

The Mind-body Problem and Activity: Is Intelligence Useful in Environmental Protection Activities?

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Abstract. Using a questionnaire, we investigated the relationship between an affinity for places and the removal of illegally dumped waste by surveying 124 anonymous Japanese men and women, most of whom were in their 20s. The survey results are intended to be published on the Internet. The relationship between degree of an affinity for places and score of the removal of illegally dumped waste showed a high lineality; high precision of conformity with a decision coefficient of 0.8278 in a linear approximation. It means that respondents with an affinity for places tend to remove the illegally dumped waste. The reasons for the removal of illegally dumped waste from the district in which the subject lives were: embarrassing, 10.53%; bad impression, 25.26%; an affinity, 28.4%; fairness, 12.6%; ignored, 23.16%. The intellectual motives such as shame, the image or fairness were not more dominant than an affinity motive. For a person to perform the removal of illegally dumped waste, the motive seems to be based on an affinity to the geographic area (a place that the person knows well or has resided for a long period) rather than social factors such as shame or an undesirable image. With the spread of an affinity toward the environment, even if the action of people is not intellectual, it is expected that they will recognize the environment as a whole. Affinity suggests an important function in forming an "earth family". Moreover, by the application of the Internet to environmental protection activities, we confirmed that the affinity increases the consciousness of the activities. At real time, the respondents upload to the internet the amount of illegally dumped waste that they found at the district where they live, and the data of the personal unpleasant degree for this waste. We applied such subjective data to obtain the real feeling of living environment. Utilization of the Internet for environmental protection seems to be very effective to investigate the human sense against various environment disruption; wild animal, deforestation and water pollution and so on. Activities such as disclosing information about environmental disruption, the interchange of people, collaboration, and observation of wildlife will lead to a basic resolution of these problems through understanding of natural systems and their connections to the self. For this reason, as actual environmental protection, we propose the foundation of a demilitarized international environmental rescue party (tentative name) to wasteland recovery, and ecosystem protection.

Keywords: Mind-body problem, Self, Other, Environmental protection, Illegal dumping, Affinity, Morals, Intelligence, Internet, Rescue team, Plasmodium, *Physarum polycephalum*, Galvanotaxis

1. Introduction

The destruction of the natural environment worsens by the day. Measures such as the enactment of environmental laws have been carried out, but the situation continues to escalate, in part because recognition of the importance of natural environments is currently insufficient. All components of the natural environment are closely connected and have interdependent functions. Therefore, to understand the enormous system of natural environments, it is necessary to establish a method to infer the behavior of the whole system from the relationships between elements rather than from the analysis of individual elements. Environmental protection depends upon human cooperation because the natural environment is closely related to the daily lives of humans. However, humans are basically egotistical [1] and tend to think only of their personal happiness, or satisfaction of the self. However, it remains unclear precisely what the "self" is.

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We understand nothing more than the feeling of happiness from satisfying a desire according to the situation. Despite this human characteristic, how can we protect the natural environments that are the common property of all of us? For the realization of environmental protection, perhaps we may rely on human morals, an intellectual property, because humans have a social nature. The protection of the natural environment should be a sustained public activity by the free will of people. However, it is necessary to determine whether we can rely on our morals to generate environmental protection.

The mind-body problem involves a psychophysical dualism that asserts that the body and the mind are independent of each other, as well as the monism that they are two aspects of the same thing [2]. The monism considers the mind to be a set of various functions of the brain, but does not yet provide a satisfactory solution from a physiological point of view. The brain is not apparent in the mind-body problem as the origin of the mind. Analytical research continues to map specific functions onto specific brain sites and connect neural networks to mental functions such as creativity. However, the area of the brain that houses the mind and the sense of self has not been identified. The mind and body are closely connected not only with each other but also with the outside world. When we regard the body A, the mind B, and the outside world C as one system S, the characteristics of the system S may be identified by investigating the dynamic behavior of the system S. Suppose that this system exhibits behavior D. Because A, B, and C have relationships to each other, they are not independent variables.

However, the function that expressed each relationship is unknown. Nevertheless, we can examine how behavior D changes under the influences of elements A, B, and C. Investigation of the dynamic behavior of system S from the interrelationships of A, B, and C may clarify the mental mechanism of intelligence and consciousness that are supposed to be psychophysically integrated actions.

