Theory of the Organism-Environment System: IV. The Problem on Mental Activity and Consciousness

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Abstract—The present article is an attempt to bring together the development of mental activity and consciousness in the framework of the organism-environment theory (Jarvilehto, 1998a, 1998b, 1999); the main question is how the development of mental activity and consciousness can be formulated if the starting point is not the separation of man and environment as in traditional cognitive psychology, but a unitary organism-environment system. According to the present formulation, mental activity is conceived as activity of the whole organism-environment system and connected to the general development of life as a specific form of an organism-environment system comprising neurons. The advent of consciousness is regarded as a result of co-operation of such organism-environment systems. Consciousness is based on cooperation for the achievement of common results, and shared by the cooperating individuals (general consciousness), although each individual also makes it concrete from the perspective of his/her own body in the act of participation in common results (personal consciousness). Language is the means of formation of the cooperative system in the achievement of common results, and it is suggested that the use of language is related more to the type of cooperative system and intended common results than to any symbolic representation of the world. It is claimed that on this basis it is possible to develop psychology which takes seriously the concepts of mental activity and consciousness in the description of human action, but does not reduce these concepts either to biological or social factors. The present formulation should be regarded more as a conceptual outline than as a full-blown theory.

Introduction

THE THEORY OF the organism-environment system (Jarvilehto, 1998a, 1998b, 1999) starts with the postulate that many unsolvable problems in sensory physiology, psychophysics and psychophysiology (and perhaps in psychology, in general) are due to a very simple mistake in the basic assumptions about the character of the objects under study. The mistake is the conception of the organism and the environment as two separate systems ("two systems theory"). In most explanations of human behavior this common sense view is uncritically taken as a starting point. Hence, behavior and psychological processes are conceived as processes belonging to the organism, and the environment is seen as something that either triggers or modulates these processes. This leads psychological and psychophysiological research to search for the structure of the psychological processes (mental activity and consciousness) in the organism and their neural correlates in the brain, which eventually ends with identification of psychological processes with some characteristics of neural activity.

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At the present, considerable research resources are devoted in psychology and cognitive science to the determination of the places in the brain in which different psychological "functions" (perception, attention, emotion, etc.) are supposed to be performed. The possibilities for such work have been dramatically increased in a few decades as a result of the development of sophisticated recording techniques. Thus, it is a common belief that it will take only a few years until we know how some basic psychological processes, at least, are carried out by the brain, and there even seems to be a general consensus that consciousness will eventually be found in the brain, either as a general characteristic of the brain or as the property of specific neural connections (Dennett, 1991; Clark, 1997).

In contrast, it follows from the basic postulate of the theory of the organism-environment system that mental activity or consciousness will not be found in the brain, but in a system of relations including both the organism and environment, and the traditional psychological "functions" (such as sensation, perception, memory, etc.) describe only different aspects of the organization of the whole organism-environment system. This view questions the mainstream of cognitive science and neurophilosophy. The brain is not the only place (and not even the most important one) to look if we want to understand what it means to be conscious, and it is a serious conceptual confusion if we think that consciousness will be eventually "found" in the brain. The brain is an organ like the other organs of the body; there is no more "psyche" in the brain than in the heart, for example. The brain—which can be neatly localized within the cranium only in anatomy books—consists of a huge number of specialized living cells which are organized together over the whole body and carry out physiological, but not psychological processes.

Thus, it seems that many neuroscientists together with their supporting philosophers are simply looking for things in the place where they can never be found, and only because there happens to be such nice equipment for carrying out the measurements. Furthermore, there also seems to be a theoretical confusion in the thinking that in the near future we will be able to solve "the easy problem" (Chalmers, 1996), and describe all the events in the brain which constitute a simple perception. That day will never come if only the brain is studied, because perception is a process which cannot be limited to the brain (Gibson, 1979; Jarvilehto, 1999).

In fact, neuroscientific theory is loaded with tautologies, and the value of experimental evidence for the location of consciousness in the brain is questionable. If we define the brain as a site where the elements for the system of consciousness may be found then it is clear that we will find these elements only in the brain. Nothing else is regarded as worth studying. However, if we take into account all possible factors that may contribute to our conscious existence then it may turn out that the processes in the brain have very little or no explanatory value, at least in respect to the content of our experience.

With this controversial theoretical situation in mind, the present article sketches an outline of development of mental activity and consciousness in nature. This consideration should not be regarded as a theory of life, mental activity, and consciousness, but rather as a conceptual outline that tries to show how mental activity and consciousness can be conceived when taking as a starting point the postulate of a unitary organism-environment system. The basic question is what the conceptual structure of psychology would look like on the basis of the organism-environment theory. Can the principle of unity of the organism and environment be maintained, or is it necessary at some point to partition the organism and the environment? Why is it a commonly accepted fact that organism and environment are two separate systems?

