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[Special Feature]

**Consciousness:  
The Heart and Mind**

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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.

RADIANT July 2018 Issue 8

Special Feature:

## Consciousness: The Heart and Mind

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# 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.

Considering these issues, as a developmental psychology researcher, Makiko Naka studies *forensic interview* techniques that draw out as much accurate information from children while not mentally burdening them.

“It is the ability to communicate, besides having the basic capacity to retain memory, that makes the difference in properly reporting what one had experienced,” Naka began to explain. Initially, a toddler may only have the ability to describe a memory of a car in an associative manner, such as by mimicking related sounds. However, as they grow in their cognitive abilities and accumulate experience in talking with adults, they learn to speak in specifics, saying things



The interview is monitored by a behind-the-scenes staff, checking the content of the questions and providing advice as needed.

such as, “the other day, I was in Daddy’s car, and...” Naka clarified, “it is not merely about finding out whether they remember something. The most important is to have them talk at length about it.” Naka is developing methods of and training programs on forensic interviews, based on findings from basic research on developmental and cognitive psychology.

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 dis-

stress, 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 relaxing

one 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.’ Then, you will let the child speak at his or her own pace, only following up with more open-ended questions, such as ‘and then?’ or ‘and then what happened?’, as you gather information.”

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 even experience secondary trauma due to recalling their 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.

## Makiko Naka

Professor, College of Comprehensive Psychology

Research Subject: development and provision of a training program to foster the use of forensic interviews by a multidisciplinary team, development of a forensic interview method and a training program to protect children against crimes and on conversation between adults and children

Research Keywords: experimental psychology, jurisprudence on new territories



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



“You 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 form 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 relationship*, 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 much 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 leisure 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 tendencies and individuality. However, the majority of those categorized as having the other five types of relatedness

## Longer Marriages and the Meaning of Happiness to a Husband and to a Wife

Table 1 Evaluation criteria and characteristics of relatedness statuses

Status	Meaning of Existence	Proactive Involvement	Characteristics
Personal relatedness status	Exploration → Affirmation of personality	Yes	The best possible match. I think we (the spouses) have a deep understanding of each other. To me, my spouse is my one and only.
Devoted relatedness status	Currently Exploring	Yes (or at least trying)	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.
Compromised relatedness status	Exploration → Neutral	No	I wanted us to understand each other better. However, I do not expect that any more, and I could not care less if things do not change.
Diffused relatedness status	Exploration → Negative	No	In the past, I tried to understand my spouse. However, I no longer wish to be hurt. Why did we meet in the first place? I want us to separate and start my life over.
Superficial relatedness status	No exploration (Functional support)	Yes	I have never wondered why I ended up with this person. I am satisfied. There is nothing more to say.
Independent relatedness status	No exploration (Neutral)	No	It is pointless to ask why I am with this person. My spouse is important in my life. Whether or not one loves the other does not matter to me.

status tend to express individuality. “To lean toward individuality does not necessarily mean there is disharmony between spouses,” Utsunomiya clarified. He further stated, “We could actually say that they

are balancing each other out for them to maintain harmony. Even from this example, we can glimpse the complexity of marital relationships.”

In addition, Utsunomiya investigated

daily conflict, subjective sense of happiness, and the consistency of status between couples. “It is interesting that even though the two may have lived their lives together for so many years, they do not necessarily share the same status. If the husband is categorized as having a *personality-based type of relationship*, there is a high tendency that the wife shares the same status. However, if the husband is categorized as having a *superficial type of relationship*, there is a high tendency that the wife would be having either a *devoted, compromising, or diffusive type of*



Hiroshi Utsunomiya

Professor, College of Comprehensive Psychology

Research Subjects: continuation/adaptation of married life and lifetime development of relationship with spouse, the psychological influence of discord between parents on children, the diversification of partnership types and psychological adaptation, clinical psychological support for couples working on infertility treatment, etc.

Research Keywords: developmental psychology, family psychology

## Following the dynamically changing relationships of married couples

Fig. 1 Commitment orientation model in marriage

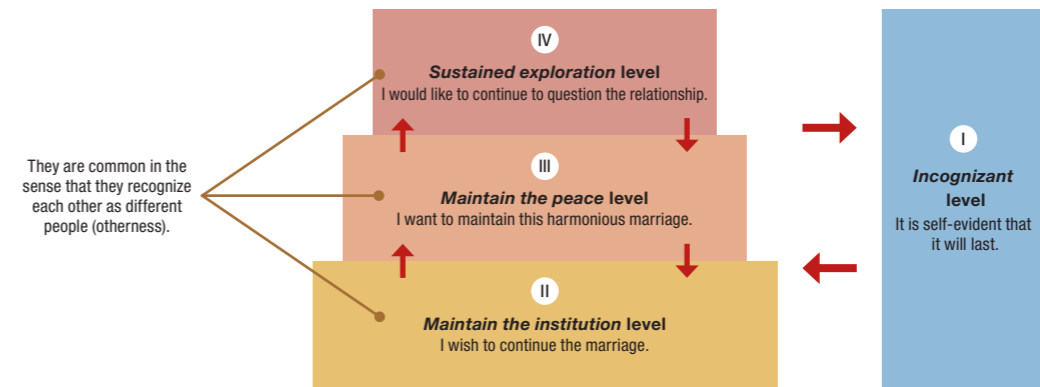
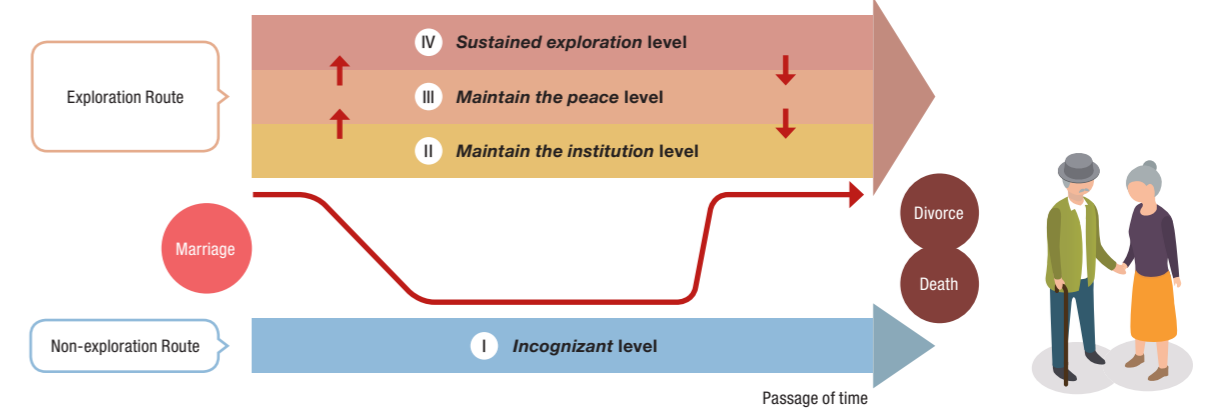


Fig. 2 A model of transformation of commitment orientation over time



relationship. We can see that even though they may share a sense of happiness or well-being, the relation between a couple could be drastically different.”

