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The future is shining brightly
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that enlighten the world

[Special Feature]

**Connecting
with the World**

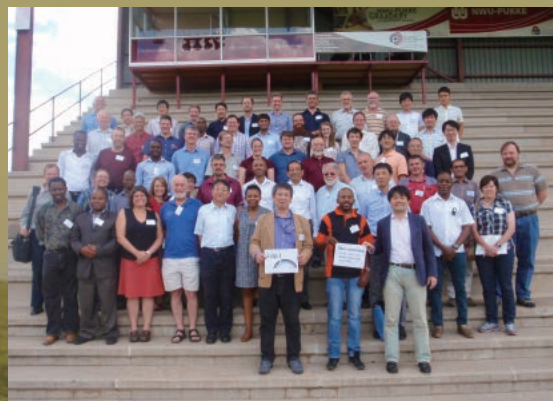
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We now live in a borderless age where
all things transcend national boundaries.
Researchers search for new insights
around the world to tackle global issues.

The researchers at Ritsumeikan also apply
a world-embracing perspective in their fieldwork and studies,
whether domestic or abroad,
considering the entire planet as their research field.
Through their findings,
they aim to contribute to the betterment of humankind.

In this issue, our researchers, along with scientists from
around the world involved in solving advanced,
universal challenges that face humanity today,
will share the appeal of connecting across borders
to engage with diverse cultures while advancing their studies.



Hiroshi Ogasawara has studied the physics of earthquake hypocenters in South African gold mines for more than 24 years. He plays a central role in the South Africa DSeis Project, which brings together Japanese, South African, Swiss, American, German, Indian, Israeli, and Australian researchers from a range of disciplines in the underground tunnels of gold mines.

Special Feature:
Connecting with the World

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The World's first direct Observation of a Hypocenter: Uncovering the Mechanisms of Earthquake Generation



They are drilling a total of 1.6 km from 3 km underground to reach seismogenic zones, generating quakes of about the same magnitude as the one that struck northern Osaka in June 2018.



Under the leadership of Ogasawara, Japan, and SA, research teams from Switzerland, the U.S., Germany, India, Australia, and Israel are collaboratively conducting drilling and investigation

Hiroshi Ogasawara

Professor, College of Science and Engineering

Subject of Research: Study of the physics of earthquake hypocenters in deep South African gold mines
Research Keywords: Solid earth and planetary physics
Third from the left, together with his lab students, who also participated in the SA investigation



In June 2017, the DSeis Project (short-hand for *Drilling into seismogenic zones of M2.0–5.5 earthquakes in deep South African gold mines*) began drilling 1–3 km underground to get to a location from which earthquakes of magnitudes (M) 2–5.5 were generated. The drilling was completed in June 2018, and the borehole logging survey ended in July.

The proposal for this project was accepted by the Germany-based International Continental Scientific Drilling Program (ICDP) and is led by Japan, with the help of South Africa (SA), Switzerland, the U.S., Germany, India, Australia, and Israel. The individual coordinating this huge international research project is Hiroshi Ogasawara of Ritsumeikan University. Ogasawara has studied the physics of earthquake hypocenters in SA gold mines for more than 24 years. (In Japan, he is currently working together with Tohoku University, Kyoto University, The University of Tokyo, Osaka University, Kochi University, the Fukada Geological Institute, 3D Geoscience, Inc., the National Institute of Advanced Industrial Science and Technology, and the National Research Institute for Earth Science and Disaster Resilience, among others.)

In SA, a large number of deep gold reefs have been excavated over the past 120 years. As a result of the many cavities, the host rock has become severely unstable, resulting in small earthquakes occurring on a daily basis. Ogasawara explains, “It is believed that natural earthquakes are also generated as a result of stress building up in the host rock, but it is too remote to observe processes of stress build-up and natural earthquake generation in detail from the earth’s surface. In contrast, in gold mines at great depth, hypocenter faults or ruptures can be easily exhumed or instrumentally closely observed. By studying them, we may discover what controls the occurrence and termination of seismic activity.”

Moab Khotsong mine, in particular,

provided the means to enable the team to start drilling from a 2.9 km-depth from the earth’s surface. Within 800–900m from the borehole collar, we can gather valuable samples from the faults of a M5.5 earthquake still generating aftershocks. Ogasawara is hopeful, stating, “This is a global first. We are having the closest unobstructed view of hypocenters, something that is unviewable from the earth’s surface. We expect to find clues to address fundamental questions of the mechanisms of earthquakes.”

Between 2010 and 2015, Ogasawara’s research team was able to successfully instrumentally monitor earthquake activity in detail at gold mines at 1–3.4 km depths under the auspices of Japan Science and Technology Agency (JST) and the Japan International Cooperation Agency (JICA) for the Science and Technology Research Partnership for Sustainable Development (SATREPS).

During 2015–2019, the collaborating researchers came from a wide range of academic disciplines, including seismology and rock engineering, as well as geology, structural geology, and geomicrobiology. They have been investigating not only the seismic activity and geological structures around hypocenters but also groundwater and microbiological activities. In 2019, samples will be digitally archived into the ICDP Information System and eventually made available internationally for use in a wider variety of scientific research fields.

To observe at the closest proximity to a hypocenter, they must first identify the time and location of an earthquake occurrence and install an ultra-sensitive seismometer near the hypocenter. Ogasawara made the drilling plan based on data thus obtained by Japan and its partner organizations in SA, which included a main shock and tens of thousands of aftershocks and ultra-microearthquakes. In June 2017, they finally started drilling two holes from a tunnel 2.9 km underground, to probe around the upper fringe of a seismo-

genic zone of the M5.5 aftershocks. They attempted to collect cylindrical samples called cores by drilling these holes, 76 mm in diameter and about 820 m and 700 m in length. In February 2018, the second drill hole penetrated the M5.5 aftershock zone. Where the fault fracture zone was intersected, a layer of substances thinner than 2 m with very slippery material was recovered.

Ogasawara explained their results, saying, “We were able to collect a large number of extremely interesting samples of fresh fractures thought to have been caused by M5.5 earthquakes or subsequent aftershocks, as well as samples of new fissures caused by rock stress enhanced in host rock without previous seismic history.” They have already started measuring rock stress and conducting detailed structural geological analysis with the samples recovered from the hypocenter faults. “It should be noted that a local increase in differential stress was found right at the upper fringe of the aftershock zone. With further seismological analysis of the main rupture and aftershocks of the M5.5 mainshock, we hope to clarify earthquake rupture propagation and the condition that controls rupture propagation.”

At the same time, the geomicrobiology research group from Princeton University in the U.S. is exploring rock-hosted microbes that live in the deep subsurface of the earth. They hypothesize that earthquakes rupture host rock, which generates hydrogen to fuel life deep in the rock. This could unravel the mystery of life during our planet’s early history or extant life on Mars.

Ogasawara explains that from here on out, “We will analyze the core samples, but we also wish to further extend the drilling of the *DSeis Project* and conduct drilling to probe a wider extent of the aftershock zones in greater depth.” Are they close to a new view of the mechanisms of earthquake generation? Their findings are eagerly awaited.



If the direction of drilling into seismogenic zones is not carefully set, drilling severely pulverizes recovered samples. The teams successfully collected a core sample with a total length of about 1.6 km with minimal drilling damage, allowing them to start a comprehensive investigation of fractures from earthquakes, fault substances, stress, geological features, physical properties, microbes, gases, and groundwater.

A modern Economic System in Hong Kong's Underground Economy



The Tanzanians of Chungking Mansions

Chungking Mansions faces Nathan Road, which runs through Hong Kong's most prominent business district, Tsim Sha Tsui. Cheap accommodations are concentrated in this five-block complex, which attracts traders and backpackers of all nationalities and ethnicities. Chungking Mansions, which is reputed to be a *den of vice* for the dodgy activities it has housed over the years, is where the

cultural anthropologist Sayaka Ogawa resided for over half a year, starting in October 2016. She stayed in the complex in order to conduct fieldwork on small-scale Tanzanian traders and their commercial activities.

In Tanzania, East Africa, Ogawa had previously researched and closely observed the commercial practices of small-scale traders called *Machinga*. She lived

there for about three years, became part of the *Machinga* community, and even sold second-hand clothes by the roadside to better understand their business arrangements. The *Machinga* approach to business is known as *ujanja*, meaning *slyness* and *craftiness* in the Swahili language. Ogawa was particularly interested in the logic behind their approach, which differs from *formal business practices* of contracts and legal regulations that are often employed in developed nations and other societies.

In recent years, this group of people from Tanzania has been increasingly travelling to China in search of new import products to replace the second-hand clothes they typically sell. Ogawa followed them to Hong Kong and discovered an underground economy run by small-scale traders from all over the world.

