

# SCIENCE, KOKORO, RELIGION

## Part 2: The Potential for a Science-Religion Dialogue in Japan

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*The present essay updates the Nanzan Institute's involvement in the science-religion dialogue in Japan through its Global Perspectives on Science and Religion (GPSS) project, and examines the Japanese notion of "kokoro" as an operating concept or bridge for stimulating a science-religion dialogue in Japan. Kokoro, a comprehensive term that includes both "mind" and "heart," "thinking" and "feeling," allows one to speak of science and religion as interrelated. The presentations and discussions from the GPSS colloquia and symposium series in 2005–2006 are examined and quoted to show how kokoro was a useful concept to stimulate discussion in this area, and how it provides potential for future science-religion dialogue in Japan.*

The participation of the Nanzan Institute in the science-religion dialogue through a new program called "Global Perspectives on Science and Religion" was announced and explained in a previous issue of this *Bulletin*.<sup>1</sup> Through a series of colloquia and a final three-day symposium, many top scientists and other scholars on the philosophy and theology of science in Japan gathered for lively discussions. Speakers and topics at the final symposium (12–14 March 2006) included the following:

"Science and Religion in Japan"

YOKOYAMA Teruo, *Professor, Nanzan University*

"Diversity and 'Yasashisa' in Medical Engineering"

TOMITA Naohide, *Professor, Kyoto University*

1. See "Science, Kokoro, and Religion: Thoughts on a New Project," by Paul L. Swanson, *Bulletin of the Nanzan Institute for Religion and Culture* 29 (2005): 20–26. The GPSS project is funded by the Templeton Foundation.

“A New Relationship between Humans and Machines: Is it Possible to Create Machines with Heart/Kokoro?”

HASHIMOTO Shūji, *Professor, Waseda University*

“Mind (Kokoro), Goal-Directed Behavior, and Prefrontal Association Areas”

TANAKA Keiji, *Vice Director, RIKEN Brain Science Institute*

“Simulation Culture”

SATŌ Tetsuya, *Director, The Earth Simulator Center*

“Science and Religion, Science and Spirituality: A Christian Perspective”

YAMAMOTO Sukeyasu, *Professor Emeritus, University of Tokyo*

“A Dialogue among Spirituality, Science, and Religion”

SANDA Ichirō, *Professor, Nagoya University*<sup>2</sup>

This symposium, the thirteenth in our series of Nanzan dialogue symposiums, marked the end of the first phase of our “science and religion” project. The program continues into the second phase, however, as Nanzan was selected one of a few GPSS projects on an expanded basis (2006–2009). The second phase of the GPSS at Nanzan, with the theme “Kokoro [mind-heart-spirit]: Affirming Science and Religion in the Japanese Context,” will focus on questions of “kokoro,” which will include speculations on the spiritual implications of kokoro based on specific brain science experiments and research, discussions (through workshops and an internet forum) among our elite network of scientists and scholars that was established during the first GPSS project, a general and open internet forum (blog) to promote science-religion discussion, and international conferences to widen the dialogue beyond the domestic Japanese context.<sup>3</sup> Our goal is to promote, through these activities, a compassionate scientism and a critical spirituality in the Japanese context.

The following remarks were prepared as part of our proposal for the second phase of the GPSS project, reflecting back on the accomplishments of the first phase and looking forward to future possibilities.

## Kokoro

The human mind (and heart) and how it works is one area of mystery that is still ripe for examination through scientific inquiry. What does it mean to think (and feel)? Is the bifurcation between thinking and feeling, cognition and emotion, mind and heart, an accurate and useful distinction when considering the

2. Details on the project as a whole, including English translations of these presentations, are available for viewing at <http://www.nanzan-u.ac.jp/SHUBUNKEN/Purojekuto/GPSS/GPSSMain.htm>.

