What does it mean to be conscious, to be human? Ancient philosophers posed such questions as a search for the seat of consciousness. Aristotle finding it to be the heart in our chest; Hippocrates, the brain in our heads. Traditionally, ‘spirit’, ‘feelings’, ‘awareness’, ‘action’, and ‘words’ represented a plethora of concepts used to describe the human experience and phenomenon of consciousness, and yet, as abstract concepts, they left a great deal unexplained.

What then for us, living as we do in an age of continuous scientific progress and innovation? How might our era provide answers to these persisting questions? This edition of RADIANT takes an in-depth look at the new perspectives researchers at Ritsumeikan University are providing to age old conundrums.
How to obtain accurate Testimonials from Children? The evolving Practice of forensic Interviews

Obtaining accurate information from children who may be witnesses to a crime or an accident, or are victims themselves, is not easy. Their memory capacity and their language capabilities to convey accurately what they remember are yet to be fully developed. Adults who disregard these facts tend to ask repeatedly leading and suggestive questions, such as “did someone hit you?” and “did you see a white car?” This way of questioning contaminates the child’s memory and reduces the credibility of his or her testimony.

According to Naka, forensic interviewing was developed in the West during the 1980s and the 1990s. It was adopted by the police and welfare organizations, and, eventually, many interview techniques were devised. Specifically, the National Institute of Child Health and Human Development (NICHD) protocol developed by Professor M. E. Lamb and his colleagues piqued Naka’s interest. It was developed in the U.S. and has been widely used across North America and Europe, as well as in Israel and Asian countries such as Korea. Naka translated this protocol into Japanese, organized its critical items, and worked on devising a forensic interview method that is appropriate for the Japanese context. Based on the consideration that children can be influenced easily by leading questions and suggestions, and that they are vulnerable to emotional stress, “There are four main features in this interview method,” Naka says. First, (1) we must emphasize open-ended questions, with no limitations or restrictions on their answers, and free narratives, allowing the child to use his or her own words. (2) The interview must be flexibly structured for maximum effect. (3) Document the interview by video recordings, to retain accurate information. Finally, (4) minimize the number of interviews to avoid memory changes and secondary damages due to emotional distress, by working with an interdisciplinary team of professionals.”

The actual forensic interview follows a structured format with the following stages: pre-substantive phase, the substantive phase (free narratives), questions if necessary, and the closing. In the pre-substantive phase, the interviewer will explain the “ground rules” by describing the rules and instructions of the interview. Then, the interviewer will engage in a rapport-building conversation so that a more relaxed child can take place. After having the child practice recalling and discussing an event that took place in his or her everyday lives, the conversation will proceed to the substantive topic. “The ironclad rule of this type of interview is to keep it open-ended. You may ask the child, ‘tell me everything that happened from the beginning to the end,’ and open-ended questions, such as ‘and then?’ or ‘and then what happened?,” as you gather information.”

Drawing out accurate information from interviews that support children, who are still undergoing development in their abilities to retrieve memories and communicate

Moreover, inter-institutional collaboration has gained importance as forensic interviews are being implemented. In Japan, when children claim to have been victimized, they will, first, be interviewed in a Child Guidance Center. If any criminality is suspected, it is common for the police to interview the child, followed by interviews by the prosecutors. “At worst, they may be interviewed over ten times. Aside from the danger that their memory could deteriorate or change during that time, they may also experience secondary trauma due to recalling memory each time they are interviewed. The purpose of an inter-institutional collaboration is to reduce the number of hearings,” Naka explained. Previously, there was no system in Japan under which the police and the prosecutors or the welfare and medical institutions can collaborate. As each institution had different questioning procedures and information that they would like to obtain, initially, an interdisciplinary collaboration was considered difficult to organize. Under these circumstances, in October 2015, a notice was issued by each of the institutions, namely, Ministry of Labor, Health and Welfare, National Police Agency, and Supreme Public Prosecutors Office, to encourage an inter-institutional collaborative fact-finding process. Since then, there has been a surge of interest and gradual progress in forensic interviews.

Naka and her team have developed training programs to spread the knowledge and skills relating to forensic interviews and promote interdisciplinary collaboration for those involved in forensic interviews. They have also provided training to those working in Child Guidance Centers, the police, the prosecutors, staff of medical facilities, and specialists in welfare institutions. Through training, Naka intends “to understand the thinking and positions of other institutions and specialists to achieve a smooth collaboration in the forensic interview process.”

Forensic interview methods are currently used in not only welfare and legal settings but also medical institutions and schools. These methods, which consider the interests of victims, must be useful in dealing with not only children but also adults. Further development and dissemination of interview methods and training programs would certainly benefit society.
“Y ou will live to 100. I’ll live to 99.”

The wish to grow old together as husband and wife, as represented in the quote above, and to share an intimate and long life has been considered a sign of happiness. However, in reality, many forms of marital relationships last, but their longevity is not necessarily proof of happiness. From a lifelong developmental perspective, Hiroshi Utsunomiya seeks to grasp marriage longevity and the relationship between spouses. Specifically, he believes that new insights can be obtained by focusing on elderly couples who are at their ultimate stage in life. Utsunomiya's approach is unique in that he incorporates the concept of commitment in considering the relationship between husband and wife. Utsunomiya calls it the “basic stance that each individual takes toward the continuation of a married life.” Commitment to married life is directed to not only spousal relationship but also the institution of marriage and its social benefits. Utsunomiya classifies commitment qualitatively into six types of relationships, or what he calls the relatedness status: personality-based, devoted, compromising, diffusive, superficial, and independent (Table 1). “When we look at the relationship of elderly couples in Japan through this relatedness status, we find interesting things,” Utsunomiya revealed. First, when looking at the distribution of each status, it can be observed that the majority of men have personality-based and superficial types of relationships, and many elderly men take a positive view on married life. In contrast, over 30% of women have devoted, compromising, or diffusive types of relationships; this percentage of women is nearly three times more than that of men. “We can see how many women are dissatisfied with, are feeling resigned to, and struggle in their married life,” Utsunomiya explained.