Tanzanian Commerce at the Chungking Mansions in Hong Kong

"The China-based transnational informal trade started appearing in the early 2000s," Ogawa explained. She added, "Small-scale traders from Asia, Central and South America, the Middle East, Africa, and around the world came to China and built their own production and trade system. Although such a trade system has been conducted discreetly, as almost all of their business activities are illegal, it is said that it provides employment to hundreds of millions of people globally and generates huge profits in the tens of trillions of dollars." A vast amount of money flows through this underground economy. "This is intriguing," Ogawa thought to herself and instantly became captivated by the idea.

During her half-a-year stay in China, Ogawa tracked the daily activities of a Tanzanian second-hand car dealer who called himself "the boss of Chungking Mansions." Through him, she explored the kinds of businesses Tanzanian traders conduct in China.

Ogawa explained, "There are two types of Tanzanian traders living in Chungking Mansions. The first one comprises traders who visit Hong Kong for short periods to buy products or look for valuable goods. The second one includes those who live in Hong Kong long-term and earn a living as brokers, dealers, and guides between their visiting fellow citizens and the Chinese. Most of them are illegal workers." The Tanzanians export natural stones to China and Hong Kong. Then they bring various products, such as used cars, cell phones, home appliances, clothes, and general goods from China to Tanzania. Ogawa was surprised by their business

arrangements.

As most of their transactions are illegal, it is not uncommon for them to encounter fraud, non-payments, and other business troubles. Nonetheless, they have built their own system that allows them to conduct trade reliably. To anticipate business problems, they use their own trade system called TRUST. With TRUST, Hong Kong dealers transact products with African dealers and buyers in an auction format on social media platforms such as Facebook. Once a deal has been concluded, a small capital sum is solicited through crowdfunding and used to procure products. Eventually, these products are sold in Africa and then the profits are divided among dealers, buyers, and investors. These monetary transactions are conducted using electronic money via informal financiers.

The traders have also formed the Hong Kong-Tanzania Association and Guangzhou-Tanzania Association to facilitate mutual assistance in case of unforeseen circumstances, such as injuries, sicknesses, or death. Although they trick one another at times and engage in illegal trades, they use advanced technologies to achieve a form of collaborative commons and form mutual organizations to, ultimately, conduct commercial activities smoothly. Ogawa's research highlights the realities of such a flexible and resilient



Tanzanians in Hong Kong

informal economy that is unimaginable in the context of a formal economy.

"Informal trade might sound like something dubious and *unsophisticated*, but Tanzanian traders and dealers are actually using SNS, crowdfunding, electronic money, and other advanced technologies to the fullest and have built a global business network," Ogawa explained. Most innovative economic systems, such as the sharing economy, free economy, and blockchains, originate from underground economies run by small-scale traders. Ogawa added that "this *globalization from below* paradoxically emerges as a result of dissatisfaction with and contradictions in *formal economies*, which are considered mainstream." With eagerness, she said, "This is the real thrill of cultural anthropology."



Filling a container with bought used cars

Sayaka Ogawa

Associate Professor,
Graduate School of Core Ethics and Frontier Sciences

Subject of Research: Study on the consumption culture of present-day Africa as seen in circulation/consumption of used/non-regular goods, dynamics of brinkmanship, anthropology of practice/act, and anthropology of a hand-to-mouth life
Research Keywords: Area studies, cultural anthropology



Today, as the number of energy-related problems, such as environmental pollution, the exhaustion of underground resources, natural disasters, and nuclear power plant accidents increases, renewable energy is becoming increasingly more important. In particular, expectations are high for solar power, but much development must take place before it can surpass existing power generation methods. Solar cells made from silicon currently have a market share of more than 90%, but there is a limit to the reductions in manufacturing costs that can be achieved; thus, significant efforts are being devoted to develop new types of solar cells that do not require silicon.

One such new kind of solar cell is the CIS thin-film solar cell, which mainly consists of copper (Cu), indium (In), and selenium (Se), with a chalcopyrite crystalline structure.

Jakapan Chantana is engaged in the development of solar cells that use Cu, In, Se, gallium (Ga), and sulfur (S), instead of silicon, for optical absorption.

CIS solar cells are characterized by their capacity to absorb about 100 times more light than silicon-based cells. They can also be made into thin films. The cell thickness of silicon solar cells is about 200 μm , while that of CIS thin-film solar cells is no more than 2–3 μm . This is the extent to which we hope to decrease resource use and costs. Yet, the photoelectric conversion efficiency of CIS thin-film solar cells remains inferior to that of silicon types, preventing replacement in the market.

Chantana explains, “The highest photoelectric conversion efficiency achieved for CIS thin-film solar cells in the world is 22%. These solar cells are still at the research stage. Nevertheless, there is still a big gap between this value and the 26.7% efficiency of silicon solar cells. In addition, CIS thin-film solar cells require rare metals such as cadmium and other materials that are toxic to the human body during the film deposition process. Furthermore, significant amounts of electricity are required to fabricate these high-quality thin films using a vacuum process.” To overcome these challenges, he is attempting to build highly efficient solar cells using a low cost, low power consumption method to fabricate the film while eliminating most of the expensive and hazardous materials.

The typical CIS thin-film solar cell has a substrate structure covered by rear-side electrodes, an optical

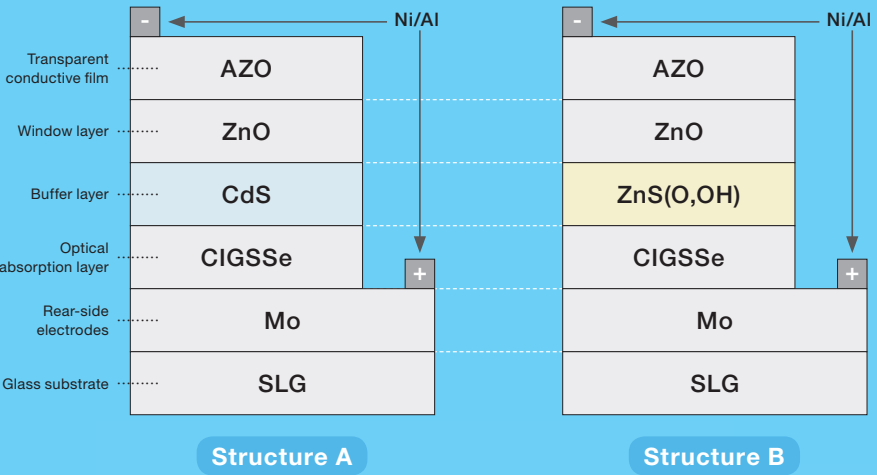
absorption layer, a buffer layer, a window layer that lets light in, and a transparent conducting layer. There are several methods for creating these layers. Sputtering and other dry processes are used for the CIS optical absorption layer, while a wet process called solution growth is used for the deposition of the buffer layer between the CIS optical absorption layer and the transparent conducting layer. However, a wet process raises production costs, so it is preferable if all depositions can be achieved using dry processes. Another issue is that cadmium sulfide (CdS), a hazardous substance, is often used

during the deposition of the buffer layer to achieve higher efficiency.

In recent studies, Chantana has created solar cells using different materials and deposition techniques for each layer to compare their photoelectric conversion efficiencies.

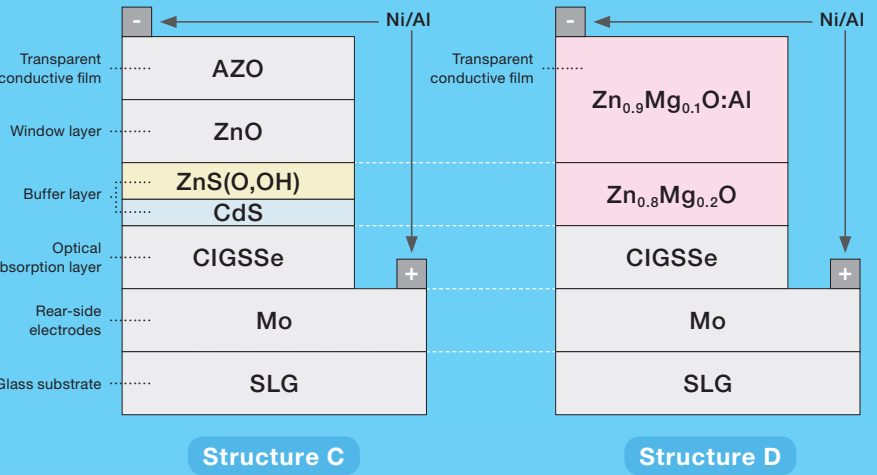
Chantana first fabricated a solar cell using a CIGSSe optical absorption layer and the conventional CdS wet process for the buffer layer (Fig.: Structure A). “We managed to achieve a photoelectric conversion efficiency of 18.3%, but we were left with the issue of a thick buffer layer that absorbs short-wavelength light.” To

Structure of a CIS thin-film solar cell with various buffer layers



What would the structure of a thin-film solar cell that does not use harmful cadmium and yet achieves high photoelectric conversion efficiency look like?

