



PROJECT MUSE®

Sushi Science and Hamburger Science

Tatsuo Motokawa

Perspectives in Biology and Medicine, Volume 32, Number 4, Summer 1989,
pp. 489-504 (Article)

Published by Johns Hopkins University Press

DOI: <https://doi.org/10.1353/pbm.1989.0023>



➔ *For additional information about this article*

<https://muse.jhu.edu/article/402343/summary>

SUSHI SCIENCE AND HAMBURGER SCIENCE

TATSUO MOTOKAWA*

I am a biologist, visiting the United States from Japan. My stay in a North Carolina town has been full of surprises. What struck me most is the difference in the behavior of the people. The way they talk, the way they think, the way they laugh, the way they express their anger—all are different from those I have been used to. The daily experiences and observations of these differences have led me to notice that there exist some differences even in science and the way it is done. I had always regarded science as universal and believed there are no differences in science at all between countries. But I was wrong. People with different cultures think in different ways, and therefore their science also may well be different. In this essay, I will describe differences I have observed between Western science and Eastern science. Let me start with a parable.

A man visited the United States from Japan. The first trouble he had was with foods. He found all the dishes served at restaurants too spicy, too hot, too salty, or too sweet. He was horrified to see someone cover a steak with salt like piles of snow. The man was a fish eater, as most Japanese are. He tried several seafoods. Most of them were deep, deep-fried denatured protein once called fish; a blackened red fish: it was nothing but charcoal. The conclusion he drew was that the cuisine of the West is overcooked (see fig. 1). Of course there are good dishes in the West. He loved the fancy French cuisine, for example. Someone claimed that French chefs can make a good dish out of the soles of shoes! They really have an art of cooking. Japanese dishes seem to have no art of cooking at all. Sashimi and sushi are raw fish. “What savage people they are to eat raw fish!” would be a common impression, if one does not

This essay was prepared while the author was staying in the laboratory of Professor Steven A. Wainwright at Duke University. Professor Motokawa thanks Professor Wainwright for his encouragement and reading of the manuscript, the Cocos Foundation for financial support during the stay, and Lisa Orton for discussion and reading of the manuscript.

*Department of Biology, University of the Ryukyus, Nishihara, Okinawa, 903-01 Japan.

© 1989 by The University of Chicago. All rights reserved.
0031-5982/89/3204-0641\$01.00

know what sushi is like. Although sashimi and sushi use uncooked fish meat, they are one of the most difficult dishes to prepare among Japanese cuisines. Fine skill in cutting meat really makes the difference in taste; extremely fresh fish is needed, which means fishermen, dealers, and cooks must know how to catch, transport, and store the fish in a very fresh condition. A lot of skills are hidden behind the no-cook. This is really an art, and definitely a different kind of art than that found in Western cooking.

Some Western cuisines are great: we taste the skills of chefs. Sushi is also great: we taste the materials themselves (fig. 1). Chefs' skills are hidden: they are devoted to keeping the fresh and natural flavor of the materials. These are two different attitudes toward cooking, and I see in them a reflection of the aesthetics of different cultures.

Similar differences are found also in science. I want to describe the differences in science by discussing four pairs of contrasting concepts found in the two cultures. They are one/many, gap/no gap, "I"/no "I," and word/fact (see bottom of fig. 2). These differences are found not only in science but also in various other fields of human activities. These differences seem to appear most clearly in religion, perhaps because religion itself has been one of the main forces to drive society in such a direction. Therefore, I will first describe the differences in the religions of the West and the East in order to illuminate the differences in their science. Here I consider the West to be Western Europe and North America and the East to be the Far East, mainly Japan. Christianity is the main religion in the West. In Japan, the most influential one among the intellectuals has been Zen Buddhism. I will examine the differences between these two religions here. (Those who are not familiar with Zen Buddhism, please refer to the works of Suzuki [1].)

Differences in Religion

In Christianity, the noted character of God is that he is the one and the only. He is the creator of the world and He created it with a purpose.

