The Etymology of Sport — a Pastime.
A future where exercise is a part of everyday life, created by advanced technologies

Everyone gets old, but how we age is not common to everyone. Some age healthily and lively, while others may become sick or bedridden. Everyone of course hopes to "remain healthy, regardless of their age," but in modern times, where the burden of nursing and medical care increases in conjunction with the declining birth rate and aging population, the extension of a ‘healthy life expectancy’ is a challenge to be tackled as a country, beyond the obvious desire for this by individuals.

The Center of Innovation Science and Technology based Radical Innovation and Entrepreneurship Program (COI STREAM), which was launched by the Ministry of Education, Culture, Sports, Science and Technology in 2013, heralds "Secure Sustainability as a country advanced in its aging population and declining birth rate" as one of its three visions. A ‘Bright Future for All Ages with Health Innovation by Daily Exercise’ was adopted in 2013 on a trial basis and was officially adopted by COI STREAM in 2015, an advanced research core representing Japan. In this, we target contributing to the extension of a healthy life expectancy by making exercise a part of everyday life.

"The main feature of our research core is an attempt to make exercise an everyday affair from the viewpoint of ‘Spaces,’" says Tadao Isaka, serving as the leader of the research core. "We are currently studying a new sports health technology that can radically change the ‘value of space,’ referring to smartwear, space-sharing, and exercise induction/retention technologies." He reports on progress, saying, "From 2015 and onward, a Juntendo University research team aiming at the elimination of ‘becoming bedridden’ by preventing locomotive syndrome has joined our university as a satellite partner, proceeding with research to contribute to health maintenance and improvement from the perspectives of both ‘sports & exercise’ and ‘medicine.’"

As explained by Isaka, for each research theme “that is in full view of social implementation through cooperation with corporations, not just remaining as research,” they are full of surprises that may well appear in the “dreams about the future” of children.

For example, Naruhiro Shiozawa, studying “smart-wear technology,” is working with Toyobo to develop “Undergarments that can measure physical and mental conditions.” The objective involves measuring body temperature, perspiration, respiration rate, and heart rate, etc., in real time by mounting a device to measure human body data within the undergarment. Grasping physical and mental conditions will make it possible to develop a wide variety of programs and applications to inspire a feeling such as, “I want to exercise” and “Exercise is enjoyable,” depending on individual conditions, or to change the contents of exercise and environments.

Shiozawa says, “We are initially developing undergarments with an electrocardiogram measurement function that enables to grasp physical and mental conditions in the most versatile manner.” Toyobo Co., Ltd., a fiber material manufacturer, has joined with research members in support of this development. As Shiozawa says, “It would be ideal that instead of especially wearing undergarments for measurements, to wear them as part of everyday life and to measure physical and mental conditions without being aware of it. For this reason, we paid great attention not to damage any of the functions as clothing.” The finished prototype looks like just an ordinary undergarment at first glance and is as comfortable as ordinary products. However, the undergarment is made of a special material excellent in terms of elasticity and is printed with electrodes, and on the front there is a removable device that can utilize an ECG.

It is not only comfortable, but it can also stably and accurately collect data, which is another important development challenge. When you move your body, a system to enable one to naturally exercise will be created by, for example, feeding back data in real time for communication among users of different generations. This could also be useful for diagnosis via the Internet.
Flexible ultrasound loudspeaker: Ultrasound elements are vertically aligned on a board to control the curvature of the emission plane. The reach of sound can be controlled at will by vibration.

Audio spot for minimum domain: Amplitude modulated waves are separated, and three loudspeakers emit a sideband wave 1, a carrier wave, and sideband wave 2. These are demodulated at the single point where they intersect to become an audible sound.

A flexible ultrasound loudspeaker is combined with an electric-driven panning head to automatically control the direction of emission. Based on the number of users and the range of use, the playback area can be controlled at one’s discretion.

Biwako-Kusatsu Campus, which is due to open next year, will house a new gymnasium at Ritsumeikan University, contributing to exercise promotion. At a recent demonstration, one group hears a different sound so as to receive exercise instructions suitable for them.

Nishiura explains, “Sound waves travel differently (directionally) depending on the frequencies. According to him, when the frequency is low, sound generally travels concentrically (semi-directional), while a higher frequency travels straight. In other words, the lower the frequency is, the wider the sound travels, while the higher the frequency is, the straighter the sound travels at an acute angle. However, ultrasound waves with high frequencies cannot be detected by human ears. For this reason, Nishiura successfully generated a sound that is audible to human ears that has directivity like an ultrasound sound wave by modulating and emitting music and audio within an audible range and by demodulating it in the atmosphere. By controlling the directivity of sound, it has become possible to create a sound space that can be heard only in a specific direction and at a specific range.

Furthermore, Nishiura designed a curved loudspeaker surface and developed a parametric loudspeaker that can freely control the direction and range in which sound travels by automatically controlling the curvature. The "audio spot" using this loudspeaker transmits the sound within a limited direction and range, much like a spotlight, making it possible to create completely different sound domains in a single space. “Even when we generate multiple sounds in a space, if the sound domains are different, one cannot hear other sound domains. For example, elderly people, youths, and children can share the same space, while receiving audio exercise instructions that are suitable for each group,” Nishiura explains. They have conducted many demonstration tests, confirming the possibilities of contributing to exercise promotion. At a new gymnasium at Ritsumeikan University’s Biwako-Kusatsu Campus, which is due to be completed in the fall of 2016, these ultrasound loudspeakers will be installed to realize space-sharing via sound. “We want to eliminate any spaces where exercise will be inhibited by sound,” says Nishiura, looking further into the future.

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At the same time, Takanobu Nishiura is trying to create a “Space that makes people want to exercise” using acoustics. He is developing an ultrasound directional loudspeaker.

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S hiozawa says that, while discussing the development going forward, “Toward full-scale commercialization, our next step is to meet the standard as a clothing item.” Currently, they are tackling the challenge of performance improvement as a product, such as strength. At the same time, they are also proceeding with implementing sensors to measure other inputs, such as perspiration and body temperature. They also “Have an idea to implement ultrasound loudspeakers in smartwear.” The idea is to mount ultrasonic loudspeakers on the shoulder of smartwear to send audio information to the ears, so as to promote exercise. Though some technological issues still remain, realization is said to be in the not-so-distant future.

Nishiura is also developing an “audio spot for minimum domain” to reproduce sound in a minimum domain of a space by further exploring audio spot technology. By separating amplitude modulated waves and emitting each separated amplitude modulated wave from multiple directions using parametric loudspeakers, audible sound is demodulated only at a point where these waves intersect. If commercialized, it will become possible to let adults and children of different heights listen to different audio guides while in front of a painting at a museum, for example, or play back different sounds without interference in a driver’s seat, passenger’s seat, or back seat of a vehicle. Isaka expresses his enthusiasm by saying, “The point is that by the year 2021, to what extent will research results be able to be implemented in society? The real challenges are yet to come.” What kind of exercise space will become a reality? It is very exciting to think about what will happen in 10 years’ time.

Only you can hear things from under the “audible-sound spotlight”; creating multiple sound domains in a single space.
What type of sport facilities can allow people both with and without disabilities to enjoy sports/exercise together?

In recent years, increased attention has been given to both the Paralympics and the Olympics. The media increasingly features athletes achieving world-class performance in sport events for para-sports, such as wheelchair basketball, for example. However, considering everyday life, are there opportunities for people with disabilities and without disabilities to play and enjoy sport together?

"With increasing levels of attention being given to adapted physical activity and sport, mainstream discussions have been focusing on the idea that people with disabilities and without disabilities should enjoy sports ‘together’ without separating them," explains Chihiro Kanayama, engaged in research focusing on opportunities for people with disabilities to play sports, with her background of knowledge on sports management and targeting the promotion of adapted physical activity and sport. She explains that the real intention of adapted physical activity and sport is the “Development of sport adapted to each person by contriving favorable rules and sporting goods without adhering to personal physical capabilities, age, or disability,” and continues that what is considered especially important for their promotion is the concept of “Inclusion.” For adapted physical activity and sport in Japan, concepts of separation, integration, and then inclusion have been introduced and materialized in series. Kanayama explains, “While integration pays attention to differences such as individual disabilities and individuality, and enables people to adapt to sport they cannot do by using tools and different rules, the concept of inclusion is to discover what is in common before what is different. This means to think about tools and rules that everyone can make use of, whether one has a disability or not. According to Kanayama, this overlaps the shift from “barrier-free design” to “universal design.”