Utsunomiya also looks at the association of relatedness status with how long time is spent. Those who are categorized as having a personality-based type of relationship are more likely to join social activities as a couple or as an individual, expressing high marks in both cooperative and individualistic behavior. However, the majority of those categorized as having the other five types of relatedness status tend to express individuality. “To me, my spouse is my one and only. I never thought I would end up with this person. I am satisfied.” In the past, I tried to understand my spouse. However, I no longer wish to be hurt. “Our meeting could not be a mistake. I want us to understand each other from the depths of our hearts. I do not want to give up.” To me, my spouse is my one and only. Our meeting could not be a mistake. I want us to understand each other from the depths of our hearts. I do not want to give up. “Why did we meet in the first place? I want us to separate and start my life over.”

In addition, Utsunomiya investigated the mechanism in which such changes occur in the history of marital relationships using his unique commitment orientation model (Fig. 1). Commitment orientation shows the manner by which commitment is developed. Commitments are multilayered. Commitment levels depend on the appearance one maintains or on one's beliefs. There are those who would say, “No matter what happens, I will never leave my spouse”; this belief is found at the lowest layer called the maintain the institution level. Then there is the sustained exploration level found at the highest layer; in this level, each of the couple questions the meaning of their existence while requiring holistically each other. Additionally, there is the incognizant level where the relationship is compared to the air one breathes; that is, for better or worse, one considers their partner's presence as a given and thus, typically, not much thought goes into the relationship. “These levels are not constant. They dynamically change throughout one’s life” (Fig. 2). Specifically, when people face a crisis, they tend to shift to a different level,” Utsunomiya explained. When a couple faces difficulties, each reassesses each other. Certain couples deepen their relationship and enter the sustained exploration level, whereas others head toward the maintain the institution level as the crisis has caused other frustrations to surface. The decisions made at key milestones in life depend on the type of relationship a couple has tried to build up to that point. “This is among the reasons it is important to understand the dynamics of a marital relationship over an extended period,” Utsunomiya said. Moreover, marital relationships impact children’s development and their spouse selection in the future. For this reason, Utsunomiya also pays attention to the partnerships of those in their 20s and 30s who are children of the current middle-aged and elderly couples. “Today's lifestyle is diversified; we see reports stating that 90% of unmarried men and women between 18 and 34 years old intend to marry someday. This illustrates that in Japan, the main stream view of life includes the prospect of marriage. I would like to examine the younger generations’ commitment to marriage or cohabitation,” said Utsunomiya. Sharing his vision, he stated, “We must consider a variety of partnerships beyond the legally married couples, such as same sex and cohabitating couples; otherwise, it would not reflect reality. We would also like to include unconventional couples in the empirical studies.”
At what Threshold should Depression be diagnosed?

Depression is at times referred to as “the mental cold” because of its pervasiveness and no one is immune from it. Contrary to such common impression, however, depression can be dangerous and have serious consequenc-es. In recent years in Japan, depression has gained attention as a critical factor of suicide. According to Shizuka Kawamoto, whose research focuses on depression, the number of patients with depression (including bipolar and mood disorders) exceeds one million (Ministry of Health, Labour, and Welfare, Patient Survey, 2014).

In addition, of all the suicides with an identified cause or motive as stemming from health issues, more than 40%, or 4,496 cases in 2016, had depression as its cause (Ministry of Health, Labour, and Welfare, Suicide Statistics, 2016).

Kawamoto’s research focuses on the prevention of depression of particularly those in their late adolescence, based on the perspective that “preventing depression is an important aspect of suicide prevention.” She is particularly interested in determining where the boundary between health and disease lies. “The sense of being down or not being able to sleep because of anxiety are all depressive symptoms that we have experienced. Therefore, what is the difference between what is called a disease and what is not?” This question set off Kawamoto’s research. The question of at what threshold should depression be diagnosed is referred to as the continuity controversy of depression. Although many studies on the subject have been conducted, no clear answers have been obtained to this date. Researchers of continuity hypothesis have argued that there is no definitive boundary between the depressed and the healthy state, and pointed out that healthy people possess characteristics similar to that of people with depression. According to Kawamoto, “an analogue depression group comprises those who have depressive symptoms but have not yet been diagnosed at a specialized institution.” Kawamoto compared patients with depression to ‘analogue’ subjects (i.e., male and female university students) to determine their resembling and differing characteristics.

First, to determine the severity of the subject’s state of depression, Kawamoto asked her subjects to respond to a 21-item multiple-choice self-report inventory called the Beck Depression Inventory-II, or BDI-II for short. “As a result, we found that among those in the analogue group, there is a gradation (a continuous sequence); there is also no definite border between healthy subjects and those in the analogue group and between those in the analogue group and patients with severe depression,” Kawamoto explained. Even among subjects in the analogue group, there are those with depressive symptoms but who remain in the range of healthy people, whereas others have characteristics that are close to that of patients with depression. To scrutinize further the differences between them, Kawamoto examined each of the BDI-II items to determine how each of the symptoms manifests. “One of the items that showed a clear difference was those related to suicidal ideation,” Kawamoto revealed. The more severe their case is, the higher this item was rated, indicating an abnormal level of depressive symptoms. In addition, statistically significant differences were found in the items related to loss of interest, loss of vitality, difficulty in concentration, changes in sleeping habits, and changes in appetite. “These are conditions that interfere with daily life, especially when one is involved in studies and work. As among the diagnostic criteria of depression is to determine whether the condition impairs social and occupational functions, these findings indicated that not because one may be in the analogue group, their depression can be taken lightly,” Kawamoto stated. She added, “It would be good if such findings lead to early detection and prevention of depression.”