It should be stressed that the theory of the organism-environment system is not a theory

about how environmental factors should be taken account in the explanation of the behavior of the organisms, or how different contextual factors contribute to mental phenomena. The organism-environment system is not a system consisting of the organism and the environment that could be treated as subsystems of the whole system, but the organism-environment system is rather a methodological principle. This methodological principle entails that—instead of looking at simple linear causal relations (e.g., the events from the stimulus to the response) when explaining behavior or subjective experience—the research should start from the determination of the results of behavior, and lead to the necessary constituents of the living system determining the achievement of these results (see Jarvilehto, 1998a). The key concept of the theory is the concept of result which does not mean a simple effect or consequence of behavior, but a possibility of a new act, a transition from one act to another (see below). Thus, in the frame of the organism-environment theory, the starting point of all analysis of behavior is a historical and a developmental one. The organism-environment theory is essentially a theory of development, and its methodology is based on the analysis of different forms of the organism-environment system in their formation during phylogeny and ontogeny.

There are several important theoretical developments that bear direct relevance to many parts of the present consideration under such labels as "functional systems theory" (Anohin, 1974, Shvyrkov, 1990), "ecological psychology" (Gibson, 1979), "dynamic system theory" (Ford and Lerner, 1992; Port and Gelder, 1995; Thelen and Smith, 1994; Clark, 1997; Hurley, 1998), "theory of complex systems" (Kauffman, 1993), and "autopoiesis" (Maturana and Varela, 1980; Varela et al., 1991). However, their perspective is somewhat different from that in the present formulation, and there are also differences among them; it is the task of the future to relate all these theoretical developments together. There are also several "-isms" which seem to deal at least partly with the same problems and in a related way, such as emergentism, holism, general semantics, or postmodernism. For the present purposes I will only incidentally cite these approaches at points which in my opinion come closest to the present formulation.

Development of Life and Mental Activity

The organism-environment theory attempts to grasp conceptual problems in psychology by anchoring them in the evolution and development of the organism-environment systems. Thus, the first task is to consider how mental activity and consciousness may have appeared in the evolution. This should be done without reducing these concepts to some more "elementary" descriptions (physical, chemical, or biological), but also without separating them from the general development of nature. Such a task cannot be carried out in detail without concrete research, and in this context it is possible only to indicate the general line of the reasoning. Thus, in the following I will sketch how mental activity and consciousness should have evolved to be consistent with the theory. It is another task to show if this really happened in the history of evolution.

Living Systems

The present article starts with the proposition that mental activity is typical of living systems. What is peculiar to them and how may living systems be related to inanimate ones? This is a question that has yet to be solved, and it is questionable whether it can be solved at all. For our purposes, however, there are certain differences in the organization of

living and inanimate systems which are of importance when we try to figure out how mental activity and consciousness may have evolved.

At this point it is necessary to introduce a working definition of "system." A system will be defined as follows: a whole consisting of elements, the interaction of which makes possible its existence or action.

It is often thought that the basic difference between living and inanimate systems is activity: livings systems are active agents, whereas inanimate systems show no activity, but respond passively. As pointed out already by Spinoza (1677), this is a very limited view, because, in fact, every system is active: we always need some outer force to break the system. Thus, in this respect inanimate and living systems do not differ. However, it seems that the characteristics and structure of action are different in living and inanimate systems. The inanimate system keeps together because of static forces between the elements, whereas the living system seems to exist only through continuous dynamic change. (It may be, however, that this difference turns out to be spurious when we look at very basic physical changes in inanimate things which may prove to be much more dynamic than usually thought. See e.g., Stapp [1971]).

For example, a watch is an inanimate system that can be used for showing time (the action). This system consists of elements (metal cover, screws, wheels, springs, etc.) that realize the action of the system in their interactions. The elements of the system have a certain spatio-temporal stability, but the relations between them change within limits during the action of the system. The surface of the watch is a border to the environment (e.g. air). According to the definition of the system, the environment outside the surface does not belong to the system because it does not participate in the action of the system. Therefore, we may speak about the parts of the system being "inside", and the environment of the system being "outside." If the outside factors have influence, they mainly disturb the action of the system: if the ambient air, for example, gets too hot the watch is destroyed. The fact that the air or some other environmental factors do not belong to the system may be seen in that the watch is best preserved in a void, and separated as far as possible from all environmental influences.

The first living system that appeared on the earth, the primordial cell, seems at first glance to form a similar system as the watch. It has a limiting border to the environment, the cell membrane, inside of which there are many inner elements maintaining and making the actions of the cell possible. However, a cell as a system differs in a basic way from the watch, because the relation of the cell to certain parts of the environment is not a neutral one. Instead, these parts are essential for the life process of the cell. The environment of the cell is not functionally homogenous, but it consists of substances the significance of which varies from the point of view of the life process (some may be harmful, others useful etc.). In order to exist as a living formation, the cell must continuously use its environment by identifying some substances, and transporting them through the cell membrane. Therefore, according to the definition of the system such environmental parts must be regarded as constitutive parts of the cell system.

It is precisely here that we come to the basic difference between the inanimate and living systems: a cell as a system is not limited to its membrane, the border between the cell and environment, but it extends as a functional unit into the environment. The membrane of the living system is not a line of separation, but rather connects the inner parts of the cell with selected parts of the environment. The membrane is an organ of connection, not just a cover as in the case of the surface of the watch. The cell is, in fact, bound to its environment, to its indefinite and changing parts, in such a complex way that we may no

more see these connections, and the cell therefore seems to be independent, separated from the environment. However, the cell is continuously growing into the environment and connects to constantly new environmental parts.