Marital relationships can be quite diverse and tend to change in the course of a lifetime. Utsunomiya explains 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 layer, each of the couple questions the

meaning of their existence while requires 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 mainstream 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. I 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 consequences. 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).



**Shizuka Kawamoto**

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

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 hypothe-*

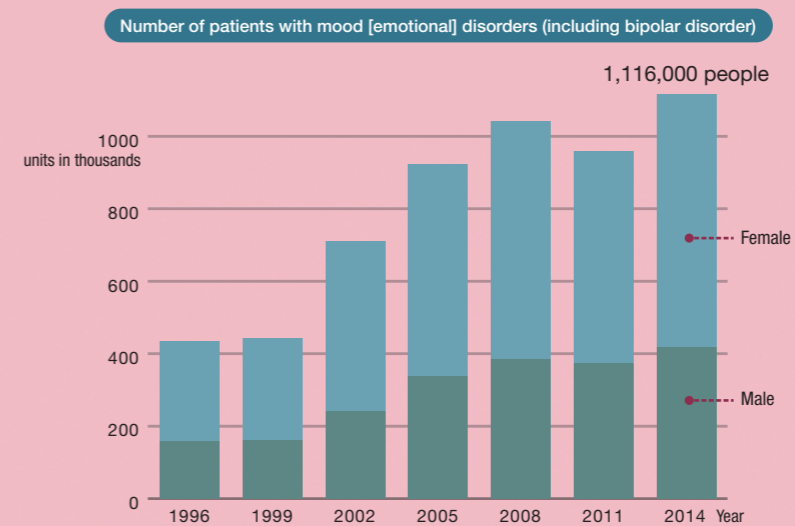
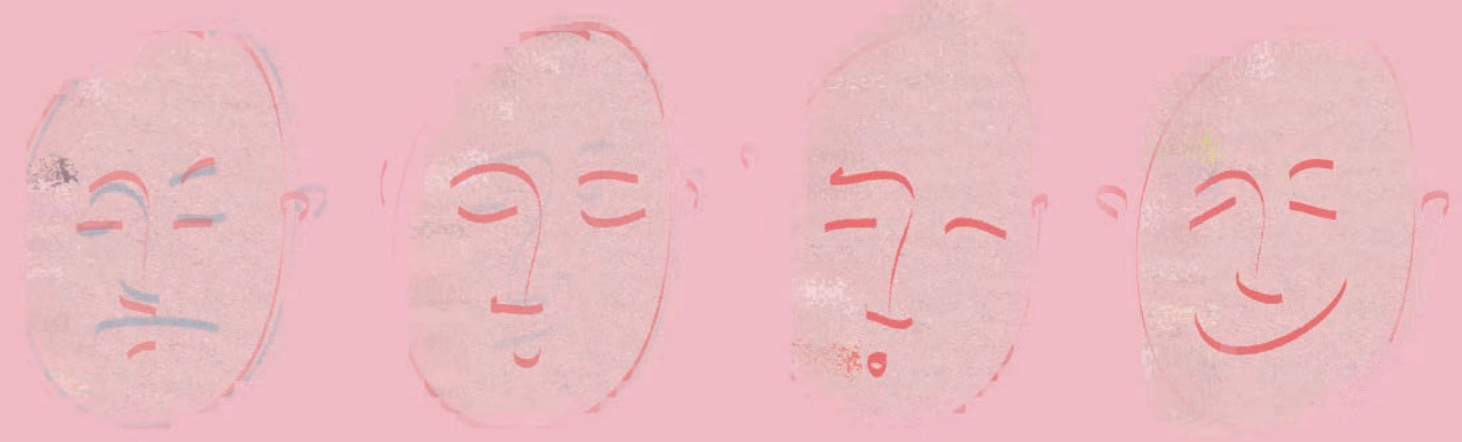
*sis* have argued that there is no definitive boundary between the depressed and the healthy state, and pointed out that healthy people possess characteristics similar to that of people with depression. According to Kawamoto, “an *analogue depression group* comprises those who have depressive symptoms 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 BCI-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 definitive 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.”

However, 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



## Detecting and preventing depression prior to diagnosis

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.



# 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 explained the herding phenomenon, is an expert in behavioral finance; he has published many research findings on the subject. What is particularly unique about Qin's study is that he brought emotions in on securities market analysis.

"Traditional investment theories were constructed based on the notion that investors would make rational decisions, and thus they did not consider emotional factors. However, it is clear from the studies in neuroscience and psychology that emotion plays a significant role in decision making." Among all possible emotions that one can feel, Qin focuses on regret and has analyzed the impact it can have on the stock market. The securities trading model that he constructed, which incorporates *regret factor*, had a momentous impact globally as such factor was not included in prior theories.

Of all the negative emotions, Qin decided to focus on *regret* because he thought it would influence decision making. He then began to theorize what would happen if we

### Regret-CAPM (Risk averse)

$$E[r_j] - r_f = \beta_{jg} \{E[r_m] - E[h_m] - r_f(1 - \xi)\}$$

$$E[r_m] - E[h_m] - r_f(1 - \xi) > 0$$

$$E[r_j] - r_f = \beta_{jm}(E[r_m] - r_f) + \hat{\beta}_{jh}(E[\hat{h}_m] - \xi r_f)$$

$$E[\hat{h}_m] - \xi r_f < 0$$

### Regret-CAPM (Risk neutral)

$$E[r_j] - r_f = \beta_{jg}(E[r_m] - E[h_m])$$

$$E[r_m] - E[h_m] > 0$$

### CAPM

$$E[r_j] - r_f = \beta_{jm}(E[r_m] - r_f)$$

$$E[r_m] - r_f > 0$$

surge as the buy orders will increase. With that said, at this point, the trade volume will not be that high. However, the sense of regret is a feeling that comes into play not only when the investors *take the wrong action* but also when they *take no action*. In other words, once bearish investors who exited the market find that the stock prices have increased, they start to believe that 'if they don't buy now, they might regret it,' and thus return to the market. This would result in a greater number of buys, which then creates the bubble. The opposite of this phenomenon is a crash, the bursting of the bubble." Qin created a mathematical model

to explain this chain of events. He is the first in the world to logically explain the *herding phenomenon* using the emotional factor called *regret*. Qin is also the only person who managed to create a model that considers both regret in making a wrong investment and regret of *not making any investment*.

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."

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 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.

look at the *herding phenomenon* while considering the effect of *regret*. Qin illustrated, "suppose that there were two types of investors, bullish and bearish ones." If each makes objective decisions based on information he or she possesses and acts reasonably in the securities market, the stock price and its asset values should hold the right balance. "On the contrary, if we consider the effect of *regret*, bearish investors fear that they may make the wrong decision and thus will exit the market, leaving only the bullish investors in the market. This will cause the stock prices to

Qin's Regret-CAPM (Top and Middle). He incorporated the emotion of *regret* into the traditional CAPM (Bottom).