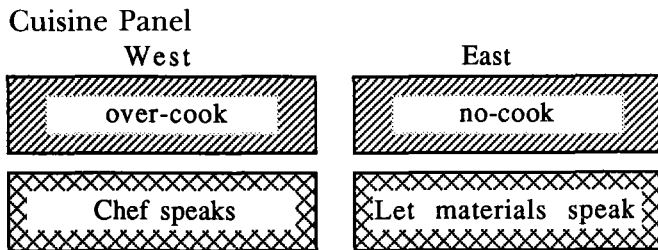


FIG. 1.—Differences between West and East in cuisine

Religion Panel

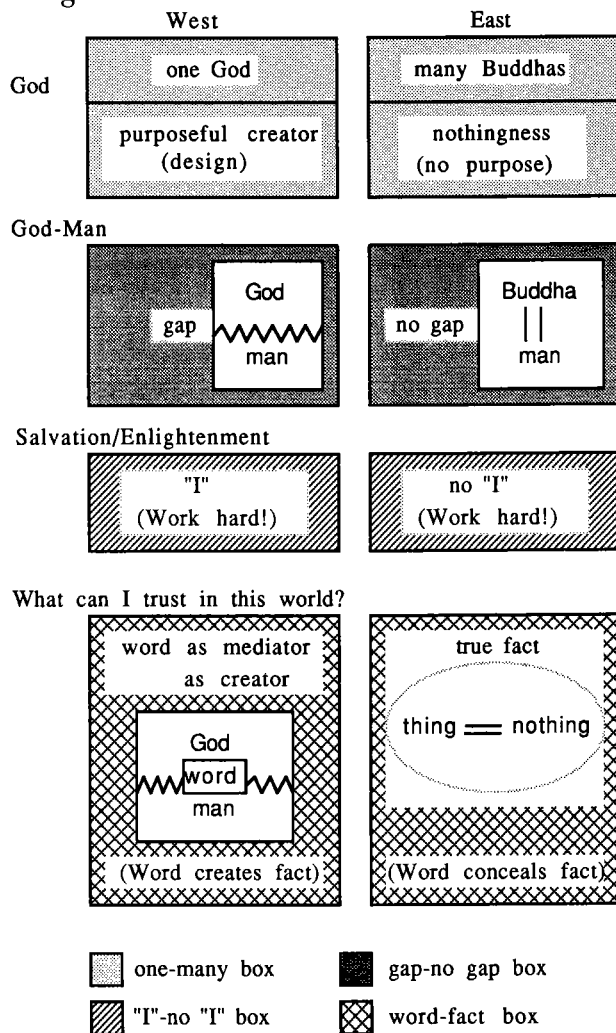


FIG. 2.—Differences between West and East in religion

The world is designed by Him. In Zen Buddhism, on the other hand, there is no one creator god. There is no purpose of creation. Concepts such as purpose are a creation of the mind of mortal man and thus are not reliable. What is reliable lies in what is beyond human imagination, and thus no word can name it. It is called nothingness or emptiness to point it out. To know that everything is empty is the enlightenment, and the enlightened man is called the Buddha. If we regard Buddha as the counterpart of God in Christianity, he is not one, because there live as

many Buddhas as there are enlightened people in the world. Therefore, the “one-many box” in figure 2 is filled with one God—many Buddhas.

How about the god-man relationship? The Christian God is transcendent over man. Man cannot be God: there is a gap that man cannot overcome. In Zen Buddhism there is no such gap between Buddha and man: a man can be a Buddha. Buddha and man live in unity and harmony.

How can a man be a Buddha? It is by throwing away one’s self and becoming “unconscious.” “I” should be denied to be enlightened. Zen Buddhism regards the world perceived by an ordinary man as just a projection of the image that his mind has created. Therefore, unless he throws away his ordinary conscious mind and becomes unconscious, he can never grasp the true nature of the world and thus can never attain enlightenment.

How can man be saved in Christianity? There is a profound gap between God and man. God, however, kindly provided a word as a mediator: He gave us Ten Commandments; He gave us Christ, and He is the Word. But the words are not enough: even if we think we are believing God, we have to be chosen by God to be saved. It is psychologically very important for individuals to know whether they have been chosen. Puritans tried to find the sign of choice by God in their ability to work hard, which has been a driving force of capitalism. I regard the choice of “I” by God and the responsibility of “I” to keep the words of God as the two main factors that have oriented the West as an ego-centered society. The importance of “I” derives from the character of God. He has a personality: He is a living God with passion; He created the world so that he might be praised by his creatures, and therefore He is an egotistic, selfish guy. (It is reasonable that he has created selfish genes.) Man is created after the image of God. Therefore, self-ish is not at all bad but rather a good characteristic. “I” must be established in Christian individuals. This makes quite a contrast to the no “I” of Zen Buddhism.

Word, besides acting as a mediator, has another important role in Christianity: a word creates a fact. “Let there be light, and there was light.” Thus the word has two key roles in Christianity. This I suspect is the main factor that made the West into a word-oriented society. I regard Western society as where the word has more reality than the fact has.

Zen Buddhism distrusts words. Words are associated with our conscious mind, which should be denied if we want enlightenment. Instead of words, we trust the true fact. The true fact is not the existence of a mountain, for example. Once we regard this mountain as empty and nothing, and look at it again, then it becomes the true fact; it becomes more real than the mere existence that we observe through our ordinary

conscious minds. This cannot be explained by logical words; to try to understand using words prohibits us from grasping the true fact.

