3.1 *Propagation*

Social information is generated in *HACS* such as a psychic system or a social system. As HACS is a closed system, the semantic content of *social information* is hardly transmitted to the outside. Namely we cannot believe that simple dissemination of *mechanical information* ensures correct transmission of its semantic content to people. On the contrary, it may invite misunderstandings or misinterpretations.

It is *the medium* that helps minimize misinterpretation and transmit the semantic contents of social information as correctly as possible. But for media our social life could never hold. Strictly speaking, the transmission of semantic contents through a medium is nothing more than pseudo-transmission. "The medium is the message", as Marshall McLuhan indicated, and the semantic content changes in various ways depending on media. Hence, it becomes one of the greatest issues for *fundamental informatics* to analyze how it changes and clarify the interpretation process of social information.

A medium has two functions: the first one is the enlargement of mechanical information propagation range. This function is related to many technologies how to transmit, store, and process symbols, and the media corresponding to which are called "*Verbreitungs (propagation/transmission) media*". They are conventionally classified by their equipments and institutions into well-known categories like the mail service, newspaper, magazine, book, telephone, radio, TV, Internet, etc.

Traditionally Verbreitungs media have often been classified into two types, *telecommunication* and *broad casting*, or *analogue* and *digital*. But the boundary between them is gradually becoming vague with the development of digital ICT. We all know at present that we can download a screen image originally made for broadcasting through telecommunication lines. Analogue television service was already replaced by digital service here in Japan. Internet mail system has substituted for most of conventional mail service. Even newspapers and magazines are partly changing into electronic books. Like them, the digitalization efforts for integrating almost all Verbreitungs media into Internet service is one of the prominent features of the 21st century information society. Digitalization is expected to improve greatly the efficiency of Verbreitungs media and attain mass transmission of mechanical information. However, the effect of digitalization on the transmission of semantic contents is still an open question.

The second function of a medium is to *mediate social information* logically and/or emotionally by the use of Verbreitungs media. That is, the purpose of the function is to establish order and *achieve communication*. Let us take an example of conversation between two persons. The medium must put an order to the argument so as not to digress from the main point. We call the media which have such a function "*Erfolgs (success/succession) media*". (Both Verbreitungs media and Erfolgs media are from Luhmann's terminology.)

Unlike Verbreitungs media, we do not regard Erfolgs media as a kind of media in our everyday vocabulary. But they are well known in the field of theoretical sociology, and considered essential concepts to analyze information phenomena through the approach of systems theory. We will describe them in detail after next lessons.

These two media, Verbreitungs media and Erfolgs media, are both related mainly to *micro-scale information phenomena* of comparatively long distance transmission in a short time span. An instantaneous communication between two persons is a good example. On the other hand, there are also *macro-scale information phenomena* which appear by the accumulation of micro-scale information phenomena. They correspond to the birth of values or ideas within a social group (esp. a community), and their dissemination there in a long time span. Such macro-scale information phenomena are truly important because they actually determine how an information society looks like. In comparison with "communication" which is short-term, we call this kind of information transmission "*propagation*", which is long-term and considered having historical effects.

In fundamental informatics, the propagation is discussed based on hierarchical relations among various HACS. Roughly speaking, the accumulation of communications in a low level HACS can often be seen as propagation from an upper level HACS. Furthermore attention should be paid to the birth and death of a HACS from a historical viewpoint.

● Supplements and Applications

Semiology (semiotics) and communication studies have attracted much academic concern in the 20th century. On the other hand, a philosopher Régis Debray proposed a

new theory termed "*mediology*" since the 1990s, which mainly analyzes diachronic or historical propagation rather than synchronic or instantaneous communication. (Note that the word "transmission" is used instead of "propagation" in Debray's terminology.)

The great feature of mediology is that it turns its attention to *a group or social organization* composed of individuals rather than each individual. The conceptual assumption of an individual with freedom and equality is put into parentheses. It is discussed in mediology how a group or community behaves under diverse regulations or institutional constraints, and how cultures, values and doctrines are historically propagated, in the relation of Verbreitungs media of diverse physical and technological properties.

This kind of analysis is extremely important in the 21st century, because we have now the Internet, a global scale Verbreitungs medium. The conventional arguments on the Internet culture used to assume *a free and equal individual* acting on one's own responsibility – an assumption for the people of an ideal democratic country. But in fact, an every individual is integrated into various social groups such as a nation, local body, company etc. If we ignore this viewpoint, we can hardly analyze the 21st century information society.

Accordingly, *fundamental informatics* and mediology share, more or less, an awareness of the issue. Nevertheless their *approaches* are quite different from each other. The methodology of mediology is far from systems theory, and closely related to traditional historical studies of liberal arts field. Fundamental informatics, on the other hand, tries to analyze the propagation of semantic contents in a group (between groups) using a HACS model, based on micro dynamics of symbol transmission and communication.

As an example of the problems caused by the assumption of "a free and equal individual acting on one's own responsibility", let us consider the issue of nonage people visiting an on-line dating site. Such a site, which anyone is allowed to visit by a handle name, is very popular because of its easiness to access and feeling of liberation. But not a few of them are *dangerous sites*, since they are often related to prostitution or mafia. As a matter of fact, the cases have been reported that nonage people became victims of sex crimes as a result of accessing such a site.

Previously, adult-business shops used to be concentrated in an entertainment area of

cities, to which average nonage people could not go without some difficulty. Before visiting such a shop, young people have had to make up their minds because adult people might be watching them. In short, nonage people were in a sense protected by *physical distance* in a real space.

But in a virtual (Internet) space, a user can access instantly and easily to any dangerous site with a simple touch on a cell-phone. Ignorant nonage people are, so to speak, like those thrown into wilderness without any arms. Since there are nowadays a good many criminals in virtual space, it would be against the spirit of *youth protection* if we stick to the assumption of a free and equal individual acting on one's own responsibility.