Low-cost, high-efficiency, next-generation Thin-film Solar Cell to replace Silicon



increase the efficiency, the buffer layers must be made thinner, or the short-wavelength photoelectric loss must be limited using a substance with a wide band gap.

Next, Chantana created a solar cell by substituting CdS with zinc sulfide (ZnS) and used sputtering to deposit a buffer layer (Fig.: Structure B). This resulted in a band gap of ZnS of 3.5 eV, which is wider than the 2.6 eV of CdS. This strategy eliminated the use of the harmful substance and reduced the short-wavelength photoelectric loss. Yet, Chantana explains, “Compared to the previous solar cell, the overall particle efficiency was low, and the voltage had clearly fallen.” The reason is that sputtering of the ZnO window layer that connects the buffer layer and the

transparent conductive layer causes sputtering shocks, which damage the surface of the CIGSSe optical absorption layer. CdS is resilient against sputtering shock and protects the CIGSSe optical absorption layer from damage, but there was no substance to fulfill this shielding function in this new structure.

Therefore, Chantana decided to deposit a buffer layer that combines ZnS (O,OH) and an ultrathin CdS film to increase short-wavelength sensitivity while, at the same time, reducing the sputtering damage (Fig.: Structure C). As a result, short-wavelength sensitivity increased, and a high photoelectric conversion effi-

ciency of 18.6% was achieved.

Furthermore, he succeeded in depositing all thin films using dry processes, employing a ZnMgO:Al transparent conductive layer and a ZnMgO buffer layer (Fig.: Structure D) to achieve a high photoelectric conversion efficiency of 20%. There is no known successful case in which a CIS thin-film solar cell was created using these materials. In his research so far, Chantana has developed a transparent conductive film that is able to control the conduction band positions, using thin films made of zinc (Zn), magnesium (Mg), or other ternary mixed crystals containing zinc. Mg has a wide band gap and lets in more light than conventional films that use only Zn, which is what enabled this high efficiency.

Chantana is confident, saying, “We can increase the photoelectric conversion efficiency further by changing the materials and deposition methods for each layer.” Chantana is leading the way in a highly competitive global race to develop CIS thin-film solar cell materials.



Jakapan Chantana

Professor, Research Organization of Science and Technology

Subject of Research: Increasing the efficiency of CIS thin-film solar cells
Research Keywords: Solar cells, solid-state electronics

Through the voices of ordinary citizens, the tragedy of state failure and its background come into focus.

Kota Suechika

Professor, College of International Relations

Subject of Research: Contemporary Middle East politics, with emphasis on Islamic political thought and movements in Syria and Lebanon
Research Keywords: Middle Eastern area studies, international relations, comparative politics



As of 2018, the Syrian conflict, said to be the *worst humanitarian crisis of the twenty-first century*, has entered its eighth year. The antagonism between the Assad regime and the opposition was brought out into the open during the Arab Spring of 2011. This antagonism developed into a conflict, and eventually, the extremist group Islamic State (IS) appeared from among the opposition groups. Even after IS lost its clout, with the military intervention of its neighboring countries and major powers, the path to resolution is nowhere in sight. More than half of its entire population has been forced to take refuge from the wartime destruction, either within Syria or abroad, and tens of thousands of lives have been lost already.

“We are prone to believe that the conflicts and political turmoil in the Middle East are due to some unfathomable special causes. There is truth to this in some respects, but we will never be able to develop an understanding by fixating on the differences. I believe that we can *better* understand the politics of the Middle East by discovering uniqueness and peculiarities, as well as commonalities and universalities.” These are the words of Kota Suechika, who has been grappling with this problem from the standpoint of Islamism.

According to Suechika, Islamism is “a political ideology rooted in the teachings of Islam that aims to bring about social change and nation-building.” Suechika explains the importance of analyzing Islamism from a long-term perspective of more than a century. The issue of the relationship between *politics* and *religion* that came about with the collapse of the Ottoman Empire was long sealed away at the hands of dictatorships. The Arab Spring greatly changed this situation. Movements to reflect Islam in



politics came out into the open, and such voices have grown stronger. Suechika moved his attention to this relationship between *politics* and *religion* that was now being re-evaluated and has since studied what influence Islamism has on politics in the Middle East, as well as how the relationship between the two will change in the future.

Numerous studies on the Middle East and Islam have been conducted in Japan as well, but they are still at an early stage when it comes to the attempt to cover both topics. It is for this reason that Suechika’s research, which is fleshing out the reality of Islamism and using its clues to reassess Middle Eastern politics, has garnered much attention.

“However,” Suechika explains, “it goes without saying that Islam does not influence all political phenomena of the Middle East.” The politics of the Middle East contain a diverse range of topics such as dictatorships, democratization, conflict, war, and economic problems relating to oil resources.

Recently, Suechika started a new research project focusing on *conflict* and *state failure* in the Middle East, as a way to add a new perspective on the research he had conducted thus far. He discusses countries like Syria and Iraq that have experienced conflict and tries to clarify why conflicts and state failures occur, as well as what problems are caused by such failures.

“State failure is by no means a domestic problem. If a state fails and conflict ensues, not only will the people of that country suffer, but it will have a major impact on international society as well.” The *Islamic State* that emerged from the Syrian conflict built a “state” that encompassed a vast territory across Iraq and Syria, and then called on Muslims all over the world to become its “citizens.” It is well-known that, as a result, terrorism has become rampant, not only in the Middle East but in Europe and North America as well.



However, in the field of Middle Eastern political studies, globally, the research on conflict and state failures has seen limited progress. An indispensable part of area studies is to head out to the actual locations and collect the voices of its peoples, as well as its literature, but this is practically impossible in conflict zones. As such, Suechika’s research project has commissioned a local research institute to conduct a large-scale opinion survey, in an attempt to collect the voices of its residents. In 2017, they managed to collect data from about 1,000 people each from Syria and Iraq. Such a collection can reveal the thoughts and attitudes of ordinary citizens, which are difficult to perceive from the macro perspective. “The detailed analysis will take a bit longer, but the data is beginning to show aspects different from what are commonly claimed to be their thoughts or what had been previously thought of as *common knowledge*, in relation to Middle Eastern politics.”

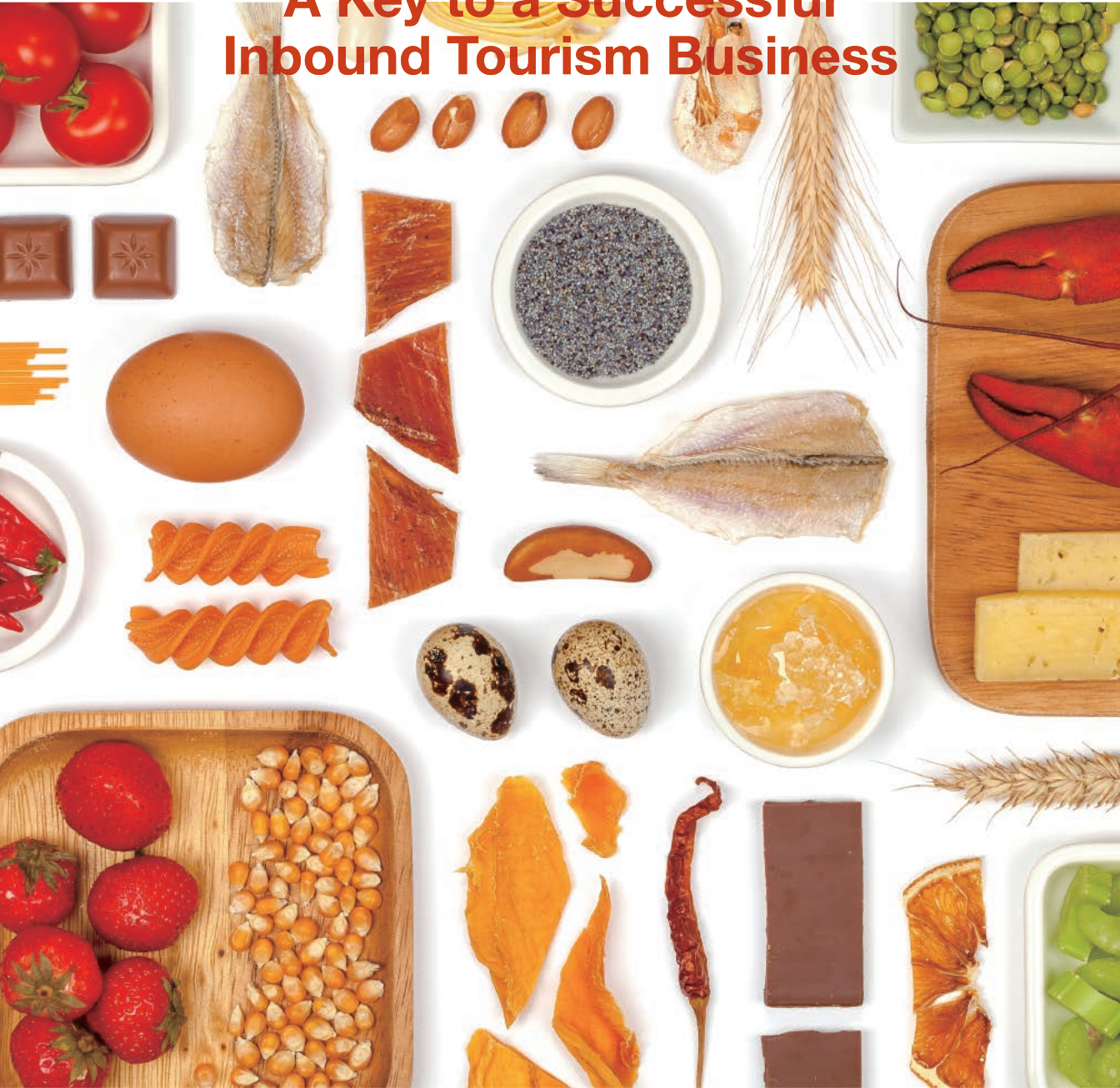
Suechika says that a common misconception about conflicts in the Middle East is that the cause is *sectarian antagonism*. For example, the civil war in Syria is a confrontation between the Assad regime, which advocates secularism, and the opposition, which seeks to restore Islam in politics. In other words, the conflict is about *whether or not to have religion*, rather than a confrontation between different sects. Suechika states that the findings of this opinion poll have corroborated the views held by him and his colleagues.