H owever, Kawamoto found that an early detection of depression does not necessarily result in a visit to a psychiatrist or a neurologist. “In Japan, reports have pointed out the low examination rate of those who experienced depression; only about 30% of them have visited a medical institution for consultation.” With university students as subjects, Kawamoto investigated the factors that influence one’s decision to seek medical treatment, and found the following four factors: an expectation that the passage of time will naturally lead to recovery, the inconvenience of going for a professional consultation or seeking advice from others, the difficulty in making an association with the disease, and a sense of resistance to psychiatric institutions.

The Japanese government has begun taking countermeasures to address this situation. Although there have been activities to disseminate knowledge and increase awareness of depression, as well as depression screenings, with the intent of early detection and early treatment at the local community level, no noticeable impact has been observed: Kawamoto pointed out that “it is possible that such mental health literacy aimed at the masses may not be reaching those who really need the information.” Kawamoto, now, turns her attention to the individuals, hoping to create opportunities for each to have a dialogue with specialists, so that they obtain the kind of information that they find useful. Her next research aims to examine whether conversations could make a difference in mental health literacy and eliminate prejudices that surround psychiatry.

“I would like to be able to provide options and possibilities that would be helpful when one becomes mentally and emotionally weighed down.” This is why Kawamoto continues to be active in the field of clinical psychology and carries her research forward.

**Detecting and preventing depression prior to diagnosis**

**Number of patients with mood [emotional] disorders (including bipolar disorder)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
</tr>
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<tbody>
<tr>
<td>2005</td>
<td>1,116,000 people</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>1,200,000 people</td>
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**Research Subject:** Community support for depression and suicide prevention, psychological education for improving mental health literacy, health communication between professionals and non-professionals

**Research Keywords:** social psychology, clinical psychology
Regret: The Emotion that impacts Stock Trading

Let us say you find a popular restaurant with a long line of people waiting to get in right next to an empty and quiet restaurant. Which would you choose if you were to have lunch?

Most people will choose the former, not because of the taste of what the store serves but because of the long line that formed outside it. People do not logically determine their own actions; rather, they find comfort in doing the same actions as others, and thus tend to follow. “These actions are called the ‘herding phenomenon’ in behavioral economics. Many stock market investors do not consider each stock thoroughly; they rush to buy certain stocks simply because ‘everyone is buying these stocks.’ Even the issues relating to the bankruptcy of the Lehman Brothers, which brought about a global financial crisis, is considered the result of a herding phenomenon, in which people overheated the market as they bought subprime loan-based products.” Jie Qin, who is interested in and has bought subprime loan-based products.

Qin stated that “even (Harry) Markowitz, who is a Nobel prize winner for economic science and a founder of modern investment theories, mentioned that he divided his pension into bonds and stocks evenly, as he was afraid that he might regret not doing so.” Although using a unique analogy to demonstrate how emotion can significantly influence a person’s activities, he advocates the need to incorporate emotional factors into securities investment research. “In the field of neuroscience, many reports state that those who lost their emotional faculty due to brain damage are unable to make rational decisions. In our decision-making processes, both our brain, as the hardware, and emotions, as its software, are indispensable. My research serves only to remind others as its software, are indispensable. My research serves only to remind others of the need to consider emotions in considering all aspects of finance.” We expect that Qin’s research will open new territories in financial research.

When you use information from a capital market where opinions from many investors are aggregated, the capital cost or the expected rate of return will typically show up as high-risk high-return. Qin decided to integrate regret factor into the CAPM to build a new mathematical model. This is the first theoretical model that incorporates regret into the equilibrium price. He stated, “Although there is room for refinement and expansion, this is an important first step toward a new direction.”

Next, Qin focused on the relation between risk and return of individual stocks and analyzed how regret affects the process in which investors expect return to be formed. “Currently, the most widely accepted premise in analyzing risk and return is a theory called the Capital Asset Pricing Model (CAPM).” Qin explained. When you use information from a capital market where opinions from many investors are aggregated, the capital cost or the expected rate of return will typically show up as high-risk high-return. Qin decided to integrate regret factor into the CAPM to build a new mathematical model. This is the first theoretical model that incorporates regret into the equilibrium price. He stated, “Although there is room for refinement and expansion, this is an important first step toward a new direction.”

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Qin’s Regret-CAPM (Top and Middle). He incorporated the emotion of regret into the traditional CAPM (Bottom).
Psychology reveals the Truth behind our Sense of Taste

Palatability is a complex subject. Depending on the food, the person eating, or circumstances, the sweetness or bitterness of food could be considered delicious. The smell or texture could also make one like or dislike the food; some foods are disliked simply because of how they look, despite what their flavor may be. For example, even if you analyze the elements of a fruit at its molecular level and reveal its sugar content, you cannot uncover the truth behind the palatability we feel.

Yui Wada considers palatability to be an emotion that occurs when a person partakes food; based on this premise, he is trying to unravel the mechanism of palatability through a perceptual psychological approach.

“If I were to explain the mechanism of gustation based on molecular biology, people’s ‘taste’ things when the brain receives signals through the central nervous system, based on their sweetness, saltiness, bitterness, sourness, and umami, which are the basic flavors contained in the chemical substances that come into contact with taste receptors at the tip of the taste bud within the lingual papilla,” Wada said. Humans have an innate receptor for these basic tastes. For example, it is said that the sense of sweetness or umami, which relate to nutritional values that are indispensable for survival, are considered innately desirable for not only humans, but also many other animals. In contrast, sourness and bitterness are received as signals for poison and spoilage.

“However, there is a much more complicated mechanism involved in humans’ perception of food,” Wada continued. According to Wada, the perception of food is impacted by not only the five senses of sight, sound, touch, smell, and taste but also the visceral sensations and the kinesthesia of mastication and swallowing; aside from these, culture, learning, and preferences also play a role. Thus, it is necessary to consider the perception of food as a multi-sensational perception.