It is unknown whether we can clarify the origin of the mind B, but the relationship between the other variables is becoming clear. To understand the signals coming from the outside world and to communicate with others, the brain in the stages of development builds a speech system by using plasticity, one of the characteristics of the brain, for adaptation to the outside world. This speech system, sometimes manifested internally as thoughts or feelings, is constantly being forced to update itself by external stimuli, especially the words that other people use.

One idea from quantum mechanics suggests replacing language with waves and linguistic understanding with resonance phenomenon. Because of this, we cannot consider the mind-body problem to be simply a brain phenomenon because it requires the existence of the outside world for enlightenment. Furthermore, in protozoa that have no brain, communication between protozoa in reaction to signals from the outside world may be observed. It may be supposed that adaptation to the outside world necessitates a developed brain and a substitute organ for survival. Even if the brain is capable of creating an intrinsic mind, external stimulation is necessary to enlighten the brain. Conversely, human thinking and all signals from the outside world may be thought of as mind waves and the human brain may be thought of as a resonance machine that updates, edits, and uses this wave information. Because understanding is agreement by a logical form peculiar to humans.

In this paper, we suggest the possibility for understanding a characteristic of the human mind, affinity for a location, by examining system S according to its relationships rather than its causation. Human behavior is considered to be based on an intellectual characteristic, morality, which is essentially an autonomous capacity. There are two types of morals [4]. One is the moral as the social intelligence, which is produced by the evolution of reciprocal altruism as known in reciprocal food sharing in the vampire bat [5,6,7,8,9]. Another is moral as the educated intelligence which is not depending on altruism; the fairness based on the concept of responsibility or justice[10,11].) Using a simple questionnaire regarding the issue of environmental protection activities, we investigated the responses of humans (self) to the environment (the other), the relationship between the self and the other, and the relationship between behavior and the environment. If a human has intelligence, his or her behavior may bring about the effect of social intelligence. What, then, is intellectual behavior? Does a human have intelligence by which he behaves in concert with the environment? In addition, in everyday life, what conditions are required to elicit environmental protection activities as an intellectual action?

To better understand the origin of human behavior in response to the environment, we investigated the galvanotaxis of a plasmodium of *Physarum polycephalum*. From the results, we sought a method by which humans can take autonomous action for environmental protection.

2. Methods

A questionnaire regarding affinity for places and the removal of illegally dumped waste

Using a questionnaire, we investigated the relationship between an affinity for places and the removal of illegally dumped waste by surveying 124 anonymous Japanese men and women, most of whom were in their 20s; in range of 30 years from age of 19. The survey results are intended to be published on the Internet.

2.1. Affinity for Places

We investigated each subject's affinity for places using a 5-point scoring system, in which 1 represented the highest affinity and 5 represented the lowest affinity. The five places that were scored were the front yard of the subject's home, the family vegetable garden near the house, a park in the neighborhood, a hiking trail, and an unknown railway station.

2.2. Removal of Illegally Dumped Waste

Each subject was given the hypothetical situation of discovering that radioactive waste was illegally dumped in the five places that were scored. Although this waste did not affect human health, each subject was asked how he or she would remove the material by one of the following three possibilities: 1) request removal assistance from a public organization; 2) remove it without assistance; or 3) do not remove it. Responses constituted the neglect score, with a higher number representing more neglect.

2.3. Rationale for Each Subject's Answers

After looking at a map of the sites with illegally dumped waste, each subject was asked the following questions.

Q: When you find out that a large quantity of radioactive waste has been illegally dumped in the district where you live, do you remove it, and if so, why?

1. Yes, it is embarrassing.
2. Yes, it gives a bad impression (bad image).
3. Yes, there is an affinity for the district.
4. Yes, it is my full duty as man.
5. No, I would ignore it and allow it to stand.
6. Other.

Q: When you find out that a large quantity of radioactive waste has been illegally dumped in the district where you live in a house you own or rent, do you want to continue to live in your current house or do you want to move to another house in a district that has no illegally dumped waste? You may assume that the other house is similar in floor plan and other conditions to the house where you currently live. Regardless of whether you choose to move, do you remove the illegally dumped waste?

1. I would continue to live in my current house after removal of the illegally dumped waste.
2. I would continue to live in my current house without removal of the illegally dumped waste.
3. I would move to another house without removal of the illegally dumped waste.
4. Other.

