AESTHETIC PREFERENCE FOR NONREDUNDANT COMPLEXITY: KEY TO CREATIVITY

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Abstract

The basic principle of all biological and social, and some physical processes is increase of interactive heterogeneity, which evolutionarily raises the sophistication level of intraspecific and interspecific systems. Primates, including humans, and other species of animals such as elephants, are known to create multicolor pictorial patterns on a canvas, holding a painting brush in a hand, or in the case of elephants, wrapping the long "nose" around a painting brush. Therefore the pattern creation has a long evolutionary history.

Humans and monkeys branched off 6 or 7 million years ago. Humans and elephants much earlier.

Another important consideration is the method of mate selection by females. Females prefer "minority" males. If Type A males and Type B males are mixed, females prefer "minority" males instead of "supernormal" males. The females' preference for "minority" males leads to intraspecific heterogenization, but if females preferred "supernormal" males, it would lead to intraspecific homogenization.

There is heterogeneity of individual aesthetic preference types in terms of nonredundant vs. redundant complexity. Some examples of nonredundant complexity are: Picasso's Guernica, and Stravinsky's Le Sacre du Printemps.

Aesthetic preferences are expressions of the individual's perceptual/cognitive/cogitative/action types (abbreviated as "mindscape types"). While individuals who prefer nonredundant complexity tend to be creative, those who like redundant complexity tend to be anti-creative.

Furthermore, we must become aware that the individual types are NOT subcultural variations, but they exit across cultural, social, gender,

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and professional boundaries, and are therefore transgroup occurrences. The individual types also cut across boundaries between species, and are therefore transeidosic. This knowledge is useful in multicultural management.

Awareness of transgroupness of individual mindscape types will reduce self-stereotyping and ingroup homogenization, and contribute to reduction of hostility, violence and terrorism between religious, political and ideological groups. In plain language, some persons in other groups are more similar to you than many people in your own group. Psychological tests are available.

INTRODUCTION

Aesthetic preferences in visual design patterns (painting, sculpture, architecture, landscape architecture) and auditory design patterns (music composition) are expressions of individually different perceptual/cognitive/cogitative/action types (abbreviated "mindscape types"). Though there can be as many mindscape types as there are individual, the following four types and their combinations account for approximately two-thirds of all individuals in most of the cultural, social, genderic, and professional groupings. The heterogeneity of individual mindscape types exists beneath the surface of culturally ritualized, socially standardized behavior.

H-type	I-type	S-type	G-type
homogenist	heterogenist	heterogenist	heterogenist
hierarchical	independent	interactive	interactive
classificational	random	pattern-maintaining	pattern-generating
competitive	uniquing	cooperative	cogenerative
zero-sum	negative-sum	positive-sum	positive-sum
opposition	separation	absorption	outbreeding
one truth	subjective	poly-ocular	poly-ocular

Picasso's *Guernica*, Stravinsky's *Le Sacre du Printemps*, and Holst's *The Planets* are examples of nonredundant complexity.

H-type persons prefer symmetries, unity by repetitions, hierarchy of themes and subthemes. Gothic cathedrals are an example. I-type individuals prefer caprice, randomness and unexpected surprises. S-type and G-type persons avoid symmetries, repetitions, and hierarchy, and look for interactions among heterogeneous which enhance the individuality of each element.

While the works by Picasso, Stravinsky and Holst, which made use of nonredundant complexity, occurred in the 20th century, the development and elaboration of the principle of nonredundant complexity began in Japan 5,000 years ago, in mid-Jomon period. The name "Jomon" means "rope print pattern." In the early Jomon period, clay pot surfaces were decorated by pressing a straw rope against the surface of pots while the clay was not yet dry. The fact that straw ropes existed in the early part of Jomon Period, which began 16,500 years ago, disprove the popularly held notion that Jomon people are "hunters and gatherers."

The potteries excavated from Tama Region near Tokyo, and Sannai Region near Aomori in Northern Japan show the beginning of efforts for nonredundant complexity. I interpreted this directly from the pots displayed in museums in Tama and Aomori. My interpretation was confirmed by Prof. Kobayashi of Kokugakuin University, who is the foremost authority on the Jomon culture archaeology.