3. To consult our blog, go to <http://gpss-japan.cocolog-nifty.com/blog/>.

integrated nature of human experience? Are the familiar Western (and some distinctively English) concepts of mind, heart, spirit, will, consciousness, soul, and so forth the best way to describe and divide human experience? Or is a broader and more inclusive concept useful for understanding how humans think/feel? The Japanese term “kokoro” is such a comprehensive concept that may prove useful for considering the interrelated activity of the human mind and heart,

Thomas Kasulis, an expert in comparative cultures and philosophies and current holder of the Nanzan Chair for Inter-Religious Research, addresses this question as follows:

What is kokoro? For starters, we can say kokoro is the center of both emotive and cognitive sensitivity. So, translators often render the word into English as “heart and mind.” A problem with this rendering, however, is the conjunctive “and.” It might lead one to think kokoro is the combined function of two separate faculties, one affective and one intellectual, but this is not the case. To translate kokoro as “heart and mind” is like translating the Japanese word for “water” (*mizu*) as “hydrogen with a half portion of oxygen.” It is not that the translation is inaccurate exactly, but rather that it misses the point, at least in any ordinary context. When requesting a glass of *mizu*, a Japanese does not think of it as a compound of two elements. Similarly, in ordinary Japanese contexts “kokoro” is a simple, not a compound. If we need to use a compound expression to translate kokoro into English, that fact tells us more about the web of English concepts than it does about the nature of kokoro in the Japanese worldview. In modern Western philosophizing, we have drawn such a wedge between the affective and the cognitive that we too easily slip into believing the universality of the bifurcation. Hence, we assume that kokoro must have a dual rather than singular function and we translate it as such. To sum up: the “heart and mind” translation hides as much as it discloses. We think we know what kokoro means only by occluding its most threatening suggestion, namely, that our modern Western bifurcation between emotion and cognition may be at best limited and at worst simply wrong.<sup>4</sup>

Over the past couple of years, in the course of the first-stage Japanese GPSS project of conducting discussions, colloquia, and a symposium on the theme “Science—Kokoro—Religion,” the Japanese notion of kokoro (mind/heart/

4. From an essay by Thomas Kasulis on “Cultivating the Mindful Heart: What We may Learn from the Japanese Philosophy of *Kokoro*.” For the full essay, see the Nanzan GPSS homepage indicated in note 2, “Reference Materials.”

spirit) has served well as an “operating concept” or bridge or focus to speak of matters of the mind, heart, and spirit.<sup>5</sup> Since “kokoro” is a concept that includes both “mind” and “heart”, it serves as a way to address bifurcated concepts such as “mind-and-heart”, “reasoning and emotion,” “thinking and feeling,” and, by extension, “science and religion,” as interrelated and mutually dependent rather than independent and separate. In Buddhist terms, one can say that these bifurcated notions are “neither the same nor separate/distinct,” “neither one nor two,” or even “neither dual nor non-dual, and yet both dual and non-dual.”

This idea of the interrelatedness of mind and heart is not uniquely Japanese but seems to be increasingly recognized around the world. For example, to give some random items from the popular press, a special issue of *Newsweek* magazine (International edition, 2005 October 17) on “Stress and Your Heart” introduced recent trends in the medical community that increasingly recognize the interrelationship and mutual influences of mental, emotional, and physical states (a fact which seems to me rather obvious), closing with the statement “the heart does not beat in isolation, nor does the mind brood alone” (p. 35).

Again, an essay in the *International Herald Tribune* (2005 August 25, reprinted from *The New York Times*) on “A Brain in the Head, and One in the Gut: Scientists Study Connection between Digestive and Psychiatric Problems,” explains the new field known as “neurogastroenterology” and the recent discussion over the “second brain” in the gut known as the “enteric nervous system.” It appears that, due to the heavy concentration of nerves in the human digestive system, we “think” (or “feel” or at least “react”) directly through the enteric nervous system in our bellies without consciously “thinking” and analyzing the situation first in the brain in the head. Hence, it is not so accurate to say that we “think” with our heads (brain) and “feel” with our gut; the two functions are inextricably part of an integrated nervous system that guides human behavior.