The government is aware of this problem. *A filtering software* has already been developed and anybody can make use of it, so as to prevent voluntarily the young people's undesirable use of the Internet. This software can automatically block the access to illegal or harmful sites, which include not only dating sites but also those related to bomb manufacturing or suicide.

However, it is comparatively easy for a skilled person to get over this sort of software blockage. What is more important is that the young user oneself has the ability to avoid instinctively dangerous sites even though they look attractive. How to obtain *the sense of risk in a virtual space* should be one of the greatest issues of today.

3.2 Erfolgs Media

Social information is logically and emotionally mediated by Erfolgs media (German word "erfolgen" means "come about as a result"). Incidentally, it is also called "*generalized symbolic media*" in sociology. Erfolgs media as well as Verbreitungs media concern themselves mainly with micro-scale information phenomena, and put an order on communications. Although the function of Verbreitungs media is correct transmission of symbols (*mechanical information*), Erfolgs media devote themselves to the transmission of semantic contents conveyed by symbols.

In general, the longer time/space social information is transmitted, the greater becomes the distortion of its semantic content. There is a risk of completely unexpected interpretation as a result of successive misunderstanding. Especially, we have a

significant risk of *discommunication or deviation of semantic contents* in the flood of symbols of present age. To avoid that, Erfolgs medium is employed. It gives logical consistency to linguistic communication, and lessens the interpretation range.

Imagine, for example, that a mathematician has completed an extraordinary paper. He wants to submit the paper to an academic society as quickly as possible. In such a case, should he say at the counter of post office "A very important paper in question is in this envelope, so send it without a mistake, in a special way as soon as possible"? Even if he said so, the post clerk would be a little puzzled, and simply send it in normal service. Namely the transmission of the semantic content fails.

Then what should the mathematician do? – He should say briefly "Send this envelope, registered and in express" while paying extra charge. The point is that the semantic area of an academic discourse is different from that of economic discourse related to commercial trade. An Erfolgs medium symbolizes a certain semantic area which the interpretation of social information should be led to. In above examples, the Erfolgs medium of the former and the latter each correspond to "truth" and "money", respectively.

A theoretical sociologist, Niklas Luhmann indicated "power", "love", etc. as Erfolgs medium in addition to truth and money. The important point is that there come about a social *HACS* for each Erfolgs medium: an academic system for truth, economic system for money, political system for power, family & friend system for love, etc. They are all functionally differentiated systems in which corresponding Erfolgs medium prevents a breakaway of communication. For example, the confinement of academic arguments to communications related to truth prevents the academic system from being broken down by the economical interests or private feelings.

Modern society has been modeled by Luhmann as a set of social systems which are *functionally* differentiated. They are all autopoetic systems that are closed and semantically independent. Such a society is called "*functionally differentiated society*" whose information phenomena are analyzed in *fundamental informatics*.

Incidentally, let us imagine how the communications of premodern society were like. In the old days people used to live in a small community doing hunting and gathering. Most of communications were done by face-to-face conversation. People shared common

monotonous *everyday experiences*, hence there was very little fear of communication breakaway. The same situation could be seen in every community which looks like a segment. Therefore such an old society is called "*segmentally differentiated society*".

Then, as the technology of agriculture and cattle-breeding developed, there appeared a kingdom with class system where communications are done throughout a large territory. Documents of (hand-written) characters were conveyed across time and space, based on which law-abiding governance and economic activities were carried out. In those societies, communication is mostly done within each class or social stratum. Hence such a society is called "*stratificationally differentiated society*". Note that it was *the authority of a ruling class* which was a literate class, or even *the authority of God*, that prevented the deviation of semantic content transmission.

● **Supplements and Applications**

What is the prominent feature of modern society composed of functionally separated *HACS* in parallel? – That is the absence of *absolute values or standards*, allowing us to observe the world in *relative* and *diverse* manners. Namely we can now observe things from various angles or viewpoints: economic, academic, legal, etc. where none of which have supreme priority. This is the essential character of *functionally differentiated society*, or modern society, which has no inviolable classes like king, aristocrat, commoner, etc.

Let us consider this feature, in comparison with former *stratificationally differentiated society*. The commoners, ruled class people, did not have sufficient opportunities to read/write documents, and they used to depend as the old days on local face-to-face communications. On the other hand, upper class people (a king, aristocrats, etc.) and merchants were doing communication across their country. Then how did they prevent misinterpretation of text documents? – It was *the sacred book (e.g. Bible)* that took the role, which shows absolute values and standards. They believed that they could interpret any text correctly enough by referring to the sacred book. This situation was clearly seen in Christian society of medieval Europe, but also in the feudal age Japan where sacred texts written by the ruling class used to play the similar role.

When these absolute values or standards broke down, a social mechanism became indispensable, in the flood of symbols caused by Verbreitungs media development, to

prevent deviation of semantic content interpretation. Erfolgs media is considered to have appeared for that purpose. We are going to describe refined Erfolgs media in the following sections, although we are interested in information phenomena rather than the society itself.

Here we pay attention to *the copyright issue*, in relation to the relative observation of the society (world). As seen by the popularization of blogs, everybody is now able to express one's own view in a text together with music, images, animations etc. in the Internet. But it is hard to create everything – texts, images, music – by oneself. The use of favorite piece of music and images is desirable, but there appears the problem of copyright. Any existing work has a copyright and we cannot freely quote it even for our blogs.

We can take several viewpoints for that issue. First, from the pure legal viewpoint, authors' personal right is very important. For example, we must not modify other's work without permission and make it public by our names. Plagiarism is one of the most unpleasant actions for a creator. Second, from the economic viewpoint, we must not gain interest by the use of other's work – e.g. by citing for advertisement – without the permission of a creator. This is because a work is its author's intellectual property.