Well, this is impossible to discuss. I am sure most of you do not understand what I have said about the true fact. I will add a philosophical discussion that might be helpful, although such an attitude is against a habit of Zen Buddhism. According to the traditional Western philosophy, we observe two different things in this mountain: a material that makes up the mountain and an essence that enables us to tell that this is a thing called mountain. The Western world is built up on a dichotomy between essence and material. The essence can also be called a name, word, or thought because it corresponds to the thought in our mind. It is through the essence that our mind makes contact with the existence.

Zen Buddhism claims there is no such thing as essence of mountain; it is nothing but a creation of "I." Western people may then ask what agent connects us with this mountain if there is no essence of mountain. Without essence, existence would become meaningless to us and we would be alienated from the outside world. Zen Buddhism says that the problem in the West is that there is a gap between "I" and this mountain. When there is no gap and thus no dichotomy, we do not need a mediating idea such as essence of mountain. The essence is an artificial extraction and creation of our mind. If we extract essence from existence, neither the essence nor the rest represents the true existence. There is no truth outside or inside this mountain. This particular mountain as it stands as the true fact. We can grasp the true nature of existence only after we have denied all the dichotomies such as essence versus material and "I" versus this mountain.

How can we deny dichotomies? All the dichotomies derive from "I." "I" observe; therefore, the dichotomy between the observer and the observed emerges. When we deny "I" and become "unconscious," the gap between "I" and this mountain disappears. Because there is no "I," "I" am empty; because there is no dichotomy between "I" and this mountain, this mountain is also empty. And yet, I is I and this mountain is this mountain. The existence, as I and as this mountain, reveals the true nature without being interfered with by our conscious minds. Everything becomes empty and real when we lose the self and become unconscious.

Unconsciousness is a special conscious state in which ordinary consciousness has been abandoned. According to traditional Western philosophy, there is a sharp dichotomy between mind and body in ourselves; consciousness is a work of mind. Zen Buddhism claims that such a dichotomy should be eliminated. If we have in ourselves a gap between mind and body, how can we expect to solve the problem of the gap between I and external world? When we discard ordinary mind and thus consciousness, mind and body become one and the true consciousness

emerges. With this true consciousness, or unconsciousness, we can grasp the true nature of external world. Unconsciousness is an experience that cannot be explained by words. If it were a matter concerning only the mind, it might be explained by words. But it involves both mind and body. The involvement of body is the key characteristic that distinguishes Zen from Christianity.

How can we know everything is empty? How can we lose self and become unconscious? It is through practice. *Zazen* is one way: it is a special meditation in which works of both ordinary mind and ordinary body are suppressed to obtain the unity of mind and body. The other way is to concentrate on daily works. Work hard and sincerely; produce good quality things. If you lose yourself in the hard work, then your product will be the true one. Work hard, then the tools you are using become a part of your hand and the product you make becomes a harmonious extension of yourself, and you are nothing, the product is nothing, all is nothing, and all is real. Zen Buddhists rely on this kind of real fact, whereas Christians rely on words in this relative world.

Now we have filled up all the four boxes in figure 2. Notice “Work hard!” appears both in the West and in the East. This is the driving force of two societies. “Work hard!” is, however, associated with “I” in the West and with no “I” in the East. This really makes the difference in the behavior of the people in the two societies, although there is superficial similarity in working hard.

Differences in Science

With these differences in religions in mind, I will now describe the differences I observe in sciences. Four similar boxes can be drawn in figure 3. The “one-many box” is obvious in the sciences. Western science stands on a premise that nature is reasonable and uniform [2]. Some universal rules, or designs, are to be found in nature. To discover these rules is what science does, and parsimony of rules is imperative, as in Occam’s razor. Every rule should be simple: the ultimate statement of the rule should be unique—an equation. This idea of simpler is better is not intuitively obvious. It is clearly the reflection of one-God religion [3]. There must be the ultimate Rule in the universe and that is God’s will. Everything has evolved from this Rule and the apparent diversity of rules can be reduced to this final, pure, and crystallized Rule. Eastern science, on the other hand, has no such frugality in rules. This is probably because there is no one god, but there are many Buddhas and thus many rules. That leads Eastern science to stress not the uniformity and the similarity but the differences and specificity.