Or, to give a literary example, the novelist Natsume Sōseki (1867–1916) opens his novel *Kusamakura* (“Grass on the Wayside” or “The Three-Cornered World”) with one of the most famous passages in modern Japanese literature:

Walking up a mountain track, I fell to thinking. Approach everything rationally, and you become harsh. Pole along in the stream of emotions, and you will be swept away by the current. Give free rein to your desires, and you become uncomfortably confined. It is not a very agreeable place to live, this world of ours.<sup>6</sup>

5. See my essay on “Science—Spirit—Religion: Reflections on Science and Spirituality in the Japanese Context” (prepared for the first-stage GPSS project, published in the *Bulletin of the Nanzan Institute for Religion and Culture* 29 [2005]: 20–26), for thoughts on the difficulty of discussing religion in the Japanese context, and the usefulness of “kokoro” in this situation.

In other words, thoughts, feelings, and desires (will) are all interrelated aspects of what it means to be human, and we would be wise to take all of them, and their interrelationship, into account in order to understand human experience.

## Reflections on the First-Round of GPSS Activities

The use of kokoro as a bridge between science and religion allowed Japanese scientists to explore and discuss “spiritual” matters in a way that they would not be free to do so in their usual academic environment. Some of the most sophisticated scientific work related to these questions—in areas such as brain science, robotics, simulation science, primatology, medical technology, and so forth—is being conducted in Japan by Japanese and international scientists. Many of the best Japanese scientists in these areas participated in our first round of fourteen colloquia and a final symposium at Nanzan, and have shown an interest in a continued pursuit of these issues.

Let me introduce some of the content and themes of the colloquia and symposium to illustrate this point:<sup>7</sup>

### 1. Satō Tetsuei and Simulation Science

Dr. Satō Tetsuei is Director of the Earth Simulator Center, currently the largest concentration of computing power in the world, and is involved in using computers to make predictions concerning events such as earthquakes, typhoons, global warming, and so forth. In discussing simulation science, Dr. Satō pointed out that when the human brain tries to anticipate the future, it evaluates stored memories and uses various criteria to make a judgment. Thus it can be said that the ability “to think” is closely interconnected with the ability to “predict the future.” But can a computer replace the human brain or mind? For a computer, the greater the computing capacity, the greater the accuracy of prediction, making estimations and predictions of the future into “science reality” rather than “science fiction.”

However, as Satō points out,

the human brain makes predictions inside brain nerve cells and determines behavior by comparison with the matters of the past, but this prediction cannot, strictly speaking, be called a prediction. For the most part it is rather related to the sphere of human desires and

6. For a translation see Natsume Soseki, *The Three-Cornered World*, tr. Alan Turner, Tokyo: Tuttle, 1965 (reprint: Regnery Publishing, 1989).

7. A full list of the Nanzan GPSS colloquia, and the contents of the Symposium, along with English translations of the papers presented at the Symposium, are available on the Nanzan GPSS homepage indicated in note 2 above.

wants.... Computer simulation is not concerned with fulfilling one's desires or expectations, or some selfish ideas; it is concerned with the implementation of scientifically definite things. Therefore, it does not cause any frustration (anxiety or dissatisfaction) in the kokoro and hence does not, in itself, require religion.

The activity of the brain can easily shatter the (fragile) human kokoro, but simulation science and its predictions are robust. On the other hand, the human heart is rich in intuition; it possesses attributes such as illogicality, hunger for novelty, creativity, infinity and openness. Computer simulation is deterministic (closed); it lacks diversity and is an embodiment of dryness. I believe that this is the decisive difference between computers and human beings.<sup>8</sup>

## 2. Matsuzawa Tetsurō and Primatology

Perhaps the most provocative of the colloquia was a presentation by Dr. Matsuzawa Tetsurō, one of the top primatologists in the world. His work with the chimpanzee Ai (and now Ai's son, Ayumu) has shown how close the relationship between chimpanzees and humans is. Physically, there is only a 1.3% difference in the genetic DNA content between chimpanzees and humans, less than the difference between a zebra and a horse, or between a rat and a mouse (about 4%). Matsuzawa has shown that chimpanzees are better at some cognitive skills (e.g., retention of short flashes of information) than humans, that they can develop their own, recognizable "artistic style" through a series of paintings, and so forth, indicating that the human mind (and heart) is not unique in the animal world.<sup>9</sup> Matsuzawa's stated goal in working with chimpanzees is "the study of kokoro": that it is possible to study the evolution of the human mind-and-heart by getting to know chimpanzees, and that this will shed light on what it means for humans to think and feel. The implications of this research for religion are stunning and present strong challenges to an anthropocentric religious world view.