## Explaining the logic of securities trading while integrating emotional factors.

Jie Qin

Professor,  
College of Economics

Research Subject: behavioral  
finance, neuroeconomics

Research Keywords: regret, emotion and markets, herding,  
crash





# Psychology reveals the Truth behind our Sense of Taste

**P**alatability 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. Yuji 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 '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 receptors 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 *udon* 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.

**W**ada explained that "the deliciousness of food is greatly associated with acquired learning." Those who have had *natto* (fermented beans) may say that "it smells delicious" when they get a whiff of the beans; in contrast, those who have never had it before may only identify it as having an offensive and rancid odor. Information, such as *brands*, can also be a factor in taste.

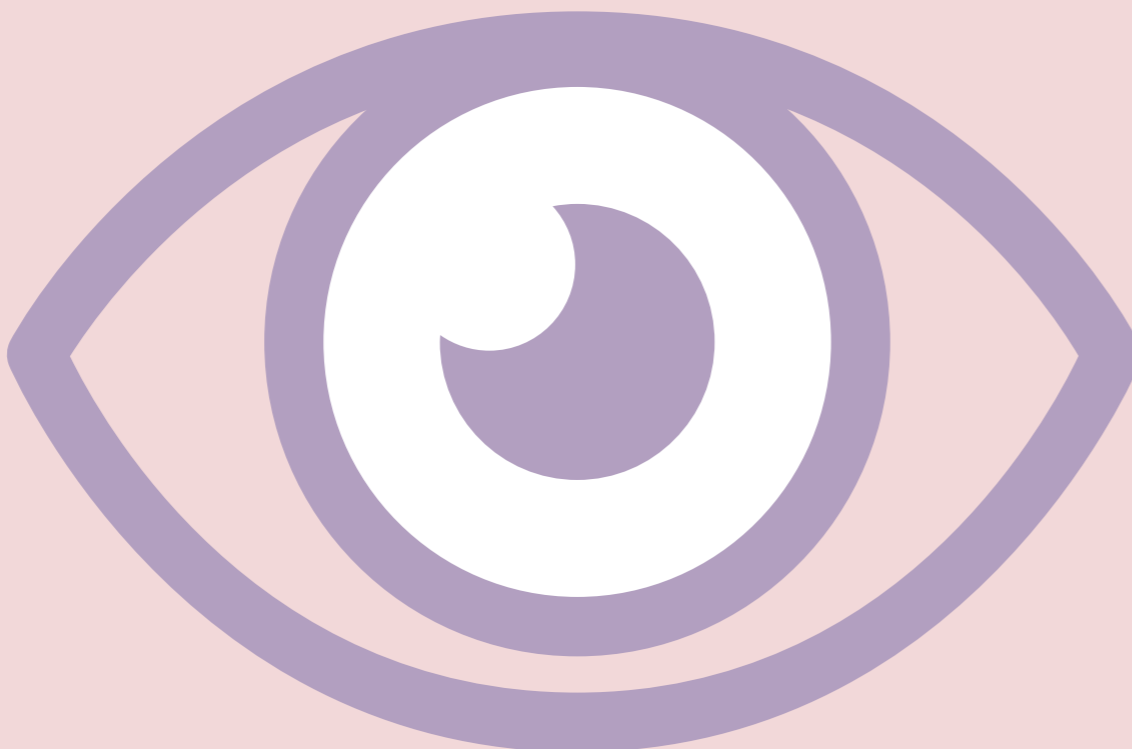
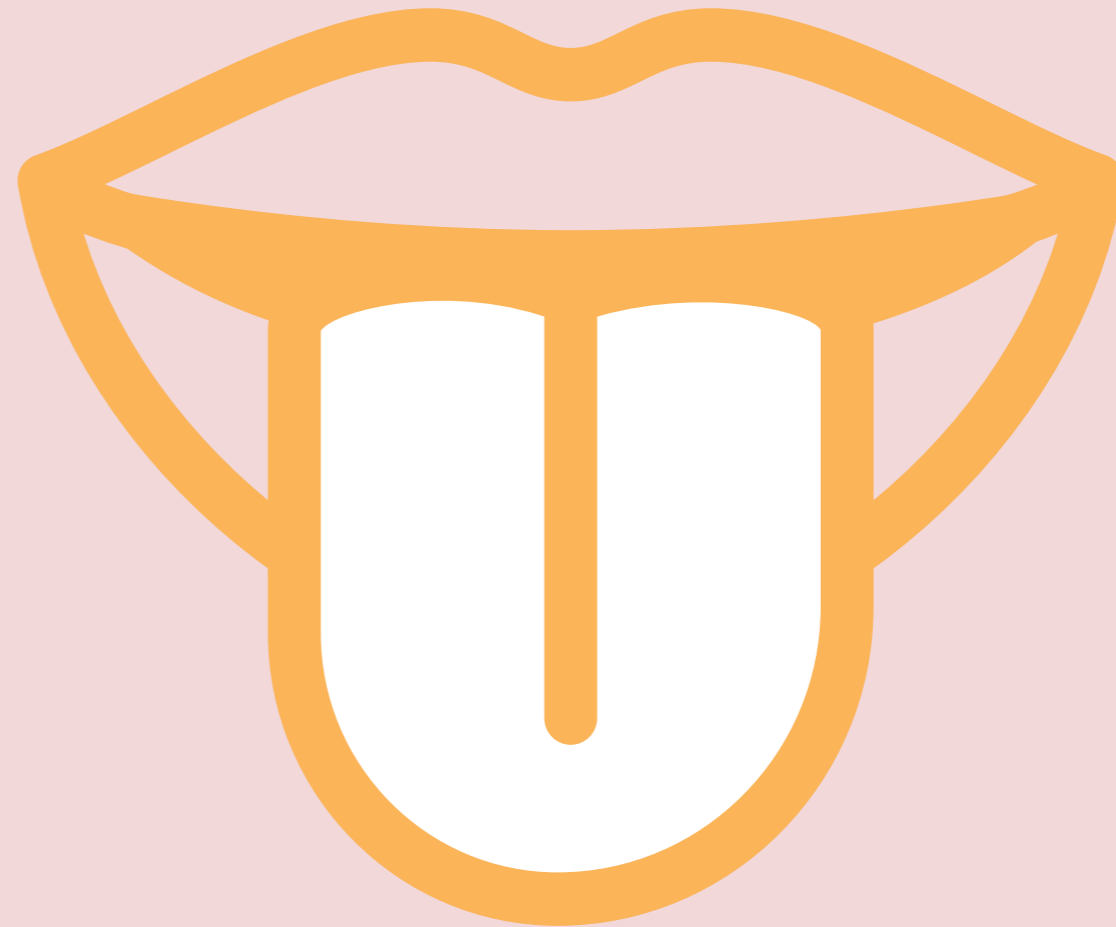
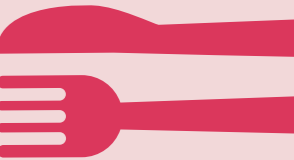
Recently, Wada turned his attention to researching types of food that would be considered repulsive by certain people. "For example, *tsukudani* of locusts (that is, locusts simmered in soy sauce) causes people to feel disgusted if they have never had them before. However, those who are accustomed to eating it, or those who know others who eat it, tend to think that it rather looks delicious. Moreover, certain types of food that look delicious to Japanese people may feel visually disgusting to many foreigners, such as in the case of grated (and slimy) yam paste and *natto*." Through experiments, Wada has tried to determine what factors and opportunities turn one's cognition of food from *one that brings disgust* into *one that tastes good*.