These two viewpoints guard the right of an author but they also hinder free use of an existing work. Here we should remember that there are some authors who do not stick to fame or money but simply hope to impress people. And there is a way of thinking that free sharing of works among people brings about fruitful culture. Hence the third viewpoint comes about, which corresponds to something like community of love. This promotes broad use of existing works without troublesome conditions. The communications based on these three viewpoints each belong to different social systems. Because of such relative values, we cannot obtain integrated theoretical solutions.

Despite that, a noteworthy effort is made to accommodate this contradictory situation, which is called "*Creative Commons*" proposed by a jurist Lawrence Lessig. Roughly speaking, it is based on the third viewpoint but at the same time adopts several limitations, taking the first and second viewpoints into consideration. The limitations are: (1) Attribution (showing the name of author), (2) Non Derivative Works (prohibition of change), (3) Share Alike (succession of original license for derivative works), (4) Noncommercial (prohibition of commercial use). In actual cases, free use of existing

works is allowed, under such limitations or combination of limitations.

3.3 *Syntagmatic Media*

Erfolgs media are classified into *syntagmatic media* and *paradigmatic media*. The former and the latter each concern themselves to a *consecutive* connection and to *conceptual* connection of communications, respectively.

To help understand the difference between the two, just imagine the arrangement of words in a sentence. For example, let us consider a sentence "He likes high mountains very much", which is composed of subject (he), predicate (likes), object (mountains), and their modifiers (high, very much). Grammatical relations are found among words, and *logical (sequential)* connections make up a meaning of the sentence. The function of syntagmatic media is to make up such a logical connection among communications generated consecutively. On the other hand, as a variation of the previous sentence, let us consider a sentence "She likes huge sea very much". Here the words "he" and "high mountains" each have been replaced by "she" and "huge sea", respectively. Owing to such a *paradigmatic (parallel)* relations, the meanings of the two sentences become much clearer. Paradigmatic media make up similar relations in the generation of communications.

Although syntagmatic media basically succeed the idea of Erfolgs media (generalized symbolic media) of theoretical sociology, its function becomes even more definite by being combined with paradigmatic media. The refinement is necessary because *fundamental informatics* intends to analyze information phenomena rather than the logical relations supporting modern society.

Then how does a syntagmatic medium function? – Here we need the "*binary code*" and "*syntagmatic program*". The binary code defines the basic distinction to realize a communication in a system. For example, a legal communication always concerns whether or not the issue in question is in accord with law. We argue legal problems solely on the basis of the distinction of legal/illegal. Conversely, such inappropriate judgments are excluded as profitable/unprofitable, affectionate/unaffectionate, etc. In short, the *binary code* for the *HACS* of law is *legal/illegal* based on which communications are continuously generated.

On the other hand, the essential point of economic communications is whether a sales contract can be made or not, or more concretely, whether a bill is paid or not. When dealings are made, they would naturally be also important for traders whether the contract is legal or not, whether the business partner is affectionate or not, etc. However, they are related to the trade itself only as supplementary conditions. Therefore the binary code for the HACS of economic activities is *payable/nonpayable*. Likewise, that for the HACS of academic work is *true/false*.

Then how can we make a judgment for the basic distinction of binary code? It is "*syntagmatic program*" that helps making a judgment. For example, we must refer to each provision of the regulations or laws, in order to make judgment whether the issue in question is legal or illegal while continuing communications. Accordingly, the syntagmatic program of a legal system is "*regulation (law)*". As for the economic system, it is detailed data of price and investment that determine whether the trade in question is payable or not. Hence the syntagmatic program of the economic system is "*price and investment*". As for the academic system, we should refer to some theory if we want to ensure an academic proposition is true or not. Therefore the syntagmatic program of the academic system is "theory". In short, syntagmatic media are aimed at attaining smooth connection of communications by the use of binary code and syntagmatic program.

● **Supplements and Applications**

Everyday communication often gets confused and even breaks down because of the absence of absolute values. The conversation between a couple being about to divorce would be a typical example.

If we regard marriage as a civil law contract, the communication about divorce seems to be legal one, but that is not always the case. There is common-law marriage and the communication might be related to de-facto couple. At any rate, economic issues such as divorce settlement or child support payment are also very important, which cause economic communications. Moreover, we can consider that marriage is originally the action to love each other and give birth to children. Hence its breakdown has much to do with communications of the family & friend system whose Erfolgs medum is "*love*".

Consequently, several viewpoints are apt to get mixed in the conversation of divorce, leading to unfruitful discussion. It often happens that, for example, as soon as an

unfaithful husband begins to talk about divorce settlement, his furious wife screams "You may think everything can be solved by money, but first you must kneel on the ground and apologize!", resulting in domestic violence. As such, when functionally different communications get mixed, the system breaks down. To prevent such a tragedy, it is necessary to take the intervention of a lawyer, or a cool third party, who can separate communications according to their functions.

As for the family & friend system, it is noteworthy that continuous generations of communication may cause socially undesirable results. A typical example is *group harassment in the Internet (net-harassment)*. This is a phenomenon that a group of people attacks a particular person all together using an anonymous bulletin board or informal site of a school, sometimes resulting in eviction or even suicide of the victim.

The binary code of the family & friend HACS is "love/ not love", which can be said conversely "hate/ not hate". Love and hatred are tightly connected. If we introduce a communication of money trade or academic theory into the family & friend system, it would simply be out of place. But when "hatred" instead of love becomes the Erfolgs medium, the system would keep generating hostile communications, and *offence might be exaggerated*.

Namely, the binary code of net-harassment is "hate/ not hate" and syntagmatic program is "internal rules" of a group. The victim of the harassment is regarded as a troublesome person who does not obey the rules, and offensive communications ever continue.

Here we must note that the prominent features of the Internet as a Verbreitungs medium, the first of which is *immediacy*. As we say "Giving tit for tat", the use of instantaneous media is apt to cause extremely offensive sentiment, because they do not afford people the time to become cool. This is apparent when comparing with the arguments made by conventional letters. Even a person who is usually calm easily loses his/her temper in the Internet conversation, as seen in so-called *flaming*.