## 3. Hashimoto Shūji and Robotics

Famous for his stated goal of creating a robot with a kokoro, or a "sentient machine," Hashimoto Shūji of Waseda University has shifted his thinking from "building" or "creating" to "cultivating/growing/developing" a sentient machine:

8. Satō Tetsuei, "Simulation Culture," *ibid.*

9. See, for example, MATSUZAWA Tetsuro, et al., *Cognitive Development in Chimpanzees* (Tokyo and Berlin: Springer, 2006).

My dream is the creation of various kinds of robots with self-reproductive functions and with a will to live. I want to rear robots by putting them into a skillfully arranged environment and looking out for them like a shepherd, or like a nurse caring for a baby, not letting it go too far, or pulling it back up if it falls into a drain. Then I will wait for a robot that will develop in the course of several generations and be able to discuss with us issues such as “what is a living being?” and “what is kokoro?”

If in the process a robot rebels and hits me, with my nose bleeding I would probably rejoice in my heart, thinking, “Finally, I did it. We’ve almost made it!” This is because a period of rebellion naturally precedes independence.<sup>10</sup>

Hashimoto is also critical of Issac Asimov’s famous “Three Laws of Robotics” as too anthropocentric.

As we ponder the society of the near future, we realize that the difference between humans and robots will become vague and the concept of “human” existence underlying Asimov’s Three Laws of Robotics will become dubious.

In the field of high-technology medicine, experiments are currently conducted on the production of all kinds of artificial organs, and human robotization progresses. A “happy” human brain does not yet exist. However, chemicals influencing memory and mental activity are already partially used. In addition, for the treatment of vision or hearing-related illnesses, there are surgical methods that involve the direct connection to nerves. Perhaps artificial organs with a direct connection to the brain will appear soon. As robots are getting closer to humans and humans are getting closer to mechanisms, Asimov’s Three Laws of Robotics will become basically meaningless. I believe that scientific technology—not limited to robots—must elaborate a new philosophy based on the goals of humanism that will tackle questions such as “what is human?” and “what does it mean to live happily?”<sup>11</sup>

10. Hashimoto Shūji, “A New Relationship between Humans and Machines: Is It Possible to Create Machines With Heart/Kokoro?” See the Nanzan GPSS homepage, loc. cit, 8–9. This is a rather different attitude for a “creator” with regard to his “creation,” compared to the Christian story in which rebellion against the creator is the mark of sinfulness.

11. *Ibid.*, 8

#### 4. *Tanaka Keiji and Brain Science*

Dr. Tanaka Keiji, Group Director at the Japanese government-sponsored RIKEN Brain Science Institute, also addresses the question of “what does it mean to think and feel” from the perspective of his very technical research on the neurological workings of the brain through brain imaging. In his presentation at the symposium he notes:

To consider the mind (kokoro) from the viewpoint of neuroscience, let us define it provisionally as the overall mental activity controlling one’s behavior by a goal-directed approach. In the case of reflexes, innate compound movements, instinctive behavior, or habitual behavior, people are not aware of the purpose of their behavior. Goal-directed behavior is only one among many type of behavior in humans. The frontal association areas (also referred to as the prefrontal cortex) play an important role in goal-directed behavioral control....

The results of human brain imaging studies suggest the involvement of the medial prefrontal cortex, similar to the case of an action aimed at obtaining a primary reward. It is thus possible to analyze how the mind functions in goal-directed behavioral control, and it has been demonstrated to date that the different regions of the prefrontal cortex play important roles for goal-directed behavioral responses.<sup>12</sup>

Dr. Tanaka plans to pursue the spiritual or religious implications of this technical research on the brain in the future.