2.4. Element of the Affinity

By a questionnaire method, we asked subjects the principal element which constitutes their affinity for places. As multiple choices allowed, we give them several elements such as:

1. (Experience). I know this place very well from my personal experience.
2. (Safety check). There is safe place

3. (Management). I can clean the place, or I can use it for myself; as vegetable garden and so on.
4. (Memory). There are good memories at this place.
5. (Communication) I want to exchange my idea with family or friend at this place.
6. (Relaxation). This place gives me peace of mind.
7. (Mental integration). I feel uncomfortable, when someone condemns the place or when he makes it dirty.
8. Other.

2.5. Application of the Affinity Data for Relational Database and Internet

To obtain the real feeling of living environment, personal impression data of the subjects are investigated. For this reason, we make a design of the relational database which contains the affinity elements. We apply for this RDB to activity of environmental protection by internet which anyone can participate in the activities. At real time, the subjects upload to the internet the amount of illegally dumped waste that they found at the district where they live, and the data of the personal unpleasant degree for this waste, using a 4-point scoring system; 3: large, 2: medium and 1:small and 0:nothing. Subsequently, we make a survey of the consciousness of subjects concerning with environment protection activity, ie, the waste removal, before and after upload of their personal data.

3. Results

(1)(2) Questionnaire regarding affinity for places and the removal of illegally dumped waste

As shown in Figure 1, the place affinity, from highest to lowest, was: the front yard of the home, the family vegetable garden near the house, a park in the neighborhood, a hiking trail, and an unknown railway station. The neglect score, from highest to lowest, showed the reverse order: an unknown railway station received the most neglect, while the front yard of the home received the least neglect.

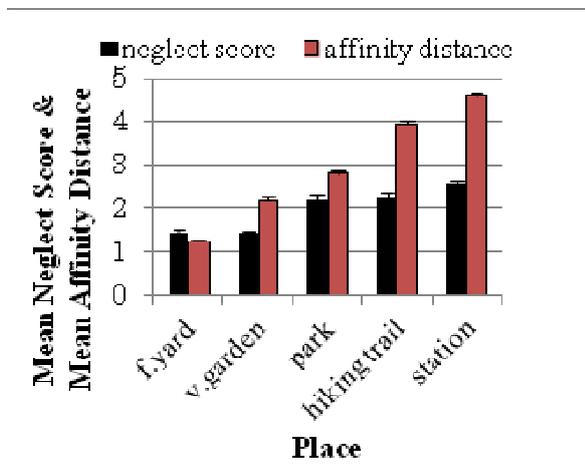


Fig. 1: Mean Affinity Distance and Neglect Score. The both are dimensionless quantities with SE. Blue: negative score. Red: affinity distance.

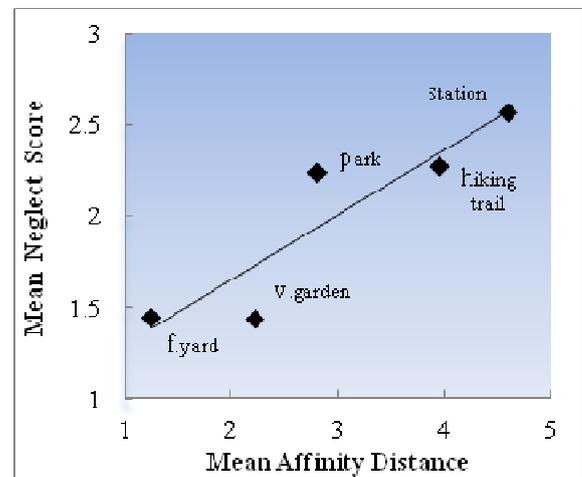


Fig. 2: The Affinity Distance and Neglect Score. The both are dimensionless quantities.

The relationship between place affinity and neglect score showed a high precision of conformity with a decision coefficient of 0.8278 in a linear approximation and a decision coefficient of 0.8273 in a multinomial expression approximation (Figure 2).

(3) The reasons for the removal of illegally dumped waste from the district in which the subject lives were: it is embarrassing, 10.53%; it gave a bad impression, 25.26%; it is an affinity, 28.4%; it is fairness, 12.6% ; it could be ignored, 23.16%;. The intellectual motives such as shame, the image or fairness were not more dominant than an affinity motive (Figure 3).