Thus, the real "environment" of the cell (in the same sense as that for the watch) lies outside its "functional environment" (the parts of the environment belonging to the cell) and the border between the "inner" and "outer" is located somewhere outside the cell membrane. As for any living system, this border is constantly changing. Thus, the exact definition of the elements of the living system is difficult if not impossible.

The difficulty in the study and understanding of life is probably related to the fact that the elements of a living system are continuously changing. The elements outside the cell membrane are assimilated by the cell, processed and joined to the structural parts inside the membrane, destroyed, and rebuilt or expelled. The cell is maintained as long as this process goes on; if it stops then the cell is no longer a living system.

The view according to which the cell is a system limited by the membrane and only interacting with the environment outside the cell is based on inconsistent application of the definition of the system. This inconsistency is probably due to the idea that the basic building block of all living systems is a separated cell ("cell theory"). However, if we look at the cell in this way we define the living and the inanimate systems as similar: the cell membrane is seen as a similar border as the surface of the watch. However, if the parts of the environment belonging to the metabolism of the cell are not counted as elements of the cell system, and a cell as a living system is thought to consist only of the parts within its membrane, it is impossible to understand the functioning of the cell. With this line of consideration it is then logical to postulate some special life forces acting within the cell that would explain the difference between the living and inanimate systems.

With the advent of life a new kind of system appeared on the earth in comparison to the inanimate systems. This system is composed of parts that may be described separately as inanimate systems, but it has new characteristics of organization which are not encountered in its parts. The dialectics of life consist of the principle that the living cell is separated from the environment by its protective membrane, making possible development of complicated structures within the cell. However, this membrane is simultaneously an organ joining the cell selectively to an abundant number of environmental factors rendering a functioning living system possible.

It should be pointed out that these environmental factors are not "physical," but living in the same sense as the originally inorganic parts of the cell are no more inanimate. This means that the cell as an organism-environment system is not a physical system. Physical description is possible only in the case of inanimate parts of the world; if a living system is described as a physical system then it is reduced to only one of its aspects. Physical description of a living system can never be a complete description, not only because physics has nothing to say about life as such, but also because the parts of the system are not selected according to the physical laws, but on the basis of the living structure. A cell identifies and takes up from the environment those substances that fit into its inner structure. There is no possibility of defining these substances exactly *a priori*. A cell defines its own environment itself in its characteristic way in dependence on the total structure of the cell-environment system; the functional environment of the cell consists of only those parts which may be fitted together with the other parts of the system. In fact, the basic problem in the study of the living system is that the elements of the system define each other and cannot be studied separately. When we "separate" such an element we destroy its organic connections and it stops being an element of the living system studied. Life is a process:

when we stop it for scientific study we lose some of its essential characteristics (cf. Whitehead, 1925). Therefore, life can never be explained by physical concepts. The same applies as well to the study of mental activity and consciousness.

There is, of course, hardly any biologist who would not think that a cell interacts with its environment, but usually the essential environmental factors are left outside the cell system and the cell itself is described as an "open" system. However, without the environment the cell is not a system at all. No functioning system may be open because "functioning" or action means co-operation of all the elements of the system (see the definition of the system). Thus, every acting system must be closed in asmuch as all its elements are bound together and contribute to the result of action. This means that the "agent" of the action is not a cell limited by its membrane, but the whole cell-environment system.

Hence, the cell and its functional environment form together the unit of life, a basic organism-environment system. This unit represents in the first form the basic systems architecture of life, that is also preserved in more complicated organisms, although the basic elements and their functional significance vary. In the beginning of life the parts of the system "isolated" by the cell membrane from the environment could be maintained only for a short moment, until the inner structures grew too large and with their growth the cell exploded. With evolution more stable coordinated forms of the cell structure appeared, which eventually led—instead of disruption—to division of the cell under the inner pressure. Two or more cells were formed, which took with them some elements of the original cell.

In the beginning, life was a continuous process of reproduction and destruction of primordial cells. As the environment of the cells was not homogenous, cells in some regions could develop new forms, and some of them could reproduce and divide more efficiently. The abundant increase of certain types of cells changed the structure of the environment in a certain direction and made the existence of the earlier forms more difficult, but offered new conditions for new formations. A continuous change of the environment and structure of the cell-environment systems resulted in variation in the types of systems. Life, which was in the beginning very similar over all regions on the earth, started to acquire differentiated, more complicated forms. The living systems became specialized, their structures and the possibilities for achieving results became more specific.

Single systems were not acting alone. In addition to the established and new environmental factors, they were also interacting with each other: hitting, touching, and changing the living conditions. At a certain phase of development most probably a larger system "transported" a smaller one through its membrane, which led to a new formation, a cell system within which another cell merged into the structure of the mother cell and started to influence the growth of its structures (see Oparin, 1961). In this way the development of the nucleus of the cell possibly started, the specialized part of the cell system which was going to have an essential role in the development of the organisms and in the transfer of structural heritage from one generation to another. It was just this part of the cell in which complicated regulatory structures appeared. These mediated the structure of the mother cell to its followers, viz. the genetic system based on DNA-macromolecules.