If we replace the words God and Buddha in the “gap box” of the religion panel with the absolute “truth,” the relation between the scien-

Science Panel

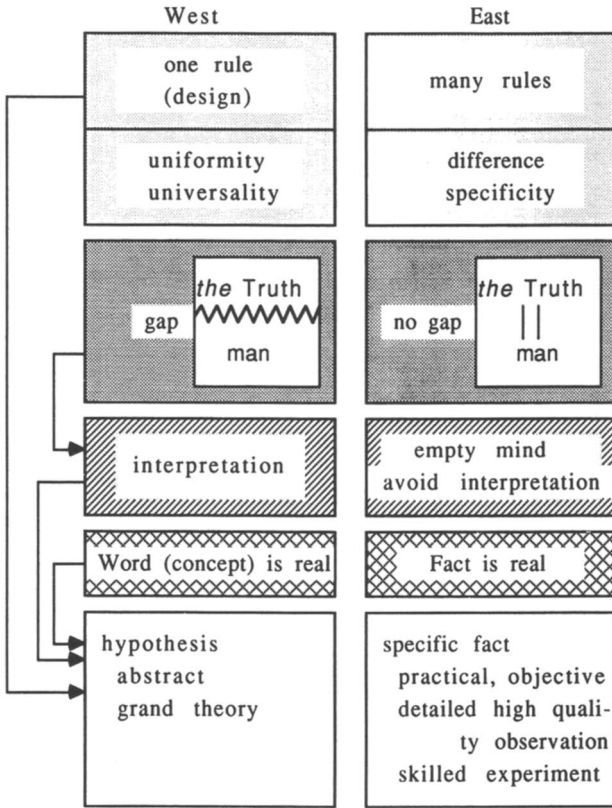


FIG. 3.—Differences between West and East in science

tist and the truth appears. In the Western world, scientists cannot attain the absolute truth [4]. The absolute is always out of reach of man in the West; it belongs to God. What man can do is to interpret the world that God has created. "My" interpretation of the world is the only thing a scientist can produce. It is a personal view and "I" plays a critical role in the interpretation. This makes a good contrast with Eastern science. In the East, man can obtain absolute truth if he denies "I" by emptying his mind. An interpretation is the imagination of the mind. To avoid interpretation is necessary if one wants to get the truth. Bodily exercises such as observations and experiments are recommended because they prevent a mind from going astray leaving a body behind. Mind and body should go hand in hand in Eastern science. There is a real fact in front of you. You can obtain it if you stop speaking and devote yourself to the observations and experiments to the extent that you become unaware that you are observing or doing experiments. To interpret is to create your personal world, which always closes the way to the truth.

In the West, interpretation is always done using words because the word is the only mediator that connects us with the truth and because the word has more reality than the facts have. Let me explain this reasoning. Western science does not regard the mere description of a fact as science. The fact becomes a truth only after it has been interpreted as a part of a universal rule. Therefore, words (interpretations, concepts, rules) give reality to a fact, and thus words create facts. This makes a good contrast with Eastern science. In the East, a single fact as it is stands as the truth.

Now we have filled the four boxes in the science panel that correspond to those in the religion panel. The structure of science corresponds quite well to the structure of religion when “god” is read as “rule” or “truth” and “I” is read as “interpretation.” This is not surprising because science and religion are among the many activities of a particular society and that society no doubt has a common thinking pattern in its activities. Science and religion, in particular, may well have quite a similar structure because both are involved in man’s relation to the truth.

Let me summarize the differences of the sciences (bottom box in fig. 3). Western science is hypothesis oriented. A hypothesis is a personal interpretation using words about how universal rule works in a particular matter of interest. The hypothesis should be big: the final rule should be one, and therefore the biggest and most general hypothesis is the best one. This drives the hypothesis to become abstract.

The hypothesis is not the absolute truth; it changes with time. The value of a hypothesis, therefore, should not be measured merely by its correctness; it should also be measured by its influence [5]. If a hypothesis stimulates many other people to do the researches in that field, it is a good hypothesis, even if it turns out later to be false.

Eastern science is fact oriented. It tries to communicate with the truth, not through generality and abstraction as Western science does, but through specificity and objectivity. A specific fact represents the absolute truth. Interpretations and hypotheses should be avoided because human discursive intellects conceal the reality. Skilled experiments and detailed observations on a specific existence reveal its reality. Scientists also find their realities in their devoted scientific activities. The tendency of Eastern science to stress specificity and particularity makes it quite objective and practical.