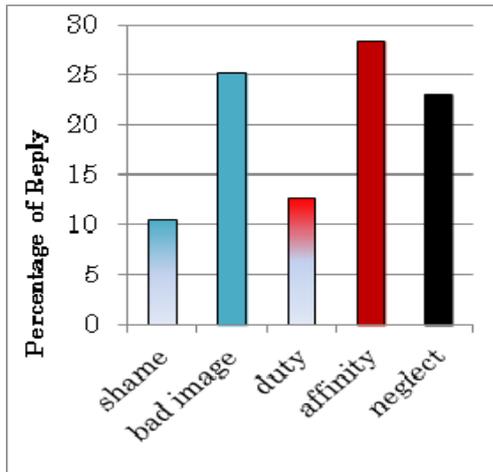


Fig. 3: The Reason for the Removal of Illegally Dumped Waste. The morals as social intelligence (shame and bad image) amount to 35.8 % and the morals as educated intelligence (fairness; duty) amount to 12.6 %.

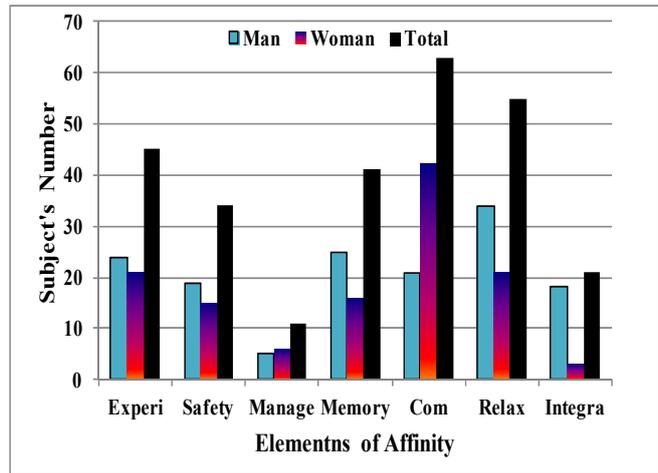


Fig. 4: The Elements of Affinity. Each figure is number of subjects who chose the best fitted one as the element of affinity from several elements. Experi.; experience, Manage.; management. Com.; communication, Relax.; relaxation, Integra.; integration.

When subjects were asked about changing houses or remaining in their houses with removing the illegally dumped waste, 43.2% of subjects would remain in a house that they owned and 24.2% would remain in a house that they rented. Of subjects that would change houses without removing the waste, 33.7% would leave a house that they owned and 62.1% would leave a house that they rented. Subjects showed the highest response for removing the illegally dumped waste from the front yard of a house that they owned.

(4) As shown in Figure 4, the size of the elements in the affinity, in descending order, are communication, relaxation, experience, memory, safety, integration and management. The elements can be separated into two classes which are composed of the operating elements and the mental elements. In fact, according to the principal factor analysis, these elements are classified as the factor I as operator: safety (-0.74), experience (-0.62) and management (-0.41), the factor II as feeling: relaxation (0.60), memory (0.56) and integration (0.48), and the factor III as communication (-0.69).

In order to investigate the elements of affinity, we asked the same subjects for multi choice about element pairs which has close relationship as shown in table 1 to table 4, and figure 5.

Here, table 2, 3 and 4 show the elements of affinity of the man and woman.

Table 1: The Mutual Relationship between Elements of Affinity and Number of Subjects.

Experi	Safe	Mane	Com	Memo	Relax	Integr	
	10	11	8	16	6	7	Experi
		13	4	12	10	7	Safe
			3	6	8	6	Mane
				9	9	4	Com
					21	9	Memo
						5	Relax
							Integr

Table shows relation which subject recognized close relationship between two elements of the affinity.

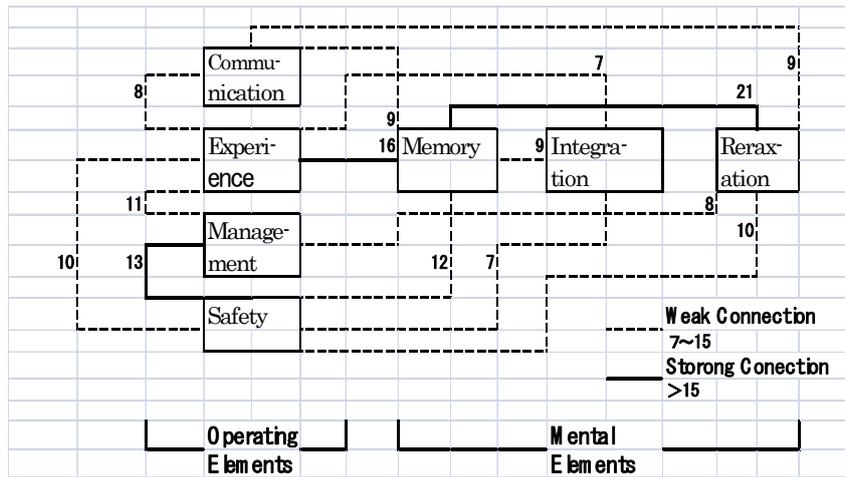


Fig.5: The Connection of the Elements of Affinity. Score: number of subjects (answer number).