For example, one factor that affects sense of taste is smell. There are two kinds of olfaction when it comes to food; one comes in through the nose, and the other comes back up with the breath from inside the mouth after the food is chewed or swallowed. They both significantly impact the sense of taste. For example, if we pinch our nose and close our nostrils as we eat chocolate, we cannot sense that chocolate flavor. This is because we are unable to sense chocolate’s distinct, rich flavor that we would otherwise be able to sense through its aroma. As this example shows, smell, in effect, enhances the subjective sense of taste.

Vision also significantly impacts one’s evaluation of food. “Perhaps because most fruits and vegetables are red, green, or yellow, food colors that are on the opposite end, like blue, give many a repulsive feeling,” Wada explained. In addition, the typical colors associated with food have a significant impact on visual recognition of foodstuff. For example, the reason melon or lemon-flavored syrup used on shaved ice is much brighter than the actual fruit juice is to encourage association and identification.

The typical color of food impacts not only one’s impression of it but also how it tastes. In fact, there are reports that sucrose solution with a reddish hue tastes sweeter than one without a color, apparently because the color red has a stronger association with red food, such as fruits, and thus it may have an enhancing effect on the sweetness. Based on such examples, we can see that our sense of taste is created as a mixture of various senses, including smell and vision. Texture (haptic sense) is also among the senses that help form one’s perception of food. Wada mentioned that “people in Kyushu tend to favor softer unon noodles, and those in Aomori say apples with a harder texture taste better.” It is quite fascinating that what is considered delicious differs by location.

Psychology reveals the Truth behind our Sense of Taste

The sense of taste is a combination of many elements, including the five senses, culture, learning, and preferences.
Healing the Heart and Mind: The Power of Picture Books and Music

December 2017, Tokyo. Participated by many musicians and voice actors from different genres, a charity event in support of the Kumamoto- to and the Great East Japan Earthquake relief efforts was held. The main event was a collaboration of talents where music is played while a picture book is read aloud on stage. This was the eighth event since it began as a response to the Great East Japan Earthquake in 2011, offering healing to the victims of the devastating earthquake - including those who were forced to relocate and live in the rehabilitation areas.

Rika Masuda, a clinical psy-
chologist and the initiator of this activity, has used the power of picture books and music in several of her counseling and psychological care sessions. "When I was a child, my mother read me the fairy tale Urashima Tarō (also known as The Fisher-boy Urashima), that was my starting point. I became fascinated with the ocean and dreamt of becoming a captain of a submarine. A small book contains an infinite world of experiences, Masuda has engaged actively in activities related to pairing picture books with music held at support facilities for the elderly and patients with mental health issues.

"Using psychological indices, I have proven that jazz rhythms have a positive effect on both the right and left brains, causing a relief in stress," Masuda explained. Based on these findings, Reading Picture Books with Jazz was included in the experimental workshop held at a rehabilitation center for victims of the Great East Japan Earthquake.

"A month after the disaster, I had a strong desire to do something useful as a mental health expert, a mission of a sort, and thus visited the disaster-struck areas. However, once I was there, I felt powerless," Masuda declared. A few months later, Masuda visited Miyagi and Fukushima Prefectures. As she visited the temporary housing and shelters for disaster victims as a listening volunteer, she felt that "a specialized skill in clinical psychology is not what is needed now." After considering what she could offer, she arrived at a conclusion to harness the power of picture books and music. On September 30, 2013, an event titled "Pairing Picture Books with Jazz" was held at the Osashi Jusanzama Children’s House, located in Osashi temporary housing complex in Ishinomaki City, Miyagi Prefecture. Masuda’s hope, along with her colleagues, was to "relieve the stress, even for a moment, of those who live in the temporary housings through the fusion of reading picture books and listening to jazz music." Since then, similar events have been held in various rehabilitation centers to offer encouragement to those who had to relocate because of the earthquake. After 2016, the scope of activities included support for the victims of the Kumamoto Earthquake, and events were held outside of rehabilitation centers, such as in Tokyo and Kyoto. "The idea is to expand our imagination through picture books and music. I was inspired to adopt and learned such idea from a mentor," concluded Masuda, referring to her university professor and illustrator, Saizo Watanabe. With this belief in mind, she plans to continue to use the power of picture books and music in her activities to offer healing to people’s hearts and minds.

Rika Masuda

Professor, Graduate School of Human Science

Research Subjects: clinical psychology, research methods using picture books, study on detecting and responding to students with developmental disabilities in school settings, introduction and collaboration of picture books in support programs using picture books

Research Keywords: distressed children (childhood environment science), educational psychology, clinical psychology, special needs education

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We tend to assume that the colors and brightness of objects seen in our daily lives manifest their true colors and brightness. However, in reality, the objects themselves do not have color. In fact, when the light that hits an object is reflected, the spectral reflectance of that light bouncing off that object is what we perceive as color. That is to say, color is a visual perception. Our visual perception involves both physics, as we approach to understand the characteristics of any given object, and psychology, as in the way we feel about that object.

From a psychophysical approach, Hiroyuki Shinoda works on discovering the characteristics of the human visual system and information processing mechanisms, and attempts to apply those findings to color science and engineering of visual environment.

Humans sense colors and light by the photoreceptor cells that act as sensors, which are known as cones and rods in the retina. The wavelength of light is perceived as color. We distinguish the colors of an object by a perception of, in the order of short to long wavelength, purple, indigo, blue, green, yellow, orange, and red within the visible light range.

“However, the human visual senses do not necessarily perceive brightness as the physical amount of light, or color is a wavelength of light,” Shinoda said. Even if the amount of light is low, people can feel that it is bright, and the opposite may hold true as well; people’s sense of brightness (perceived brightness) is not simply determined by the physical amount of light. Shinoda focuses his research on how to grasp the human senses, which are difficult to quantify.