Now I will move to figure 4. The first box describes a model of two societies partly based on Goldstein and Tamura [6]. This box contains both “one-many” and “gap-no gap” concepts. In Western society, especially in the United States, men and women are endowed by God with equal rights. There is only one level at the moment of birth. Because each man is “I” oriented and thus develops a strong ego, a gap develops between two people. The word is the only mediator between them. There-

Scientist Panel

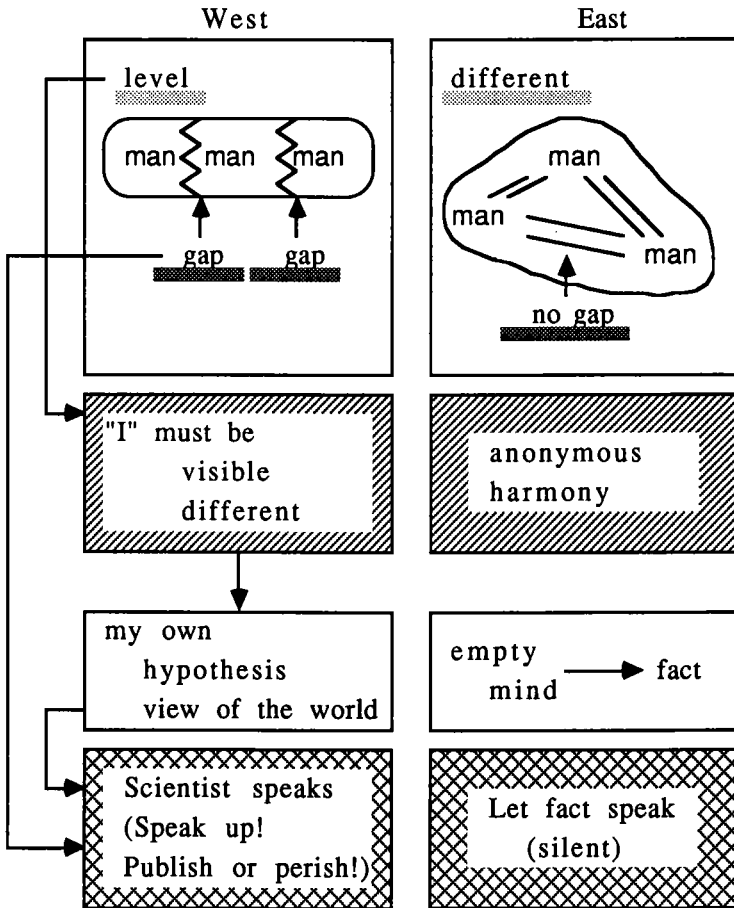


FIG. 4.—Differences between Western and Eastern scientists

fore a lot of words must be spoken in order to develop and keep relations between people. Even in a family, man and woman have to keep on saying "I love you, darling" every morning and every night. In Japan, just a smile is enough for communication between husband and wife.

In the East, humans are born unequal: some are born rich and some are born poor; some are men and some are women, some are handicapped, some are born as birds or as worms. There are many levels among living things and all these are the result of *karma*. Because this society is not "I" oriented, there is no serious gap between two men even if there are such differences in level. Once you are accepted as a member of the society, you are a part of the whole. In this society, men, especially of high rank, should hide their status to keep the harmony. Anonymity

is the aesthetics of this society. In the West, on the other hand, ambitious people want to get out of the level plane and to be different and visible. Everyone wants to be a hero in the West. Especially after the “death of God” in the nineteenth century, every single person wants to be and has to be the god.

With these general views in mind, I will describe the differences between Western scientists and Eastern scientists. In the West, every scientist wants to be different from every other scientist. A scientist must produce his own hypothesis and his own view of nature. After the “death of God,” he must fulfill the roles that have been played by God; one of them is to re-create his world as God once did. Scientists have to advertise their hypotheses and their re-created world in a loud voice to be visible and to persuade other scientists. In the East, scientists have no big hypothesis to advertise. To advertise “I” and “my something” is quite bad manners in the East. Scientists seek a highly specified fact. Once they have obtained such a fact, they do not have to speak because the fact speaks. In natural sciences, it is more natural and therefore better to let nature speak for itself than to let man speak; scientists should keep silent. This is the aesthetics of the East. Similar aesthetics are found in various activities of Eastern people, such as in the cooking I have referred to.

Merits and Demerits of Two Sciences

Now I have filled all the boxes in figures 3 and 4. I realize this is a simplified view. The characteristics of two sciences and religions are quite simplified and even caricatured here. But remember, this kind of brutal oversimplification is the noted character of Western science. I just followed your way. My scheme is far from the truth, but I think it is illuminating and therefore it is of value if we realize that scientific truth is not absolute truth.

My analysis reveals merits and demerits of two sciences. Let me discuss those of the Eastern science first. The Eastern scientists do not feel happy in producing big hypotheses. They are rather technology oriented because technology does not need hypotheses. China led the technology of the world before the Industrial Revolution of the West; Japan is now catching up with and competing with the West in the modern technologies. These are the fruits of practical minds. There is, however, a serious drawback to this antihypothesis habit. Western scientists may ask whether Eastern science is really a science because, according to their definition, science, especially pure science, is the activity of producing hypotheses. Western science claims that the accumulation of mere facts leads us nowhere. The strength of Western science lies in the hypotheses that can make predictions and thus lead us to new directions.