Judging from the existence of kaizuka (heaps of shellfish shells discarded after meals during a long period time), the ocean level must have been higher then than now. Tama Region is now more than 50 kilometers from Tokyo Bay, and Sannai Region near Aomori is now tens of meters above the sea level. It must have been possible to connect Tama and Sannai by boats during Jomon Period, and exchange of pot designs took place between Tama and Sannai. "Avoidance of repetitions" began in Mid Jomon period, 5,000 years ago. The principle of avoidance of repetitions also occurred much later in garden designs and floral designs in vases. The traditional garden designs originated in Kyoto toward the end of the 14th century. An example is Kinkakuji Garden, 1397. the oldest floral design school was Ikenoboo. Its founder was Sen-ou Ikenoboo, 1483-1543.

On the other hand in Europe, redundant complexity (symmetry, repetitions, hierarchy of themes and subthemes, similarities, arithmetic proportions) became the basic principles of beauty. Parmenides (born about 515BC) considered sphere to be the most beautiful shape, and Pythagoras (born about 580BC) considered

arithmetic proportions to constitute harmony. DaVinci (1452-1519) tried to fit the human body into a square and a circle, implying that the human body is beautiful because it fits in a circle and in a square.

In contrast, harmony among heterogeneous elements was not only the basic design principle in Japan, but also Japanese people used aesthetic designs for ethical teaching, instead of verbal preaching. On the other hand, in Europe, ethics must be explained verbally, not by means of pictorial examples, even though nowadays humorists and cartoonists use pictures for ethical teaching.

Watsuji gave an interesting explanation for the preference for nonredundant complexity among the Japanese. He considered the climate as the cause. He published a book *Fuudo* (1935) (fuu = wind; do =land). It was inspired by Heidegger's *Sein und Zeit*. The word "fuudo" can be considered to mean "Sein und Umwelt" (being and environment), i.e. the relationship between the individual and his/her environment. Watsuji (1889-1960) was born in the same year as Heidegger. Heidegger's *Sein und Zeit* was published in 1927. Initially Watsuji was a specialist in Nietzsche and Kierkegaard. Fortunately Watsuji had read Heidegger's *Sein und Zeit* before Heidegger became a Nazi supporter. Heidegger's concept of "Dasein" gradually deteriorated into "Deutsches Dasein" because Heidegger admired the military life as a paragon of hard work (Löwith 1986).

Watsuji wrote that people who developed their cultures in monsoon regions (such as southeastern and eastern Asia) where heavy rain and storms brought both abundance of harvest and destruction of crops were dependent on weather which had regularity as well as unpredictability. This made them interactive and mutually accommodating. They also saw animals and plants as partners of humans.

He thought that Japan is somewhat unique because Japan combined very cold weather resulting from Siberian influences. (We might add that Korea and Manchuria have the same combination.) Trees in Japan tended to have irregular shapes due to damage by storms and avalanches. Trees in Siberia suffer from the same damage from storms and avalanches, but Siberia had no benefit from Jomon designs. The Japanese, since the mid-Jomon period, preferred nonredundant complexity.

Watsuji continued: Farmers in Japan had to spend 80% to 90% of their labor fighting weeds and insects during the crop growing season. The harvesting

had to be accomplished within a very short time span between the end of the growing season in August and the typhoon season which began in September. A short delay could mean destruction of the crops by typhoons. Therefore harvesting required a high degree of coordination and cooperation among the farmers.

On the other hand in Europe, the weather not only was benign but also had a high degree of predictability. In fact, the European sewage and river systems would be unable to handle a fraction of precipitation volume discharged on lands in monsoon regions. The roadside ditches in Singapore are like deep, wide and swift rivers. If you fall in them, you will be swept away like a straw. But in Europe, animals and plants are easily under human control. Trees have regular forms, like Lego toy trees. Even where there are strong winds, such as Normandy Coast in France, all trees are bent in the same direction, resulting in another type of regularity.

In Europe, humans are masters over animals and plants, not interactive partners. Together with the regularity of tree shapes, this fostered a hierarchical view of the universe. Simple geometric forms like circles, spheres and squared are considered beautiful, high redundancy is preferred over nonredundant complexity.

An additional consideration: I mentioned that in S-type and G-type designs, interactions among heterogeneous elements enhance the individuality of each element. In contrast, in Dutch tulip gardens, flowers are used as color carpets, in which the individuality of each flower disappears. If we use a sociological metaphor, in Dutch tulip gardens the individual flower performs "self-stereotyping" and "ingroup homogenization" for the sake of "group identity" (Maruyama 1999).