Suechika explained that “in Japan and the Western world, where the separation of church and state and secularism are taken for granted, we are prone to think the cause of conflicts in the Middle East is *religion*. However, in reality, not all of politics is driven by religion, and some places are no different from the countries and regions where we live.” Perhaps the Middle East may appear different at first glance, but the causes and mechanisms of conflict or peace may be surprisingly universal. Suechika expressed his zeal, saying, “With the current research project, I want to pursue the methodologies and techniques further to gain a *better* understanding of Middle Eastern politics.”

To gain a *better* Understanding of Middle Eastern Politics

How to Accommodate Food Taboos

A Key to a Successful Inbound Tourism Business



Mariko Arata
Professor, College of Gastronomy Management

Subject of Research: Indonesian food culture studies, halal food studies, food business in multi-cultural societies and globalization, food preference, and food choice
Research Keywords: Eating habits, area studies, linguistics, Japanese language education, foreign language education, cultural anthropology

Over the past few years, with the number of foreign tourists soaring, the inbound tourism business has been booming all over Japan. Aside from China, Europe, and North America, the number of tourists from Southeast Asia has also visibly increased in recent years. Many such visitors list *food* as one of their reasons for visiting Japan. At a time when the restaurant and food industry is attempting to find a way to accommodate these foreign visitors, one especially urgent task is how to deal with food taboos and avoidance.

“At least one third of the world’s population observes food taboos and practices avoidance based on beliefs or religion. There are also a significant number of people with allergies, yet Japan cannot be said to be sufficiently accommodating such taboos and avoidances.” This is a point made by Mariko Arata, a cultural anthropologist who has conducted fieldwork on food culture in Indonesia and has made many contributions to halal studies.

In the Japanese food service and ready-meal industries, a lack of consideration due to ignorance is not uncommon, and conversely, some choose to exclude everything to the point of neglecting the basics of *providing delicious food*. In response to this current situation, Arata is proposing a method of providing food to people who observe diverse forms of food taboos and avoidance. Arata attaches the greatest importance to *disclosure*. “First, there are two types of disclosure to keep in mind when displaying the menu at a restaurant. There is *menu information* such as ‘Deep-fried chicken’ and ‘Potato salad,’ which lists the main ingredients of a dish and describes its cooking method, and then there is *ingredient information*, which reveals all ingredients used, including those used in small amounts.” Menu information is sufficient for customers who choose their dishes based only on preference, but those who have allergies or religious taboos cannot get by without the ingredient information. If a detailed description is difficult, simply adding labels such as “Pork-free” or “Meat-free” makes it easier for many people to choose their dishes.

Moreover, Arata recommends not only textual information but also labeling, using *foodpicts*.

Foodpicts are pictograms that refer to 14 kinds of food materials

provided by FOODPICT Inc. They cover major allergens and religious taboos, and accommodate vegetarians, also. However, “if you use *foodpicts*, you must strictly observe the guidelines. Picking and choosing a part of them as you please is not acceptable,” she warns. “What would happen if there was a hotel buffet that used *foodpicts* for only the seven allergenic ingredients? A vegetarian might never imagine there were no labels for meat or fish and could end up consuming it. This would render the *foodpicts* useless.”

She also says that care is required when labeling for alcohol. This is because two types of needs exist: 1) the need to avoid all food and drinks that use ingredients derived from alcoholic drinks (*khamr*), regardless of the amount, for religious rea-

offering alcohol drinks could, for example, add additional information such as ‘For adults only’ or ‘OK for kids, too.’”

One issue that has garnered attention in the food business world in recent years is *halal*. According to Arata, *halal* signifies “things allowed in Islam or things legal under Islamic law.” When it comes to halal food, the globalization of distribution and the sophistication of food processing have resulted in an increase in food and drink whose halal status is difficult to verify immediately, which has increased the importance of halal certification, by which certification bodies guarantee that “this is halal.” While there are firms that enter Muslim markets by obtaining halal certification,

there are examples of restaurants and accommodation facilities that struggle with how to manage this.

However, “Many people misunderstand this, but halal is not the same as being halal-certified,” Arata explains. “To begin with, certification is a very new institution that came about toward the end of the twentieth century. Moreover, there are diverse interpretations of what constitutes halal among Muslims, depending on their sects or schools of jurisprudence, etc., while food preferences and customs also differ among countries and cultures. Foods are often judged to be authentically halal and consumed by Muslims without any certification, while on the contrary, some halal-certified foods may be suspected to be non-halal. More important than obtaining certification, just as with any other product, is 1) providing reasonably priced products that are in line with consumers’ needs and preferences and 2) gaining their customers’ trust.”

She explains, “What we should worry about the most is non-Muslims arbitrarily deciding what is halal and what is not.” She is concerned that there is an overprotective tendency to avoid risk by judging products to be “non-halal” based on a shallow understanding.

She stresses that “Muslims, Jews, vegetarians, and others each have their own food taboos, but they are the same as any of us, as each possesses a rich culinary world of their own. To help such people from all over the world enjoy Japanese food, it is important that we create an environment in which each and every one can choose freely, following their own judgment.”



FOODPICT@INTERNASHOKUNAL & NDC Graphics

Foodpicts are the 14 pictograms provided by FOODPICT Inc. accommodating allergies, religious taboos, and vegetarianism, which can be used as an effective tool for disclosing information on ingredients used in a dish to international visitors.

sons and 2) the need to avoid intoxicating food and drink because of reasons such as pregnancy or having to drive. In the case of the former, because some people avoid food seasoned with *sake*, *mirin*, or alcohol-added *miso* and soy sauce, *foodpicts* accommodate this stricter requirement; however, for those who fall into the latter category, such labels may be an overstatement and lead to confusion. Arata suggests that “restaurants and shops

How do we accommodate the food taboos that apply to one third of the world’s population?

What if the worlds of science fiction were to become a reality? Denis Taillandier, whose research looks into the dynamics at play between science, technology, and science fiction (SF) from a cultural studies perspective, explains that “SF is not just fiction but has influenced and been influenced by real science and technology, playing a role in their development.” Taillandier, who studied Japanese at a French university, aims to understand technology-driven modern society by focusing on Japanese works of science fiction and analyzing the relationships between *real science* and *fictional science*.

“SF tends to be perceived as fiction in the sciences and as entertainment in literary studies. However, Sakyo Komatsu pointed out that ‘the hybrid aspect of SF contributes to the understanding of both literature’s evolution and society’s scientific and technological development,’ identifying SF not as the *literature of science* but as a literary field of its own: a *literary science*.” Drawing on Komatsu’s insight, Taillandier initially focused his interest on the field of nanotechnology, analyzing how it has been represented in works of SF and how those representations evolved.

Taillandier’s name first became known through a critique of Yoshio Aramaki’s early science fiction novella *Soft Clocks*. Since the late 1960s, Aramaki has written speculative science fiction novellas influenced by New Wave SF and surrealism. As indicated by the title, *Soft Clocks* is a novella articulated around Salvador Dalí’s famous painting, *The Persistence of Memory*. Taillandier won wide acclaim for drawing connections between the aesthetics of Dalí’s surrealism, rheology, and nanotechnology through the analysis of Aramaki’s *novum*, “flabby engineering.”