Although, clearly, perception of food is created by the combination of information obtained through the five senses, kinesthesia, culture, and learning, its mechanism is yet to be discovered. Wada hopes to uncover this secret. His eyes glisten with excitement as he ventures deep into uncharted territory.

**Yuji Wada**

Professor,  
College of Gastronomy Management

Research Subject: food texture perception in humans  
Research Keywords: experimental psychology, cognitive science, perceptual information processing, eating habits, social psychology



**The sense of taste is a combination of many elements, including the five senses, culture, learning, and preferences.**

# Healing of 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 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 onstage. 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 psychologist 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 imagination. I was drawn to such picture books. At the same time, influenced by my father's love for songs, I grew up enjoying a variety of songs and music; this have also shaped the foundation for my research" Masuda revealed.

In the field of psychology, picture books are considered to have the power to heal. According to Masuda, the approachability of picture books brings back the reader's childhood memories and conjures up warm feelings. They can also stimulate imagination and serve as a communication tool. Masuda, who has long been involved in the psychological care of children hospitalized in the pediatric ward, has used reading therapy, where picture books are read to children as a way of

alleviating their anxiety and stress; the effect was undeniable. She also worked as a school counselor at a junior high school for over 10 years. At the time, she would visit the homes of students, who refused to attend school, and used picture books to start their conversations. "By using picture books as a medium in the conversation, the students and their parents who, previously, were silent begin to open up and share their memories. There was once a case where, during a conversation with a student who expressed how he used to enjoy a picture book based on the



"Picture Book Healing:" A Kumamoto and Great East Japan Earthquake Recovery Support Charity Event

*North Wind and the Sun* from the *Aesop's Fables*, his parent was in tears with remorse, saying, 'I acted as the *North Wind*.' At the time, I was so moved by the power of picture books," she shared. In addition, she conducted a psychological test called the Picture-Frustration (P-F) study to determine objectively the effect of picture books before and after her sessions. She held 12 sessions, or once a week in three months. Then she analyzed the psychological changes before and after those sessions. She found that, on the one hand, there was an increase in emotional stability; on the other hand, aggressive tendencies were suppressed, thereby in-

creasing their capacity to accept and take in their given situation. She also found an improvement in the degree of self-expression over the course of the sessions.

Moreover, she confirmed the effect of reading picture books on children using physiological indicators. She read picture books to five-to-six-year-old kindergartners and measured their heart rate and nasal skin temperature before and after the readings. She found that their heart rate decreased, while at the same time their nasal skin temperature increased.

"The nasal skin temperature reflects temperature changes based on blood flow variations due to the effect of the autonomic nervous system. Based on these findings, it became clear that reading picture books cause the parasympathetic nervous system to dominate and place the listeners into a relaxed state."

Based on her previous experiences, Masuda has been 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 physiological 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 experiential 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 revisited Miyagi and

## Picture books that reach the depths of hearts of people of various ages

These picture books were selected based on the keywords that matched each stage of children's psychological and physical growth processes. The books were chosen from the perspective of developmental psychology, with the intent to support parents who have difficulty in raising their children. Excerpts from the joint research project, titled *Research on Picture Books Based on Developmental Psychology*, with the Tamagawa Children's Library of Kanazawa City

Developmental Stage	First step in developmental psychology
Keyword	Lifelong development

### Love You Forever

IWASAKI Publishing (1997)

The mother sings lullaby to her baby as she puts him to sleep. When the boy becomes adolescent, he reaches a rebellious stage, but the mother still holds and sings to him every time he finds him asleep. This picture book follows the lives of the boy and the mother as he grows into adulthood and she eases into old age, illustrating the bonds of parents and children.

Written by Robert Munsch, Translated by Rika Nogi, Illustrated by Shunsaku Umeda



Developmental Stage	Prenatal to neonatal period
Keyword	Pregnancy/Birth

### Just Like a Baby

Kaiseisha (2002)

The mother is pregnant. As everyone waits for the baby's arrival, the father builds a cradle, and the grandparents and the soon-to-be older brother decorate it. This picture book makes one feel the warmth of a family and the joy of waiting for a baby.

Written by Rebecca Bond, Translated by Yumiko Sakuma



Developmental Stage	Infancy
Keyword	Facial recognition

### Face, Face, What Kind of Face

KOGUMA Publishing (1988)

Varied expressions, with clearly drawn lines and vivid colors, appear in this book. In consecutive pages, eyes, nose, and mouth are gradually added to an outline of a face to allow readers to verify each addition as they read along. It is humorous and entertaining even for adults.

Written and illustrated by Ryohei Yanagihara



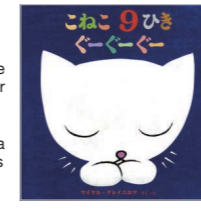
Developmental Stage	Late infancy (3 to 6 years old)
Keyword	Number concepts

### Nine Little Sleepy Cats

POPULAR Publishing (2009)

It is a simple storyline where nine little cats, each with different colors, wake up one by one and leave the scene. The cats that appear in this book are drawn in the same size and location from start to finish, to help a child reader grasp numbers and spatial relations.

Written and illustrated by Michael Grejniec



Developmental Stage	Childhood
Keyword	Bullying

### How to Heal a Broken Wing

Hyoronsha (2008)

In the middle of a city, a bird fell and injured its wing. Only Will noticed the bird. The story illustrates the power of life and the warm companionship that Will offers to the bird until it can fly again. It makes the reader feel that people's hearts must be remedied in the same manner.

Written by Bob Graham, Translated by Mayumi Matsukawa



Developmental Stage	Puberty to adolescence
Keyword	Understanding permanence

### All Alone (For You Series Vol. 2)

IWASAKI Publishing (1996)

The story illustrates the loneliness that people feel when they lose their connection with others. Lonely people have a hole in their heart. The elderly, the sick people, people without friends. The book concludes by stating that "you can offer them warmth."

Written by Leif Kristiansson, Translated by Masaaki Nimonji, Illustrated by Rimako Horikawa



Fukushima Prefecture. 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, 2012, an event titled "Pairing Picture Books with Jazz" was held at the Osashi Jusanhama 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, Seizo Watase. 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.

A picture book that is read in collaboration with jazz or harp music at each support event for the disaster stricken areas

Santa Santa Santa, by Seizo Watase (TAKESHOB0, 2011)



©Seizo Watase/ TAKESHOB0



### Rika Masuda

Professor, Graduate School of Human Science

Research Subjects: clinical psychology interview methods using picture books, study on detecting and response to students with developmental disabilities in school settings, introduction and utilization of peer support training using picture books

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

## Alleviating the post-quake stress by pairing picture books with music



# A measuring System for visual Perceptions leads to innovative Designs



The perceived brightness cannot be determined simply by metering the amount of light. Even when one uses the same lighting source with the same intensity, placing colorful objects (left) in the room makes the room look much brighter.