Kanayama explains that taking a cue from the enactment of the Basic Act on Sport in 2011, which heralds the promotion of sport for people with disabilities, the development of adapted sport in communities is shifting from sport facilities with priority for people with disabilities to general public sport facilities. In other words, it means that inclusion is being promoted at public sport facilities, but the reality of this is not that visible. Kanayama’s interest is to clarify issues from the perspective of quantitative data and to place focus on solutions. “Above all, the absolute number of people with disabilities is fewer compared to those without a disability. Conventional research on adapted physical activity and sport has mainly focused on the individuality of disabilities, and there are not many quantitative reports. However, to move society or the government, scientific evidence based on quantitative data is emphasized,” says Kanayama explaining the high importance of quantitative research.

As part of this effort, Kanayama conducted a survey on the evaluation of service quality toward people with disabilities using facilities at three different types of public sport facilities. The facilities subject to the survey were of three types, namely, facilities dedicated to people with disabilities, shared facilities with priority use for people with disabilities, and general public facilities that can be used by anyone. One of the results revealed by analyzing user responses to 33 questions was that shared and general public types of facilities that were inclusive were highly appreciated by people with disabilities in terms of their “facilities.” For people with disabilities, a clear announcement of “This facility can be used by anyone with a disability.” is directly related to whether they will use it or not. In addition, facilities that are inclusive received a favorable evaluation from people with disabilities in terms of “sense of empathy,” such as staff consideration and attentive service. However, an analysis in further detail also revealed that evaluations of the “appeal that facilities can be used” and “greater attention given” were not necessarily linked to satisfaction with actual use.

Private companies are often involved in the management of shared and general public facilities, and the challenge is that they are not sufficient in terms of their professional ability to support people with disabilities,” Kanayama says. Furthermore, there is the issue of “cost” behind this. Naturally, resources are required to develop the professional capabilities of staff, so as to prepare facility equipment and tools that everyone can use. Under the current designated administrator system used by many municipalities, it is difficult to operate sport facilities in the long term, making it an obstacle to secure training opportunities for staff members and to nurture successors. Also, at service facilities with a welfare-related objective, options for users are extremely limited, thus Kanayama presents a proposal as follows. “People with disabilities should be the customer, not just a user. Although the concept of paying user fees has not quite penetrated into adapted physical activity and sport, it is important for disabled users to increase their options for sporting opportunities by paying a nominal fee.”

In addition, Kanayama will conduct a survey of service strategies by expanding subjects to 116 sport facilities with priority given to people with disabilities across Japan. “In Japan, neither policies nor responses by individual sport facilities have caught up with the quickly rising interest in adapted physical activity and sport,” she says while expressing this sense of crisis. Research conducted by Kanayama that focuses on the opinions of people with disabilities in a “quantitative” manner is sure to greatly contribute to establishing more inclusive facilities in Japan in the near future.

Chihiro Kanayama

Professor, College of Social Sciences

Research Keyword: Sports Science

Subject of Research: Research on the preferred shape of physical education and sport in an inclusive society with a focus on how to promote inclusion, teaching methods, policies, and regulations, such as teachers, instructors, and sandlot; in addition to sport organizations such as schools and public sport facilities.

People in Japan can still fondly recall that, at the Rugby World Cup in 2015, the Japan team had three wins for the first time ever in the history of the event. This was something that really excited Japan. A main topic of media coverage comparable to this very accomplishment was the fact that so-called “foreigners” were included in the Japanese team. Opinions on this in Japan were both positive and negative. The negative viewpoints involved, “As they represent Japan, they have to be Japanese,” while the positive viewpoints voiced acceptance, considering that, “As they are competing for Japan, nationality or place of birth has got nothing to do with it.” Each sport has its own rules about what types of people can represent a country, but eligibility rules to play for national representative teams are different than those of the Olympics, requiring actual nationality. It is stated that a player may only play for a country’s representative rugby team if they were born in that country, one of their parents or grandparents were born in the country, or they have lived in the country in question for 36 consecutive months, and that if they satisfy any of these three conditions, they can represent a country in an international competition. Tsuyoshi Matsushima questions, “However, have we ever considered as to when, where, and for what this rule was established and by whom in the first place?”

Matsushima has long been questioning “What is the reason of being of a sport?” while studying the generation and development of sports, especially the history of rugby. He says, “We accept the current rules or state of sports without any doubts. It is like the ‘horror’ of having the state of your life or society controlled without you ever knowing it.”

According to Matsushima, rugby originally started in England, and from there it spread across the globe. World Rugby, which now governs rugby as an international sports federation, was originally a local organization ruling four associations born in the U.K., and the Republic of Ireland. Since the first world cup took place in 1987, World Rugby quickly developed into an international organization consisting of more than 100 countries and regions to control rugby across the globe, but it has turned into a “black box.” Matsushima points out, “Rules and every other decision have been promoted by the countries involved in the foundation of World Rugby. If we take a close look at not only the decision-making process but the world of rugby itself, we can find inclusions and exclusions in different shapes and sizes,” which reveals a reality where positive ideals of sports such as a “culture of mankind” and “fairness” are not necessarily under real consideration.

He says, “Simply changing a single rule not only causes great influence on the world of rugby and all that this entails. Matsushima explains, “As rugby poses questions about nationalism, such as “What is a Japanese person?” and “What shape should our country take?”, sports expose aspects and issues of modern society and creates a future regardless of being right or wrong, Matsushima concludes, “That is what makes it so interesting.”

Reasons as to why the Japan national rugby team has so many foreign players

Who are the actual people how to ensure fairness in that decide sports? 
A n event called the “Nagahama Health Walk” was held in Nagahama City, Shiga Prefecture for three months from September to November 2015. This was the second installment of the event since it began in 2014. The objective was to provide an opportunity for local residents to exercise. Participants formed teams of three or five people and took on the challenge of walking a total of 200km or 120km for 10 days. This meant that each participant would walk longer than 4 km per day.

Haruo Noma, the mastermind of the event, has conducted a substantial amount of empirical research aimed at “embedding exercise in lifestyle and culture.” In response to a request from the City of Nagahama, he worked together with Kyoto University and Kinds University to develop a social service system aimed at promoting healthiness called “Tekupeko.”

Noma says he represents the feelings of many people when he says, “Everyone seems to know that unless you establish exercise habits early on, it will be too late when you get old or when your health starts to deteriorate. And if you become ill, not only will you suffer, you will also need to spend extra time and money on remedies. However, even if you realize this in theory, it is not that easy to start doing something good for your health 10 or 20 years down the line. For people that do not like exercise, it is even harder.” His research pursues the question of, “What should be done to change the feelings or behavior of these people?”

As Noma explains, “Our target is to develop technology and mechanisms to solve social and lifestyle issues using information technology as a tool.” His interest consistently turns to “Passing on the benefits of information technology to society.”

For example, one of his achievements in promoting behavior modification using information technology is the development of “Tekupeko.” This is a system that induces physical movement at shopping malls using a treasure hunt game. Beacons that transmit a Bluetooth signal are installed at various locations in a mall, and shoppers receive the transmissions on their smartphones. This system enables customers to browse shops while also engaging in a treasure hunt on their smartphone. As a result, the shoppers have a more enjoyable shopping experience.

At Noma’s laboratory, people’s behavior is analyzed based on the movement data of shoppers collected at actual shopping malls. Based on this, Noma thinks about what types of information could be transmitted to provide more shopping enjoyment and induce more customer purchases in multi-generational groups.

The target city for this survey is Nagahama. As a typical city in the countryside, it has a high automobile usage rate. Many residents use their cars to travel only very short distances. According to a city survey, only about half of the population walk or use a bicycle even for short distances that are only 10 minutes on foot. This lack of exercise due to that kind of a Lifestyle is an issue for the municipality, as it increases the risk of medical problems in the future. How can we get people who habitually travel by car to walk? Noma had the idea of making exercise a game, and to naturally let people develop the habit of exercising while enjoying the game. “One of the ways to modify behavior is to give a ‘reward’ when a goal is achieved,” Noma says. For this reason, he planned the Nagahama Health Walk as a game to encourage behavior modification and decided to give both positive and negative incentives. A reward is given if a goal is fulfilled and the participation fee is forfeited if it is not.