According to Taillandier, “*Soft Clocks* connects art and technology by shedding light on things that are otherwise invisible to the eye.” By unveiling the connections between Dalí’s aesthetics and the nanotechnological imagination, Taillandier points out the conceptual similarities that underpin early twentieth century aesthetics and early twenty-first century technology. “On the one hand, it is Dalí’s paranoiac-critical method, whereby the

artist, in his delirium of interpretation, is able to reveal multiple images—otherwise invisible—within the same configuration of reality, organizing and objectivizing them so that they become a tangible reality. And it is, on the other hand, nanotechnology’s ability to peer into the infinitesimal world of atoms and molecules and generate images of atomic surfaces by using a microscopic scanning tip. The artistic creation and the technological imaging

Denis Taillandier

Associate Professor, College of International Relations

Subject of Research: Japanese science fiction studies, representations of science and technology in science fiction, interplay between *real science* and *fictional science*
Research Keywords: Cultural studies, Japanese literature



The Impact of Science and Technology in Science Fiction’s imagined Futures

What would it mean to live in a post-nanotechnological world?
This is the very question that science fiction’s imagined futures ask of present-day reality.

processes share common aspects.”

Taillandier concluded that Aramaki’s science-fictional use of Dalí’s artistic perception of space offers valuable insight in terms of nanotechnology and its underlying conception of the world.

Taillandier argues, “Science fiction is often seen as the poor relation of science: It is convenient and entertaining when it backs up technoscience’s dreams and hopes, but it becomes inaccurate fantasy when it leads to fear and anxiety. Nevertheless, SF has had a major influence on the development of nanotechnology, while nanotechnology has contributed, in turn, to the birth of the nanopunk subgenre.” Nanotechnology’s genesis was retrospectively attributed to

Nobel Laureate Richard Feynman’s 1959 speech, in which he speculated “whether—ultimately—in the great future, we can arrange the atoms the way we want,” but many of the ideas formulated by Feynman revolved around metaphors that were already circulating in science fiction.

Taillandier has also looked into the mobilization of science fiction rhetorical techniques in the discourse on nanotechnology. “Getting funds is a hard task that requires complex rhetorical skills. Scientists need to convince decision-makers that their research is innovative and exciting, and that they will have a tremendous impact on society, thus producing an effect close to the SF sense of wonder.”

Taillandier contends that “SF plays an important role in discussion of the so-

cial impacts of science and technology.” Project Itoh’s *Genocidal Organ* looks, for instance, into the military applications of nanotechnology, raising questions about its convergence with biotechnologies. Itoh further explores the medical and social implications of nanotechnology in his 2009 novel *Harmony*, in which a device embedded in the body enables complete medical monitoring and management of the population.

“SF raises questions about the social and philosophical impacts of scientific and technological development. SF imagined futures are not just mere fantasies: They are distortions of present-day trends that they contribute to critically looking back on. This is why SF is so fascinating.”

Possession and Exorcisms in contemporary Societies

After I underwent a purification ritual at the Shinto shrine, my chronic illness was cured as if an evil spirit had been exorcized. An anecdote such as this does not exist only in legends and folklore. In fact, even today in the twenty-first century, there are many such stories and locations related to ghosts and possessions all over the world.

“While demonic possession and exorcisms, or so-called religious and spiritual healing practices, have been observed from ancient times, there remain many phenomena we experience in our physical bodies that modern science still struggles to explain. This theme remains an active area of interest and debate in the field of socio-cultural anthropology,” shared Andrea De Antoni, who has visited places that are believed to be connected to hell and the afterlife across Japan to research the relations between humans and non-human actors, as well as how such relations and discourses are perceived and experienced as reality. At present, he is widening his field of research beyond Japan to include Italy and Austria to conduct comparative research on cases of spirit/demonic possession and exorcism in late capitalist societies. One of the characteristic features of De Antoni’s research is his focus on individuals who experienced spirit possession. He focuses on patients who healed

through religious healing practices known as exorcism, after medical treatments had had no effect on them. He conducted participant observation of the treatment process, and interviewed those individuals. “By understanding what is happening from the patient’s point of view,” De Antoni explains, “I would like to shed light on how within our present late capitalist societies,

tinuous increase of visitors. De Antoni repeatedly visited the shrine over several years to observe and document over 150 worshippers undergoing the ritual, and he conducted interviews with them. His interviews included questions such as *What are your conditions or symptoms? What motivated you to come here? Have you been seen at a hospital? What were you diagnosed with? What treatment have you received? Did you experience any specific sensations while praying? If yes, could you describe the feelings?* A detailed analysis of the responses helped De Antoni identify a number of interesting findings.

One such finding was that while a variety of physical pains, ailments, and sufferings were expressed by many of the worshippers, such as headaches, stomach-aches, lower back pains, and heaviness in their shoulders, as well as coughing, most of them were unanimous in saying that hospitals were unable to identify their disease or a successful way to treat their conditions. “We can observe,” De Antoni explains, “how those who had fallen outside the scope and framework of modern medicine had turned in their desperation to the shrine to visit and pray.” This was not the case in Italy, as will be discussed below. What intrigued De Antoni the most was that “the majority of the people who

had come to be exorcized did not even ‘believe’ in the existence of dog-spirits or, for that matter, any other spiritual entity.” De Antoni continued, “Although they perceived Kenmi Shrine as a shrine for exorcizing spirits, the vast majority of participants had no interest in finding out whether they were possessed by a dog-spirit. Despite this, strangely, many people still genuinely felt that their ‘symptoms were alleviated’ after the exorcism.”

De Antoni is also investigating exorcists and exorcisms of demonic possession, in a region in Italy, where the Catholic influences are deeply rooted. Although the phenomenon of possession is known in Italy, it nonetheless differs from the Japanese version. First, in contrast to the worshippers who go to Kenmi Shrine with a range of symptoms, the people who undergo exorcisms in Italy suffer from a rather fixed set of symptoms. As De Antoni explains, “This is because the role of exorcists is strictly institutionalized in Catholicism.” Only people who exhibit specific symptoms are diagnosed with *demonic possession* and thus considered for exorcism.

Another aspect in which they differ from Japan is the dramatic response demonstrated by people who suffered from demonic possession. De Antoni had

observed a young woman suffering from demonic possession groaning loudly in a voice that was very different from her own as she struggled so violently that five men were barely enough to restrain her. De Antoni analyzed this experience by focusing on the sensations experienced during this ritual, which were: 1) all sensations felt by the person during the ritual, 2) all phenom-

performance change depending on where one’s *attention* is directed. But it’s not just our *attention* or physical conditions that change. How our body performs depends on the *skills* and *abilities* we acquire through enculturation and frames of reference. That is to say, the body is directed towards acting in a specific way within its cultural framework.”

De Antoni notes other interesting differences between Japanese exorcisms or purification rituals and Italian demonic exorcisms. For example, differences were seen in the patient’s relationship with the *Gūji* (the chief priest of a Shinto shrine) versus that with exorcists in the Catholic church, particularly with respect to the patient’s physical responses and healing processes. Although the comparative analysis will take additional time, he has already found one answer to his initial question: “The majority of modern people do not believe in spirit or demonic possession. However, since people *heal* or, in other words, because the rituals

themselves have actual efficacy, ‘possession’ paradoxically continues to exist within this modern, globalized society. .” He continues to conduct research on the boundaries between *religion*, *the spiritual*, and *science* in the search for insights that can contribute to psychiatric care and physical therapy.



Despite its inconvenient location, surrounded by precipitous mountains, people continue to visit the shrine. (Kenmi Shrine, Tokushima)



It is said that “those who have fallen outside the scope and framework of modern medicine” visit the shrine in desperation to pray. (Kenmi Shrine, Tokushima)



Andrea De Antoni
Associate Professor, College of International Relations

Subject of Research: Medical experiences between religion and science—anthropological research on spirit/demonic possession and exorcisms in contemporary Japan, Italy, and Austria
Research Keywords: Cultural anthropology, religious studies, area studies

Cross-Cultural Comparison of
spirit/demonic Possession and Exorcisms



Can China be a Responsible Great Power?

A Chinese peacekeeping memorial in Skun, central Cambodia. In 1992, two members of the Chinese peacekeeping team stationed there as part of the United Nations Transitional Authority in Cambodia (UNTAC) mission died in the line of duty. (Photo by Miwa Hirono)

At the UN peacekeeping operations (PKO) summit in September 2015, as the U.S. and other countries declared that they would expand their contributions, Chinese President Xi Jinping surprised the world by announcing contributions on a remarkably grand scale, creating an 8,000-strong standby force and permanent peacekeeping police squad, and contributing US\$1 billion in military assistance to the African Union. Most of Japan and the West saw this as a strategy to restore China's worsening international image, but Miwa Hirono says she was "skeptical of this one-sided argu-

ment based on the Western perspective." Since the 2000s, China has actively carried out PKO and humanitarian assistance in developing countries and in areas affected by conflicts or disasters in Asia and Africa. Today, about 2,500 Chinese peacekeepers are deployed in PKO, far more than those from any other permanent member of the UN Security Council. China's financial contribution is also second only to that of the U.S., so there is no doubt that recipient countries see China as indispensable. While the international community supports these contributions, it often criticizes China's strategic methods and development, which can at times be inconsiderate of environmental and social sustainability.