Typically, brightness is represented as a photometric quantity, such as luminance (lux) or luminance (candela per squared meter), that considers the physical quantity of the radiating light and the spectral sensitivity (sensitivity as a function of wavelength) as sensed by people. If the photometric quantity is something that is supposed to express how people sense it, then we should be able to measure perceived brightness. However, “as there are new sources of light and various lighting methods, the number of cases of unmatched photometric quantity versus the brightness increases,” according to Shinoda. Therefore, Shinoda established the measuring method of perceived brightness (subjective brightness), which utilizes two well-known perceptual phenomena, namely, lightness constancy and modes of color appearance, to measure perceived brightness for space quantitatively. With this, he developed an index called Feu.

“Regardless of the strength of the lighting, black objects look black, and white objects look white,” Shinoda explained. “This is because in response to the reflected light in the object, the human eyes adjust the perceived intensity of that light. Such phenomenon is called lightness constancy. Moreover, when we make light fall on an object, in the beginning, we can distinguish colors by its reflected light. However, as the light becomes intense, the object looks white, and in the end, we perceive it is a light-emitting object. The mode of color appearance is how we perceive the color as an attribute of the object or of the light.” Shinoda used these two perceptual phenomena to conduct the following experiment.

Using a gray color patch, a spotlight with an independent light source was applied. Then the light’s intensity was gradually tuned up, so the gray looked white and then eventually looked as if the patch was light-emitting (high luminance). In this process, the subjects determined the limit in which the color patch was still the object’s own color based on the intensity of the luminance. As the upper limit of the object’s reflectance is 1,0, the luminance of that moment in which the object’s color changes to be perceived as light-emitting (border luminance between two color modes) was equivalent to the perceived intensity of the light falling onto the patch (see figure). Therefore, if we could set the luminance, we could quantity perceived brightness. In addition, by using a digital camera to measure the luminance distribution within the visual field and averaging it out with a logarithm, a unit of measurement called Feu was created. Feu enables one to determine the border luminance of color modes without the need to conduct experiments.

“By creating an index for perceived brightness for space, we could consider lighting that is closer to the human perception,” said Shinoda. For example, even in cases where the lighting equipment displays the same wattage, the Feu value would be higher if that light was directed to illuminate the walls or the ceiling rather than the floor at a similar intensity level. Once we know this, it becomes possible to achieve the same brightness using less energy. Also, it allows us to change the direction of light, such as using down-lighting or up-lighting, to attain the perceived lightness one desires and change the atmosphere of the space.

“The perceived brightness is associated with not only light fixtures but also windows,” said Shinoda. The type of lighting that is designed to save energy when natural light enters from the window may feel dark even when sufficient illumination is assured. This is because perceived darkness inside is induced by a contrast to perceived brightness outside. Shinoda continued, “when a room is kept dark while it remains bright outside, we can create a sense of separation and feeling that we are in a different space. In contrast, if the indoor lighting is adjusted to match the brightness outside, it feels like we are in the same, continuous space. If we use these perceptions, we can allow for the sick and the elderly, who are unable to go outside, to feel as if they are outside while still being inside.”

Shinoda also discovered that color schemes can impact perceived brightness for space. “You can be under the same lighting, but placing colorful objects in the room makes one feel that the room is more bright. In contrast, if the indoor lighting is adjusted to match the brightness outside, it feels like we are in a different space. In contrast, if the indoor lighting is adjusted to match the brightness outside, it feels like we are in a different space.”

Shinoda unraveled the mystery of the mechanism of color perception, and offered his knowledge and insights for product development. A barrier-free lighting is one of such developments. "One company is user-specific, detecting the light of the long and middle wavelengths, relatively. These people can not distinguish the colors that fall within the range of green and red. Therefore, we figured that by making lighting of appropriate spectral distribution shine on objects, the detectable color would change, which would then allow those who have color vision deficiency to distinguish colors. That is what this lighting system is about. Based on this barrier-free concept, which brings clarity for everybody, Shinoda currently contributes to the productization of a lighting system that optimizes the lighting for other products. A measuring system for human perception, which was previously impossible to quantify, fashions innovative designs and product, which, in turn, lead to the creation of a new market.
Flexible yet unyielding Self-expressions that facilitate a smooth Relationship

Many of us have stifled ourselves by withholding what we really wanted to say or experienced stress by carrying on unmanageable relationships. What can we do to be able to express ourselves honestly? Takashi Mitamura tackles this question from a behavior analysis perspective. Behavior analysis is a practical discipline in which environmental variables that influence behavior are identified and then manipulated to seek optimal outcomes. In interpersonal relationships, the idea is not to always have a frank discussion, but rather to express oneself in the context of the relationship with the other person and the condition both are in to achieve one’s intentions. Compared with traditional assertion techniques, the concept of functional assertiveness employs self-expressions that are much more flexible yet unyielding at the same time; they can be acquired as a life skill that is true to reality, Mitamura explained. Initially, the issue was that these discussions were not going well. In most cases, the request and concerns were raised by parents, who typically have no training in school education. Therefore, the teachers, who are experts on the receiving end of this communication, were overwhelmed with work. The effect was remarkable. The more the parents practiced, the more they were able to express words of consideration and gratitude, and the more their requests and concerns being raised for consultation became more specific and clearer. “We found out that not only it took a relatively short period for the training to take effect but also the effect was significant that the teachers, who were on the receiving end of this communication, gave it high remarks,” said Mitamura. The findings confirmed the effect of functional assertiveness training.

Functional assertiveness is expected to be effective in various communication situations. “I believe its effectiveness is not exclusive to Japan and can be demonstrated across different countries and cultures,” said Mitamura. “Japanese are often said to be quite mindful of context. However, according to Mitamura, the phenomenon of adapting oneself to others’ self-based on the context is not limited to Japan; rather, it is a universal reality found in different cultures. “The next task is to establish an index that measures objectively the effect of functional assertiveness, to prove that it is a universally applicable technique,” said Mitamura, who is currently developing such an index. Perhaps in the near future, the functional assertion technique will be recognized as a global standard.