To promote behavior modification to an even greater extent, Noma and his team employed ideas like “visualization” and “making friends.” Then they developed a smartphone application called “Takueko.”

With this, an automatic measuring device measures body weight and energy consumption over the course of a day. The results are accessible from a smartphone at any time. Noma says, “The key point here is the ‘automatic’ counting and confirmation using a familiar tool, like a smartphone.” Thus, this application aims to encourage physical activity by minimizing effort on the part of the users. An additional unique feature was the formation of teams of three or five participants in order to achieve a specific goal. “Even a person who tends to think of excuses to give up will feel ashamed about giving up once they feel some responsibility to their team. We incorporated this key human psychological aspect.” Consequently, the total number of participants in the Nagahama Health Walk exceeded 1,000 people. And more than 90% fulfilled the target distance, making the event a great success.

Noma’s next task was to analyze the data collected from the event and derive a behavioral model for the question of “In what situations will people walk?” He says, “Our goal is to make people who tend to not exercise, including myself, adhere to exercise. If we can find the optimal variables, we can develop an approach suitable for these people.”

Going forward, mechanisms to adhere to exercise not only for 10 days, but also for longer periods like one month, six months, and one year, will become necessary. Noma will use computing technology to build and widely disseminate an optimal model to ensure that people continue walking.

The secret to motivating sedentary people to keep exercising

### Information technology that changes feelings and behavior

#### Subjects of Research

- **College of Information Science and Engineering**

- **Research Keywords**: Human Interface and Interaction, Intelligent Robotics, ITS/Health/Medical informatics, Rehabilitation science/Biomechanics

- **Researcher**: Haruo Noma

- **Problems**: College of Information Science and Engineering

- **University**: Ritsumeikan University

- **Objective**: Use information technology to solve social and lifestyle issues using empirical research aimed at embedding exercise in lifestyle and culture.

- **Objective**: Develop technology and mechanisms to solve social and lifestyle issues using information technology as a tool.

- **Objective**: Pass on the benefits of information technology to society.

- **Objective**: Induce physical movement at shopping malls using a treasure hunt game.

- **Objective**: Provide more shopping enjoyment and induce more customer purchases in multi-generational groups.

- **Objective**: Develop a social service system aimed at promoting healthiness called “Tekupeko.”

- **Objective**: Encourage physical activity by minimizing effort on the part of the users.

- **Objective**: Incorporate ideas like “visualization” and “making friends.”

- **Objective**: Form teams of three or five participants in order to achieve a specific goal.

- **Objective**: Create a behavioral model for the question of “In what situations will people walk?”

#### Methodology

- **Participants**: Formed teams of three or five people and took on the challenge of walking a total of 200km or 120km for 10 days.

- **Counting the number of steps using a smartphone**: The number of steps is counted using an automatic counting device that changes using familiar tools.

- **Feedback for the following day’s behavior**: Participants are given positive and negative incentives.

- **Feedback for the following day’s behavior**: Participation fees are forfeited if goals are not fulfilled.

- **Feedback for the following day’s behavior**: Rewards are given if goals are fulfilled.

#### Results

- **Results**: More than 90% of participants fulfilled the target distance, making the event a great success.

- **Results**: Participants are given positive and negative incentives.

- **Results**: Participation fees are forfeited if goals are not fulfilled.

- **Results**: Rewards are given if goals are fulfilled.

#### Conclusion

- **Conclusion**: Information technology can be used to change people’s behavior and promote exercise.

- **Conclusion**: Technology can be used to encourage physical activity and improve health.

- **Conclusion**: People can be motivated to exercise through incentives and positive reinforcement.

#### Additional Information

- **Additional Information**: The Nagahama Health Walk was held in Nagahama City, Shiga Prefecture, Japan.

- **Additional Information**: The event was conducted in November 2015 with the objective of providing an opportunity for local residents to exercise.

- **Additional Information**: Participants formed teams of three or five people and walked a total of 200km or 120km over 10 days.

- **Additional Information**: Noma used information technology to count the number of steps taken using a familiar tool.

- **Additional Information**: Positive and negative incentives were given based on the fulfillment of goals.

- **Additional Information**: Participation fees were forfeited if goals were not fulfilled.

- **Additional Information**: Rewards were given if goals were fulfilled.

### Diagram

**Diagram Title**: Information technology that changes feelings and behavior

- **Diagram**: Shows the flow of steps taken by participants using a smartphone application called “Takueko.”

- **Diagram**: Highlights the use of information technology to encourage physical activity.

- **Diagram**: Illustrates the positive and negative incentives given to participants.

- **Diagram**: Depicts the process of counting the number of steps using a smartphone.

- **Diagram**: Visualizes the feedback given to participants for the following day’s behavior.

#### Key Points

- **Key Points**: Information technology can be used to change people’s behavior and promote exercise.

- **Key Points**: Technology can be used to encourage physical activity and improve health.

- **Key Points**: People can be motivated to exercise through incentives and positive reinforcement.

- **Key Points**: The Nagahama Health Walk was a success, with more than 90% of participants fulfilling the target distance.

- **Key Points**: Positive and negative incentives were given based on the fulfillment of goals.

- **Key Points**: Participation fees were forfeited if goals were not fulfilled.

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Out of pure curiosity about the unknown and more with the purpose of pursuing the possibilities of mankind and the development of civilization, Japan has been making strides in space. In particular, the global development of space technology is and after the second half of the 20th century has made progress at an astonishing speed, with many technological developments being made. The development of space technology, with huge amounts of capital involved all across the country, is expanding its range to various fields on Earth, not just in space.

After being involved in the International Space Station (ISS) and other development projects for space technologies at the National Space Development Agency of Japan (NASDA) and the Japan Aerospace Exploration Agency (JAXA), Nobuaki Minato went to France to learn more about cutting-edge aerospace management taking place in such countries as France and Italy. His field of research is the focus on technological management for space exploration. He explains, "Space is a potential of cutting-edge science and technology beyond the domains of aerospace.

"MOT, or the Management of Technology, is considered essential for companies with technological strengths, and it originated from the development of space technology," Minato explains. It actually dates back to the U.S. Apollo program in the 1960s. To make this unprecedented gigantic project of sending a man to the moon a success, it was necessary to unite all knowledge across all fields of technology and the general integrated management covering everything from basic research to technological development, production, and operation. "The foundation of management is said to be people, things, and money," and at that time, a viewpoint of "Operations Management" was necessary at this time," says Minato, explaining the origin of MOT. Since that time, MOT has been adopted in the R&D strategies of private companies, has made great achievements, and has been systematized into academic fields. When discussing the development of space technology, technological achievements are just one part of it.

Training to fulfill a mission in space can lead to sports team-building

The development of space technology is a domain where teamwork is essential. The subject systems are large in scale and very complicated, with a high level of uncertainty. A spacecraft in orbit can only be remotely controlled, and after launch, it cannot be repaired on the ground, thus systems need to be reliable, they need to be optimal and efficient, and they need to be robust. In outer space, where a return to Earth is not at all easy, even a minor error by an astronaut could be critical. Previous operational mistakes involving spacecraft were not necessarily caused by a lack of individual knowledge or skill but often due to the way of working as a team. A team where members cannot point out a leader’s mistake is not likely to accomplish safe and secure operations. In other words, even if individual abilities are of a high level, it doesn’t always mean that total performance can be maximized as a team. For this reason, in the development of space technology, every situation possible has been assumed, where design technology as a system to withstand things and management methods as a team have been accumulated. Such technologies and know-how are then used in many ways and applied to various fields of business on Earth. Sports are no exception, and one of them is "application for training."

A chapter in outer space is achieved by not only the astronauts but as a team, including the people providing support on the ground. For this very reason, astronaut training includes Space Flight Resource Management (SFPM). This is a course for learning how to work as a team to achieve a mission, making decisions as a team, and ultimately making the team function properly. During actual training, a leader and their subordinates take on the challenge of solving a mission in the summer and winter months while exchanging positions within the team on a daily basis. "What is emphasized is the assumption that space is an unpredictable environment and to make the team function even in an unforeseeable event," the leader," says Minato, explaining the intentions of the training, which enables everyone to carry out functions necessary for the team both as a leader and as a subordinate.