Hirono comments that "as China's influence in the

international community grows, whether or not the country is a *responsible* great power has become a major question." In a climate where discussions about what it means to be a responsible great power are going nowhere between China and the West, Hirono garnered much attention by setting forth a novel viewpoint, asking, "What are the perceptions of the recipients of such assistance (the insiders)?"

Hirono explains, "My current research project is an investigation of how the people—the insiders—living in conflict and disaster-affected areas where China has carried out PKO or humanitarian assistance perceive China's responsibility in the international arena." She is conducting on-site surveys in five countries: Cambodia, Indonesia, Nepal, South Sudan, and Liberia.

Characteristic of Hirono's research is that she takes a qualitative approach by carefully collecting the opinions and voices of the individuals concerned. She

interviews a diverse group of insiders, including senior government officials, journalists, ordinary citizens, researchers, firms, medical practitioners providing aid, and the local Chinese community, and conducts a qualitative analysis to illuminate their perceptions.

One of the survey sites was Aceh, Indonesia, which was devastated by the 2004 Indian Ocean earthquake and tsunami. Immediately after the disaster, Japan, Western countries, and China arrived and devoted themselves to providing humanitarian aid. Hirono comments that "when asked about China's international responsibility in connection with this disaster, the majority of insiders surprisingly answered, 'China's responsibility should lie in economic assistance such as investments into the trading port in Sabang, Aceh.'" The economy in Aceh saw rapid development thanks to reconstruction projects after the disaster, its growth rate reaching as high as 5%. However, as soon as the five-year assistance period ended, most countries withdrew, and the disaster-affected areas faced economic stagnation. "I realized that what was most urgent for the insiders in such areas was economic assistance with a long-term perspective, even if it happened

in the context of humanitarian aid. This reality isn't clearly visible in theoretical discussions." Hirono also gained interesting insights during her survey in Cambodia. She explains, "What surprised me first was that almost all insiders responded 'Yes' to the question, 'Do you think China is a responsible great power?' They said the reason was that China 'supported King Sihanouk.'" During the civil war, in a conservative estimation, the Khmer Rouge (the Communist Party of Kampuchea) is said to have murdered over one-fifth of the Cambodian population. Many Cambodians still carry wounds from that time, so it would not be surprising for some to reject China for having supported that regime. Still, Hirono says, "Nevertheless, they highly appreciate China for welcoming Sihanouk to Beijing after his expulsion by the Pol Pot regime and for helping to establish the government in exile. This perspective on history by the people of Cambodia had never appeared in previous studies." Moreover, the survey in Nepal revealed another unique dimension. Soon after a massive earthquake struck Nepal in April 2015, relations with neighboring India deteriorated, and Nepal's oil supply was cut off in September of that year. Hirono

says that insiders are extremely appreciative of China for providing oil across the Tibetan border. With respect to the effect this has had, Hirono comments, "It was a new revelation that things like geopolitical conditions and relations with surrounding countries, which are ordinarily considered in a context different from disasters or conflict *per se*, do influence perceptions about what makes a responsible great power in the context of disasters or conflict." In recent years, a growing awareness of environmental protection and sustainability in developing countries and regions has prompted local skepticism about the nature of China's international contributions. For example, the Myitsone Dam construction project, jointly carried out by the Myanmar government and China, was suspended because of popular concerns about its impact on society and the environment. "As China is promoting the Belt and Road Initiative, it will not be able to ignore local perceptions about great powers' international responsibilities." The insider perspective revealed by Hirono will perhaps become even more meaningful in the coming days.

After the December 2004 Indian Ocean tsunami, China provided humanitarian assistance in Aceh, Indonesia, by building a village and supplying items such as prefabricated tents. (Photo by Miwa Hirono)



Asking locals about how they perceive China's international contributions



Miwa Hirono
Associate Professor, College of International Relations
Subject of Research: China's peacekeeping operations, disaster management, cultures of humanitarianism in East Asia, China's role in conflict-affected regions, peacebuilding
Research Keywords: International relations, China's international relations

Artificial Intelligence that autogenerates Games to entertain Humans



development for health promotion, using the *FightingICE* platform. He approaches health from three angles—*physical*, *mental*, and *social*—and is developing games that promote each of these aspects.

One is a study of AI that increases the user's amount of exercise through *FightingICE*. “We capture the player's movements using Kinect motion capture technology, which recognizes gestures; have the player fight an AI-controlled character (enemy) in the game; and have the enemy character induce player movements. By setting algorithms that allow the MCTS-using enemy character to choose effective actions in any given situation, it induces players to move both sides of their bodies in a balanced manner. We also created

algorithms that prompt players to make jumping movements, thereby increasing the effectiveness of the exercise.”

Furthermore, the background images that make up the game stages consist of Japanese *ukiyo-e* paintings that shift appropriately, which allow players to enjoy Japanese culture as the game promotes their health.

Next, Thawonmas is developing game AI that emphasizes storytelling to promote mental health. The PPG explained above falls into this category. He constructs algorithms for AI that creates a pattern of initial struggle, a gradual comeback, and finally, a reversal victory. The challenge is to derive functions that restrict character movements to create natural story

Game applications of artificial intelligence (AI) technology have made progress in recent years. “Digital games are also a challenging research theme in the AI field because of the need for real-time computation, despite the limitations of machine capability.” These are the words of Ruck Thawonmas, one of the world's foremost researchers on AI in fighting games.

Recently, the presence of individuals who enjoy games as *spectators* instead of as players has been receiving attention in this field. Thawonmas explains, “Every month, several hundreds of millions of people use video-game live-streaming

services to watch games, yet almost no research has been conducted on game AI that targets spectators.” Thawonmas's research team is engaged in researching Procedural Play Generation (PPG), which autogenerates contents for spectators' enjoyment.

There are no human players involved in PPG. The characters fighting each other move automatically, based on algorithms, and users can autogenerate gameplay in accordance with their preferences of favorite playstyle and progression. Thawonmas and his team use their independently developed fighting game, *FightingICE*, for their research.

FightingICE is extremely versatile, as it allows the use of both Java and Python languages. It has become the game of choice for researchers studying fighting game AI all over the world. It is also used as the official

platform for an international competition at the Conference on Computational Intelligence and Games of the Institute of Electrical and Electronics Engineers (IEEE), an authority in the international research community. “Until 2016, the top performance was monopolized by the Monte Carlo Tree Search (MCTS) method, which determines an individual's own actions based on the results of simulating the enemy's randomized actions. However, a diversity of search methods has gradually been researched, and recently, there has been an increase in participants using deep learning.” Just as Thawonmas says, our competition offers glimpses of trends in AI research.

After coming to Japan, Thawonmas encountered AI for the first time in graduate school and developed an interest in Japanese culture and the Japanese fighting games that caused a global boom, incorporating them into his research. His current focus is on game

Developing the official game for a fighting game AI competition at an international conference on game AI

progression that does not feel sudden or forced.

A unique development involves games that induce *smiles*. A system using *Science Birds* (SB), a clone of the action puzzle game *Angry Birds* developed by overseas researchers, uses a web camera to recognize player facial expressions and is programmed so that *smiling* triggers switches for shooting and other actions. Thawonmas explains, “A lot of research on the correlation between smiling and health has been conducted in the field of health science. We're planning on verifying the health effects of our proposed system through clinical trials.” He shares

his vision: “In the future, I want to develop games that can help prevent depression.”

Another multiplayer game developed based on SB, *AngryICE*, is equipped with a chatbot*. It is designed for multiple users to participate and play by working together. The aim is to promote social health by inducing user behavior and conversations.

Thawonmas plans to make all the games he develops available for free. *FightingICE* has already been released. His goal is to make broad contributions to society while boosting the evolution of AI to entertain humans.



Ruck Thawonmas
Professor, College of Information Science and Engineering
Subject of Research: Game AI, games for health promotion, digital humanities
Research Keywords: Artificial intelligence

*Chatbot: A program that uses AI to autogenerate text and voice to converse and exchange messages.

RESEARCH TOPICS

Ritsumeikan University and Dalian University of Technology to set up joint Research Center



On April 17, 2018, Dalian University of Technology in China and Ritsumeikan University entered into an agreement to establish a joint research center. The aim of the agreement is for Dalian University of Technology and Ritsumeikan University to establish the “DUT-RU Co-Research Center of Advanced ICT for Active Life” as a center to research Information and Communication Technology (ICT), medical care, and health, as well as to further advance collaborative research between the two universities and contribute to scientific development. The signing ceremony at Suzaku Campus was attended by President Mikio Yoshida, President Dongming Guo of Dalian University of Technology, and other representatives from both universities.