We tend to assume that the colors and brightness of objects we see 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 illuminance (lux) or luminance (candela per squared meters), 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 sensed 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 with perceived brightness are increasing,” according to Shinoda. Therefore, Shinoda established the *measuring method of border luminance of color modes*, which utilizes two well-known perceptual phenomena, namely, *lightness constancy* and *mode of color appearance*, to measure perceived brightness for space quantitatively. With this, he developed an index called *Feu*.

“Irrespective 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 whiter, 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 note). Therefore, if we could set the luminance, we could quantify 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. Alternatively, it is possible 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.

“It (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 win-



By making supplemental light of appropriate spectral distribution shine on objects, people with congenital color deficiency will be able to distinguish the color of those objects.

dow may feel dark even when sufficient illuminance 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 brightly lit. I am currently in the process of developing a new scale that considers the brightness enhancement by colored objects.”



When the lighting is turned blue, the smartphone screen will look yellowish. In contrast, if the light is turned green, the screen will look pinkish. Human eyes have auto-adapting functions to illuminant. In other words, when they observe a light-emitting object, such as a smartphone screen, they will adjust automatically their sensitivity to the wavelength of the light in the environment, thereby changing the perceived color on it even though the light emitted from the screen stays unchanged.

Quantifying our perception of color is just as difficult as measuring brightness. This is because humans’ visual perceptions have various adaptation mechanisms in relation to colors, such as *chromatic adaptation* and *color constancy*. Shinoda unraveled the mysteries of the mechanism of color perception, and offered his knowledge and insights for product development. A color-barrier-free lighting is one of such developments.

“Some people are born without the L or M cones, which detect the light of the long and middle wavelengths, respectively. These people can not distinguish the colors that fall within the range of green and red. Therefore, we figured that by making light 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 for the elderly, among other products.

A measuring system for human perception, which was previously impossible to quantify, fashions innovative designs and products, which, in turn, lead to the creation of a new market.



Hiroyuki Shinoda

Professor, College of Information Science and Engineering

Research Subjects: color barrier-free, study on the elderly vision and their application, study on perception of illumination and color appearance, study on VR sickness, and study on space perception affecting size perception and adaptation level in complex visual environments

Research Keywords: vision science, psychophysics, color science, visual optics, architectural environment/facilities, cognitive science, Kansei engineering, intelligent informatics

(Note) The proposed formula reads: “reflected light intensity = perceived intensity of incident light (the perceived intensity of lighting) x perceived reflectance.” When the subject sets the luminance at the upper limit of the object’s mode of color appearance (*border luminance of color mode*), it is thought that the perceived reflectance would be at the object’s maximum reflectance of 1.0, hence the border luminance of color mode = the perceived intensity of lighting.

## Applying subjective brightness and color measurements to lighting technologies



# 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, to resolve the difficulties in our interpersonal relationships, and to live a fulfilling life? 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 a behavioral change. Mitamura said, "it is precisely because the mind (*Kokoro*) is such an ambiguous entity that it needs to be approached scientifically; through this, I wish to assist in facilitating smoother communications among people."

Mitamura focused his attention on the communication method called *assertiveness*. According to Mitamura, *assertiveness* refers to frank self-expressions that value both oneself and others. It is a way of thinking that was developed in the U.S. in the 1960s. Many assertiveness training courses were conducted through which people learned to express one's personal feelings and opinions while respecting those of others. "However, in practice, people learned gradually that assertion techniques do not always help in facilitating smoother communications in interpersonal relationships; rather, in certain cases, these techniques were even causing people harm." The desire for an honest communication can often result in hurting or offending others. Frankness is not always the best policy in interpersonal relationships.

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), 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, they (concept of functional assertiveness) employ self-expressions that are much more flexible yet unyielding at the same time; they can be acquired as a life skill that is truer to reality," Mitamura claimed. Therefore, as part of his empirical research project, Mitamura developed a training program for practicing functional assertiveness.

Mitamura received a request from a certain self-help group that supports children and adults with developmental disabilities to develop a special training program for them. The aim was to facilitate an effective communication between parents of children with developmental disabilities and the teachers of the elementary schools where those children attend. Thus, the program was created, and the training was carried out.

Parents of children with developmental disability often go to the elementary schools where their children attend, to request for specific assistance regarding their children while at school. Discord between parents and teachers also often ensued. 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, to the teachers, who are experts in the field. However, perhaps because the parents were concerned about the well-being of their children, they ended

up expressing their requests in ways that threatened the reputation of the teacher. These requests at times came across as unilateral demands to the teachers who were already overwhelmed with work."

To resolve these problems, Mitamura assessed the situation by listening to the parents' side of the story. Through such assessment, he determined the factors that played a role in the parents' requests and concerns but were not heard effectively by the teachers, because *there were not enough expressions of gratitude and considerations*, and because *the requests were vague and not specific*. Thus, it was determined that the goals to communicate effectively are "to have more expressions of considerations and gratitude" and "to be more specific with the requests." With these goals in mind, a functional assertiveness training, which focused on role-playing, was carried out.

The effect was remarkable. The more the parents practiced, the more they were able to express words of considerations 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 how one expresses one's 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 index. Perhaps in the near future, the functional assertion technique will be recognized as a global standard.



**Functional assertiveness:  
flexible choices that also survive difficult situations**

**Takashi Mitamura**

Associate Professor,  
College of Comprehensive Psychology

Research Subject: development of functional  
assertion training programs

Research Keywords: clinical psychology





# Post-disaster Mental Care that promotes Cultural Understanding

Yuanhong Ji

Professor,  
Graduate School of Human Science

Research Subjects: expression-based psychotherapy, multicultural counseling, post-disaster mental care and culture  
Research Keywords: clinical psychology



Cultural differences can be found in how we conduct our interpersonal relationships, or in the manifesting symptoms of a disease. For example, the symptoms of neurosis appear in significantly different manners in Japan, 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 relation 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 warned 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

and her colleagues advised the Chinese Psychological Society to inform the volunteers that administering such expression therapies immediately after a disaster is not appropriate.

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



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.

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

Sichuan Province, mahjong is played frequently by the locals and deeply rooted in their lives. A famous story has it that after the earthquake, while the volunteers were providing support activities, the victims sat around a table and started playing mahjong. Although the locals' action did not sit well with the volunteers, it was proof that people were starting to feel a little more at ease and were able to regain their daily routines; psychologically speaking, it was a good sign," explained Ji. It is with such understanding of culture and customs that *mental care* can take root.

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

tals at the disaster-stricken Deyang City (photo bottom of page, left). Moreover, Ji interviewed junior high school teachers in the affected areas to conduct a qualitative study on what considerations were given to the students who experienced loss. In this study, she found that, on the one hand, the teachers communicated actively with the students to help them recover their self-esteem, but on the other hand,

Ji's efforts in providing post-disaster psychological support were useful after the *Great East Japan Earthquake* in 2011. "In particular, the common experience of the *Sichuan* and the *Great East Japan Earthquakes* is that they both had *ambiguous losses*." An ambiguous loss refers to the type of loss of loved ones who are missing due to natural disasters or other events; in this type of loss, although the loved ones are not physically present, they are registered psychologically as being alive somewhere. "Although Japan is known for encountering frequent disasters, it had never seen as high a number of people going missing. The notion of *ambiguous losses* was a newly introduced concept (at the time)," Ji said.