There are several characteristics that might be the demerits of Western science.

1. Western people have a tendency to believe that the words and concepts are more real than the definite facts and existence are. This is quite dangerous. The history of science is full of examples in which the correct observations were neglected by the believers in false concepts. Once a Zen master said that we should not mistake the pointing finger for the moon to which it points. Although the finger teaches us that the moon exists, is it proper to say that the finger created the moon? Although the word "moon" is needed to refer to the thing shining up in the heavens, is it proper to say that the word created it, and thus that the word is more real than that celestial existence?

2. The aim of Western science is the unique general rule. This sometimes leads to the neglecting of differences and complexities. I think the role of biology in Western society is especially important because it teaches about complexity. Another problem of the one-rule-oriented science is that the rule always tends to grow bigger and bigger because the rule that covers the wider range is the better. Can all men handle such a big rule?

Perhaps we need giants and heroes for that. The history of Western science is the history of giants and heroes. I am not sure we can keep on depending on heroes to make the rules bigger and bigger. There seem to be limits to the size of rules: within the limits, ordinary people feel happy to handle them, but outside the limits, they may feel uneasy. I am not saying that science should stop pursuing bigger rules. Rather, I want to say that we should reevaluate the Western priority that bigger is better.

In the East, mind and body should walk hand in hand. The size of rules and ideas, and thus the size of mind, should match that of body. The size of our body is difficult to change. Inventions such as microscopes, telescopes, engines, and motors may have increased the size of our body by strengthening our eyes and muscles. I am not too optimistic, however, because it is extremely difficult to make these machines harmonious extensions of our body. We are suffering from the gap between our body and machines. Compared with the size of our body, the size of our mind is far easier to change. Mind tends to become larger and larger, leaving body unchanged. The strength of the West and also the problem of the West lie in a habit that people let mind walk far ahead of body. The oversized rules, which are created by oversized minds, are deepening the gap between mind and body. I think this is one of the main factors that makes man unhappy in the modern age.

3. Everyone in the West tries to establish his ego after the "death of God." This has given various merits to the Western society. It has demerits, however. Every ego has to struggle to obtain the truth and the

meaning of the existence—often in despair. I will call this phenomenon the “ego inferno.” A similar phenomenon is found among scientists. Each scientist has to put forward his own hypothesis to establish his *raison d’être*, even if he knows his hypothesis is not the absolute truth. I will call this the “hypothesis inferno.” Which is happier: the Western way in which scientists have to withstand the gap between the absolute truth and this relative world or the Eastern way in which scientists can feel unity with the absolute truth?

There are three types of scientists in the West. The first type is a traditional Christian who finds religious joy in discovering God’s rules in nature. The second type finds a heroic pride in the strength of mind withstanding the gap between the absolute and the relative. He refuses the necessity of God and tries to find out the meaning of this world that has been created by chance. The third type is a practical person; he simply finds joy in the puzzle-solving nature of science, paying little attention to religion and philosophy. This type seems to be the majority. For these people, science is a hypothesis-producing game. Nature is just an object in such games. This view of nature is dangerous because it enhances the tendency of Western science to handle nature at man’s own will, which is the next point I want to discuss.

4. In the West, there is a gap between man and nature. Man is transcendent over nature as God is transcendent over man (fig. 5). Man is a master and nature is a slave; man can handle nature at his own will. This has given the scientists freedom of manipulation and interpretation of nature. This is a great merit: you can make any story out of nature.

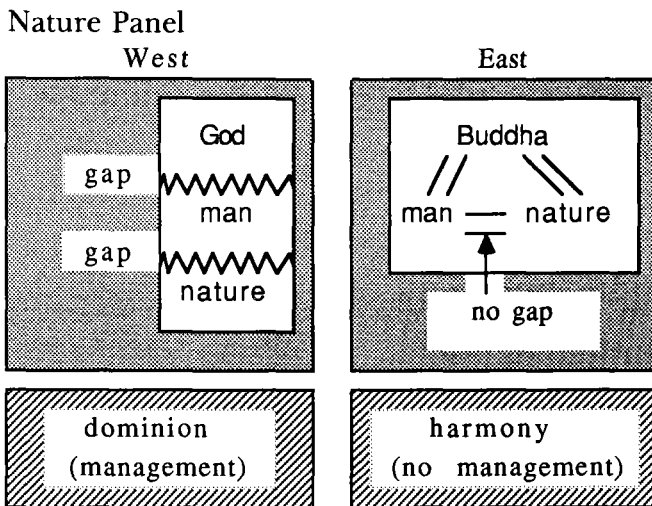


FIG. 5.—Differences between Western and Eastern conceptions of man’s relation to nature.