North Wing Restoration Ceremony at the Nagae Family Residence, a tangible cultural property designated by Kyoto City

On May 24, 2018, a ceremony was held to commemorate the completion of the restoration work in the north wing of the main building of the Nagae Family Residence, a tangible cultural property designated by Kyoto City, which had sought to restore the interior to how it looked when the building was constructed 150 years ago. After Ritsumeikan University was donated a collection of items belonging to the Nagae Family Residence, the university’s Art Research Center documented each of those items in a database. Based on this donation, Art Research Center also began to plan and manage the folding screen festival (*Byobu Matsuri*) at the Nagae Family Residence, held in conjunction with the annual *Gion* Festival in July. During the restoration, the College of Image Arts and Sciences, along with the College of Science and Engineering, documented the restoration and surveyed the site. At the commemoration, footage of the restoration process was screened, and the attendees of the ceremony watched the restoration process captured on film with great interest. Furthermore, on the 25th, the restored Nagae Family Residence was opened for a special showing as an opportunity to publicly display Kyoto’s valuable and tangible cultural properties—the Nagae Family’s Residence itself and the collection of items belonging to the residence—to a broader audience.

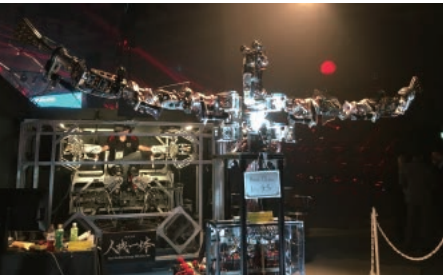


Awards Ceremony for the “12th Ritsumeikan Shizuka Shirakawa Awards for East Asian Characters and Culture”

On May 26, 2018, an awards ceremony and memorial lecture for the 12th Ritsumeikan Shizuka Shirakawa Awards for East Asian Characters and Culture was held at Kinugasa Campus. The awards are given by the Shirakawa Shizuka Institute of East Asian Characters and Culture to honor the achievements of the late Shizuka Shirakawa, emeritus professor of Ritsumeikan University, as well as to publicly acknowledge meritorious individuals and groups as a way to encourage and support capable persons in fields such as East Asian characters and cultural studies. At the 12th ceremony, the excellence award was conferred on Professor Makoto Ueno (Faculty of Letters, Nara University) and Professor Dai Matsui (Graduate School of Letters, Osaka University) by Takao Sugihashi, Director of the Shirakawa Shizuka Institute of East Asian Characters and Culture, along with certificates and extra prizes. Following the awards ceremony, the awardees delivered their memorial lectures titled “The Bewilderment of a Student of the Manyoshu on receiving the Ritsumeikan Shirakawa Award” (Professor Makoto Ueno) and “East Asian Cultural Exchange as seen from the Multilingual Inscriptions in the Dunhuang Caves” (Professor Dai Matsui). Professor Sim Kyung Ho (Korea University), the first-ever recipient of the award, delivered a keynote lecture titled “The Sinographic Culture of Korea.”

Special Lecture by Dr. KANAOKA (Visiting Researcher) on Man-Machine Synergy Effectors

On May 17, 2018, the Biwako Kusatsu Campus (BKC) Research Office (Division of Research, Ritsumeikan University) and the Kinki Head Office of the Organization for Small & Medium Enterprises and Regional Innovation, Japan, held the BKC Graduation Memorial Lecture, delivered by Dr. KANAOKA (visiting researcher at the Robotics Research Center of the Research Organization of Science and Technology, former lecturer at the Department of Robotics, College of Science and Engineering), Representative Director and President of Man-Machine Synergy Effectors, Inc. After starting to teach at the College of Science and Engineering, Dr. KANAOKA proceeded with robotics development in the BKC incubator, but as the business expanded, he decided to relocate to the *Himitsu Kichi Jinki Ittai* (JINKI the Secret Base) in Kusatsu. The special lecture celebrating Dr. KANAOKA’s new start was attended by a total of 116 people. Dr. KANAOKA looked back on his 16 years at Ritsumeikan and said, “I dedicated my life to robots and have been pondering what my mission is,” identifying the Great East Japan Earthquake as an event that spurred him into action when he was not able to make any contribution in a situation in which robots should have played an active role. He expressed, “From



here on, Man-Machine Synergy Effectors wishes to supply the world with robots that can operate in environments like that of the aftermath of the Great East Japan Earthquake. We believe that our products—anthropomorphic heavy machines—are useful in a variety of industries and that their implementation is having a major impact.”

Estimating the Ideologies of Japanese Twitter Users with Machine Learning: News Audience Fragmentation in some Media

Assistant Professor Yuki Ogawa (College of Information Science and Engineering) and his research team have used machine learning to estimate the ideologies of news audiences in Japanese Twitter with high accuracy and have demonstrated that the kind of news audience fragmentation by ideology seen in the U.S. and elsewhere cannot be found in Japan, with some exceptions. This study was led by Associate Professor Tetsuro Kobayashi (City University of Hong Kong) and also involved Assistant Professor Ogawa, Assistant Professor Takahisa Suzuki (Tsuda University), and Professor Hitoshi Yamamoto (Rissho University). The findings were presented in the Asian Journal of Communication on April 6. Twitter and other social media facilitate users’ selective contact with information that is in agreement with their pre-existing views. Thus, the possibility of news audience fragmentation has been pointed out in case of conservatives, while liberals follow media that tend toward either side. As news usage on social media increasingly has a tendency to “see only what one wants to see,” news audiences become fragmented along ideological lines, opportunities for people of different viewpoints to know each other’s opinions and carefully consider political issues are lost, and there is a risk of rigid public opinion. Associate Professor Kobayashi expects that the findings of the study will help clarify the role of social media in the formation of Japanese public opinion.

Emeritus Professor Nanishi is awarded the ISPlasma Special Recognition Award



Emeritus Professor Yasushi Nanishi (College of Science and Engineering) was awarded the ISPlasma Special Recognition Award at the ISPlasma2018/IC-PLANT2018 international symposium in March. ISPlasma is a prominent international symposium in the Tokai region that gathers outstanding researchers with considerable research performance in the field of plasma from around the world to conduct broad discussions about the latest in plasma science, the applications to nitride semiconductors and nanomaterials, and collaboration with industry. On the occasion of the 10th anniversary of the establishment of ISPlasma, Emeritus Professor Nanishi was recognized for his many years of contributions to ISPlasma/IC-PLANTS and received the

award together with Professor Sumio Iijima (Meijo University Graduate School).

Faizul Salihin Bin Abas (Graduate School of Science and Engineering) is awarded the ISPlasma2018 Best Oral Presentation Award

Second-year doctoral student at the Graduate School of Science and Engineering, Faizul Salihin Bin Abas (The Nanishi & Araki Lab. for Optoelectronic materials and devices research) was awarded the Best Oral Presentation Award at the ISPlasma2018/IC-PLANT2018 international symposium in March.



Cell Wall Pectin Synthesis in Growing Plants: Terrestrialization and Evolution

A Ritsumeikan University research group led by Associate Professor Takeshi Ishimizu of the College of Life Sciences, in collaboration with researchers at Nagoya University, Konan University, and Tohoku University, have, for the first time, elucidated the mechanism by which plant cell wall pectin is synthesized. The Ritsumeikan group included graduate student Kohei Kato, also of the College of Life Sciences, and postdoctoral researcher Yuto Takenaka of the Ritsumeikan Global Innovation Research Organization, among others. Pectin, which is synthesized in growing plants, consists of sugars that are connected in a chain. The research group discovered that glycosyltransferases are responsible for synthesizing the pectic backbone. They also found that these enzymes belong to a novel gene family. This gene family appears to have emerged during the terrestrialization of plants. The research suggested that pectin synthesis is a key factor that contributed to successful terrestrial adaptation by plants. This discovery has helped elucidate part of the developmental mechanism in plants. The results of the group’s study are applicable to the breeding of fast-growing crops. Pectin has been used as a gelling agent (thickening agent) in food additives. The newly discovered enzymes may also help develop a new type of gelling agent with novel functions. This discovery was published in the September 2018 issue of *Nature Plants*, a sister journal to the British scientific journal *Nature*. The News & Views section of *Nature Plants* will cover this research project. This study was supported by Grants-in-Aid for Scientific Research (KAKENHI) from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan, and the Japan Society for the Promotion of Science (JSPS), as well as the Ritsumeikan Global Innovation Research Organization (R-GIRO).