Considering local cultures and religion is important in helping with mental and physical recovery due to ambiguous loss. "The challenge is that treatment methods and mental care for post-traumatic stress disorder (PTSD) were initiated in the West, and in many cases, they may not fit with Asian cultures," Ji mentioned. Based on this insight, Ji and her colleagues, in collaboration with researchers in Japan, China, and other Southeast Asian countries, have tried to establish a mental care method that is uniquely Asian, taking local culture into consideration.

"When I came to Japan to study as a graduate student, I wanted to become a mediator between Japan and China. Now that I am a researcher, I want to deepen the relationship between the two countries through mental care, and extend this relationship to the rest of the world," Ji said, as she shared her aspirations.



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.

also provided mental care. They conducted a mental health care training for Chinese specialists in the field of psychology at the Southwest University in Chongqing (photo below, right). They also provided consultation to the Southwest University volunteer teams at Chongqing's hospi-

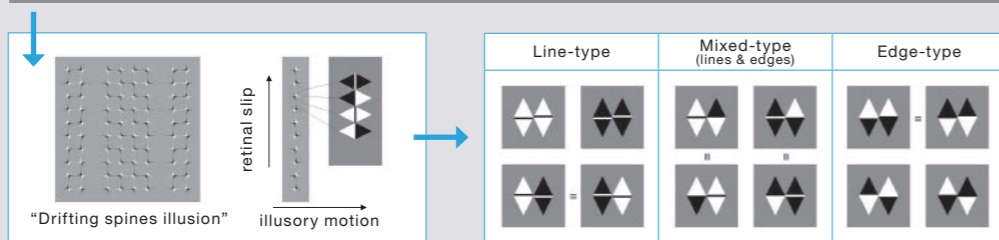
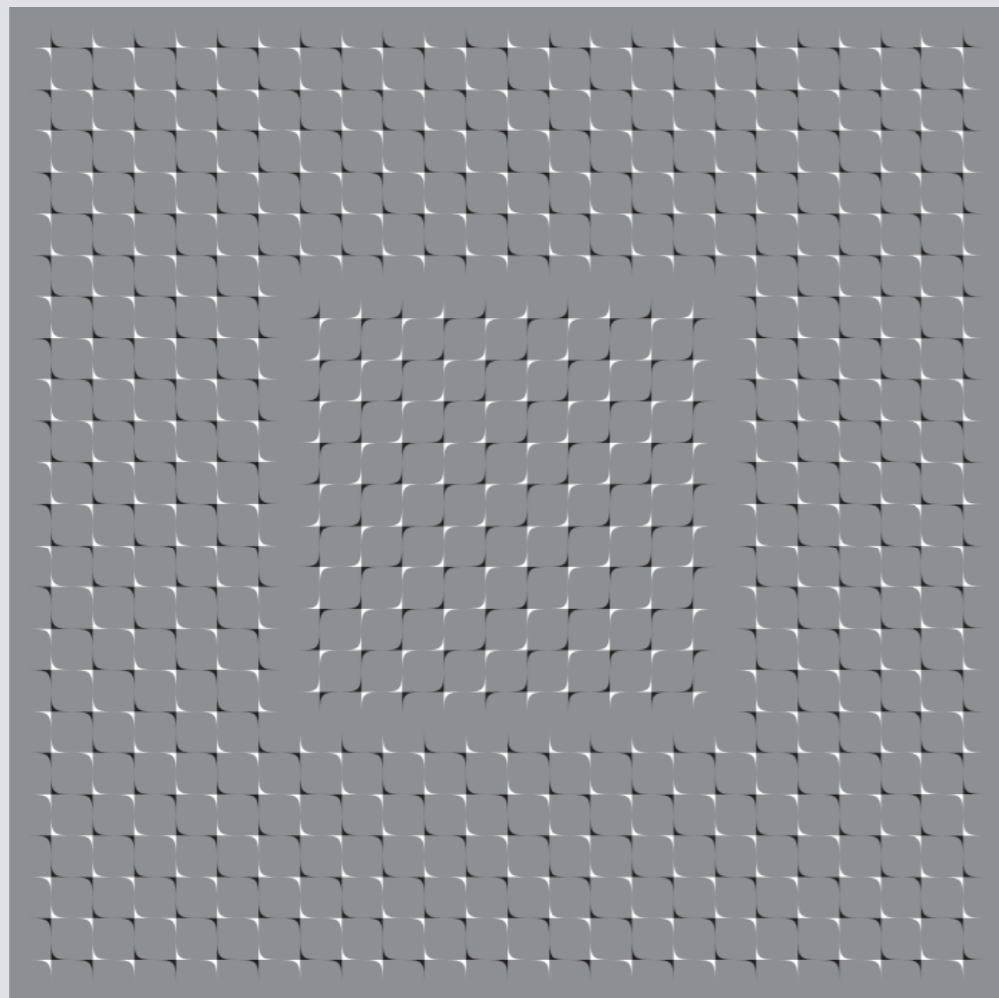
they tried to assume the roles of social workers and psychological support specialists. By trying to satisfy dual roles, the teachers' established role as an educator became ambiguous. This finding provided insights on ways to help other support groups.



**The psychological care provided after the Sichuan Earthquake demonstrated vividly Japan's extensive research on mental care.**



# Visual Illusions and the Mysteries of Human Perception



The *drifting spines illusion* (above) is a new tilt illusion and illusory motion where still images appear to be in motion. The diagram describes its illusory motions by breaking the image down into the four-stroke apparent motions (bottom left). According to Kitaoka, the Fraser optical illusion group can be explained in three types, which use the difference in the elements of lines, edges, and their combinations (bottom right). The *drifting spines illusion* is considered a mixed type.

**Research on visual illusions gives insights into neuroscience or engineering**

“ Illusion 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 researchers 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 ba-

sic 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-Wilcox 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 that are filtered through a different light. In addition to this, Kitaoka created an optical illusion called the *color dependent illusory motion* and explained its mechanisms.

“S uch 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 into 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 step 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 Kaizuka Interchanges on Tokyo-bound Keiyo Road; Sidewalls that depict 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).