The chances of survival of a single cell-environment system with sudden changes in the environment were relatively small, especially when the cells became specialized and their life process presupposed the existence of quite specific environmental parts. At some phase of the development this problem was solved in a new way: the single cell-environment systems started to collect together and produce formations in which cell systems

secured the survival of each other under changing circumstances by sharing some parts of the environment. Perhaps the specialized cells first approached the cells whose metabolic products they could use in their own metabolism, and finally developed more permanent connections to such cells. Multicellular organism-environment systems started to develop.

Appearance of First Forms of Mental Activity

The joining of the cell-environment systems together in multicellular organisms resulted in a more complex and differentiated structure of the organism-environment systems. These new formations were associated with more differentiated environmental parts: when the specialized single cell systems adhered to each other they also brought with them their constitutional environmental factors, the environmental parts for which they were specialized. Thus, the environment constituting a multicellular organism-environment system was no more homogenous in the same sense as that of the single cell system, but it consisted of highly differentiated parts from the point of view of the whole system. The environmental parts belonging to the organism-environment system started to acquire new order and differentiated properties.

Some cell-environment systems were using in their metabolism sources of energy that were based on direct contact with substances, while some others were specialized for energy forms influencing at a distance, such as radiation. The continuous metabolic flow of the cell system presupposed continuous reorganization and identification of substances. This was possible with motion, and already unicellular organisms had some sort of efferent vehicles, such as celia or other fin-like devices for motion.

When the multicellular organism could not directly assimilate the substances necessary for its metabolism, the most sensitive cells started to be destroyed. These were typically the most recently formed and specialized cells, which needed very specific environmental conditions for their life process. If no energy-rich substances were to be found in the vicinity of the cell, the maintenance of the life process favoured those cells which could also use energy forms, such as electromagnetic radiation, at a distance. These cells then gave the direction of motion to the multicellular organisms, this being typically movement towards the light.

In this way perhaps the action of the first organism-environment systems became directed towards certain regions in the environment. From the point of view of the cell formation this could be seen as movement; from the point of view of the whole organism-environment system, this action was a process of reorganization of the whole system. In any case, the movement of the organism was no more a relatively random search process for metabolites in the region close to the cell membrane, but the organism started to move around in the environment, to search. This new kind of behavior was possible for a multicellular organism with the development of motor organs and with cells—the receptors—using the more distant forms of energy. However, some early forms of directed movements can be seen already in the behavior of unicellular animals, which may be based on the specialization of different parts of the membrane to different energy forms in the environment.

The specialization of cells of multicellular organisms and the associated differentiation of the environment led finally to the broadening of the functional environment of the organisms from the hydrosphere to the other main environments of the earth, to the lithosphere and atmosphere. The organisms started to crawl over the earth and fly in the air. Multicellular organisms started to become specialized and complicated inner structures

joined the cells of the organism together and made possible coordinated action and a rich merging with the environment. From the point of view of appearance of mental activity, an especially decisive phase of development was the appearance of the neuron, the neural cellular element of the organism.

A nerve cell or neuron is a highly specialized cell that differs from all other cells of the organism in its ability to influence directly the activity and metabolic conditions of the other cells. The neuron may exert its influence by special substances, "transmitters," to the other cells of the organism. The transmitters may feed the associated neuron across the synaptic gap or distort its action. In the former case we have an inhibitory synapse (the second-order neuron gets inhibited) and in the latter one an excitatory one (the second-order neuron fires action potentials; see Jarvilehto, 1998b).

Through their influences on other cells of the organism, the metabolism of nerve cells and their mutual organization became decisive in the appearance of coordinated actions of the organism. The nerve cells connected together the motor and sensory cells, creating a functional circle through the environment. Thus, from the beginning, the receptors and motor organs acted together with the environmental elements in one process. The nervous system was organized in elements that formed together with specified parts of the environment action systems, systems making the achievement of specific results possible. After the appearance of the nervous elements, the organisms no more used only single environmental substances, but complicated energy constellations. In the organism-environment system a new form of action appeared: mental activity.

Mental activity represented a change in the structure of action, such that the action now included complicated integrated parts of the environment and the process of action was divided into action results, transitions from one act to another. The environmental elements could be included in the organism-environment system by motor and sensory elements in their coordinated action. The sensory elements consisted of cells that were sensitive to useful forms of energy, but also could detect harmful substances and environmental effects. In addition to the motor elements, elements also developed which could tune the sensory elements to correspond to the specific structural situation of the organism-environment system (efferent influences on sensory cells; see Jarvilehto, 1998c).

The appearance of mental activity was the advent of a new kind of action of the organism-environment system. Mental activity was a new form of action of the highly developed system that was capable of using its history of experience in achieving results of action and forming systems directed towards the future. With its neural nets, receptors and motor organs and associated heterogeneous environment the organism-environment system could extract from the environment *things* which it could use in its action, or avoid if they were harmful. A new scale of action appeared (cf. Keijzer, 1998). The action of the system was no more an undifferentiated process, but could be divided into action results in relation to the extracted parts of the environment. This possibility gave the organism-environment system a new evolutionary advantage.