Some animal species such as elephants and nonhuman primates are known to draw pictures on canvases with a painting brush. However, missing from the descriptions by observers (Borgia 2005; Rogers and Kaplan 2007; Wells, McDonald and Ringland 2008), is the concept of nonredundant complexity. This is due, most likely, to the inattention by the observer rather than to the conceptual inability of the animals. Elephants seem to like nonredundant complexity, judging from the photo in *Psychology Monitor* (Dingfelder 2008).

In some cases, the animals' own preferences are concretely described. "Like all spotted bowerbirds, one we call "Sam" weaves an archway of twigs that opens into a courtyard where he conducts mating rituals. He then decorates the archway and adjacent area with objects from nearby garbage cans: green glass,

orange bottle caps, black ribbon. When Sam was younger, he used just pile like-colored objects together, like many neighboring birds. Now, after about ten years of practice, Sam fans out, creating intricate, symmetric patterns" (Borgia 2005). (Note the words "like-colored" and "symmetric.")

Missing from all these researchers' discussions is the fact that in some species, females prefer "minority" males, i.e. females prefer whichever happens to be "minority type" among males. It is interesting to note that two groups of researchers, working independently, found this tendency. It is more important to note that of the two groups, one consisted of women in New York, and the other consisted of men in Japan.

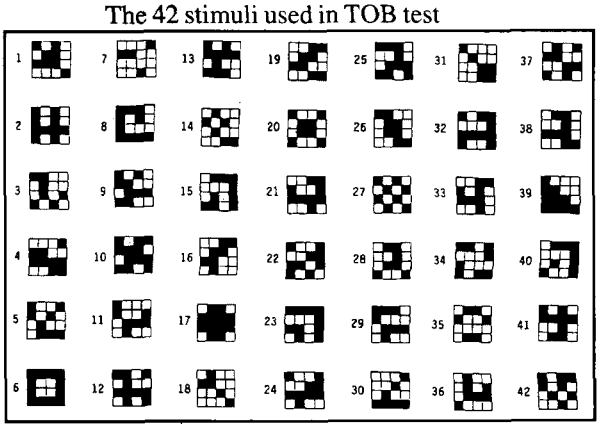
The preference for "minority" in mating leads to heterogenization within one species, whereas if females preferred "supernormal" (more desirable than the "normal"), it leads to homogenization within each species.

One of the two independent research groups consisted of two women in Stonybrook, New York (Ehrman 1972; Ehrman and Probber 1978). The other group consisted of two men in Japan (Watanabe and Kawanishi 1979). Are Japanese males more similar to North American women than to North American men? Judging from data from many cultures, Indonesians are closer to North American females than to North American males.

TOB-TEST AND NONREDUNDANT COMPLEXITY

In the 1990s, a pictorial Gestalt test was devised, using the following 42 patterns as stimuli.

FIGURE 1
The 42 stimuli used in TOB test



These patterns were abstractions of the features of nonredundant complexity: They were abstracted from traditional Japanese gardens and floral configurations in vases, transformed into an array of four-by-four squares, to make the degree of redundant vs. nonredundant complexity quantitatively definable: symmetries (vertical, horizontal, diagonal, rotational, color-reversal), weight balance (horizontal, vertical, diagonal, in which "weight" was defined as distance from axes: the further away from the axis, the heavier).

The four-by-four-arrays representation was convenient because it can be accurately copied without use of artistic talent which would be required if gardens or floral pot design were to be drawn.

The accurately reproducible patterns were practical for use in many countries, for use with many species of animals for evolutionary studies, and for longitudinal studies of individuals in humans as well as in animals.

A very important use of the tests using these visual stimuli was to adapt the learning/teaching methods to the individually different perceptual/cognitive/cogitative/action types of students. (Schools need such tests.)

The test using the 42 patterns was named "TOB Test" because initially it was used in Tokyo, Bruxelles, and Budapest (Maruyama 1995, 1999, 2001).

In the past, when a TOB Test was given, the test-takers manually wrote down their responses on mark sheets as follows (Maruyama 2001): For each of the 42 stimuli (The stimuli sequence was randomized), the test-takers were asked to rate it on a seven-point scale between ugly and beautiful, and to indicate whether the stimuli had any meaning, and if so, to write the meaning, and to indicate whether the meaning was positive or negative, and to rate the intensity of the meaning on a five-point scale. This was important because some stimuli had culture-specific or individual-specific meaning(s), for example, stimulus #10 means "Nazi" in Europe, but "temple" in Japan. Stimuli with strong meanings were eliminated from computation, unless the meaning was the same for all test-takers.