"Teamwork to identify one’s role, which can change due to a certain situation, and to take action in consideration of the team would also be effective for every team sport," Minato says. At my laboratory, we are proceeding with a study to apply this to leadership development for businesses."

Development of new products and services using space technology

Another viewpoint is to take advantage of space technology for the development of future products and services. For example, the Global Positioning System (GPS), originally developed as a military system in the U.S., is now indispensable in the tactical analysis of sports such as managing formations, such as American football, rugby, and even soccer. Furthermore, Minato adds, "As a unique field, wing technology that was developed for collecting spaceships was later developed into a sport: hang gliding. Also in an environment with microgravity, it was on the soles of the feet of astronauts that deteriorated because of a lack of load that was not working. In fact, there is an example where to maintain the strength of the soles of astronauts’ soles, a sporting goods manufacturer took the bold decision to develop "shoes that cause friction" and is now trying to apply the technology to nursing support products. This exemplifies the fact that reverse thinking generated from challenges associated with space resulted in the development of an innovative product concept. "Space is an unknown and untraveled frontiers," Minato says. "That is why the development of space technology gives birth to multitudes of ideas for devising and realizing innovative concepts and management power, which in turn offers lots of opportunities for applications to other fields. Our goal is to design a feasible and sustainable future by utilizing the knowledge obtained through the development of space technology. The results are sure to lead to further innovations that will change the future."

Nobuaki Minato
Associate Professor, Graduate School of Technology Management
School of Design, System Innovation and Service Development, Ritsumeikan University

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"Outer Space" in "Sports"
Approaching the mechanism of exercise effect

There are of course quite a number of people who have had the experience of resolving to exercise for health or dietary restrictions only to eventually flizzle out in the end. One of the main reasons many people give up is that “achievements” are hard to visualize. Even if you devote yourself to training, it will take a few months at the very least to really see any changes in body shape or weight. It is therefore rather difficult to remain motivated while not achieving immediate results from your efforts.

“It takes at least a few months for the effects of exercise to become visible. But inside the body, a wide variety of changes are already taking place after only a week or two. If you can understand these changes inside your body, you will be able to better motivate yourself to adhere to exercise for a long period of time,” says Motoyuki Iemitsu. Iemitsu is studying why habitual exercise can contribute to the maintenance and enhancement of health. He also studies the types of exercises that are more effective on the molecular level. His focus is the prevention of lifestyle-related diseases such as cardiovascular and cerebrovascular diseases through exercise.

As a person grows older, blood vessels age, lose their flexibility, and gradually stiffen. This is known as “arteriosclerosis”. Furthermore, increase in the stiffening of arteries not only increases blood pressure, generating an additional burden on the heart, but also causes accumulated excess cholesterol in blood vessels, thin vascular lumens, and ultimately blocks the lumens to cause myocardial infarction or cerebral infarction. “Sir William Osler (1849–1919) once said, ‘A man is as old as his arteries.’ But unlike the one-way process of aging, blood vessels can actually be rejuvenated by exercising, regardless of how old you are,” Iemitsu states. “However, the mechanism as to why exercise reduces the risk of cardiovascular and cerebrovascular diseases has not yet been fully clarified.”

To address this, Iemitsu had persons of middle age or older do continuous aerobic exercise training three days a week for a period of two to four weeks. He found that the secretion of hormones in the blood that increase vasodilation reduce arterial stiffness. In addition, he discovered hormones that showed changes in just a short period of two to four weeks after beginning exercise training and identified the possibility that these hormones might play a key role behind the effects of exercise. Iemitsu feels that the contraction of combusted adipose tissues and muscles might secrete hormones from skeletal muscles that increase vasodilation. He is researching this right now.

It is good news for top-level athletes that the effects of exercise can be seen through observing changes in the body. To increase muscle mass, you must continually do resistance training for a long period of time, but Iemitsu is exploring a substance that can check whether training has resulted in any effects within one month.

As illustrated above, if we can identify the body’s response to exercise, then obese patients, middle-aged to older adults, and athletes can change the type, time, or intensity of exercise depending on their objectives and steadily achieve effects. Iemitsu explains the goal, saying, “Eventually, we want to link this to the development of blood biomarker to indicate the effects of exercise in the body in the form of scientific number values."

Iemitsu also works with companies to develop supplements to acquire the effects of exercise more efficiently and to verify their effects. Iemitsu has been engaged in research using animals, paying attention to sex steroid hormones as hormones associated with the prevention and improvement of diabetes, which can be a risk for the development of arteriosclerosis. “My administration of sex steroid hormones in diabetic rats, it was recognized that their fasting blood glucose levels, which was the cause of diabetes, were lowered, and that the effects further increased by engaging in exercise in tandem,” Iemitsu reported. “With diabetes, the production ability of sex steroid hormones is lowered, so we hope to develop a supplement to compensate for the lower amount,” he explains. Currently, based on the results of basic research using animals, he is engaged in developing new supplements with applications to human beings through joint research with a private company.

In a cooperative project with yet another different company, he found through animal experiments that administering chlorella for a long period of time may increase the ability to adjust glycogenesis metabolism in skeletal muscles and improve exercise performance when required to repeatedly exert explosive power for short periods of time. If this effect is confirmed in human beings, chlorella supplements may become a very significant aid for athletes to increase power.

Iemitsu keeps his gaze focused beyond basic studies. “I believe it is my mission to contribute the results of basic studies to human kind in order to show the effects of exercise based on scientific evidence. In other words, I want to conduct research that links the basics with real life applications.”

Invisible changes have already occurred in the body immediately after exercise training.
ATHLETIC ACTIVITIES VARY FROM ATHLETIC TEAM ACTIVITIES AT SCHOOL TO PROFESSIONAL SPORTS AND FROM DAILY PRACTICES TO WEEKEND GAMES. IN THE U.S., “ATHLETIC TRAINERS” WHO ARE THE EXPERTS IN SPORTS INJURIES ARE ALMOST ALWAYS AT THE SITE OF ATHLETIC ACTIVITIES.

IN RECENT YEARS, ATHLETIC TRAINING HAS DRAWN MORE ATTENTION IN JAPAN. STILL, THE PROFESSION IS UNRECOGNIZED BY THE PUBLIC FOR ITS IMPORTANCE AND QUALIFICATION. IN JAPAN, THE WORD, “A TRAINER,” IS OFTEN DRAWN MORE ATTENTION IN JAPAN. STILL, THE PROFESSION IS UNRECOGNIZED BY THE PUBLIC FOR ITS IMPORTANCE AND QUALIFICATION. IN JAPAN, THE WORD, “A TRAINER,” IS OFTEN PERCEIVED AS AN EXPERT TO MERELY IMPROVE AN ATHLETE’S PHYSICAL PERFORMANCE OR TO SUPPORT AN INJURED PLAYER AND TAKE HIM OFF THE FIELD. THEIR ROLE IS TO ASSESS HIS/HER CONDITION AND GIVE NECESSARY CARE. ATHLETIC TRAIERS SHOULD BE ABLE TO HANDLE A BROAD SPECTRUM OF CONDITIONS, INCLUDING CONTUSION (BUMP), LIGAMENTOUS INJURIES, DISLOCATIONS, H NUMEROUS INJURIES, DISLOCATIONS, FRACTURES (BROKEN BONES), BRAIN DAMAGE (CONCUSSION AND HEMATOMA), VERTEBRAL AND SPINAL CORD INJURIES, HEART-RELATED ILLNESS, AND EVEN SUDDEN DEATH SYNDROME,” OKAMATSU SAYS.