**Akiyoshi Kitaoka (Left)**  
 ■■■■■  
 Professor,  
 College of Comprehensive Psychology

Research Subjects: tilt illusion, color illusion, phenomenological or psychophysical study on visual illusion, visual phantoms, motion illusion in still images  
 Research Keywords: experimental psychology

**Seiichi Tsuinashi (Right)**  
 ■■■■■  
 Assistant Professor,  
 College of Letters

Research Subject: study of slope perception  
 Research Keywords: experimental psychology



## RESEARCH TOPICS

## 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 the 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—involved in 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 com-

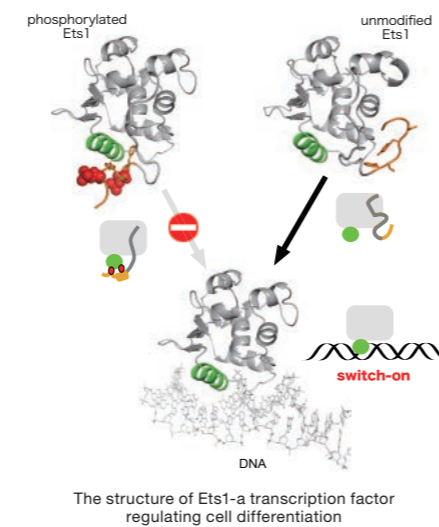
pletely change the effective function of the protein. Depending on the modification, the protein either binds or does not bind to DNA, causing genes to turn on or off.

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.



**Find out more:** Title of original article: Phosphorylation of an intrinsically disordered region of Ets1 shifts a multi-modal interaction ensemble to an auto-inhibitory state  
DOI: 10.1093/nar/gkx1297 Journal: *Nucleic Acids Research*  
Contact corresponding author: Kota Kasahara, ktkshr@fc.ritsumei.ac.jp

### “Where Are We Headed, War or Peace?”

On October 30, 2017, Ritsumeikan University and Hankuk University of Foreign Studies (HUFS) co-hosted an international symposium to explore multilateral Cooperation to resolve the North Korean Nuclear Crisis. The practical presentations were conducted by members of the former Six-Party Talks, the former U.S. Ambassador Christopher Hill, who represented the United States and Japan's former Foreign Affairs Vice Minister Mitoji Yabunaka (a Visiting Professor at the Ritsumeikan's College of International Relations). In response to the presentations above, the discussants developed constructive arguments started by the very precious notion from David Straub (the former Department of State Korean Affairs Director). The faculty members of HUFS and our own College of International Relations also took their own place among participants.

South Korea's incumbent Special Adviser Chung-in Moon to

President Moon Jae-in, gave a keynote speech on the crisis in North Korea, in which he delivered this message to the audience: "The Korean government will not allow North Korea to possess nuclear weapons. We are committed to a peaceful, diplomatic solution to resolve the nuclear issue in North Korea, with the aim to establish permanent peace. We do not want war. We want peace. We need to look back and learn from the past mistakes as we move forward."

The Former Ambassador Hill and Yabunaka provided their comments on the past negotiations. Amb. Hill pointed out that "based on our



From left: Moon, Hill, Yabunaka, and Choi (the Former President of ROK Institute of National Unification)

experience of the Six-Party Talk, we hope that North Korea would no longer pursue nuclear weapons and ensure that the Korean Peninsula would be nuclear-free. The door for negotiation should open to not just the six countries but also many other countries." In reaction to his comment, Prof. Yabunaka indicated that "Japan should clearly state their stance on this issue to domestic and international societies. There will be progress when Japan proposes to lead an emergency foreign ministers' meeting among five nations, and when North Korea is able to join that meeting all in good time. The important thing is that the five nations stand firmly together on the same ground."

### 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 Arts and Sciences around the Globe: Pioneering the World of Gastronomy"; how gastronomic arts and sciences must be taught in higher education was discussed in the symposium.



Wendy Wolford

Two keynote addresses were presented on that day. Nicola Perullo, who represented the Dean of The University of Gastronomic Sciences, delivered the first keynote address about the history of gastronomy. Then Wendy Wolford 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 Miho Museum, chaired the joint discussion session. Commentators from the Japan Foodservice Association, Doshisha University, and Kokubu 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, Kenichi 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 *Tsuzuraozaki 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 academe. 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 *Tsuzuraozaki Kotei Iseki* was conducted 16 times between 2010 and 2017, by, among others, Sadao Kawamura (Professor at the College of Science and Engineering), Nobutaka 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 their images. As this archaeological site is extremely difficult to access by human divers, owing 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.



Pottery (Front view)



Pottery (Back view)

Image provided by Michio Kumagai, Professor at Ritsumeikan University's Research Center for BIWAKO SIGMA

### A pioneering Food-based Research Center, The Research Center for Gastronomic Arts and Sciences, is established

In April 2018, the *International Research Center for Gastronomic Science* (established in January 2014) was renewed and reestablished as the *Research Center for Gastronomic Arts and Sciences, Ritsumeikan University*. Because the field of food research has expanded in recent years, and such research is becoming indispensable to approach comprehensively the aspects of the field of arts and sciences, a need for a facility that can support the various food research fields has emerged. This research center combines the research results over the years in areas of, among others, agriculture and food production, processing, distribution, dietary lifestyle, and the promotion of health through food. In various situations, these results aimed at creating innovations relating to gastronomy. In addition to the previous core areas of study, *food culture* and *gastronomy management*, we added *gastronomy innovation* with the aim of creating a base and center for gastronomic research.



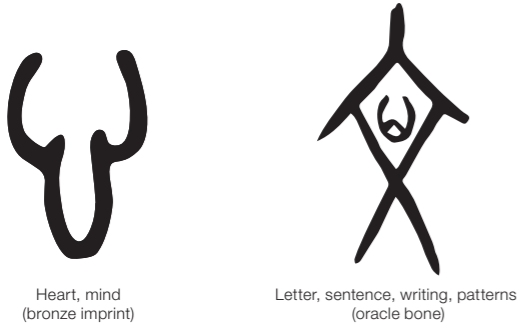
COLUMN #1 The World of Shirakawa's Letter Science

From the special feature: *Kokoro*

Takao Sugihashi

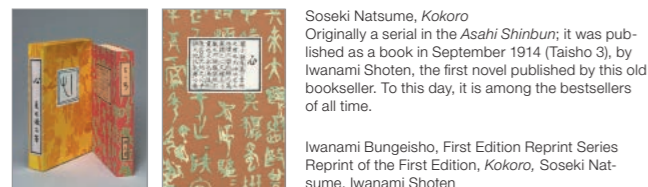
The special feature of this edition is encapsulated in the word *Kokoro*. In Japanese, one could apply the Kanji characters 心 (heart/mind/core/center), 情 (emotion/feelings/compassion), and 意 (will/intention/volition) to this word. One may also be reminded of Soseki Natsume's novel *Kokoro*, written as こゝろ in certain cases. However, most fundamentally, the term is captured in the character 心. The author was deeply involved with the book design of the first edition. He stated, "I came up with each and every aspect of the book, including the design of the box, the cover, the pastedown, and the title page, as well as the design for the colophon, the title fonts, the scarlet seal, and the author seal." However, when we examine its bindings and the advertisement on the back side, or overleaf, *Kokoro* is written as こゝろ, the title of the main page as こころ, the spine of the box and its introduction as 心, and the title in the handwritten manuscript as 心 (こころ)—the Kanji character along with the Hiragana characters—in the manner in which the characters were intended to be read. (100-year anniversary edition, *Kokoro* -Soseki, Iwanami Shoten).