The second prominent feature is anonymity. A user often accesses the Internet in handle name rather than real name. In a face-to-face quarrel we must be prepared for a counter attack, or at least for the grudge of opponent even in a kangaroo court. But by using a handle name, we may believe in our safety for the time being. (To tell the truth, the message source could be identified through investigation, though.) As such, loathsome

and sadistic net-harassment comes about. We must watch out for the abuse of a handle name, although it can activate the exchange of views in the Internet.

3.4 *Paradigmatic Media*

Paradigmatic media help continuous generations of communication in a way different from *syntagmatic media*. The semantic contents of information are often stored as a kind of memory. Especially in the case of social *HACS*, they are usually stored and kept long time by the use of some Verbreitungs media. More specifically, various publications, documents on electronic devices, and even hand written manuscripts are utilized. They are, so to speak, a social storage of semantic contents, which can be called "*semantic-base*". The semantic-base is a physical archive of social information, typical example of which is database on the computer, or a bundle of books in a library. (Although paradigmatic media as well as syntagmatic media exist for any HACS including psychic systems, in this text we describe only those for social HACS, to simplify explanations.)

How do paradigmatic media concern with the establishment of communication? A paradigmatic medium accesses semantic-base and prepares for the conceptual choices. Here we should note that the social memories stored on semantic-base are comparatively independent of the context or situation where they are used. That is, they have an *abstract or universal feature* like a vocabulary explanation in a dictionary, being a little separated from original "one-time-only" value of life information. In other words, the contents of semantic-base are *stable* for temporal and spatial changes.

Generally speaking, the longer time and space symbols are conveyed via Verbreitungs media, the more difficult becomes the correct transmission of semantic contents. But owing to paradigmatic media, the interpretation can be related to *stable semantic-base*, resulting in the avoidance of uncontrolled misinterpretations. This makes easier *pseudo-transmission* of social information. On the other hand, semantic-base itself will be modified and developed, in accordance with the operation of HACS – continuous generations of communication.

Let us take an example of the communications concerning a traffic accident just happened. Then the Road Traffic Law is accessed by a paradigmatic medium with reference to corresponding traffic regulations and passing rules of vehicles. In that way,

legal responsibility is made clear, opponent sentiments are restrained, and unfruitful quarrels such as “You’re to blame” “What? That was your fault” etc. are avoided. Afterwards the related documents are classified, and stored in the appropriate place of the database of the police and the prosecution.

The related regularities belong to the Road Traffic Law which is a part of administrative laws. As such, the semantic-base is an accumulation of descriptions and data for each communication themes that are classified into details. Note that the document of a traffic accident is preserved, but it does not change the Road Traffic Law itself. Namely general people cannot take part in the creation of a law, to which can attend only administrative officials, legislators, jurist, etc. General people do not need to learn by heart detailed regularities of the Road Traffic Law except for such a simple rule as “Go at green signal, stop at red signal”.

The same thing can be said not only for semantic-base of law, but also for those of economy, science, technology, etc. The semantic-base of expert knowledge is created solely by communications among professionals of the area, and general people are not so much familiar with its contents. This is deeply related to the trend of detailed ramification of modern society. On the other hand, there remains a part of semantic-base which everybody knows (e.g. “Go at green signal, stop at red signal”). Hence, we can say that the semantic-base is composed of two parts – “*knowledge-base*” related to expert knowledge and “*common-sense-base*” shared by everybody. The boundary between the two is not very clear, but both are indispensable for successful generation of communications in the present society.

● **Supplements and Applications**

Today’s semantic-base includes huge scale knowledge-base whose contents are dynamically updated day by day. We can see a portion of such dynamics through Web search or by looking at book shops’ shelves. General people cannot take part in *the evolution process of knowledge-base*, except for a small fragment that they are professionally engaged in. Moreover they have little chance to become cognizant of most part of knowledge base. Nevertheless, the content of knowledge-base regulates the way people communicate, and eventually constraints the operations of people’s psychic system. Once a traffic accident happens, for example, people must resolve related problems according to detailed traffic rules or sophisticated insurance contracts which

they are not familiar with.

In brief, people of today can hardly grasp the clear *state of real world* surrounding them. As Luhmann indicated, we can no longer look at the whole society from the transcendental or absolute viewpoint in functionally differentiated society. The universal values of old days, in stratificationally differentiated society, have been lost.

It is sure that school education might be able to provide people with basic knowledge to understand the real world, which consists of an essential part of common-sense-base. But the problem of today is that it is becoming more and more difficult to acquire navigation policy of one's life, with the *sophistication of society* and *diversification of values*.

Here let us think about "*otaku*", which is considered to be one of prominent features of present information society. As is well known, otaku is a kind of person who is extremely enthusiastic about works of particular subculture like animations or comics. They are distinctive from ordinary fans of subculture. Young people gathering at Akihabara of Tokyo are said to be typical examples. They communicate with each other actively, and they tend not to call others by real names but by "otaku", which made the word very popular. Otaku concentrates one's interests on micro objects, disregarding any macro movements of politics or economy in society. Because of such lack of sociality, they are often criticized.

Nevertheless, researchers or artists as well as otaku usually focus their interests and energy on limited objects. In general, any creative activity needs some sort of maniac concentration without regard to other people's evaluations. Such enthusiasm can be found even among passionate amateurs (so-called "*manias*") as well as professional creators. The passionate amateurs involved in an antique collection, model train making, etc. may not very creative, but they are eager to communicate with friends who have the same taste. Therefore we cannot regard otaku only in negative context.