DURING ATHLETIC ACTIVITIES, ANYTHING CAN HAPPEN AT ANY TIME. AS ATHLETIC TRAINERS HAVE TO MAKE QUICK AND APPROPRIATE DECISIONS AND FLEXIBLY RESPOND TO ANY SITUATION, THEY NEED TO HAVE AN EXTENDED KNOWLEDGE IN AN ARRAY OF FIELDS. THE KNOWLEDGE COVERS MULTIDISCIPLINARY FIELDS, INCLUDING NOT ONLY MEDICAL FIELDS, ESPECIALLY ORTHOPEDIC AND EMERGENCY MEDICINES, BUT ALSO KINÉSIOLOGY, PHYSICAL TRAINING, PHYSIOLOGY, BIOCHEMISTRY, NUTRITION, PSYCHOLOGY, AND SO ON. FOR THIS REASON, TO BECOME A CERTIFIED ATHLETIC TRAINER IN THE U.S., YOU MUST GRADUATE FROM A FOUR-YEAR COLLEGE OR GRADUATE SCHOOL THAT HAS AN ACCREDITED ATHLETIC TRAINING CURRICULUM AND PASS A BOARD OF CERTIFICATION EXAM (THE ACCREDITED ATHLETIC TRAINING PROGRAM WILL BE OFFERED AT GRADUATE SCHOOLS BY 2022). OKAMATSU COMPLETED HIS BACHELOR’S DEGREE IN ATHLETIC TRAINING WITH 1,500 HOURS OF CLINICAL EXPERIENCE OVER THREE YEARS UNDER SUPERVISION OF CERTIFIED ATHLETIC TRAINERS AT NORTH DAKOTA STATE UNIVERSITY IN THE U.S.

This clinical experience helped athletic training students improve their practical athletic training skills.

Okamatsu points out an important issue in Japan, saying, “there is no risk management specialist who can handle the injuries that may occur during physical activities, including physical education classes or athletic activities.” One of the reasons he returned to Japan is accepting an invitation from Ritsumeikan University, to change this situation. To achieve this goal, he enthusiastically educates the students to increase the number of athletic trainers in Japan. Okamatsu’s current role in the College of Sport and Health Science at Ritsumeikan University is to prepare students to become certified athletic trainers, which includes teaching athletic training in English. The College of Sport and Health Science at Ritsumeikan University recently launched the Global Athletic Trainers (GAT) program, which allows the students to become certified athletic trainer in the U.S. The program consists of a preparation phase at Ritsumeikan University and a curriculum phase at accredited athletic training program in the U.S. (transferring to the graduate school of East Stroudsburg University in Pennsylvania is required).

At the same time, Okamatsu feels that, “only increasing the number of athletic trainer is not enough.” “the top priority is to create an environment in which athletic trainers can perform their capability,” he continued. in Japan, qualification of an athletic trainer is not offered by Ministry of Health, Labour and Welfare, but is offered by the Japan Sports Association under the Ministry of Education, Culture, Sports, Science and Technology. Therefore, athletic training is not considered as a medical qualification in Japan. At present, there is no regulation or policy in place to employ athletic trainers at schools. The fact is that even if you are certified, there is no place to perform your professional skills.

To increase the number of athletic trainers responsible for risk management in injuries and illnesses during athletic activities in Japan, Okamatsu has continued to promote their importance, while working on providing athletic training education at the university. He suggests athletic trainers’ triplicate with orthopedic clinics to promote the athletic training profession. Okamatsu says, “The core of sports medicine team should be orthopedists. Athletic trainers work at orthopedic clinics, and the clinics offer outreach athletic training services. In the outreach athletic training services, athletic trainers would be dispatched to schools in the community and offer athletic training services for patients.”

In Japanese athletic settings, especially at schools, it is controversial that some coaches, especially devoting themselves to younger athletes’ development, believe practice stressing on insanely extraordinary physical demand with or without scientific foundation is required to grow the mental toughness to win in the young athletes. Okamatsu’s challenge to “changing the anecdotal or experience-based Japanese sports culture” is just a beginning.

STORY #7

Athletic trainers are needed for athletic activities in Japan

No regulation or policy that requires Japanese schools to employ risk management for sports injuries

A thletic activities vary from athletic team activities at school to professional sports and from daily practices to weekend games. In the U.S., “athletic trainers” who are the experts in sports injuries are almost always at the site of athletic activities.

In recent years, athletic training has drawn more attention in Japan. Still, the profession is unrecognized by the public for its importance and qualification. In Japan, the word, ‘a trainer,’ is often perceived as an expert to merely improve athlete’s physical performance or to assist individual’s body weight control and appropriately evaluate his or her condition and give necessary care. Athletic trainers should be able to handle a broad spectrum of conditions, including contusion (bump), ligamentous injuries, dislocations, fractures (broken bones), brain damage (concussion and hematoma), vertebral and spinal cord injuries, heart-related illness, and even sudden death syndrome,” Okamatsu says.

During athletic activities, anything can happen at any time. As athletic trainers have to make quick and appropriate decisions and flexibly respond to any situation, they need to have an extended knowledge in an array of fields. The knowledge covers multidisciplinary fields, including not only medical fields, especially orthopedic and emergency medicines, but also kinesiology, physical training, physiology, biochemistry, nutrition, psychology, and so on. For this reason, to become a certified athletic trainer in the U.S., you must graduate from a four-year college or graduate school that has an accredited athletic training curriculum and pass a Board of Certification exam (The accredited athletic training program will be offered at graduate schools by 2022). Okamatsu completed his bachelor’s degree in athletic training with 1,500 hours of clinical experience over three years under supervision of certified athletic trainers at North Dakota State University in the U.S.

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"Eating program" for the development of local junior athletes

I want to ensure that food that aids physical activity is delicious,” says Kumiko Ebi, explaining the objective of her study. She not only studies “food” by, for example, taking charge of nutritional support for young athletes in local communities.

“The daily nutrition of young athletes really depends on not only the athletes themselves but also on the support of coaches and families, etc.” Ebi says. To change the dietary environment for young athletes in local communities, she launched the Society to Promote Food and Sports (“Shokusupo”) in 2010, in which teachers instructing physical education and extracurricular activities at junior and senior high schools, mainly in Shiga Prefecture and Kyoto Prefecture, voluntarily get together, and she has been supporting the society’s activities since that time. At Shokusupo, the leaders present the reality and problems of their teams and clubs, while Ebi and graduate school students certified as registered dietitians provide nutritional instructions and advice. The aim is to disseminate the importance of “food” to local communities by gathering leaders with many achievements and broad influence from various schools and by having them play a pivotal role.

Starting out as a part of a research project at Ebi’s laboratory, nutritional education provided to a Women’s Softball Club at Hieizan High School in Shiga Prefecture turned out to be one of the successful cases. Under instructions from graduate students that are registered dietitians, players set individual targets such as an increase of muscle and the lowering of body fat percentage, and tried to improve their meals or eating habits. As a result, their attitudes toward eating, not to mention their physiques, changed. Ebi says, “As players communicated the nutritional instructions they received at school to their families, indirect intervention effects were a success.” This is a good example where a virtuous circle was created where efforts toward “food” to local communities can support the future of sports but also contributes to the development of young athletes through their local communities as nutritional support.

Aiming that they can become able to think on their own about “food” or lowered bone density. “Competitiveness can increase when eating properly and following proper nutrition, but quite a number of female athletes reduce their intake of food, believing that they cannot improve their times or records if they are fat,” Ebi says.

In addition, Ebi is concerned about the decreasing number of female students joining sports clubs. “The number of female students who are thin because they neither exercise nor eat properly is increasing, but surely such women can grow into adults that can play an active role in society?” Ebi worries about this and is hoping that a solution of sorts will appear, and has thus devised recipes to increase the nutritional intake of young women who enjoy eating and exercising. She also published a book, Joshibukatsushoku (Food for Female Athletes). Some graduate students who studied sports nutrition have started a career in nutritional support for future Olympic athletes, much like Ebi did. “I feel that one of my main achievements in these six years is that I could help my graduate students—who once supported young athletes in their local communities—to develop into diet and nutrition support providers for world-class athletes,” Ebi says. “It is also important for young athletes to be able to think about ‘food’ to local communities but also the human resources to support these athletes.”

Growing athletes requires nutritional support in individual local communities.

Kumiko Ebi,

Professor, College of Sport and Health Science
Subject of Research: Research on the development of sports-related joint support system

Kumiko Ebi, explaining the objective of her study. She not only studies “food” by, for example, taking charge of nutritional support for young athletes in local communities but also contributes to the development of young athletes through nutritional support to incorporate the concept of “local production for local consumption.”