It is the role of the result of action that gives the clue to understanding the difference between the life process in general and mental activity. Mental activity appeared when the result of action contained the whole organization of the system and aided the development of the entire system. Thus, mental activity is not some mystical "emergent property" of the organization of neural elements (the brain) only, but a form of action necessarily following from the complicated development of the organism-environment system. This consequence was associated with the appearance of neurons, although some plants may show here intermediate forms. Sometimes their actions maybe also show phases of action that could

be regarded as results (e.g. some carnivorous plants). However, the appearance of the neural elements decisively increased the action possibilities of the organism-environment systems. Mental activity made possible the differentiation of the environment in things and of the action in results, having stability from the point of view of the whole organism-environment system.

Mental Activity as Activity of the Whole Organism-Environment System

Thus, mental activity is activity (reorganization) of the whole organism-environment system. It is not realized in the brain or in some other separate parts of the system (e.g., body as a whole), but by the organism-environment system as a whole. This means, however, that mental activity may exist only if there are neural elements, although it cannot be reduced to their activity. In accordance with early behaviorists (e.g., Watson) one could equate mental activity with behavior, but then the concept of behavior should be extended to include any reorganizational processes in the organism-environment system. Behavior, from this point of view, would not be that which can be observed when organisms act, but the observable changes would be only indicators of the real organizational processes directed towards the result of action. As Koffka (1935) quite correctly stated, all mental activity is dynamic organization and reorganization; however, not only of the brain or the organism as Koffka thought, but of the whole organism-environment system.

If we apply the traditional terminology, then we could say that those reorganizational processes of the organism-environment system that we may see as movements are called behavior, and those processes which are not readily detected, mental activity. Such a use of these concepts is, however, misleading, because in both cases the question is of the reorganization of the whole system. Behavior is included in mental activity if the latter is conceived as activity of the whole organism-environment system. Consequently, there is no causal relation between mental activity and behavior; thought does not cause movements or fear escape. A causal relation may exist only between reorganizational processes comprising the whole system, not between the whole system and one of its parts, because the part is already included in the whole system. The part cannot be in a causal relation to itself.

From the conception of mental activity as related to the whole organism-environment system, it follows that all traditional psychological concepts, such as perception, memory, or emotion, for example, are not separate "functions", but aspects of one and the same organism-environment system. Thus, in the frame of the organism-environment theory we may tentatively formulate new definitions for some traditional psychological concepts e.g. in the following way:

"Perception" is the process of reorganization and inclusion of significant environmental parts into systemic organization in the achievement of results of behavior. A percept of an event or thing is a result of preceding organization, not a response to a stimulus.

"Memory" is the structure of the whole system; memory is the basic requisite for any action and result. Without memory no action is possible, because the structure and action go always together.

"Learning" is the process of widening and differentiation of the system.

"Emotions" denote special organizational aspects related to the achievement of results: negative emotions refer to disorganization related to failure in this achievement of the result, and positive emotions to the integration of action after successful achievement of the result. As the reorganization of the system is a continuous process, emotions are always present and there is no action without emotions.

At the beginning of the development of mental activity we may observe all such basic forms of reorganization, typical also of more developed organisms. We may observe them in a rudimentary form in any, even in the most simple organism-environment system, although without neurons the possibilities of realizing these forms of organization are very limited. The main point here, however, is that mental activity does not consist of some "simple" functions like sensations which then developed into more complicated functions, which would then combine to "higher" functions, such as perceptions. Thus, not even in its simplest forms does mental activity consist of simple reactions to stimuli ("sensibility"; cf. Leontjev, 1975) or "automatic" responses to environmental "stimuli."

Mental activity appeared with the appearance of life or, to be more exact, some premental forms appeared with the first single cell and multicellular organisms. However, the appearance of mental activity as structured action and action results was possible only with the advent of neurons. This also explains why it is so seductive to regard the brain as the locus of mental activity (see Introduction).

The Advent of Consciousness

Up to now we have sketched a very general definition of mental activity which could also be expressed as the ability of a complex living system to divide its world into parts (things and events) which are significant or meaningful in the process of result achievement. This kind of definition applies to organisms supplied with a nervous system. Among these organisms, however, the characteristics of mental activity may considerably differ, which may be seen in the dynamics of their behavior, in the results of action, and in the action structure, leading to differences in their abilities to cope with varying life conditions. During evolution more complicated forms of mental activity appeared, eventually resulting in the possibility of investigating one's own mental activity and reporting to the members of the same species one's own perceptions, memories, and feelings. This possibility—which is reflected, for example, in the fact that I am writing this article—was created by the advent of consciousness.

Although consciousness—being able to experience, describe, and report one's own actions (perceptions, emotions, movements, etc.)—is certainly one of the central problems of psychology, traditional cognitive psychology has not shown much interest in this problem. It is also clear why: although critical towards classical behaviorism, cognitive psychology shares with it the idea that human information processing may be studied without using this concept. This is understandable, because from the point of view of linear information processing all psychological or neural processes go on in the same domain, although sometimes the question appears of why some processes seem to be connected with reportable experiences and some do not. Anyway, the processing starts with the stimulus and ends with the response; whether something between the stimulus and response becomes conscious has no special role in the explanation of the response. Even if some parts of the processing may be "conscious," such experiences have only an epiphenomenal character. Conscious and unconscious are not usually defined and separated on the theoretical level.