There is, however, always a danger of overcooking: nature is killed and only the cook is happy. There is no such serious gap between man and nature in the East.

Let me give you a remarkable example of this gap versus no gap dichotomy. A sound received by human ears is processed and perceived in the brain. In the human brain, human speech and noise are processed in different hemispheres. The sound of insects is heard by Western people in the same hemisphere as noise is heard, whereas it is heard by Japanese people in the same hemisphere as human speech is heard [7]. Perhaps this is an indication that Japanese people are hearing what insects are saying, and thus that Japanese are communicating with nature in the same way we communicate between humans. I believe that the natural science done by these people is different from that done by the people who hear the sound of insects as just noise.

There is a gap between man and nature in Westerner's mind; this may correspond to a gap in a brain between right hemisphere and left hemisphere. Japanese listen to man and nature in the same hemisphere; this way corresponds to their no gap view of nature. The "gap-no gap" pattern seems to be found even in brain process. The difference in the brain does not derive from genetic differences. The Japanese brought up in the West respond to sounds in the same way as Westerners do. This is a good example showing that human nature can be modified by nurture. Therefore, the notion should be reexamined that everybody has the same cognitive process and thus has the same image of nature.

Christianity is one of many religions in the world, and Western science is one of many sciences. Western people often tend to believe there is and there should be only one religion and also only one science in the world because in the West universality is God. Is it true that there should be one science? Science is a system of knowledge. The system does not necessarily require the one-rule hypothesis on which Western science strongly insists. It is true that Western science has been the most successful one, and I am very willing to respect it. We do not know, however, whether Western science as it is now will still be as powerful in the future. A science lives in a history. Which kind of science has the most adaptive value depends on the developmental stages of the science itself and on the society. Western science may need some modification in the near future, and it is good to remember that there are other types of sciences in the world.

Differences in Logic

The kind of discussion I have engaged in is called a "bigtalk" by Japanese people. Sincere and respected scientists should not indulge in bigtalks in Japan; we should confine ourselves to small talks that do not

neglect the minute and delicate differences found in nature. The way we Japanese talk has several other differences from the way Western people talk. I will describe the differences in the logic of language. This will further illuminate the differences in science.

When you Western people read the papers written by Japanese scientists, you will often have difficulties in understanding what the authors wanted to say, even if the article is written in English. One obvious cause is poor English; another cause is the difference in “logic.” Western logic is quite clear: it has a structure in which each statement is tightly connected and linearly arranged to reach a conclusion (fig. 6). Japanese logic is not so clear. Westerners may well find no logic at all. Japanese people talk about something and, without stating a conclusion, move the discussion to another topic. These two topics often have no logical connection, although they are related in the mind of Japanese people. What Japanese are trying to do is to describe one fact from various points of view. Each view is connected by imagery to others, not by strict logic such as syllogism.

Linear logic is very effective: it illuminates one side of the fact clearly. But that’s all. Japanese logic is like a net that embraces one fact, and thus it makes up a hollow, three-dimensional structure. The net is not strongly woven and, of course, the net is leaky. It is not a clear rigid logic that binds up the fact. Rather, the net creates an atmosphere that vaguely surrounds the fact. This is another example of the “one-many” difference. Westerners prefer the one fixed point of view, while Easter-

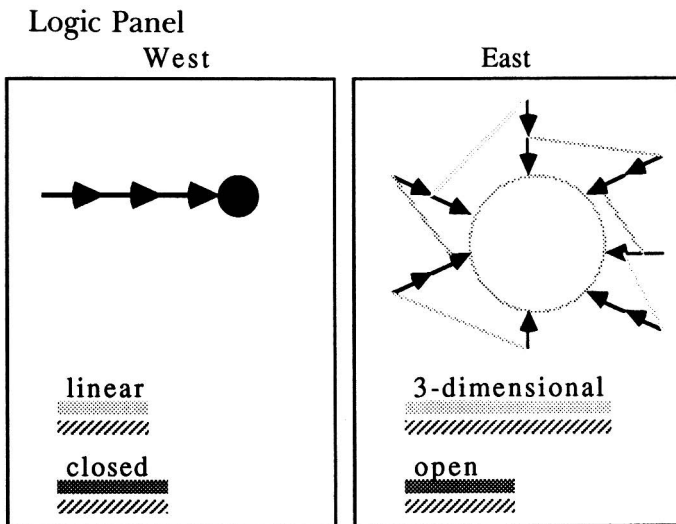


FIG. 6.—Differences between Eastern and Western logic

ners prefer the multiple points of view. This can also be interpreted as an example of “I-no I” difference because one fixed point in the West is “I.”