As a registered dietitian, Ebi has supported top Japanese athletes via “food” by, for example, taking charge of nutritional support for JOC-certified athletes at the Beijing Olympics. In the process, she renewed her awareness of building up their bodies that most athletes in the middle of the process grow up in an environment without that will become the future of Japanese sports. Starting out as a part of a research project at Ebi’s laboratory, nutritional education provided to a Women’s Softball Club at Hieizan High School in Shiga Prefecture turned out to be one of the successful cases. Under instructions from graduate students that are registered dietitians, players set individual targets such as an increase of muscle and the lowering of body fat percentage, and tried to improve their meals or eating habits. As a result, their attitudes toward eating, not to mention their physiques, changed. Ebi says, “As players communicated the nutritional instructions they received at school to their families, indirect intervention effects were a success.” This is a good example where a virtuous circle was created where efforts toward “food” to local communities are sure to lead to the development of not only athletes that can support the future of sports but also the human resources to support these athletes.

An ideal match for rice and tofu: Okra stock

Ingredients (For 6 servings; 1 serving as one meal)
- 150 g okra
- 50 g Japanese wild ginger
- 150 g ground freeze-dried tofu
- 20 g ground sesame

Directions
1. Cut eggplants in half lengthwise, and then thinly slice in cold water.
2. Remove the wetness from the okras. Cut them into slices.
3. Mix the eggplant, okras and Japanese wild ginger with the dried bonito flakes, mentsuyu noodle soup, and ground sesame.

Okra stock

Ingredients to prepare at home (for one serving)
- 150 g okra
- 3 tablespoons of mentsuyu noodle soup
- 20 g ground sesame

Directions
1. Cut eggplants in half lengthwise, and then thinly slice in cold water.
2. Remove the wetness from the okras. Cut them into round slices. Cut the Japanese wild ginger into thin slices.
3. Mix the eggplant, okras and Japanese wild ginger with the dried bonito flakes, mentsuyu noodle soup, and ground sesame.

Adding healthy minerals via something sweet: Double tofu browines

Ingredients (For 6 servings; 1 serving as one meal)
- 30 g cake flour
- 30 g cocoa powder
- 30 g sugar
- 1 egg
- 2 pieces of freeze-dried tofu
- 10 g cranberries
- 10 g pistachio nuts

Directions
1. Preheat oven to 180°C. Grind the freeze-dried tofu.
2. Mix together the cocoa powder, sugar, egg, “silken” tofu, ground freeze-dried tofu, baking powder, and cake flour.
3. Place the dough in a baking sheet with sealed paper and flatten it out. Sprinkle on the chocolate pieces and bake for 30 minutes in an oven pre-heated to 180°C.
4. Arrange the brownies on a plate and garnish them with cranberries and pistachio nuts.

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Before you know it, a weaker team on paper can beat a stronger team via untiring efforts and teamwork, to advance through a tournament. Have you ever felt this exhilarating feeling, while witnessing the miraculous advance of a team overwhelmingly inferior in terms of potential defeating a higher-ranked team? “In team sports, factors apart from skill or athletic ability can greatly affect the competitiveness of a team,” Kazuho Yamaura says, while explaining the reason why differences in actual potential are not the only factors that decide a winner. Studying human relationships and leadership in corporate organizations and team sports, Yamaura pays attention to relationships between leaders such as managers and coaches and their followers. “What is important before an inquiry is that regular players maintain good communication with each other and voluntarily think about what they should do, not just being forced by leaders who encourage substitutes to support the regulars.”

In the process of this study, what attracted her attention was the huge differences of actual potential of a team. Yamaura conducted a survey of American football and rugby teams at universities and high schools. In addition to inquiries to managers, coaches, and other leaders and players, she observed both games and training sessions, pursuing in detail the organizational makeup of sports teams for a one-year period.

“A team that makes me feel, ‘That is a good team,’ is the case with corporate organizations, the manager and coaches positively talk to players and maintain communication, while of course praising them.” Yamaura says, while talking about the results from the survey. In teams, where the Manager and coaches always try to maintain good communication, the players, players often show the leaders their respect and trust. If you can build a relationship like this, the players can willingly accept the strict guidance that must be given from time-to-time.

In sports teams or companies, unless followers themselves set their own targets and voluntarily think about what they should do, not just being forced by leaders like substitutes, they cannot grow,” Yamaura says. “A team where players maintain good communication with the managers and coaches, but where the players think on their own and enjoy the game, will sooner or later become stronger. I want to demonstrate this and show how teams should be structured, how leaders and followers should act, at the core, and what types of relationships should exist between leaders and followers, in order to make the team stronger.” Yamaura concludes.

Kazuho Yamaura

Professor, College of Sport and Health Science

Subject of Research: Study on leadership and the development of sports research on influence of superior-subordinate relationships and organizational environments on motivation and performance in both sports and corporate organizations

Research Keywords: Organization Psychology, Social Psychology

Relationships between the head coach and players in a winning team overcoming differences of actual potential

Relationships of trust making for a stronger team

Based on corporate survey results, Yamaura realized that to be able to have a positive effect, trusting relationships are necessary between leaders and followers. “What is important before an act of praising or disapproval is whether there is a trusting relationship in place as a basis. Without such a relationship, words of praise will not actually affect the counterpart or, they could even cause a negative effect,” Yamaura says, adding that if one praises someone else, the subject of the praise is important.

When a superior observes the efforts that his or her subordinate makes and praises the process, it will lead to positive effects,” according to Yamaura. Without understanding how subordinates work, a superior cannot praise the process of efforts. At a certain company where Yamaura conducted training, the positive utilization of a system to record operations and employee development was encouraged to share information.

Consequently, as the mutual understanding of each employee’s work improved, superiors became able to genuinely praise subordinates, and as additional effects, communication became more active and the workplace atmosphere improved. At the same time, through her survey, Yamaura confirmed that mutually negative or bitter speech and behavior would cause the collapse of relationships of trust.

Yamaura analyzes this as follows, “The presence of not only captains and other formal leaders but also informal leaders that encourage substitutes to support the regulars from behind the scenes will make it possible for sports teams.”

In corporate organizations as subjects is that the way that superiors express praise of disapproval continues to be organizational improvements. Based on corporate survey results, Yamaura realized that to be able to have a positive effect, trusting relationships are necessary between leaders and followers. “What is important before an act of praising or disapproval is whether there is a trusting relationship in place as a basis. Without such a relationship, words of praise will not actually affect the counterpart, or they could even cause a negative effect,” Yamaura says, adding that if one praises someone else, the subject of the praise is important.

Such relationships between leaders and followers in a corporate organization can often be found in sports teams. Yamaura conducted a survey of American football and rugby teams at universities and high schools. In addition to inquiries to managers, coaches, and other leaders and players, she observed both games and training sessions, pursuing in detail the organizational makeup of sports teams for a one-year period.

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The essence of sport is "play" and this is also something that can enrich society.

In creating a new sport, we faced this essential question. What is "sports"? In creating a new sport, we faced this essential question.
Masayoshi Mishina, Professor, The Research Organization of Science and Technology, won the Japan Academy Prize

Masayoshi Mishina (Professor, The Research Organization of Science and Technology) won the 106th (2016) Japan Academy Prize. The award is given to outstanding academic research achievements and is one of the most prestigious academic prizes in Japan. The Japan Academy Prize was presented to Mishina for his “Studies on Synaptic Molecules, Learning and Memory.” Mishina elucidated the molecular entity of glutamate receptors that mediate excitatory synaptic transmission in the brains of higher animals and showed that the N-methyl-D-aspartate (NMDA)-type glutamate receptor determines thresholds for both hippocampal synaptic plasticity and contextual learning, serving as a molecular basis for learning and memory. Mishina also revealed that glutamate receptor δ1 regulates cerebellar synaptic plasticity and motor learning and induces synapse formation via trans-synaptic interaction with presynaptic neurons. He further showed that UTRAPL1, which is responsible for intellectual disabilities, induces the extracellular synapse formation of cortical neurons through trans-synaptic interaction with presynaptic protein lysine phosphatase (FTP-1). Findings of Mishina that synaptic molecules regulating synaptic plasticity and synapse formation underlie learning and memory contributed to the development of a field for understanding the molecular basis of higher-order brain functions and their disorders. The achievements of Mishina that revealed the molecular basis of learning and memory have been highly evaluated all over the world. He has received many authoritative prizes, including the Medal with Purple Ribbon and the Takeda Medical Award.