At the present the situation has changed, and both cognitive science and neuroscience have started to take the problem of consciousness seriously (Chalmers, 1996; Hurley, 1998). In a few years, this has resulted in a large amount of literature trying to answer questions like "What is consciousness?", "How can consciousness be explained?", etc., but in the present article I am not trying to answer such questions. In fact, these questions may

be wrongly formulated, having no answer. If we suppose that consciousness underlies somehow the use of language, then it is not possible to describe consciousness with words. This would presuppose that we could go beyond consciousness and be in some other way conscious.

Usually, consciousness is conceived as an individual, private, subjective, personal faculty hiding somewhere in the abyss of the soul or brain. This follows logically from the separation of the organism and environment: when considering human action we deal with two separate systems, one is man with his body and inner life and the other the environment with all its stimuli and other people acting on the former system. Thus, man (or a body) must be the carrier of mental activity and consciousness, and it is this system which is in interaction with the (physical) environment system located outside. Such a conception is usually also connected with the idea that the activity of some parts of the brain may become conscious, or that it is just this activity which makes us conscious. From this follows the question of how the activity of these parts differs from the activity in those parts that do not have this characteristic. If the contents of consciousness are determined by the brain or some parts of it, we should be able to show some specific neurophysiological characteristics in those parts. However, neurophysiology deals only with physiological characteristics of neurons. It does not deal at all with the concept of consciousness, and so at once we have here a problem that cannot be solved.

Thus, I will not proceed by trying to answer such questions as "What is consciousness?", or "What parts of the brain make us conscious?" Instead, I shall try to formulate the conditions in evolution that made the appearance of consciousness necessary. The main idea is that consciousness is something that developed in evolution on the basis of the possibility of mental activity and, when once it had appeared, gave advantage to the life process of conscious organisms.

An Outline of the Development of Consciousness

If—in the frame of the organism-environment theory—mental activity is activity of the whole organism-environment system what would consciousness be then? Is consciousness also only an aspect of action of the organism-environment system? Does consciousness develop within such a system?

What are the essential features or criteria for the existence of consciousness? The first one is certainly its apparent subjectivity: I can know my own feelings, but I can always doubt if other humans have such feelings. Thus, consciousness is something private. The second feature seems to be opposite to the former one, viz. the commonality of the conscious experience: I can report my feelings and think that others can share them and understand what I say. In fact, even the term consciousness is related to common knowledge (Lat. com-scire, to know together). Thus, consciousness is something in common. Can this contradiction be solved in the organism-environment theory?

Consciousness is often connected only with human beings, and with the appearance of social activity (Leontjev, 1975). Without doubt, social activity is a prerequisite for the appearance of consciousness, if it is related to "knowing together", but some sort of social activity may be seen among all kinds of living creatures. In fact, hardly any animal lives alone, and all basic forms of behavior of animals—feeding or sexual behavior—are somehow connected with their fellow animals, they have a social character, or they have at least social consequences.

The development of organisms led to the appearance of different groups and species of

organisms. The organization of such groups was loose and cooperation between individuals rigid. Each individual had a fixed role, fulfilled its role in the organization, and was destroyed when no more needed. The action of the whole system was not based on cooperation in the usual sense of the word, but the question was rather of fitting together of prespecialized units in the physiological sense, in a similar way as specialized cells join to form the human body (cf. Mead, 1934). Such examples can be also seen among very primitive organisms (e.g. fungi) which seem partly to live separately, but under certain circumstances start to create formations in which an individual gets a fixed role and which helps the group to overcome difficult life conditions (see Clark, 1997). In a more developed form this sort of cooperation is typical of social insects, such as ants. It is questionable if such organisms have consciousness; at least they cannot share it with humans.

Hence, social activity alone seems not to be a sufficient criterion for consciousness, although any cooperation may already reflect some rudimentary form of consciousness. In humans the appearance of consciousness is usually connected with language and tool making, but these seem to be activities which already presuppose the existence of consciousness (at least in the sense of planning and report). Thus something critical happened in social activity before the appearance of such skills.

It is suggested here that this critical feature was the development of such social activity that produced something genuinely new as a result, i.e., a common result, which was useful for the participants and for the development of the social system as a whole. The specific feature of this result was that any individual alone could not achieve it, and it could be varied under different life conditions.

The conditions for the achievement of common results in human social action are extremely complicated. For example, lifting a stone together presupposes many coordinated and integrated actions whose temporal and spatial dynamics must be exact. If lifting is asynchronous then the individual efforts do not join as a common force; the same is true of the spatial organization. In order to create a common organization the participants must be able to influence each other, indicate their intentions and the purpose of the common action. The common result could be achieved when every participating individual plastically changed his organization such that it fitted the common organization necessary for the result. Such a process of fitting was possible through the simultaneous influence of one participant on another and on himself, through a gesture or sound which both participants could follow (cf. Mead, 1934). One individual had to be able somehow to indicate to the other his place in the cooperation and the instant of action so that the individual forces could be joined in a simultaneous effort, lifting and moving a big stone to protect the camp, for example. Such influencing was the beginning of communication that later developed into the use of language.

The development of communication offered the possibility of directing one's own and another's actions towards a common result by giving orders to oneself as well as to the other (cf. Mead, 1934). Therefore, communication developed as a tool for creating cooperative organization in which the indication given to the other also acts as an indication to change one's own actions. In this process it is possible to see through the other participants what the relation is of one's own action to the common result as well as to the efforts of the other participants. This was the beginning of human consciousness.