Despite that, it is apparent that otaku are essentially different from professional creators or passionate amateurs. Researchers or artists do naturally believe in high value of their works, even though they may look useless for a current issue: they ought to be useful for society in a wider sense. Passionate amateurs are the same as professional creators in their respect for the high values of objects, except that their

efforts do not contribute to livelihood. On the other hand, otaku get intentionally enthusiastic over even *ephemeral products* regarded as trivial in mass consumption civilization. In addition, they usually communicate with other otaku in anonymous or handle names, whereas professional creators and passionate amateurs prefer to be active in real or artistic names. That is, an otaku, unlike creators or amateurs, would like to behave as someone different from one's everyday identity.

For this reason, we may consider an otaku as an existence distinctive of today's society, which has knowledge-base ever growing rapidly without universal integrated values. In brief, it is an expression of physiological defense to *invisible and inexplicable social pressure*, symbolizing sentiments of resistance.

3.5 A Mass Media System

Today it is very difficult to have a firm image of *the real world*, as suggested by *otaku*. General people vaguely feel that the real world is becoming less and less visible and understandable, as profession is more ramified and the *knowledge-base* is more augmented. This is not only due to the rapid increase of *mechanical information* amount supporting the knowledge-base. Rather, it is due to the fact that the contents of the mechanical information are often contradictory to each other. As stated before, communications are generated from an independent viewpoint in each *HACS* – a legal system, economic system, academic system, etc. – where *no integrated universal viewpoint* could be found. Therefore general people get confused, not only because of complexity, but because of diverse inconsistent values. Nevertheless the ever-changing politics, economy and technology have great influence and constraints on the everyday life of general people. This brings about them deep uneasiness.

In such fragmented situations, the mass media give people "*the image of reality*" which is, though approximately, a universal integrated image of the real world surrounding them. *A mass media system* is a HACS whose components consist of "mass communications". Here mass communication represents a *uni-directional* (one-way), *non-interactive* communication provided by the newspaper, television, radio, etc. Mechanical information is sent in a fixed form periodically from a small number of professional senders to enormous number of general receivers. The voices of audience may sometimes affect mass communication, but most of people are silent information receivers. This is the point quite different from ordinary HACS – an economic system,

academic system, family & friend system, etc. – whose components are mainly composed of bi-directional, interactive communications. The mass media system is something in which a small number of professional senders give understandable messages to general people about such questions as "What is going on in the real world?", "What issue is now important?", "What do you need to solve the issue?". That makes common image of reality among people.

Then how is a mass communication generated? The stuff or material of mass communication is the *description of social HACS operations* – a political system, economic system, academic system, family & friend system, etc. Even though an original description may be very technical and hard to understand, it is edited and re-written by journalists in a newspaper office and broadcasting station into a mass communication text understandable for general people. Just imagine newspaper pages for politics, economy, culture, society etc.

Hence the mass communication is nothing but "*the communication of communications*" which aims at transmitting the states of diverse social communications to general people. From the viewpoint of a mass media system, various social HACS seem *heteronomous systems* that continue to provide stuffs or materials to mass communications. This is just the same as that the psychic system of a person seems a heteronomous system from the viewpoint of social HACS to which he/she belongs. Consequently we can find the following *hierarchical relations* where the mass media system is the highest and the psychic system is the lowest.

mass media system > social system > psychic system

The function of the mass media is to continuously furnish general people with persuasive image of reality. That is, the mass media system must generate attractive communications on such a theme as general people are interested in. Accordingly, its Erfolgs (syntagmatic) medium is "*current themes*" to be talked about right now. Furthermore, its binary code is "*popular/unpopular*", and syntagmatic program is "*index of audience response*" like ratings or circulations.

● **Supplements and Applications**

The fact that a mass media system is at higher level than ordinary social systems

means that the mass media impose some constraint/restriction on communications for politics, economy, academics, family & friend relations, etc. Although this may be felt a little strange, it is exactly the reflection of democratic idea that the opinion of general public should eventually be respected. (In a dictatorship society with no democracy, another hierarchy can be found: a political system takes the highest position and imposes restrictions on any other social communications.)

The mass media have much to do with the *establishment of modern nation state*. Human communities in old days had been based on face-to face voice communications, but the arrival of the mass media – especially a newspaper – brought about the solidarity of people. Although originally strangers with each other, they began to share the *consciousness of national citizenship* due to the mass media (cf. Benedict Anderson, *Imagined Communities*). It is the basic condition of democracy that general people share the same *image of reality*, exchange opinions with the same awareness of issues, and choose their future.

Naturally the opinion of each individual cannot be reflected to mass communication that is uni-directional. However, since its Erfolgs medium is current theme, binary code is *popular/unpopular*, and syntagmatic program is *ratings or circulations*, we can see that the opinion or choice unsupported by many people is hardly become the stuff or material of mass communications.

Therefore the operations of various social systems are, although mostly supported by related professionals, strongly influenced and restricted by the trend of mass communications. For example, when the news of rare plant discovery at a depopulated mountainous area attracts great attentions on television or newspapers, we can hardly make political decisions or economic trade to build up a leisure center there. Moreover, academic communications discussing the cultural importance of the leisure center could not be generated.

The influence of the mass media in the present society is so great and it has a special position among social systems. And it also brings about another serious problem, because the image of reality provided by the mass media is *not* the mapping of "*the one and only real world*", as some people believe to be.

The mass media can certainly provide a pseudo-integrated world image which alleviates

the uneasiness of people. But the integration or coherence seen there has been brought about not because the mass media honestly report the states of the sole real world, but because mass communications are generated recursively. A mass media system is a HACS operating autonomously, where mass communications are continuously produced based on previous mass communications. As Luhmann indicated, real world can be seen from diverse angles in modern age and therefore no unique real world could be assumed. In fact, if we look attentively, we can find that the mass media often give us *contradictory views* – e.g. television broadcasts a nature conservation program right after economic news promoting the land development in the area.