In the future, however, the responses can be measured with fMRI (functional Magnetic Resonance Imaging), with several technological modifications to the fMRI machines currently in use (Maruyama2003).

Currently, the MRI machines are designed for hospital use, for diagnostic purposes such as brain injury, brain poisoning, stroke, cancer, tumor. These hospital

fMRI machines are bulky, heavy and expensive, and the tested individuals must stay motionless during the test. For school use, however, the machine must be small, light and inexpensive, to be worn like a helmet enabling children and students to move around and interact.

The fMRI machines of today are bulky and heavy because they use two sets of electromagnets, each of which is bulky and heavy. The main magnetic field is a steady DC (direct current) field. The second magnetic field is perpendicular to the first magnetic field, and is an AC (alternating current) of varying oscillation frequencies (Hertz, abbreviated as Hz) to produce resonance.

The electricity which comes from outside to the hospital is AC, and has a fixed voltage (V) and a fixed Hz (usually around 100 V or 110 V in North America and Japan, and 60 Hz depending on countries). This electricity from outside has to be changed to DC first. There are two ways to produce DC from AC: (a) to use a rectifier (a device which passes current in one direction and blocks current in the other direction); or (b) to drive a DC motor to produce an AC of the desired voltage, and then to rectify the AC to obtain DC: in order to change voltage, a transformer is needed. A transformer is a rectangular block of laminated iron "core," quite heavy. This core has two sides: The input side (called "primary") and the output side (called "secondary"). Both the input side and the output side have copper wires wound around the core, and the ratio of the windings correspond to the ratio of input/output voltage. The current going through these wires produces mush heat generated by eddy currents in each sheet of the laminated core. Large transformers are dipped in oil to dissipate this heat. Thus, transformers are quite heavy. Rectifiers are also heavy. Therefore transformers and rectifiers cannot be mounted on the helmet.

Our solution is to mount all these heavy components on the ceiling or on the walls to magnetize an entire room, and let people move around and interact in the room. The position, the angle and the speed of the movements of the head can be monitored by cameras, and computer-compensated. In this way the helmet can transmit the brain output.

Currently, there are three major manufacturers of fMRI equipment: Varian Associates, Siemens, and General Electric. None of them has begun R&D on the helmet version, because they are still making profit from their hospital versions. In the future, when the helmet versions are used by all schools and all human

resources departments of business firms, the mass production will become profitable and at the same time will make the unit price low.

RELATIONSHIP BETWEEN MINDSCAPE TYPES AND NONREDUNDANT COMPLEXITY

Mindscape types are closely related to causal metatypes and therefore also to the theory types. We have said that the basic principle of biological, social and some physical processes is to raise the level of the sophistication of systems by interactive heterogeneity (Maruyama 1960, 1963). Let us examine how the concept of evolution is affected by causal metatypes. There are four main causal metatypes: (1) nonreciprocal causal models; (2) independent event models; (3) homeostatic causal models; (4) morphogenetic causal models.

In nonreciprocal causal models, there are no causal loops. The causal relations obey the transitive law (law of sequence). Nonreciprocal causal models may be probabilistic (cause-effect relations occur with some probability) or deterministic (certainty instead of probability).

In independent event models, the most probable state of the universe as well as subuniverses (isolated systems) are states of random distribution of independent events, each behaving with its own probability. Nonrandom (structured) states exist, but tend to decay into more random, even and homogeneous states, like a sand castle blown by winds.

Homeostatic causal loop models may be probabilistic or deterministic, and interactions among elements tend to maintain a stable pattern. One variation of the homeostatic causal models is a periodic cyclic oscillation such as economic cycles, which occur because of delayed corrective feedback.

Morphogenetic causal loop models may be probabilistic or deterministic, and interactions among elements tend to amplify change, increase heterogeneity, and raise the level of the sophistication within and between systems. Nonredundant complexity can gradually and steadily grow, even though some types of nonredundant complexity can occur as a result of external influences such as trees broken by storms.

EVOLUTIONARY INCREASE OF NONREDUNDANT COMPLEXITY

Different causal metatypes produce different theories of evolution.

(1) In nonreciprocal causal models, evolution occurs because of competition, including competition in mate selection. Mate selection tends to occur in the direction of supernormality (more desirable than normal color, shape, etc.). Experimentally, supernormality is found by artificial, exaggerated dummies as stimuli. Preferences for supernormal individuals leads to homogenization within a species. (But in some species, females prefer "minority" males, not supernormal males.) Another characteristic of the nonreciprocal causal models is the concepts of hierarchy, raking, and categorization and classification.