Among the major achievements of Mitamura’s research is advocating for functional assertiveness, which is based on re-conceptualizing assertiveness as a function (its effectiveness). Thus, in contrast to assertiveness as a form of self-expression (how to communicate), in functional assertiveness, the idea is not to always have a frank discussion, but rather to express oneself in the context of the relationship with the other person and the condition both are in to achieve one’s intentions. Compared with traditional assertion techniques, the concept of functional assertiveness employs self-expressions that are much more flexible yet unyielding at the same time; they can be acquired as a life skill that is true to reality, Mitamura explained. Initially, the issue was that these discussions were not going well. In most cases, the request and concerns were raised by parents, who typically have no training in school education. Therefore, the teachers, who are experts on the receiving end of this communication, were overwhelmed with work. The effect was remarkable. The more the parents practiced, the more they were able to express words of consideration and gratitude, and the more their requests and concerns being raised for consultation became more specific and clearer. “We found out that not only it took a relatively short period for the training to take effect but also the effect was significant that the teachers, who were on the receiving end of this communication, gave it high remarks,” said Mitamura. The findings confirmed the effect of functional assertiveness training.

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Cultural differences can be found in how we conduct our interpersonal relationships and manifest symptoms of a disease. For example, the symptoms of neurosis appear in significantly different ways in Japan, in China, and the U.S. Seclusive neurosis and scopophobia seem to be considered prominent in Japan, whereas severe psychosomatic diseases that manifest themselves as symptoms appearing directly on the body are more frequent in China. In the case of the U.S., a high incidence of drug dependence and violence is observed. In other words, neurosis symptoms differ by culture. “As such, when providing psychological support or treatment, understanding a person’s cultural background is essential,” explained Yuanhong Ji. Ji has conducted research on the relationship between culture and multicultural counseling in clinical psychology. She is involved in activities, such as supporting foreigners and foreign students in Japan to adapt to their new cultural environment. In particular, since the 2008 Sichuan earthquake which occurred in her birth country, she has focused on exploring ways to provide culturally considerate mental care in post-disaster situations.

The Sichuan earthquake left 70,000 dead, 370,000 wounded, and 18,000 missing (approximate figures); it was an unprecedented disaster in the history of China. After the earthquake, the Chinese Psychological Society asked Ji to serve as a mediator between the Association of Japanese Clinical Psychology and the victims of the earthquake in providing psychological support. As Japan is prone to natural disasters, there are numerous studies in Japan on providing post-disaster mental care and psychological support. More recently, whenever a large-scale disaster strikes, teams of volunteers and rescue workers gather from around the world to provide aid. In situations like this, where diverse people are involved and psychological experts play a significant role, Ji learned that not all are aware of, for example, the risks of debriefing, based on her experience. She explained: “The term debriefing describes one of the support methods by which victims of disasters are encouraged to speak about their traumatic experience and let their emotions relating to such events out. Initially, this method was considered to be among the more effective methods of providing psychological support for victims of disasters. However, this technique is now believed to cause more anxiety in victims if administered immediately after the event and thus considered as something that should not be done.” At the Sichuan earthquake-affected area, however, a volunteer team from another country, which was not aware of this, encouraged the children to draw pictures about their experience in the disaster to express their feelings. Ji and her colleagues also used a picture book, created by Japanese clinical psychologists on the subject of mental care, to teach children about stress management. At the time, she took special care to change the main character, from a hippopotamus to a panda bear, to make the book more appealing to the local children.

In addition, Ji and her colleagues offered “support for support groups” that they tried to assume the roles of social workers and psychological support specialists. By trying to satisfy dual roles, the teachers’ established role as an educator became ambiguous. This finding provided insights on ways to help other support groups.

The picture book Kabakun no Kimochi (The Feelings of the Young Hippo) for learning about post-disaster mental care was created by Japanese clinical psychology specialists. In its Chinese version, the book was modified to The Feelings of the Young Panda. After the Sichuan Earthquake, the main character was changed from a hippopotamus to a panda bear to make the book more appealing to the local children.

Ji’s efforts in providing post-disaster psychological support were useful during the 2011 Tohoku-Oki Earthquake in Japan and the 2008 Sichuan Earthquake in China, and the U.S. Seclusive neurosis symptoms differ by culture and religion in providing post-disaster mental care is emphasized, based on the findings of numerous studies on the Great Hanshin Earthquake. “In Japan, the importance of respecting culture and religion in providing post-disaster mental care is emphasized, based on the findings of numerous studies on the Great Hanshin Earthquake. “In Japan, the importance of respecting culture and religion in providing post-disaster mental care is emphasized, based on the findings of numerous studies on the Great Hanshin Earthquake. Post-disaster Mental Care that promotes Cultural Understanding
Ilusion is a perception or cognition that differs from the veridical property of an object. Visual illusion refers to visual misperception.

With these remarks, Akiyoshi Kitaoka, who is among the most prominent re-searchers of optical illusion, began his explanation. Kitaoka’s work explores the mysteries of human perception, with a focus on optical illusions, from the field of perceptual psychology.

According to Kitaoka, there has been a long history of optical illusion research, as seen in images and geometric designs that use illusions. At present, with the advancement in perceptual psychology and neuroscience, great progress has been achieved on this subject.

One example of an optical illusion is called the tilt illusion, where two parallel lines appear sloped or tilted. Certain prime examples are the Fraser illusion and Café Wall illusion (Münsterberg illusion). Kitaoka analyzed these structures and proposed that they be grouped together under the term Fraser illusion group.