Table 2: The Classified Elements of Affinity and Number of Subjects Op.Group: operation elements. Men Group; mental elements. Com; communication.

	Op. Group				Men.Group				Com
	Experi	Safe	Manege	Total	Memory	Rerax	Integr	Total	
Man	24	19	5	48	25	34	18	77	21
Woman	21	15	6	42	16	21	3	40	42

Table 3: The Test for Independence of Two Elements of Affinity of the Man and Woman

The chi-square test (X2-test) and the Fisher's exact test in 2x2 contingency table, at significant level 5%. p value as shown in p.0.014; the Fisher's exact test shows $0.014 < 2\alpha = 0.1$, two-sided test for integration element and experiment element of the man and woman. The bold-face shows significant difference.

	Relax	Safe	Maneg	Memory	Com	Integr
Experi	0.73	0.050733	0.00613	0.511143	4.32	p: 0.014
Relax	*	0.307338	0.00704	0.00704	9.5744	p: 0.056
Safty		*	0.06499	0.198839	4.6335	p: 0.037
Maneg			*	0.341098	0.18901	p: 034
Memory				*	7.6934	p: 0.080
Com					*	p:3.31e-05

Table 4: The Test for Independence of Two Elements of Affinity of the Man and Woman

The chi-square test (X2-test) for the classified elements. Op. Group + Com; new group which operation elements and community element combined as well as a new group Men.Group+Com; mental elements and community element.

	Men. Group	Com	Op.Group+Com	Men.Group+Com
Op. Group	3.311	5.99	*	0.03
Men. Group	*	14.80	11.45	*

The results show strong connection between memory and relaxation, between experience and memory, and between management and safety. And also, it show weak connection between other couplings. The independency test about any two elements of the affinity, showed that a woman is affected by a

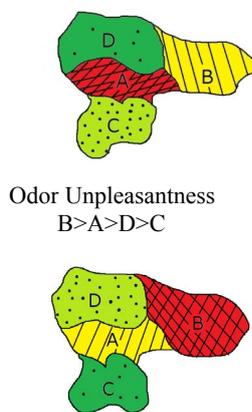
communication element for formation of the affinity, and showed that mental element gives influence to a man .

(5) For design of RDB, we applied the elements of affinity such as safety, experience, management, and communication as operating elements, and elements of memory, relaxation and integration as mental elements in addition to air pollution, water pollution, unusual temperature, decrement of the wild animals, and so on, as the elements of environment disorder.

Figure 6 shows subject's data for the illegal dumping waste on the map of the district where subject lives in. It is confirmed that the Internet increases the consciousness of the subject for environment protection activities, than when not using the Internet information.

In the test about whether the subjects clean up the waste by themselves or not, the Fisher's exact test showed $0.0236069 < 2\alpha = 0.1$ at significant level 5%, two-sided test for the presence or absence of Internet information of the waste. On the other hand, the test showed no significant difference(0.136364) in the dependence on the public institutions for cleaning. In whether subject wants a permanent residence in the same house, it showed also no significant difference(0.016295).

Amount of Waste (illegal dumping)
score; A>B>C>D



district	normalized population density/B)	amount of waste (AV)	SE	order unpleasantness (AV)	SE
A(56)	1.00	1.50	0.77	1.17	0.13
B(38)	3.18	1.07	0.09	0.97	0.13
C(156)	4.99	1.55	0.05	1.35	0.08
D(16)	1.31	1.31	0.15	0.88	0.15

Fig. 6: Impression Investigation of the Illegal Dumping Waste by the internet.

A (24) is the number of subjects in the district A.

