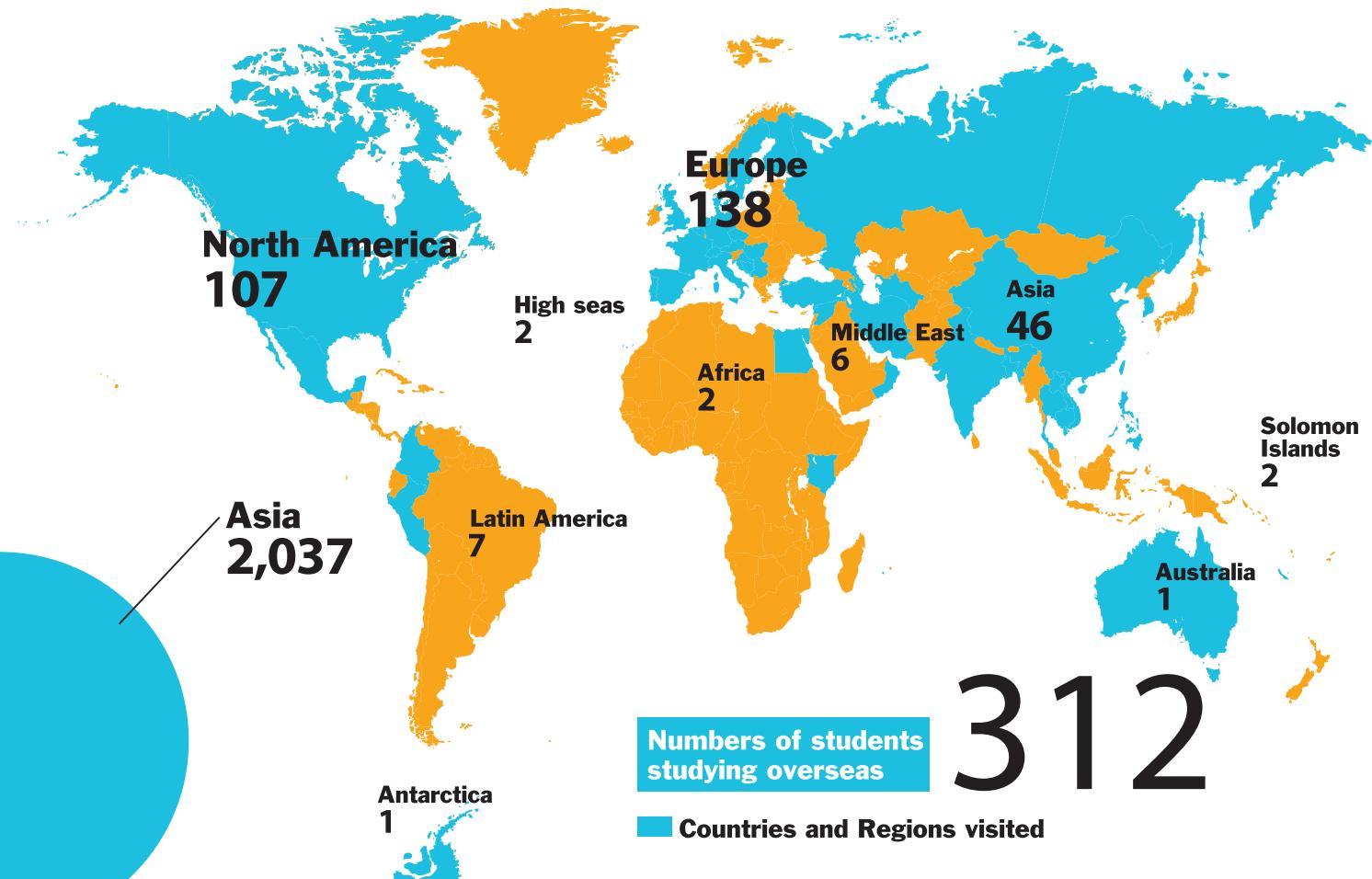
## 325,991,990 m<sup>2</sup>

As of 1 April 2009

# The University of Tokyo by numbers

Figures are as of 1 May 2009 unless otherwise marked.

Even if you know the name “The University of Tokyo,” many people probably don’t have a clear picture of the scale of the organization. So, from the previous issue, we added a new section where we present some data, including numbers of students, number of faculty, expenditure, and other figures that describe the University under the title “The University of Tokyo by numbers.” The “real” University of Tokyo emerges from its history of over 130 years through these numbers.

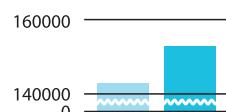


Journals at Todai

144,962 journals → 152,814 journals

As of 31 March 2008

312



Number of vessels owned by Todai

As of 1 April 2009

36      10      15      11      17

faculties

graduate schools

research institutes

university-wide centers

Total expenditure for 2008 fiscal year

226,533 million yen

The University of Tokyo Magazine



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*Portraits of the University of Tokyo Presidents*

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*Foucault's Rotating Mirror*

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WE HOPE YOU ENJOYED VOLUME 9 OF TANSEI.

WHICH SECTIONS DID YOU FIND THE MOST INTERESTING? WERE THERE ANY SECTIONS WHERE YOU WOULD HAVE LIKED MORE INFORMATION?

IF THERE ARE ANY TOPICS YOU WOULD LIKE TO SEE PICKED UP IN FUTURE ISSUES, OR IF YOU HAVE ANY OTHER COMMENTS,

PLEASE FEEL FREE TO CONTACT THE PUBLIC RELATIONS GROUP AT [kouhou@ml.adm.u-tokyo.ac.jp](mailto:kouhou@ml.adm.u-tokyo.ac.jp)