One of the most important points is that the mass media, although being strongly driven by popularity, do not directly reflect the people's opinions. A mass media system is operating recursively, in a closed manner, and the operation constraints the psychic systems of general people. Conversely, this means people do not make choices for themselves, but they are attracted to what is said to be overwhelmingly popular on television or newspapers. Namely something can be "*popular because it is popular*", regardless of its content. There is a risk, therefore, that general people are made fools of transient images of reality provided by the mass media.

3.6 Web Search

The recent spread of the Internet has brought the possibility to provide general people with a new "*image of reality*" which is different from the one by conventional mass media such as newspapers, television, and radio. It is deeply related to the appearance of a high performance search engine of *the Web (World Wide Web)*. Here the Web is considered a kind of carrier of the *semantic-base* developed in the Internet.

An individual user can retrieve a piece of information about issues of political, economic or what so ever, that is interesting and useful for him/her by the use of *a search engin*e. The obtained information is *mechanical information* given by a search engine, but it is originally *social information* and its semantic content will be interpreted by the user. Namely a *communication* is generated there. Based on the produced communication, the user tries to retrieve next information, and in that way communications continue.

How is such a Web search-driven communication different from conventional mass communication? – Usually the difference is represented by the terms "*pull type*" and

"*push type*", which are the ways of receiving information. In the former, a receiver (user) makes choice of information for oneself and obtains it (pull); while in the latter, the mass media make choice of information and present it to a receiver or people (push). This classification seems easy to understand, but the role of information becomes unclear because it is based on so-called "information package" model.

Rather, we take note of the properties of generated communications in *fundamental informatics*. In the case of Web search, a produced communication is nothing but *a component of a psychic system* of an individual user. The user, while engaged in Web search, keeps thinking in one's mind, and in so doing generates *social information* based on *life information*. In the case of the mass media, on the other hand, a generated mass communication is *a component of a mass media system* which is a *super social system*. A mass communication is generated only in the connection of previous mass communications, and has nothing to do with individual audience except for binary code popular/unpopular. That mechanism spreads common image of reality among general people, and promotes people's universal interpretation of real world states.

In short, Web search is, at least primarily, *an individual activity* of an Internet user, rather than some communal activity typically caused by the mass media. The predecessor of the Web is "*hyper medium*" appeared in the late 20th century. That is a medium for an individual to associate ideas and do creative thinking by retrieving various texts and images freely. Here the important point is that an individual can relate, depending on one's own values and interests, many items with each other such as papers, documents, books, photographs, etc. Namely the hyper medium corresponds to *a personal semantic-base on the external memory*. At the beginning hyper media had assumed microfilm as a memory device. But then it was realized as a commercial product on a Macintosh computer in the name of "Hyper Card", where we could link card-based data freely with each other.

The Web (World Wide Web) is conceptually on the extension of the hypermedia. The only difference is that texts and images are shared by all the Internet users, rather than exclusively used by an individual. As is well known, Web pages created by individuals or social organizations can be accessed and shared by everybody. Now everybody can keep thinking based on one's own interests and concerns, while retrieving any information on the Web. This suggests the arrival of a new image of reality, which is different from the uniform image of reality provided by the mass media.

● **Supplements and Applications**

Note that a new *image of reality* cannot necessarily be brought about, even though many Internet users begin to keep thinking based on Web search. This is because "the image of reality" is not simply the state of real world that each individual has. It is so to speak *a social existence* – what is important is that the surrounding people also have the same image of reality. Everybody knows the top news on television or newspapers. As an individual can talk with other people based on the top news, he/she is able to believe in his/her own image of reality.

It is sure that today, unlike personal hypermedia, many Internet users can access the same Web pages and therefore share the common *mechanical information*. However, the communications generated there may have nothing in common, as the way of access or linking is different from user to user.

The mass media have established "imagined communities", or nation states, through the creation of images of reality among people. But the Internet cannot unite people only by Web search functions. In order for an on-line community to appear in the Internet, users must actively emit information in addition to retrieving information.

Despite that, the Web search technology developed rapidly in the early 21st century does change gradually *the thinking activities* of general people. First, the efficiency of investigation has greatly been improved, as we are now instantly make use of enormous amount of mechanical information stored on any server computers on the earth. In the past we had to visit libraries faraway to inquire into detailed data, but now we can obtain them at once sitting at desk through the Web. We cannot overestimate this merit. On the other hand, we are now confronting with a new issue – the prevailing easy-going attitudes to make up a *patchwork solution* utilizing Web search, instead of building up one's own solution through elaborate investigation. These merit and demerit might be two side of the same coin.

Here let us indicate another issue concerning Web search. Current technological level of Web search is so advanced that we can obtain a search list immediately after inputting a key word. The development of such a search engine in general needs great amount of efforts, and it is maintained at the expense of huge cost. Then why is it provided to us

without any charge?

This is because Web search engine is mostly connected to the *advertisement of enterprises*, and they pay expenses of publicity. It is like a sponsored broadcast, which provides us with free television programs, in exchange for inserting commercial announcements. Take an example that a user retrieves a Web page concerning a porgy. As soon as the search engine detects that, it automatically displays the list of related advertisement URLs such as porgy fishing tours, fishing rod shops, restaurants for porgy dishes, etc. For a sponsor, these net-advertisements are much more efficient publicities than expensive advertisements on television or newspapers, because those looking at them are only the persons interested in porgies. But it means that a user is analyzed one's interests or tastes and positioned as a *consumer* without knowing it.

It is naturally convenient for a Internet user to know related sites at once, but conversely speaking, it may cause the risk that the user's thinking could be navigated by *the commercial policies of business firms*. Originally the Web has started not for commercial activities but for providing general people with neutral information. Free Web search service, though very convenient it may be, could be seen from various angles.