Hence, consciousness—in a very general sense—means appearance of an organisms-environment system in which every single organism-environment system acts as an element of the system as a whole which is directed towards common results that are useful for the whole co-operative system. In such a system it is possible to change dynamically single

organism-environment systems so that they may fit each other in the process of achievement of results. In this larger system the body of the individual gets the character of a tool; it is in a similar position to any other part of the environment in as far as it can be used in the achievement of a common result. I can look at my hand in quite a similar way as I look at the hammer in the hand; I can use both for certain purposes. However, the body of the individual is not only "outside," it is also "inside," because the body sets the point of reference for all actions of the individual. The body sets the perspective to the world, the individual point of view to the common result.

According to the present formulation consciousness is the characteristic of the structure of the social system; therefore it is not possible to regard consciousness as some sort of "inner" property of the individual. However, consciousness is not only something general, but every individual also has his personal consciousness. This personal consciousness is not something residing "inside," but means the personal participation of the individual in the results of common action. Every participating individual realizes some aspect of the general consciousness through his own action. The different individual aspects culminate in the common result and participation in the common results widens the action possibilities and the personal consciousness of the individual. The development of the personal consciousness is therefore in direct relation to the possibility of using the common results in one's own action.

Consciousness did not appear at once, but its beginnings may be seen in the whole animal kingdom in the social activity of different animal species. The advent of consciousness was a necessary consequence of the interaction of living systems, and its development has evolutionary significance in the form of common results. These results always represent something more than that an individual is capable of. Thus, a conscious individual could purposively use the power of the whole organization for his life process.

The evolutionary significance of consciousness may perhaps be seen most clearly in the structure of the human environment and culture, and in the way humans have changed the structure of the earth: in buildings, factories, roads, and even wars—all results of intensive and well-organized cooperation and possible only for the human species as a whole, not for any individual alone. The evolutionary value of consciousness is also indicated by the fact that humans seem to be alone among other animals with their highly developed consciousness. It may be precisely this highly developed consciousness which gave mankind the power to destroy all animal species which were too close and also capable of developing a similar kind of consciousness. Therefore, human beings are not alone among the other animals because of some kind of miracle of sudden creation, but because they have systematically destroyed all their closest species.

Consciousness, Individual, and Language

The former considerations indicate that we may discern in the use of the concept of consciousness at least three somewhat different meanings. First, we may consider consciousness as related to the whole social organization, as an organizational aspect of the cooperating system. We may call this "*general consciousness*" in the sense of common knowledge. Second, with the help of communication it was possible to extract the role of the individual in the organization, in relation to other individuals and to the common result. This possibility created the basis of "*personal consciousness*" which means general consciousness as realized from the perspective of a certain body. Although consciousness does not exist in the brain or in the body, the body is important from the point of view of

consciousness, because it creates the unique aspect and spatial position through which general consciousness works. Third, we may speak of *consciousness as subjective experience.*

One of the central factors in the mystification of consciousness has certainly been the manner in which it has been understood only in the sense of the last aspect, as subjective experience, which led to its localization in the brain, body, or individual, in general. However, according to the present formulation consciousness means the possibility of a certain kind of cooperation and the production of common results which are beneficial for all participants; therefore, consciousness cannot exist in the individual, but presupposes a whole consisting of several individuals.

If consciousness really exists in the individual, then it should also exist without "you." This, however, is not possible, as always when "I" exists there must also be a "you"; "I" may be defined only in relation to somebody else. Thus, an "I" may exist only if several individuals exist, making a common organization possible. An individual is nothing without the cooperative organization, because he gets his properties only through other individuals; we could even say that *an individual is the cooperative organization*, but only from a limited perspective. And this perspective is set by the characteristics of his body defined in relation to the other individuals (cf. Merleau-Ponty, 1962).

The appearance of consciousness means the appearance of an individual who can reflect his own action results, because they are not only his own, who can look at his body from "outside," because his "I" is not located in the body, and separate objects from his body. The advent of consciousness means that the individual (or now rather his body!) becomes an object of his own action through other individuals. The agent of this action is not the body, but an "I," a set of relations in the organization. In the system consisting of several individuals each "I" means only a systemic point of view of the co-operation and of the environment created in this co-operation through the common results. This aspect or point of view is not directed from the body into the "outer" world as if an "I" was looking outside through the bodily windows, but this aspect means that all action and its results are related through other individuals to one's own body. From the point of view of consciousness one's own body is as much "outside" as the other parts of the consciously perceived world.

Consequently, consciousness cannot be located in any parts of the individual, in his head or hemispheres of the brain. The localization of conscious experience in the head is based on the mistaken conception of the subject of the conscious action (mixing of personal and subpersonal, see Hurley, 1998). The subject of consciousness is not the body, brain or a neuron, but an "I," a person that may not be defined on the basis of the structure of his brain, but rather as a point of intersection in a net of social relations. The "I" is not an entity in the same sense as a body, but a systemic relation. The thinking and conscious subject is not a piece of flesh, but a set of relations and processes in the social system. Such relations create a person who is distinct from all other personalities precisely through those specific relations. Thus, a person may be defined as a point of intersection of all social relations, the body being the spatial location of the point of intersection; the concept of person contains all those parts of the world and relations which are important for the life process of the individual. These parts are the basis of the identity of the individual, his self. Nobody may have an identical personality or self to somebody else, because it is not possible to have the same social relations as somebody else. It is this fact that gives to every individual his uniqueness. For the self, the body is an object like other parts of the environment, but with one important difference: the body is the point of reference for the

self in relation to the common results; the body creates the personal aspect of social organization.