(2) In independent-event models, evolution is due to random changes. Whatever happens to get established perpetuates itself until another random change replaces it. Therefore stability is punctuated by sudden unforeseen changes (such as volcanic eruptions, earthquakes, meteorites hitting the earth). Evolution is haphazard and has no coherent direction. Random changes are not likely to accumulate in a consistent direction. Therefore the emergence of a new form must occur in unpredictable jumps and leaps.

(3) In homeostatic causal loop models, evolution is the result of interactions among heterogeneous elements. For a given local condition (size of space, energy supply, temperature, food), evolution will either proceed toward a stable configuration of interactions or go into periodic cycles. Existing cultures are the result of a long evolutionary process. Each culture fits its local condition and has attained a stable internal configuration which is perfect and should not be disturbed. Changes are due to influences from outside or occasional inventions within the cultures. Cultures tend to remain stable, occasionally changing stepwise.

(4) In morphogenetic causal loop models, interactions continuously generate heterogeneity and new patterns of mutually beneficial relations among heterogeneous elements. The development may be gradual or rapid. Changes need not occur in leaps. Usually they occur continuously and gradually. However, leaps may occur because of either very rapid change or exceeding

of a threshold. Since "kicks" in various directions may be amplified by causal loops, there are many possible directions of evolution, even within the same local condition.

HYPOTHESIS FORMULATION

There are also differences in the procedure of hypothesis formulation in different causal metatypes. Often a wrong causal metatypes is used, making you "miss the point." In nonreciprocal causal models, it is assumed that similar conditions produce, with some probability distribution, similar results. Therefore, if dissimilar results (for example, differences between identical twins) are found, it is inferred that the conditions must have been dissimilar. A hypothesis is formulated as to what was different in the conditions (for example, nutrition, social environment).

In homeostatic causal loop models, dissimilar conditions may lead to similar results.

In morphogenetic causal loop models, similar conditions may lead to very dissimilar results because of difference-amplification. Small fluctuations in the initial condition, which are within the range of high probability, may lead to large differences, which seem to have low probability. Consequently, dissimilar results may not be due to differences in initial conditions. To look for a proportional difference in initial conditions is a waste of effort. Instead, we must look for amplifying causal loops. If you ask a wrong question, you get a wrong answer.

For example, many sociologists and psychologists have attempted to explain the differences between Swedish culture and Danish culture on the hypotheses of climatic, dietary, landscape and other differences. None of these hypotheses have proven satisfactory. Analysis of internal amplification within Danish culture has been more fruitful (Maruyama 1961).

CONCLUSION

In spite of the fact that I began writing about nonredundant complexity in 1980 (Maruyama 1980), i.e. almost 30 years ago, and I kept elaborating on it (Maruyama 1981, 1984, 1991, 1992, 1994, 1995, 1999, 2001, 2004), it is the concept least understood outside Asia. I am not sure whether this article will be understood now. But I am sure that in 10 or 20 years it will be understood.

Therefore it is worthwhile to publish it.

Postscript

I thank Professor Subrata Chakraborty, who, as editor of journals, began publishing my articles in 2002, with the most conscientious efforts for eliminating printer's errors (I quoted from several languages which have accent marks not available in English: German, French, Danish, Swedish, Hungarian). Above all, Professor Chakraborty is very supportive of anyone's unorthodox theories. He is making his journal to be the cutting edge for creativity.

Professor Subrata Chakraborty encourages unorthodox manuscripts from writers whose theories are unacceptable to the "mainstream" journals, which tend to inbreed by means of procedures such as peer review, which is a mechanism to reject those who do not please inbreeders (Maruyama 1991b, 1998).

Professor Chakraborty, as a careful editor, is highly aware that most of the mainstream journals are published in English and are negligent or even hostile to non-English accent marks. I quote from several languages which have accent marks not available in English, for example: German, French, Danish, Swedish, Norwegian, Hungarian, Finnish. He has been very accurate in the use of non-English accent marks.