3.7 Bi-directional Media

What is the greatest difference between the Internet and the mass media? – It would be easy to answer this question by indicating that the former is bi-directional medium and the latter is uni-directional medium. Usually, ICT business person positions the uni-directional and bi-directional medium each as "broadcasting" and "transmission" respectively, and predicts that these two will eventually be integrated with the spread of broadband optical fiber channels. Note that, however, we regard the Internet as bi-directional medium not because we can exchange e-mails on it. Rather, what is important is that any Internet user can *make one's own thinking in public,* whether opinion, sentiments or even works, through the service like a blog, twitter etc. This gives the opportunity to create *a new image of reality*.

Before the arrival of the Internet, it was only limited people – politicians, commentators, scholars, journalists, novelists, etc. – who could make their thinking in public. Except for them, general people had few chances to appear on television, radio or newspapers.

When truly in need, they had to, at the best, write a letter to a newspaper, or distribute leaflets on the streets.

These situations did not change immediately, even after the World Wide Web and its browser appeared in the middle of 1990s. The creation of a Web page was not an easy task for general people because it needed the manipulation technique of HTML language. Hence most of the Web pages at that time used to be created by firms or government organizations. General people were mostly information receivers who could simply look up those Web pages, except for writing fragmental opinions on bulletin boards in the Internet.

The great change has happened in the late 2000s when so-called "*web2.0*" strongly attracted people's concern. The result is that the general people, the ordinary Internet users, have become the *leading actors* of the Web. This is typically indicated by the rapid popularization of blogs (Web pages of diary form) or mini-blogs (like twitter). By the use of such services, general people can now express their own views without much technical difficulties.

It is noteworthy that through such services, general people who were not acquainted with each other, can have the chances to exchange their views and share the same sentiment. Here the *Web search engine* plays an important role. As blogs or mini-blogs are written freely by Internet users, their contents are not classified in advance. Moreover, the amount of blogs in the Web should be tremendous, considering the fact that there are much more than 10 million bloggers even only in Japan. In order to pick up the appropriate blogs about some theme, a search engine must look for all the past blogs in the way of full-text searching. This difficult task has already been solved by current technologies.

For example, by inputting keyword "porgy", user A can retrieve immediately the recent blog of user B, a porgy fishing mania, and write some comment on it. Here note that B is able to know that A gave comment on B's blog. Owing to this trackback function, A and B have chance to get acquainted with, exchange words, and share the image of porgy fishing.

We cannot obtain and make sure of an image of reality only through our own experience. We need to *share it* with others around us. By associating personal expressions with

Web search technologies, even general people can have *a new image of reality* which is different from the conventional one provided by the mass media.

● **Supplements and Applications**

The image of reality stated above mainly concerns *the common-sense-base* rather than *the knowledge-base*. However, we may think that active publication of general people's views through the Internet, as combined with a powerful search engine, suggests quite a *new way of intelligence construction* in place of traditional one.

This is called "collective intelligence". Since human beings have originally been animals living in a group, the concept of intelligence or knowledge made up by people's cooperation has long history. But the collective intelligence here can be regarded as "*the intelligence of the 21st century*" which a lot of people build up in cooperation on the Web, freely discussing and exchanging their critical views. The typical example is "Wikipedia", a well-known free net-encyclopedia. A non-profit organization takes charge of Wikipedia operation where a sort of editing committee exists. But the point is that, in principle, everybody has the right to edit or give a new description of the item he/she is interested in. Accordingly, the contents of Wikipedia are not fixed but always being updated.

The traditional academic intelligence used to be constructed and maintained by a few authorized professionals of the field. These professionals or experts take charge of editing or writing of an encyclopedia, which needs fees for general people to make use of. On the other hand, general people including amateurs can participate in the making up of Wikipedia, which is free of charge. This is really surprising, and there may be the criticism that it denies *the orthodoxy of academic authority*.

Nevertheless we cannot say that such collective intelligence is academically at low level and its contents are lacking in accuracy. That is so-called "open intelligence". Therefore it is optimistically expected that a mistake, if any, would be corrected in the long run by many readers including professionals. In fact, personally I have an impression that the descriptions related to computer science are comparatively accurate. Although traditional academic intelligence is supported by official regimes and procedures, it has a demerit that existing conventional theories are favored by authorities and revolutionary new theories are difficult to be admitted. This demerit is expected to go

away for collective intelligence because it is open to the public. Especially in current Japanese society, where people have pretty high educational backgrounds on the average, we should not ignore the merit of open intelligence. As a matter of fact, we hear that Wikipedia includes the descriptions of *new theories* more often than a conventional encyclopedia does.

Furthermore we can expect in collective intelligence the views of ordinary people which was lacking in the traditional academic intelligence built up by professionals. Medical knowledge, for example, has been almost monopolized by medical professionals. But as for serious disease, we might not be satisfied with the research-oriented knowledge offered by medical doctors or scientists. We also need the knowledge from the patient sides – e.g. how to choose a hospital, how to lead everyday life, how to acquire family's help, how to solve economic issues, etc. The collective intelligence built by the network of patients suffering from the same disease, with the advice of conscientious therapists, would surely form precious knowledge.

Despite that, it would be too premature and dangerous to believe that collective intelligence activities could soon replace the traditional academic activities based on school education. The collective intelligence is supported by the idea that *human inborn nature is good*. Frankly speaking, it is presupposed that an Internet user has enough intellectual honesty. Namely the generated communications for collective intelligence are navigated by Erfolgs medium such as "truth" or "love". Sorry to say, that is not always the case. There may be someone, for example, who advocates on the Web a fraud treatment to be effective for a serious disease. The Erfolgs medium for Internet communication is "*themes*", which is the same as that for mass communication. But unlike mass communication, it is the user's responsibility to judge the appropriateness or correctness of the content of Internet communication. We must take that into consideration.

3.8 The Internet System

Let us turn around and summarize this chapter. In current information society, we can find extreme professional ramification or specialism. Along with that, *the knowledge-bases* of politics, economy, law, science & technology etc. are augmented day by day. They are created by professionals, and hard to be seen from the eyes of general public. Nevertheless they surely restrict the everyday life of general people.