#### 5. *Tomita Naohide and “Human-Friendly” Medical Technology*

Dr. Tomita Naohide of the Kyoto University International Innovation Center, is concerned with the ethics of medical engineering and the importance of mental and emotional serenity (*anshin*: “a peaceful kokoro”) in addition to the nuts and bolts of medical technology itself. He uses the Japanese concept of “yasashii” (which can be translated variously as “gentle, tender, kind, affectionate, sensitive, friendly” and so forth) to urge the development of medical technology that is “human-friendly” rather than merely “efficient,” concluding:

Inevitably it will be crucial for “yasashii technology” to create an environment completely receptive to diversity, in which we will effectively deal not only with the important factors selected from human diversity, but also gently deal with every single factor, including those considered “inefficient.” In addition, recently a new methodology was

12. Tanaka Keiji, “Mind (Kokoro), Goal-directed Behavior, and Prefrontal Association Areas.” See Nanzan GPSS homepage, loc. cit., 1–10.



proposed that allows the describing of difficult-to-describe factors in the form of a narrative. These are not pseudo-scientific methods but rather new directions that should challenge science and technology in the twenty-first century.

Although, to date, scientific technology has been utilizing a methodology of “planning and control,” the scientific methodology of the twenty-first century must recognize diversity and develop a methodology geared towards “nurturing” or “developing.” “Diversity” is a state of the continual interconnectedness of multiple mutually supportive factors. To develop a “yasashii” technology we must, to begin with, establish contact on a human level. A constructive dialogue will not be possible unless we create an atmosphere of mutual support and encouragement.<sup>13</sup>

#### *6. A Discussion on Whether or Not the Science-Religion Dialogue is a Fundamentally “Western” and/or “Christian” Enterprise*

A large percentage (about 50%) of the participants in the Nanzan colloquia and symposium were Christian, much larger than the overall percentage of Christians in the general Japanese population (estimated at between 1% to 2%). Questions remain as to whether this was a coincidence or a reflection of the current range of contacts of the Nanzan Institute, the principal investigator of the project, and the science advisor? Or does it indicate that it is mainly Christians—whether they are scientists, or religious studies or philosophy academics—who are interested in these issues and a science-religion dialogue?

The most “standard” or “typical” science-religion presentation (given my limited exposure to such meetings in the West) was the last session of the symposium, which consisted of two papers (by Drs. Sanda Ichirō and Yamamoto Sukeyasu) on physics and religion. Both presenters were physicists, both were Catholic Christians, both have spent a long time studying and teaching in the United States, and both spoke of their struggle to reconcile their Christian faith with their identity and knowledge as physicists. Their presentations provoked two different and opposing reactions: a positive reaction in that their “struggle” to reconcile their religious beliefs and their scientific research was perceived as “new, fresh, or different”; a negative reaction in that such an attempt was seen to be “foreign” to Japanese ways of thinking (too “Western”) and that most Japanese would not be able to empathize with or understand such attempts.

13. Tomita Noahide, “Diversity and ‘Yasashisa’ in Medical Engineering: A Call for ‘Human-Friendly’ Technology,” See Nanzan GPSS homepage, loc. cit., 3–4.

There was a suggestion that instead of “science and religion,” it would be better in the Japanese (or even broader “Eastern”) context to speak rather in terms of “modern technology and traditional ways.” In any case, this discussion underlined the importance of considering the science-religion dialogue from a different approach and indicated that the notion of kokoro is a promising one for fruitful discussions.

## Future Goals

The first round of Nanzan GPSS colloquia and symposium suggests that kokoro is indeed a useful operating concept for discussing the interrelatedness of science and religion in Japan (and perhaps beyond). Although terminology and focus points may differ from the preceding dominant discussion of science and religion in the West, the discussion in Japan promises new insights and different approaches. The subject of “mind” (and “heart”) is the focus of some of the most advanced scientific inquiry in the world, often led by Japanese scientists. Their insights, and the conceptualizations that flow from Japanese terminology and cultural assumptions, are worthy of attention and should be recognized as important contributions to human understanding.

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