“Fraser optical illusion is a type of illusion that makes two parallel lines look tilted. This is the type of optical illusion that when a diagonal line is drawn to intersect with a perpendicular one, the latter would look like it is tilted in the same direction as the former. Similar illusion is also observed when two tilted edges meet,” explained Kitaoka. He said that all Fraser optical illusions can be classified into three categories: the line type combines lines with different contrasting brightness and darkness; the edge type combines edges of different phases of brightness or darkness, and the mixed type combines the four elements of lines and edges of differing brightness and darkness. The Café Wall illusion combines black and white rectangular rows with a gray horizontal line; under a certain condition, the gray horizontal line looks as though it is tilting up to the right. Kitaoka demonstrated how this illusion can also be included in the Fraser optical illusion group.

Additionally, Kitaoka found that these tilt illusions also often tend to be characterized as an optical illusion where the still image appears to be in motion. “The primary visual cortex of our cerebrum has neurons that operate based on direction and motor selectivity. I thought that, perhaps, these neurons might be involved,” Kitaoka explained. As such, Kitaoka created the “drifting spines illusion” (see left page image) using the four basic elements of the Fraser optical illusion group. He demonstrated how this illusion can be explained based on the qualities of the four-stroke apparent motion. The current assumption is that most optical illusions occur not in the retina but within the cortical mechanism. Among Kitaoka’s research findings is the estimated location of where optical illusions occur in the brain.

Fraser-Wlox illusion is another optical motion illusion observed in a still image. This illusion makes the pattern appear as if it is moving from a dark-to-light or light-to-dark direction when the surface of a luminous gradient is arranged in a sawtooth wave. Kitaoka used this principle to create a unique optical illusion called the Rotating snakes. In addition, he also created an optical illusion of a moving heart, by utilizing the fact that the brain’s processing speed changes based on the luminous gradient. “The brain’s processing speed accelerates with high contrast, and slows down with low contrast. As such, our perception will have a time lag in that we see the part that has high luminance first; thus, when you move the image, the heart appears as if it is moving.”

Colors are also a major part of illusions. “The color constancy illusion is an example. When looking at an image of a strawberry with cyan (blue-green) pixels, the strawberry appears to be red, even though it does not have red pixels. This is the brain’s way of color correcting images even that do not have red pixels. Kitaoka used this optical illusion called the color dependent illusory motion and explained its mechanisms. "Such insights gained from optical illusion studies can be applied to the fields of, among others, medicine and welfare, construction, transportation, and environmental design, which have practical application in society,” Kitaoka said. For example, in trying to contribute to alleviating traffic issues using optical illusions, Seiichi Tsuinashi developed a measure that relieves traffic congestion using a visual illusion of a vertical gradient.

“It is a popular fact that traffic jams tend to occur near the sag portion where the downhill road ends and then turns up an uphill road. This is because as the longitudinal change from downhill to uphill happens gradually, the drivers do not realize that they will go on an uphill road and must stop on the gas pedal,” Tsuinashi explained. The fact that the driver can see the road rising into the distance may also be a contributing factor, he added. Tsuinashi focused on the sag section of an actual highway, and examined the effect of the visual illusion of a vertical gradient that would cause the drivers to perceive that the gradient of the incline in the road ahead is steeper than the present condition. He used a scaled model of the hill to examine the type of surrounding visual environment, the gradient, the tilting of the parallel patterns on the side of the walls, the height of the wall, and the tilting of the horizontal and perpendicular patterns that intersect one another. All these factors were expected to impact the visual illusion of the longitudinal gradient of the road. Based on these insights, he believed that a sloped horizontal pattern must be drawn on the side walls at the sag section, to counter and alter the illusion of the gradient road, thereby alleviating traffic jams. Such studies are just beginning to reveal the hitherto largely untapped benefits of visual illusion research, demonstrating its potential to contribute to a wide range of science or technology in the future.

A simulation of the longitudinal gradient illusion (right) placed between the Anagawa-Higashi interchange and the Kazama interchange on the Saitama Kanto Expressway showed that drivers who viewed the tilted lateral stripe were placed to create the illusion. The road incline appears steeper when compared with the road side with no walls (left).
A chameleon-like protein changes its shape and function in autoimmune diseases and cancer

A new study shows how certain modifications in a protein can drastically alter its structure and function.

Research published online in Nucleic Acids Research in January 2018

Debilitating illnesses such as autoimmune diseases and cancer are deadly because they are difficult to treat. Besides, finding appropriate therapies and effective drugs has been a struggle within the health care industry as the underlying mechanisms of these illnesses are not fully understood. If we can understand how molecules in the body interact and cause these illnesses, it would help researchers design new drugs that target molecular mechanisms behind autoimmune diseases and cancer.

A group of scientists from Ritsumeikan University, Yokohama City University, and Osaka University in Japan have recently made significant progress in this direction. Their recent study, published in Nucleic Acids Research, reveals the molecular mechanisms behind the functioning of a specific protein—Ets1—involves both autoimmune disease as well as cancer. The structure of this protein includes a region, termed the intrinsically disordered region (IDR), that can be modified at several sites, these modifications can completely change the effective function of the protein. Depending on the modification, the protein either binds or does not bind to DNA, causing genes to turn on or off.

The lead author of the study, Assistant Professor Kota Kasahara from Ritsumeikan University’s College of Life Sciences, says, “Although it is known that the IDRs of proteins are of importance for a variety of biological processes, the physics of IDRs have not been well understood. The researchers found that when phosphoryl groups attach to a part of the Ets1 IDR that is rich in the amino acid serine, it is no longer capable of binding to DNA; this in turn affects the expression of certain genes. Their study thus provides a striking example of how an IDR works.”

The proposed protocol can be successfully applied to other similar molecular systems. Kasahara explains, “Since modifications such as phosphorylation on the IDR are well-known mechanisms for gene-expression regulation and relevant to many diseases, the molecular mechanisms behind variety of diseases are expected to be studied by applying our protocol.”