Find out more
Title: Pectin RG-I rhamnosyltransferases represent a novel plant-specific glycosyltransferase family
DOI: <http://dx.doi.org/10.1038/s41477-018-0217-7>
Journal: *Nature Plants* 4, 669–676 (2018)
Contact corresponding author: Takeshi Ishimizu, ishimizu@fc.ritsumei.ac.jp

COLUMN #1 The World of Shirakawa's Letter Science

On the Special Feature: *The World*

Takao Sugihashi

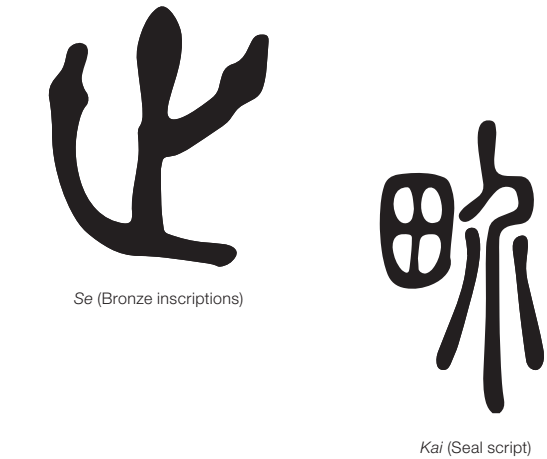
Why this issue's special feature is *Connecting with the World*

To begin with, the Japanese word for world (*seka*i) was a Buddhist term that made its way to Japan from India via China. In China, the word's meaning was already expanded beyond the sutras, and the usage kept growing in Japan.

Now, what does the Shirakawa grammarology say? Unfortunately, Shirakawa's character dictionary does not contain any commentary on the compound 世界 (*seka*i). Looking at the characters individually, 世 (*se*) is described as "the shape of vegetational branches and leaves spreading, sprouts appearing. Signifies new branches and leaves." Clearly rejecting the argument of the *Shuowen Jiezi* (read as *Setsumon Kaiji* in Japanese, an early 2nd Century Chinese Dictionary that was the first to analyze the structure of the characters), he writes, "The character's shape is close to 生 (*sei*), which also has the shape of vegetation yielding branches and leaves. In the metal script, *se* is used to construct 柎 (*ei*) and 葉 (*yō*). Trees take the shape of *se* and grass the shape of *sei*. *Se* is also called *yō*, so 万世 (*bansei*) is called 万葉 (*manyō*)" (Source: *Jitsu*). This is what it means to live up to one's reputation, that is, "From the growing of fresh spouts, it is used to signify 'a person's life [...] society [made up of humans]'" (Source: *Joyo Jikai*).

界 (*Kai*) has the following commentary. "介 (*Kai*) is in the shape of an armed person with armor in the front and back of their body," so "it carries the meaning of protecting one's body and separating oneself from others." This "is applied to fields, so that *kai* carries the meaning of *borders* that demarcate fields" (Source: *Joyo Jikai*).

In other words, the world (*seka*i) can be seen as a word combining the meanings of time (*se*) and space (*kai*). Let's set down *se* and *kai* in the ancient script.



Takao Sugihashi Director of the Shirakawa Shizuka Institute of East Asian Characters and Culture/ Professor, Kinugasa Research Organization and Professor Emeritus

COLUMN #2 The other Side of the AI Boom

Building Robot Cognition and Semantic Understanding

Tadahiro Taniguchi

Over the past five years, the world has become excited about artificial intelligence. Something special is happening within the employment environment for students hunting for jobs, as *separate quotas* are being set up exclusively for AI-related jobs. However, this boom will surely come to an end of sorts. I think this will happen in 2018.

Put succinctly, the current AI boom is "a boom in pattern processing based on developments in deep and machine learning." What is a pattern? It can be images of human faces, patterns on a *go* board, or the aerial vibrations we call speech.

As you know, regular computers are called von Neumann architecture and function on the basis of operations supported by mathematical logic. Fundamentally, it is the logical management of discrete strings of symbols. However, when we humans perceive things visually or aurally, the process does not abide by such logic. Consecutive patterns are conveyed to the brain via the visual and auditory senses and are processed to give rise to perception. At the core of this boom is the understanding that the neural network is astonishingly skilled at such consecutive processing.

Now, AI aims to construct *human intelligence* using computers, but the very question of "What is intelligence?" is a difficult one. Is intelligence nothing more than a pattern processor? Certainly not.

We are conducting AI research with the aim of building robot cognition and semantic understanding. That is, our viewpoint is based on the desire to build a robot that lives in the real world, understands things, and autonomously carries out symbolic communication with others. In the previous academic year, the R-GIRO* research program International and Interdisciplinary Research Center for the Next-generation Artificial Intelligence and Semiotics was established at Ritsumeikan. At the core is a system theory called Symbol Emergence System Theory that I proposed. Is it possible for robots to achieve the same cognition as humans? I hope that Ritsumeikan University will go beyond the third AI boom and become a world-leading AI research base.

* Ritsumeikan Global Innovation Research Organization



Tadahiro Taniguchi Professor, College of Information Science and Engineering Professor Tadahi-ro Taniguchi, who is currently with the College of Information Science and Engineering, earned his Ph.D. in Education from the Graduate School of Engineering at Kyoto University in 2006. He was an Assistant Professor and Associate Professor at the College of Information Science and Engineering, Ritsumeikan University and, later, a professor at the same college, before assuming his current position in 2017. He was a visiting Associate Professor at Imperial College London in 2015–2016 and from 2017 was involved in AI research and development at Panasonic as a guest chief engineer. This was the first university-to-company cross-appointment in Japan. He is also known as the originator of Bibliobattle. Works include *Can We build Robots that Communicate?* (NTT Publishing), *Symbol Emergence Robotics: Introduction to the Mechanisms of Intelligence* (Kodansha), and many more.

COLUMN #3 College of Comprehensive Psychology regular column

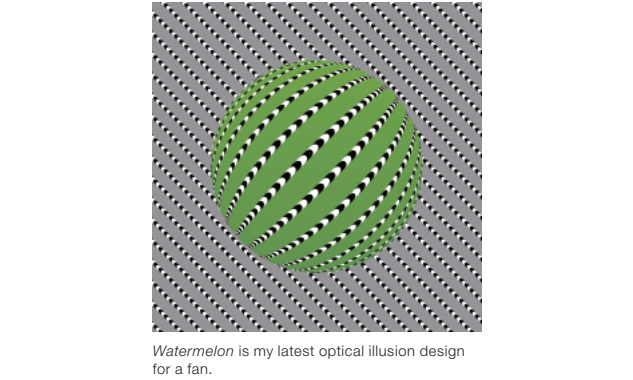
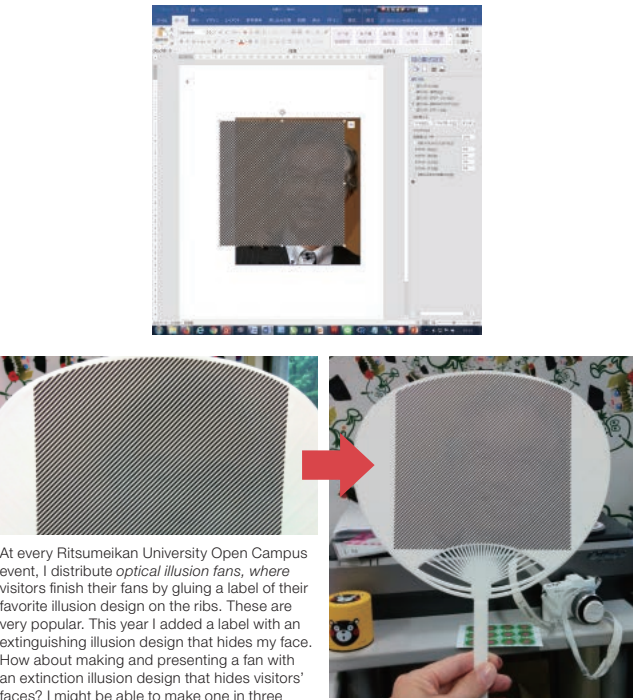
How to make an extinction Illusion using Word or PowerPoint

Akiyoshi Kitaoka

I study visual illusions.

Twitter helps me collect information on which illusions are popular. The extinction illusion is rather popular. High spatial frequency and high-contrast components of an image obstruct the perception of low-contrast contours. This phenomenon can be used to hide images in a loud, striped pattern.

This kind of illusion can be produced using graphic design software. When I tweeted about how to use it, a third-year student from the College of Comprehensive Psychology, Ritsumeikan University replied that using PowerPoint will suffice. I confirmed this and found that Word is also an option. I then realized that someone might propose Excel, so I confirmed that it would also be possible to use Excel for the creation of such an illusion. Please try these programs.



Akiyoshi Kitaoka Professor, College of Comprehensive Psychology Professor Kitaoka received his Ph.D. from the Graduate School of Psychology, University of Tsukuba. He studies perception and visual illusions. He also produces a variety of illusion designs. One of his designs was used in the inner design of the Lady Gaga CD album *Artpop*. He has written many books on visual illusions.

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