4. Discussion

The relationship between mental intelligence and a physical behavior can be investigated easily by application of the questionnaire method. To obtain information for solving the mind-body problem, we investigated the behavior of people regarding environmental protection. When deeply involved with one's belongings, hometown, and family, it is well known that one's attachment to these objects deepens. Our survey results support this phenomenon. According to our investigation, in proportion to the strength of the affinity to a specific place, a person will actively seek the removal of waste illegally dumped in that place, and this tendency was particularly marked in permanent residents. Humans have a sense of morality that reflects their intelligence and is said to be a model for their actions. These morals as intelligence are considered to represent an essential human characteristic for supporting the social order. But, intellectual motives such as shame, a bad image or duty as fairness are not necessarily more dominant than an affinity motive for prompting the removal of illegally dumped waste. The present results suggest the influence of a different factor, an affinity other than morals for making a social demand. Whatever the motivation of environmental protection activities, it is important that people sustain them without being forced.

The challenge is to instill in people an affinity for other regions and thus for other populations. The environmental problem requires that people work across geographic borders for environmental protection against global warming, air pollution, disruption of ecosystems, and other forms of environmental destruction that affect everyone. Activities such as disclosing information about environmental disruption,

the interchange of people, collaboration, and observation of wildlife will lead to a basic resolution of these problems through understanding of natural systems and their connections to the self. For this reason, we propose to have all people participate in some type of natural environment protection activity through the Internet to foster an expanded geographic affinity. Moreover, we propose the foundation of an environmental rescue party to perform environmental protection activities such as disaster relief instead of the armed forces. When people come to be interested in other geographic areas as members of an "earth family", an environmental rescue party could facilitate disaster rescue operations, wasteland recovery, and habitat protection. Financial support from governments or private enterprises, international collaboration, material resources, and professional expertise could be made available. When a person farms for a living to gain stable provisions, he or she must remove objects and conditions that threaten his or her living environment.

By the way, we do not know the origin of the human affinity that the mind relates to outer world.

In order to obtain new findings concerning with the affinity and its element, we investigate the behavior of plasmodia; *physarum polycepharum*. In our experiments with plasmodia and galvanotaxis, once a plasmodium had the experience of electrical stimulation, its crawling speed increased with or without additional electrical stimulation relative to its crawling speed before experiencing electrical stimulation. And also, our previous research has suggested the presence of memory in the plasmodium using a T-shaped road experiment [3]. The experimental results showed that such a change seemed to be sustained for several days.

Memory storage of dangerous experiences encountered in the past is very useful for such a safety check. These physiological changes, that is, the high membrane potential and an accumulation of ions after the electrical stimulation, may be the cause of the increased sensitivity of the electroreceptor and may affect the crawling speed without electrical stimulation.

The memory of negative stimulation experience is indispensable to survival; even if it is held in short-term memory, it is related to the protection of the self from damage by receiving the same stimulation again. Affinity may have originated as a safety check, i.e., a means of self-preservation from dangerous objects including negative stimulation. Memory storage of dangerous experiences encountered in the past is very useful for such a safety check. This necessity may have caused the brain function to evolve in its ability to discern between necessary and unnecessary things, as well as between beneficial and detrimental things. This behavior based on the brain functions, is a destiny imposed on a permanent resident. We, however, expect that the primitive animal will be able to give us various suggestions about the relationship between a mind and outer world.

5. Conclusion

To keep the life style in accord with nature, we need the environmental protection activity. This activity is a problem of each person receiving a benefit from natural environments basically. It is effective to have an affinity toward natural environments to raise awareness of the individual for the activity. The affinity shows that mind has close relations with others of the outer world. By extension to the outer world of the self-consciousness, we can relate each other, and the ability of extension may be survival instinct of all life. Even if the ability of this interaction is a function of the frontal association cortex physiologically, it is ability which is inspired by others.

But also, interaction ability is necessary for the creature such as a protozoans which has no brain for adaptation to the environment. The investigation of the protozoans, it may give us new findings about physiological mechanism of a affinity, and about the mind body problem.

The affinity are divided into an element about operation, and an element about mind. By this investigation, we obtained useful suggestion that a woman is affected by a communication element for formation of the affinity, and showed that mental element gives influence to a man. If we take the action to be related to an operational element and we can confirm a mental element produced by the action, we may have an affinity. Internet by application of the relational data base about the affinity, is useful for raising awareness of the activity. The activity by Internet is based on the virtual reality of nature environment. But, in order to experience the real world, we need real activity like the activity of international environment rescue party.

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