Junya Tsutsui, Professor, College of Social Sciences, won the Real Estate Companies Association of Japan Award

Junya Tsutsui (Professor, College of Social Sciences) won the 6th Real Estate Companies Association of Japan (RECAJ) Award. As part of the social contribution activities of RECAJ, the award recognizes writings and findings that contribute to understanding of the wide range of issues that RECAJ faces by allowing many readers to access various pieces of work focusing on the Japanese economy and people’s daily lives.

In the book, which won the RECAJ Award, Shigoto to Kazoku: Nihon wa Naze Hafazatsukuru Umimukono (Work and Family: Why It’s Hard to Work and Have a Child in Japan), Tsutsui points out that, in Japan, where females find it somewhat difficult to work due to male-centric working environments, resulting in a seriously declining birthrate, the current ways of working and families have reached a limit. Meanwhile, in Sweden, representing top government, and the U.S., representing small government, as these countries tend to be considered as the opposite ends of a scale, in fact both share a large number of working women and a high birthrate. Through a historical viewpoint and through international comparison, the book highlights where Japan is now, considers the shape that Japanese society should take, and shares a light on the problems that families in Japan currently face.

Top Award

Masanori Murakami, Deputy President, R-GIRO, won the Honda Memorial Prize

Masanori Murakami, Deputy President of R-GIRO, won the 57th Honda Memorial Prize. This prize is one of a number of projects that take place in memory of the achievements of the late Kiotaro Honda, who contributed to the development of metalurgy. It is awarded to researchers who have conducted research on science & technology, especially for metals and their peripheral materials, and that made major contribution to the world of science. Murakami received the award for his research on the creation of high-performance metal electrode materials for next-generation electronic devices. On May 27, 2016, an award ceremony and a memorial lecture took place at Gakushikan.

Senior Researchers, Hideki Yui and Maika Nakao, won Encouragement Awards from the History of Science Society of Japan

A book written by Hideki Yui (Senior Researcher, Kinugasa Research Organization, Ritsumeikan University), Jinke Jusui no Hondai - Sangoro Kazoku to Inyo gijutsu (Artificial Insemination in the Modern Age: Proctor “Families” and Medicine & Technology), and a doctoral thesis by Maika Nakao (Senior Researcher, also from Kinugasa Research Organization), Hoshino no Tankyu kara Genrakyo no Katio made: Sensen Nihon no Popular Science (From Research of Radiactivity to the Liberation of Atomic Power: Popular Science in Pre-war Japan), were recognized as unique research achievements and awarded with a 10th (2015) Encouragement Award from the History of Science Society of Japan. The Encouragement Award from the History of Science Society of Japan is one of four awards that were established in 2006 by the society to recognize persons who have made outstanding achievements regarding research into Japanese science and technological histories for the purpose of recognizing researchers with relatively short histories in research. Both of the awardees have experience under a Research Fellowship for Young Scientists with the Japan Society for the Promotion of Science and are young researchers establishing their careers as senior researchers at the Kinugasa Research Organization of Ritsumeikan University.

Lecture meeting in celebration of the opening of the Kato Shuichi Collection

On May 7 at Kinugasa Campus, a lecture meeting to celebrate the opening of the Kato Shuichi Collection took place. At the meeting, Sonja Kato, who served as a member of the municipal assembly of Vienna and who is the daughter of the late Shuichi Kato, and Kenzaburo Os, a Nobel Prize laureate who was a close friend of Kato, each gave lectures. The approximately 800-strong audience was given insight into the life and mind of Kato, who was one of the main representative international intellectuals of post-war Japan.

In February 2011, Ritsumeikan University received a myriad of books, posthumous writings, and notebooks, which were all donated at the wishes of the bereaved family of the late Shuichi Kato, who was a close friend of Kato, each gave lectures. The approximately 800-strong audience was given insight into the life and mind of Kato, who was one of the main representative international intellectuals of post-war Japan.

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Creation of an electronic library system that is easy to use for visually impaired persons: Joint development project with private companies

The "International Symposium at the Ritsumeikan Inamori Philosophy Research Center" on March 4, 2016, at the Tohoku College of Ritsumeikan Ibaraki Future Plaza, the Ritsumeikan Inamori Philosophy Research Center hosted its 1st International Symposium, titled "The Outlook of Globalization on Inamori Management Philosophy," with more than 180 researchers, businesspersons, and students taking part. This symposium was held with the purpose of achieving shared awareness regarding academic research in relation to the Inamori Management Philosophy and its global development and on the theme of "The Outlook of Globalization on Inamori Management Philosophy". Kazuo Inamori, Chairman Emeritus of KYOCERA Corporation and Director Emeritus of the Ritsumeikan Inamori Philosophy Research Center, expressed the significance and expectations of the center, which was established for academic studies regarding his management philosophy.

Ikuko Nonaka (Professor Emeritus at Hitotsubashi University) and a research advisor to the center, gave a keynote lecture, explaining the six requirements necessary for executives (leaders), namely: (1) to have a "good" objective, (2) respect intuition as-is, (3) devise a forum to create wisdom in a timely fashion, (4) be able to comprehend and discuss the essence of things, (5) political influence for realization, and (6) the capability to organize and disseminate. Furthermore, he referred to the importance of philosophy and the facet of tacit knowledge, and concluded his speech by saying, "The possibilities for mankind are limitless. Believing in the potential of mankind is the core of the Inamori Management Philosophy."

Following a keynote lecture, four research projects were respectively introduced by: Takahiro Nakajima (Professor, Institute for Advanced Studies of Science, Technology, and Innovation) at Tohoku College of Ritsumeikan Ibaraki, and Katsushige Furuta (Affiliate Assistant Professor, Ritsumeikan University) on ways of working, thinking, and living; and Kazuo Yamaura (Professor of Business and Health Science, Ritsumeikan University), on psychology, indicating the directions of the Inamori Management Philosophy in individualistic fields. Later on, regarding "The Outlook of Globalization on Inamori Management Philosophy," John F. Wilson (Professor, Newcastle University), Sea-Jin Chang (Professor, National University of Singapore), and Shen-Wen French (Professor, Case Western Reserve University) gave lectures, relaying significance and vision in terms of the global development of the Inamori Management Philosophy.

Thesis of Yuki Orikasa, Associate Professor, College of Life Sciences, adopted by Scientific Reports by the Nature Publishing Group

A research group by Yuki Orikasa (Associate Professor, College of Life Sciences) and Yoshihiro Uchimoto (Professor, Graduate School of Human and Environmental Studies, Kyoto University) elucidated the extent of the uneven distribution of chemical reactions that take place in the electrodes of lithium-ion batteries and studied the causes of such disorder, or disability by such means as "enlarging characters for more readability," "using text-to-speech functions," and "converting test into a multimedia format by combining audio and video." Going forward, this system will be experimentally introduced to the Santa City Library electronic library service (TRC-DL), and following a demonstration test, the service will start in the summer of 2016.

Innovation Network Corporation of Japan (INCIJ), SPAARX Group Co., Ltd., and Mitsubishi UFJ Capital Co., Ltd., decided to invest in 3MEDA Co., Ltd., a venture company that originated at Ritsumeikan University

3MEDA Co., Ltd., headquartered in Kuasati City, Shiga Prefecture) is a venture company that originated at Ritsumeikan University. The CEO of the company is Gang Xu (Professor, College of Information Science and Engineering), and the company has developed and is now selling the world's first 3D robot vision system. Innovation Network Corporation of Japan ("INCIJ"). SPAARX Group Co., Ltd. ("SPARX"), and Mitsubishi UFJ Capital Co., Ltd. decided to invest in the venture with an upper limit of 800 million yen for INCJ, 250 million yen for SPAARX, and 50 million yen for Mitsubishi UFJ Capital Co., Ltd., respectively.

3MEDA Co., Ltd. is engaged in research in the development of "eyes" and "brains" for industrial robots. Thanks to the 3D recognition technology (3D vision sensing) that was developed by the company, the addition of 3D vision to serve as "eyes" and a robot control function as a "brain" will enable robots that could conventionally be programmed to do preset actions to be able to automatically recognize and handle objects for processing that randomly appear.

With these capital investments, 3MEDA Co., Ltd. targets further technological development and the strengthening of its sales organizations toward the mass production of the technology and marketing of the system with a base in Tokyo by the summer of 2016. This decision was made to establish an overseas service organization and focusing on the recruitment of human assets to promote business.