Shirakawa's *Jikun* (a scholarly dictionary of how the Japanese phonetic sounds were assigned to each Kanji character) designates the following meaning to the character 心 (heart): "Out of the five organs, it refers to the heart. Because it is significantly impacted by emotions, it is considered as a place of psychoactivity and therefore a place where all intellectual, emotional, and volitional activities took place. Because the heart is considered as the root of all surface activities, in the Japanese language the heart was also called 'ura' (meaning, *the reverse side, undersurface, or inside*)." Moreover, it is mentioned that "心 (*Shin = heart*) depicts the shape of the heart. It is shaped as a clump of strong muscles. This corresponds to the sound of the Japanese word for heart, *Kokoro*, as a place that hardens, *koru tokoro*."



However, we do not see the character for the heart in oracle bones. Rather, we find it in the form of a tattoo as part of the shape of the character 文, representing the chest of a person standing and facing forward (from *Joyo-Jikai*, the section on 心 and 文). Let us look at the character of the heart 心 as a bronze imprint and the character 文 as seen in an oracle bone.

When it comes to Soseki's book title for *Kokoro*, it is never quite clear as to how it should be written out; should it be こゝろ, or こころ, or 心? If we look at the first publication, in the frontispiece Soseki uses a seal script to write out the character for the heart. This book was originally planned as *The Will of my Teacher* (Sensei no Isho), a novel in which the *Sensei* (the teacher) was made "a martyr to the spirit of Meiji" (p. 434). Now that the Heisei era is about to come to an end, as we now know the date of the current Emperor's abdication, this story, along with its book design that uses ancient Kanji characters, certainly tugs at my heart.



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

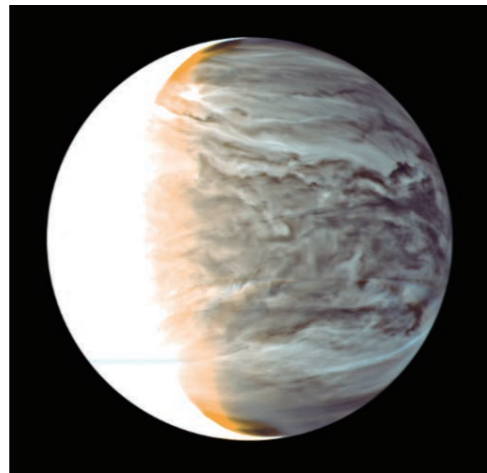
COLUMN #2 Viewing the World via Infrared Rays

Viewing the universe in infrared

Masafumi Kimata

On September 15, 2017, NASA's Saturn orbiter *Cassini* entered Saturn's atmosphere to end its final mission. In the nearly two decades since its launch, *Cassini* has received many praises for transmitting valuable observational findings from Saturn for 13 years since its arrival at Saturn. For this article, however, let us discuss one of Japan's planetary probes.

The infrared image sensor is not only applicable and useful in our everyday lives, as discussed in the previous edition, but also an important tool for astronomical observations. The wavelength band used in astronomical observations, which typically spans between 1 μm and 3 μm, is slightly shorter than what is used for night vision and thermography. However, an infrared image sensor that can capture thermal images can also be used for astronomical observations. The photograph shown here is an infrared photograph of Venus as captured on May 25, 2016, by Japan's *Venus Climate Orbiter (VCO)*, *Akatsuki*. Although the *Akatsuki* spacecraft was launched in May 2010, it failed to enter the orbit of Venus in December of the same year as planned; however, it miraculously succeeded in reentering the orbit at the end of 2015, and began its observations starting in 2016. The pattern on the right half of the image, in which the night has fallen, shows the clouds above Venus. The infrared camera that captured this photo utilized the PiSi Schottky-barrier infrared image sensor, the development of which the present author was involved in while working at *Mitsubishi Electric Corporation*.



An infrared image of Venus photographed by Akatsuki (©JAXA)

We became involved in the *Akatsuki* project when I had a chance meeting with Masato Nakamura, the project manager of *Akatsuki*, in an international conference in 2000. At the time, Nakamura had difficulty obtaining the needed infrared image sensor from overseas. Because we owned one such technology, it was decided that they will use ours. Although there were objections in the company, internally, because it was only a small business, I convinced the company to participate in the project based on my desire to contribute to the field of astronomy, as I maintained relations with specialists in that field since the 1980s. As I look back at the work we had accomplished in the *Akatsuki* project, I am once again astounded by the passionate, unchanging dedication that the researchers in the field of astronomy have had all these years. As an engineer, my heart is filled with gratitude for such a chance opportunity that allowed me to also work in the field of basic sciences.

**Masafumi Kimata** *Tokunin* professor, College of Science and Engineering Professor Kimata acquired his doctorate degree in engineering from Osaka University in 1992. He began working for Mitsubishi Electric Corporation in 1976. After being engaged in R&D of infrared image sensors, in 2004, he became a professor at the College of Science and Engineering, Ritsumeikan University. He assumed his current position in 2017. In terms of recognition: he was awarded the Kinki Region Invention Recognition Commissioner of the Patent Office Award in 1992, and the Prime Minister's Invention Award at the National Invention Awards in 1993. Since 2009, he has been serving as an invited staff member at the Japan Aerospace Exploration Agency.

COLUMN #3 College of Comprehensive Psychology regular column

The cultural aspects of suffering in cancer patients

Michiko Sawano

"(Immediately after I was informed I had cancer), I got rid of my clothes, my account, and else. Then, as I tried to throw myself off the 12th-story apartment, my son stopped me." (From a narrative told by a female in 60s with breast cancer)

To experience sickness is to not only undergo a change in one's body but also live through the cultural aspects of an illness. To many, the impression of the name of an illness or how society views them could bring upon much greater pain compared with the physical pain brought on by the biological lesion itself. For example, even in cancer cases where the condition is at an early stage, and no subjective symptoms have been felt, and the survival rate after the treatment is high, as soon as the patient or the patient's family hears the diagnosis, they think of death and are deeply shocked by it. The quote 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 talk they are suffered based on the diagnosis.

Why do people have an impression that cancer equates with 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 the most frequently and dramatically depicted disease in which patients suffer.

In addition, the various efforts of the national government or medical institutions in recent years to educate and increase awareness of the public about cancer prevention tend at the same time to build fear of cancer. 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 "therefore, be mindful of your lifestyle 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 dreadful, 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 had an unhealthy lifestyle. Although there are people who have made poor lifestyle choices, which, in turn, led to cancer, there are also those who have been quite mindful of managing their health and still ended up with cancer. To assume that people have cancer because they failed in self-management only promotes the idea that the patient is to be blamed 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** Associate Professor, College of Comprehensive Psychology Sawano earned her master's degree from the Department of Anthropology, College of Social Sciences, Seoul National University, and her doctorate degree from the Graduate School of Intercultural Studies, Kobe University, in 2014. After working as a senior researcher at Ritsumeikan University's Research Organization of Open Innovation and Collaboration, she has held her current position since 2017. She also belongs to the Japanese Society of Cultural Anthropology, the Society for Comparative Family History, and Korean Society for Cultural Anthropology.

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