Furthermore, the contents of the knowledge-base are not uniform or integrated, even sometimes contradictory, as they are products of plural HACS based on diverse viewpoints. Consequently general people nowadays can hardly grasp the states of *real world*, which brings about vague uneasiness among them.

The Mass media system is the HACS that aims at resolving this uneasiness, and providing people with a kind of universal *image of reality*, even pseudo-reality, while covering diverse aspects of contemporary society. But its component, mass communication, is generated internally and recursively from such materials as descriptions of mass-media-related persons. Namely it does not directly reflect the opinions of general people, although its binary code is popular/unpopular.

The Internet, recently spread at great speed, is bi-directional media unlike the mass media, and is expected to provide images of reality whose materials are the descriptions by general people. This may be called a new image of reality based on the communications that are brought about by the *blogs/mini-blogs* as combined with a Web search engine.

The subjects of blogs/mini-blogs cover almost all aspects of contemporary social life, such as politics, economy, academics, family life, etc. The Internet communication is, like mass communication, "*communication on social communication*". Hence the Erfolgs medium of the HACS whose component is Internet communication can be considered "*themes*", just like that of a mass media system. Then, what are its binary code and syntagmatic program? – Note that in order for Internet communications to be generated continuously, the texts of blogs/mini-blogs must be stimulating and/or interesting. Once get reputation of "interesting", they will win great number of access and links. Otherwise their words will soon be forgotten. Accordingly, the binary code is "stimulative/non-stimulative", and syntagmatic program is "reputation" which is given by the number of access or links.

An Internet system is for these reasons positioned at, like a mass media system, higher than psychic systems and social systems.

Internet system > social system > psychic system

As stated before, the mass media united people and contributed to the building and

establishment of imagined communities or modern nation states. Then what kind of communities will the Internet build up? – Let us call them *on-line communities* for the time being. A typical example of them is a *social networking service* (SNS) which is a membership group of Internet users. But not all of on-line communities are such membership communities. When many Internet users are continuously exchanging their views on some theme, we can regard it as a free access on-line community, even if it has no strict regimes.

The prominent feature of an on-line community, as compared with the national community (a nation state), is that it has few regimental supports in return for freedom. There are other features: first, its scale is rather limited. Although some SNS like Mixi or Facebook has tremendous amount of total members, but it is virtually divided into many compact groups. (Sometimes these groups are loosely connected.) Secondly, the participants are not always uniform but diverse in nationalities etc. which means it is both global and local. Thirdly, we can participate in it under anonymous or handle names. These features – fractionalization, mobility, anonymity – are merits as well as demerits of an on-line community.

● **Supplements and Applications**

Today there is great expectation for on-line communities. The reason may be, with the trend of globalization, that conventional nation states can no longer unite or integrate people as they did in the early 20th century. Also we can indicate the weakening of traditional communities and excessive individualization, such as the breakdown of company communities with life-time engagement, deterioration of regional or familial ties, etc.

The human beings are originally the kind of animals who live in a group, hence we could hardly survive totally independent of communities. An individual in a market-driven competitive society often seeks for some interchange on the Internet to dissolve *the feeling of isolation*. The Internet is considered an appropriate Verbreitungs medium for today's people, because they can communicate with others under anonymous or handle names, and if they want, can break off relations immediately. A free access on-line community is able to become a kind of "psychological treatment" for contemporary people.

On the other hand, there is an argument which tries to find more positive meaning in on-line communities. Namely it is nothing but on-line communities that represent the voice of citizens in a democratic way, while resisting the existing powers of authority like nation states. This way of thinking is related to *American counter culture*. At the time of arrival, a personal computer was regarded as an effective tool of American citizens opposing to the Vietnam War. The conventional mainframe computer was so expensive and hard to manipulate that only professional experts could utilize it. Accordingly, it was considered to be the tool of pro-war groups such as the government, the military, and big enterprises. On the contrary, the ideal of a personal computer was nothing but "a computer of *jointly united anti-war citizens* "which is inexpensive and easy to use.

Nowadays personal computers and the Internet has active and worldwide usage by governments and companies, hence we cannot regard them simply as counter cultural tools any more. Nevertheless, we can still recognize such tradition among ICT-related people, especially in the United States, where on-line communities are expected to offer relative point of view different from those by the government and major companies.

This can be seen as an expression of *mistrust* by general people toward the *image of reality* offered by the mass media. As the mass media emphasize journalism spirit, they naturally take a different stance from social powers like the government or major enterprises. Nevertheless, quite a few people, including citizen activists, think that the two often share common interests. For example, the mass media might carry out a promotion campaign of a large scale land development project involving vast investment, even though they know the high risk of environmental destruction. That may be an extreme case. But as the government or leading enterprises are inclined to conceal information to guard the organizational interests, they often exert pressure on the mass media. Therefore it seems that *the image of reality given by on-line communities* is more trustworthy because it is based on the opinions of general people who have no stakes or interests.

However, *fundamental informatics* indicates that this argument is not always persuasive. The Internet system operates, just like the mass media system, in a *recursive* way. Assume that someone in the on-line community has a tendency of strong prejudice. Once a communication is generated based on his/her offensive opinion, there is a possibility that it would be self-amplified, and exaggerated agitating messages

would be circulated rapidly through the Web. That risk cannot be ignored, because anonymous remarks in the Web are easy to become irresponsible. The opinion is off the point that the mass media provide us with deceptive information profitable to the ruling class all the time, and the image of reality offered by on-line communities are always accurate.

What is important is to recognize that both can provide, to the utmost, only the image of pseudo-integrated reality, not the picture of the real world itself. The real world can be seen in diverse ways. Consequently, general people need to have the wisdom to interpret the images of reality given by the two from *mutual-critical viewpoints*.