Furthermore, the perceptual/cognitive/cogitative/action types of non-English speakers are often very different from those of English speakers, and the differences are NOT linguistic (as many Anglophones assume), but are cultural. Therefore, I encourage non-Anglophone writers to publish their manuscripts in Professor Chakraborty's journal. Even though you have to write your manuscripts in English, Professor Chakraborty and his assistants allow for non-English quotes, and avoid anglophonizing foreign concepts. (Many Anglophone editors and printers assume that if some foreign word looks similar to a word in English, they must have the same meaning.)

There are also cultural differences in the "tournure d'esprit" (the frame of mind in which the concepts are structured). You are welcome to use your own tournure, with cultural explanations. Professor Chakraborty's journal will respect such explanations.

REFERENCES

Borgia, G. (2005) Why do bowerbirds build bowers? in Paul W. Sherman (Ed); John Clock (Ed). Exploring animal behavior. In *Readings from American Scientist*, 4th Edition, pp. 175-180. Sunderland, Massachusetts: Sinauer Associates.

Dingfelder, S. (2008) My elephant could have painted that. *Psychology Monitor*, December 2008 issue, pp. 31-33.

Ehrman, L. (1972) Rare male advantages and sexual isolation in Drosophila immigrants. *Behavior genetics 2: 79-83.*

Ehrman, L. and Probber, J. (1978) Rare drosophila males. *American Scientist* 66: 251-296.

Löwith, K. (1986) *Mein Leben in Deutschland vor und nach 1933.* Stuttgart: Carl Ernst Poeschel Verlag.

Maruyama, M. (1960) Morphogenesis and morphostasis. *Methodos* (Italy) 12: 251-296.

Maruyama, M. (1961) Multilateral causal relationships among the modes of communication, sociometric pattern, and intellectual orientation in the Danish culture. *Phylon* 41-58.

Maruyama, M. (1963) The second cybernetics: deviation-amplifying mutual causal processes. *American Scientist* 51: 164-179; 250-256.

Maruyama, M. (1980) Mindscapes and science theories. *Current Anthropology* 21: 589-599.

Maruyama, M. (1981) Denkmuster: Metaprinzipien der Umweltgestaltung. *Garten und Landschaft* October issue, pp. 806-815.

Maruyama, M. (1984) Alternative concepts of management: insights from Asia and Africa. *Asia Pacific Journal of Management* 1: 100-111.

Maruyama, M. (1985) Mindscapes: how to understand specific situations in multicultural management. *Asia Pacific Journal of Management* 2: 125-149.

Maruyama, M. (1991) Mentiforms et.

Maruyama, M. (1992) Entropy, beauty and eumorphy. *Cybernetics* 35: 195-206.

Maruyama, M. (1993) Mindscapes, individuals and cultures in management. *Journal of Management Inquiry* 2: 140-155.

Maruyama, M. (1994) *Mindscapes in Management: Use of Individual Differences in Multicultural Management.* Aldershot (England): Dartmouth.

Maruyama, M. (1995) Individual epistemological heterogeneity across cultures. *Cybernetics* 37: 215-249.

Maruyama, M. (1999) Heterogram analysis: where the assumption of normal distribution is illogical. *Human Systems Management* 18: 53-60.

Maruyama, M. (2001) Individual types: subcultural or transcultural? *General Psychologist* 36: 64-67.

Maruyama, M. (2003a) Interactive heterogeneity. *International Review of Sociology* 13: 499-506; 607-628.

Maruyama, M. (2003b) New technologies in brain study. *Futures Research Quarterly*, summer issue, pp. 13-22.

Rogers, L. J. and Kaplan, G. (2007) *Elephants that Point, Birds that make Music: Do Animals have an Aesthetic Sense?* Pp. 137-150, in Cynthia Read (Ed), *Cerebrum 2007: Emerging Ideas in Brain Science.* Washington DC: Dana Press.

Watsuji, T. (1935) *Fuudo.* Tokyo: United Nations University Press.

Watanabe, T. and Kawanishi, M. (1979). Mating preference and the direction of evolution in drosophila. *Science* 205: 906-907.

Wells, D. L., McDonald, C. L., Ringland, J. E. (2008) color preferences in gorillas. *Journal of Comparative Psychology* 122: 213-219.

Chief Editor's Note

How management educators and practitioners could benefit from the work of Prof. Magoroh Maruyama, may be a question coming up in the minds of readers after going through his two articles appearing in this issue. In today's uncertain business world, where cross-functional teams have become a necessity, Prof. Maruyama's work could be gainfully leveraged in building such teams in work places having people from multiple cultures. Observations, suggestions and sharing of experiences would be welcome from the readers.