This study provides useful insights into the biophysical behaviour of IDRs that can have benefit advances in the fields of protein science, molecular biology, medical science, and life science.

The structure of Ets1 is a transcription factor regulating cell differentiation

The International Research Center for Gastronomic Science held an international symposium

On December 2, 2017, 188 people participated in an international symposium, titled ‘Higher Education and gastronomic and Arts Sciences around the Globe: Pioneering the World of Gastronomy,’ as gastronomic arts and sciences must be taught in higher education was discussed in the symposium.

Two keynote addresses were presented on that day. Nicola Perdu, who represented the Dean of The University of Gastronomic Sciences, delivered the first keynote address about the history of gastronomy. Then Wendy Wolfrom from Cornell University gave the second one about the future of food and maintaining a global perspective in the pursuit of gastronomic research.

After their keynote addresses, researchers from Miyagi University, Ritsumeikan University, and Kyoto Prefectural University presented their case studies, as well as current research activities and prospects, each of which prompted lively discussions with questions and answers.

Isao Kumakura, the curator of the Mibe Museum, chaired the joint discussion session. Commentators from the Japan Foodservice Association, Doshisha University, and Køkbu Business Support Co. Ltd. spoke about their perspectives on the type of human resources that must be developed for those that will be involved in the foodservice industry, universities, and general corporations, respectively. The session provided a meaningful exchange of opinions.

An underwater robot survey finds ancient pottery at the bottom of Lake Biwa

In December 2017, Kenichir Yano (Professor at the College of Letters) and Michio Kumagai (Professor at the Research Organization of Science and Technology) used an underwater robot in their investigation of an underwater archaeological site called the Tsuurauzoki Kotei Iseki located at the bed of Lake Biwa in Nagahama City, Shiga Prefecture. Their exploration led them to discover a complete Haji pottery pot, which is estimated to have been made sometime between the Asuka Period (592–710) and the Nara Period (710–784). The pot was discovered at a depth of 71.5 meters; they managed to capture a video of their exploration.

The video was taken at the deepest coordinates of where the archaeological discoveries have been marked, making it particularly valuable for the academics. This particular study was conducted in collaboration with the NPO Biwako Trust and the Idea Co. Inc., the TBS Television provided the underwater robot of the Idea Co. Inc. The exploration of the Tsuurauzoki Kotei ikeki was conducted 16 times between 2010 and 2017, by, among others, Sadako Kawamura (Professor at the College of Science and Engineering), Nobukazu Shimada (Professor at the College of Information Science and Engineering), and Norimitsu Sakagami (Associate Professor at the School of Marine Science and Technology, Tokai University).

They found several previously unknown pieces of pottery at seven locations at the bottom of the lake, and managed to capture the video. As this archaeological site is extremely difficult to access, they utilized human divers, to its depth and current, they utilized underwater robots, which was created by the research group. The reason ancient pottery is found at the bottom of the lake is still unknown and remains a mystery.
The cultural aspects of suffering in cancer patients

Michiko Sawano

On September 11, 2013, NASA’s Saturn orbiter Cassini captured Saturn’s atmosphere and its final mission. In the nearly two decades since its launch, Cassini has received many praises for transmitting valuable observational findings from Saturn for 15 years since its arrival at Saturn. For this article, however, let us discuss one of Japan’s planetary probes.

The infrared sensor is not only applicable and useful in our everyday lives, as discussed in the previous edition, but also an important tool for astronomy. In addition, we have witnessed progress in astronomical observations, which typically spans between 1 and 3 μm, is slightly higher than what we see in the visible spectrum. However, infrared images are not limited to studying the shapes and the survival rate after the treatment. In the case of breast cancer, the patient may feel that the patient’s family has the diagnosis, that the patient is not a cancer, and is deeply shocked. The situation at the beginning of this column is from a cancer patient in Korea, but similar phenomena are seen in Japan. Despite having no physical pain, they feel they are suffering because of the diagnosis. Why do people an impression that cancer equals death?

Apart from there being no established treatment that can cure cancer, 100%, we could think of several other reasons.

First, people are influenced by the depiction of cancer in the media. The cancer patients in movies and dramas almost always die after undergoing terrible suffering. Although there are many serious illnesses other than cancer that could not be totally cured, in the media, cancer is currently the most frequently and dramatically depicted disease in which patients suffer. In addition, the various national government or medical institutions in recent years to educate and increase awareness of the public about cancer prevention and treatment. For example, they will demonstrate in numbers how the number one cause of death is cancer, or they may show images of a family in mourning after losing their loved one to cancer, to make people worry about their own situation. Then they will appeal to the public, saying something analogous to “because, on your lifetime so that you may avoid cancer.” This method may be useful for encouraging people to choose healthy living activities voluntarily. However, at the same time, we cannot overlook the fact that it is also spreading a scathing, scary image of cancer, that is, cancer equals death, in the minds of the public.

Moreover, promoting an improvement in one’s lifestyle as a way to avoid cancer creates an impression that cancer is something that happens to those who have an unhealthy lifestyle. Although there are people who have made poor lifestyle choices, which, in turn, lead to cancer, there are also those who have made reasonable and healthy lifestyle choices that still ended up with cancer. To assume that people have cancer because they lack self-management only promotes the idea that the patient is to blame for the illness, a notion that the patient may believe in. Although educating and encouraging people to prevent cancer is important as a public health matter, it is also critical not to overlook how that may induce suffering as well.


Michiko Sawano

Received a master’s degree in the Department of Anthropology, College of Social Sciences, Ritsumeikan University, in 2003. Since 2003, he has been serving as an invited staff member at the Japan Aerospace Exploration Agency.

Akatsuki orbiter. A full-color infrared image of Venus photographed by Akatsuki (©JAXA)

Viewing the World via Infrared Rays

The cultural aspects of suffering in cancer patients

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