Exhibited at Academic Forum

Between May 11 and 13, 2016, Academic Forum took place at Tokyo Big Sight. Satoshi Konishi (Professor, College of Science and Engineering) exhibited the achievements of his research, "Artificial operable insectal tract in vitro medicine evaluation system by using coated cells." During the product and technology seminars by the exhibiting companies, he gave a short presentation of about 30 minutes. He introduced the details and potential of robot control technology and had in-depth discussions with companies that have certain needs for robots. A total of 8,324 people visited during the two-day period of the event.

Exhibited at Service Robot Development Technology Exhibition 2016

Between May 26 and 27, 2016, the Service Robot Development Technology Exhibition 2016 took place at Tokyo Big Sight. Yasuo Okada, Senior Professor, College of Science and Engineering, exhibited the results of his research including "Competition of collaboration-free robot behavior control by integrating visual and joint angle information." He introduced the details and potential of robot control technology and had in-depth discussions with companies that have certain needs for robots. A total of 8,324 people visited during the two-day period of the event.

Research Center for Sustainability Science

Sustainability science is a new academic framework that aims at tackling the complex and long-term issues that the world currently faces, such as global climate change, biodiversity, and the deterioration of ecosystem services from a comprehensive and integrated approach. It aims at building a sustainable society in which human activities and the natural environment can co-exist in harmony. In 2005, Ritsumeikan University established the Research Center for Sustainability Science (RCS) to develop solutions to the difficulties that society faces by conducting research activities integrating art and sciences. Based on research results encompassing nine years of RCS, the Research Center for Sustainability Science at the Research Organization of Open Innovation and Collaboration was newly established as a basis to develop and promote RCS in order to carry out research on "How things should be done" or on methods of practice and challenges as a new stage. By improving the sustainability of standards and related practices, enhanced solutions to society's difficulties are being promoted.
COLUMNS

COLUMN #1 The World of Shitakawa’s Letter Science

The “” in Ritsumeikan University

Takao Sugihashi

The character “” is conceptually derived from “” and “” to mean the shape of a man standing wide, spreading his arms and feet, as seen from the front. “” indicates the position that the person is standing in. In other words, “” means standing in single file, and this is the original character for "" (standing in line). The same applies to "", which is a part of "" meaning a pair lining up in single file, and "", which is the original character for "" (standing in pairs).

The word “” in the name for Ritsumeikan comes from a passage in the Jinten chapter of the Discourses of Mencius: Yoju Utagawazu (“without passages states, “Some die young, as some live long lives. This is decided by their will.”) Dr. Shirakawa read the first part of the passage as Yoju Utagawazu (“without passages states,”) which seems more profound, implying the subtleties of the human mind.

The word "" as a registered delinquent at a different university, she began to work as a delinquent at the university’s dormitory for its sports clubs. There, she led the team to the World Fencing Championships in Russia, thereby accumulating precious experience. Following these support activities, she became a contracted researcher for JISS from April 2015. She is also continuing to study to improve competitive abilities and create optimal conditions for athletes.

Athletes are able to compete in events under an optimal condition thanks to support from researchers like Ishibashi, who accumulate daily tasks just like athletes themselves. Thanks to her efforts, we hope that others can enjoy this particular affection of a glorious sporting event.

COLUMN #2 Lifestyle recipes

Determination and an inquiring mind, comparable to athletes

Graduate students supporting top athletes

Kumiko Ebi

In the summer, the Olympic and Paralympic Games will be held in Rio de Janeiro. It is a festival gathering of all sports that all athletes dream of, but please also look out for the support staff. Aya Ishibashi, who was a former member of the Ritsumeikan University Fencing Club and who is a contracted researcher for JISS (Japan Institute of Sport Sciences), provides nutritional support for the athletes as a contracted researcher for the Japan Institute of Sport Sciences (JISS).

After acquiring qualifications as a registered delinquent at a different university, she began to work as a delinquent at the university’s dormitory for its sports clubs. There, she led the team to the World Fencing Championships in Russia, thereby accumulating precious experience. Following these support activities, she became a contracted researcher for JISS from April 2015. She is also continuing to study...
**EVENT GUIDE**

**R-GIRO Third-phase Kickoff Symposium (tentative title)**
- September 16 (Friday)
- Osaka Based Campus, Ritsumeikan University
- Application/participation fee: No advance application required, free of charge

A kickoff symposium for six projects selected for the Program for the Third-Phase R-GIRO. A symposium will be held to promote the shared heritages of mankind. A report will also be given on the initiatives subsidized by trainees and where we discuss “cultural heritage disaster prevention” to protect the vitality and creativity, responding to a declining birthrate and an aging population. Issues to be raised in an aging society with a declining birthrate will be discussed.

**INFORMATION**

**SEIZONGAKU NO KUWADATE**
- "Chronicles of the Arts in Akihoshi" Research Center for Arts in Akihoshi, Ritsumeikan University
- Sektahun Co., Ltd.

**HOSHITIRAGU HENO OSHOHAISHINSHAGAKU APPROACH**
- "Replied Social Psychological Approach to Forensic Clinical Psychology"
- Kōsuke Watanabayashi
- Nakanosha Publishing Co., Ltd.

**CONCERT TOU BURUKA SOCHI - KOKYOYOKU TO OPE no EUROPE KINDAI**
- "CulturalMechanize as a Concerto: Symphonies and Operas in the Modern Age of Europe"
- Naomi Miyamoto
- Ivanami Shoten, Publishers

**FUKUSHIMA DAIICHI GENPATSU HAIRO Zukan**
- "Excrecetidae of the "F" : A Guide to the Decommissioning of the Fukushima Daiichi Nuclear Power Station"
- Hiroshi Kainuma
- Ohta Publishing Company

**Tsoleshi Kakyu to Munakata no Koshizou**
- "(The Tamukeya Culture of the Tamukeya Steaks and Munakata)"
- Yoshinori Yasuda
- Yuzokuinka, Inc.

**Warera wa Ai to Seigi wo Hitei suru - Nosemachishi Yokota Hinsho to "Aoi Shiba" "Me We Deep Love and Justice: ‘Aoi Shiba’ and ‘Nosemachishi Yokota’, a Current Poet (Patient)"
- Hiroshi Yokota, Shinya Tateiwa, and Masaki Usui
- Sektahun Co., Ltd.

**Concert tou Bunka Sochi - Kokyo Yoku to Opera no Europe Kindai**
- "CulturalMechanize as a Concerto: Symphonies and Operas in the Modern Age of Europe"
- Naomi Miyamoto
- Ivanami Shoten, Publishers

**Kankyo Bunmei Ron**
- "Kankyo Bunmei Ronshu Vol. 18 Kofun Bunka Tsushima Kaikyo to Munakata no Seikyusha Co., Ltd.

**Takashimori Shinrigaku Rinsho - Koryoku no Kosuke Wakabayashi**
- "Applied Social Psychological Approach to Forensic Clinical Psychology" in Japan
- Hoshinrigaku heno Oyoshakaishinrigaku Approach
- Ritsumeikan University (Ed.)

**Kosuke Wakabayashi**
- "Cultural Mechanisms as a Concerto: Symphonies and Operas in Europe Kindai Kokyokyoku to Opera no Kosuke Wakabayashi"

**Ritsumeikan University (Ed.)**
- "Scheme of Ars Vivendi" Seizongaku no Kuwadate

**13th Ritsumeikan University Venture Contest in 2016**
- Final Competition: December 17 (Wednesday)
- Osaka Based Campus, Ritsumeikan University
- Application/participation fee: No advance application required, free of charge

This is a business planning contest for students. The goal is to create venture businesses originating from the university and to develop entrepreneurship, and we held business startup plans based on technologies or ideas on any business seeds that students might have.

**GIS Day in Kansai 2016**
- October 22 (Saturday) 10:00 to 17:00
- Conference Room, Soshikan Hall, Kinugasa Campus, Ritsumeikan University
- Application/participation fee: Advanced application required for workshop, free of charge

Against the backdrop of nationwide improvements in fundamental map information and the penetration of GIS (Geographical Information Systems) utilization through industry-academia-government partnerships, we have invited government officials in charge and other experts to host a lecture meeting. During the workshop in the afternoon, we will not only hands-on training for the general public using ArcGIS and ArcGIS Online but also applied training for disease prevention and proactive countermeasures using GIS.

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http://www.arc.ritsumei.ac.jp/

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