The important difference between the two languages is that the Japanese people do not state a conclusion. What they do is just point at some direction. This, I guess, is what annoys Western people most. If you state no conclusion, it is the same thing as saying nothing. But wait. Japanese people think like this: if we state a conclusion, it means that our statement is the truth. Such a statement is definitely false because our words can never be absolutely true. In addition to that, if we state a conclusion, we close our world. If we do not state a conclusion and let other people draw the conclusion by themselves, our world is open to others. If other people come to the same conclusion as the one we have in mind, then we can share the conclusion and we are happy in harmony. If other people do not come to the same conclusion, we just wait. We do not push our conclusion on other people; this is the way we keep our harmony. Aggressiveness is no virtue in the East.

The closed system is a noted characteristic of Western science [4]. Every scientist makes his own world and closes it to other people. What others can do is either to become a believer of that dogma or to destroy it and build up a new one of their own. There is always a fight between two closed systems.

The religion and the philosophy of the West also employ the closed system [8]. Zen, on the other hand, employs the open system. Once a Zen master said, “When we meet Buddha, we kill him!” This may sound very strange to the Western people. “Meet Buddha” means we have obtained the truth. Why should we kill him? The meaning of this saying is as follows. When we say “this is the truth,” we have closed our system. Such a closed system is a creation of “I,” and thus it is a relative truth. The absolute truth does not lie in a closed system. We have to open the system: we have to destroy the rigid shell of what “I” think is the truth and thus destroy the shell of “I.” This is the meaning of “kill Buddha.” When the system is open, everyone can come into and out of the “self”: Buddha will come in, other people will come in, you will go out, and we all can share the truth and live in harmony.

There are some fields in the West that employ open systems. Art and poetry are examples. They require the imagination of receivers, and thus they are open to receivers. Let me talk about the poetry of Japan. I believe the genius of the Japanese is found in a type of poetry called *renku*. You may have heard about *haiku*; it is a very short poem with only 17 syllables. *Renku* is a string of *haikus*. Several poets, usually three, meet together; one of them makes the first line with 17 syllables, then the second person makes the second line with 14 syllables. These two lines complete one poem. The third person makes the third line, with 17

syllables which is the first part of the second poem, and the next person, usually the first person, makes the fourth line with 14 syllables, finishing the second poem. The poets keep on producing lines in turn, and with the thirty-sixth or the hundredth line, one renku is completed. Each set of two lines makes an independent poem, yet it has some connection with the preceding line and with the following line. The connection is not made through logic in the scientific sense. Such a “logical connection” is prohibited in the art of renku. The connecting agent is imagery. The poems are connected by imagery to be a multidimensional structure, which makes up an atmosphere that definitely expresses some aesthetics and philosophy, although no single poem makes a definite philosophical statement. And remember, this is a multiauthored poem: different egos live in a harmony. This is a completely different logic that the Western world does not have.

I regard the logic of renku as the essence of Japanese logic. Most Japanese scientists, however, eschew this logic because it is not at all scientific. Although I do not think we can directly apply the logic of renku to scientific researches, I believe it is worthwhile for a future science to develop a new open logic with multidimensional character. “If nature is totally connected, then we should prefer those languages or systems which show the highest connection, not because they do in fact show the connections in nature, but because they are coming closest to it” [4]. I also wish to quote Cyril Stanley Smith [9]: “One must acknowledge that the richest aspects of any large and complicated system arise in factors that cannot be measured easily, if at all. For these, the artist’s approach, uncertain though it inevitably is, seems to find and convey more meaning. Some of the biological and engineering sciences are finding more and more inspiration from the arts.”

REFERENCES

1. SUZUKI, D. T. *Essays in Zen Buddhism* (3d ser.), edited by C. HUMPHREYS. New York: Weiser, 1971.
2. ARBER, A. *The Mind and the Eye*. Cambridge: Cambridge Univ. Press, 1985.
3. RATZSCH, D. *Philosophy of Science*. Downers Grove, Ill.: InterVarsity, 1986.
4. BRONOWSKI, J. *The Origins of Knowledge and Imagination*. New Haven, Conn.: Yale Univ. Press, 1978.
5. PICKEN, L. *The Organization of Cells and Other Organisms*. Oxford: Clarendon, 1960.
6. GOLDSTEIN, B. Z., and TAMURA, K. *Japan and America: A Comparative Study in Language and Culture*. Tokyo: Tuttle, 1975.
7. TSUNODA, T. *The Japanese Brain—Uniqueness and Universality*. Tokyo: Taishukan, 1985.
8. SCHAEFFER, F. S. *Escape from Reason*. Downers Grove, Ill.: InterVarsity, 1968.
9. SMITH, C. S. *A Search for Structure*. Cambridge, Mass.: MIT Press, 1981.