It is just consciousness that made possible the starting point of the two systems theory (see Introduction), because consciousness means the possibility of looking simultaneously at one's own body and at the objects in relation to it. However, here we are not looking at the subject and the object, but at two objects. In fact, when we think a little more about the concept of the subject we will see that it is not possible to describe the subject of an action. If such a description were possible the subject would no more be a subject, but an object.

The conception that we can describe the subject is based on a very simple linguistic misunderstanding. When I say, "Phil paints the house," Phil is a subject and the house an object, but only in a grammatical sense. From my point of view both Phil and the house are objects and I describe only the relation between these two objects. If I say, "I am painting the house," this "I" is no more any perceptible object, although we usually try make it such by using the body as a point of reference. However, it would be strange to say "My body is painting the house!" In many languages it is not even necessary to use "I"; it is enough to say the verb and the object.

As language was needed primarily for forming the organization directed towards common results, it (and also personal consciousness mediated by the language) started to develop in relation to the common results. Thus, a word is basically not a symbol representing something, but a proposal for common action. It is precisely the common result which is stored in language and therefore language reflects the history of mankind and its culture; language is the historical collection of the results of human cooperation.

The criterion for consciousness is the possibility of communicating and indicating common results; with words we can never describe an action, but only common results. If I want to tell what happens when I take a pencil from the table, I must divide my action into smaller results of action: my hand is now here, I move it, at the next moment it is there, I take a grip on the pencil, etc. If I am further asked what I mean with "move" or "take," I must again go to the results and say, for example, that moving means the hand is now here, but at the next moment there. We have no words for the action itself, and we cannot even have such, in principle, if consciousness is related only to the results of action. In fact, each verb is an abbreviation of a sequence of results. A human being cannot describe or understand movement, because he is himself all the time in the process of moving.

Although words are for cooperation and for the achievement of common results, the common results are something that may never be exhaustively described by words. Speech and language mean only possibilities of creating an organization leading to the common results of action. A word is an "interpretation" in the sense that it refers to an indicator of result. For example, the word "ship" denotes a piece of reality (thing) which is an indicator of the result (e.g., the possibility to go overseas). The word is a human interpretation of a piece of reality. For an ant that part of the world would not be a ship, but something else (of which we will never have exact knowledge, because we cannot share it with the ant). The identification of the indicator of result with the result itself means the stopping of development, limiting oneself to what is visible.

It is important to stress that the starting point of any description of the environment is the distinguishing of man and the environment, not because such a separation really exists, but because in the use of language we must be able to distinguish an object. However, all concepts bring, in fact, the subject and object together. If I say "forest," for example, we may have the impression that I am speaking of something which is absolutely separated

from the human being and exists without him. Thus, the concept of "forest" would not contain anything referring to the body, only to something outside the body. However, "forest" can be understood as forest only in relation to the human being; for an ant running in the forest there exists no forest in the sense we think.

The development of consciousness means the development of conception of the separation of man and the environment. This is a necessary condition for planned co-operation and for contemplation of action alternatives. A newborn baby has no such separation, and for her/him everything that happens, happens to her/him. With the development of personal consciousness the child starts to make distinctions between her/his body and the other world. This is necessary, because otherwise there would be too many unpredictable factors having a direct influence on her/his action possibilities.

With the development of consciousness s/he starts to have her own *joy or pain* that, however, is a result of learning and cooperation with the closest people. This leads then to the idea that something that happens to other people is not happening to "*me*." With the further development of consciousness it is possible that people start to realize that this connection was, however, never really cut: everything that happens to other people happens also to me, at least in the form of development of my action possibilities and experience of the world.

Language also means a possibility of a theory of action, for the explanation and understanding of one's own behavior. Language makes possible the existence of the past and the future in the present, because language gives the possibility of reflecting on what happened and what will be happening. This is the basis for our impression that consciousness is continuous and that we can use language for the description of the process of action.

Development of Consciousness and the Forms of Cooperation

If consciousness is related to the organization of organism-environment systems in the process of achievement of common results, then the development of consciousness could be examined by considering different forms of cooperation. As indicated above, the forms of cooperation are probably different at different phases of phylogeny. From the point of view of the development of the personal consciousness the most important phases could be the following:

1. "*Totalitarian*" organization based on fixed specialization. This is the earliest organization in the evolutionary sense. In this organization, cooperation is not directed towards any specific result, but the common result appears if the individuals rigidly fit together in the formation of the common result; this organization is what Mead (1934) calls physiological cooperation. Consciousness exists here only in its general form; no personal consciousness exists.
2. "*Corporate*" organization based on relative specialization of participants and communication, but the common result is pre-set by goals or laws formed earlier. The main type of communication consists of orders. Personal consciousness is present, but the organization does not allow its optimal development, because the formation of the common result involves resistance from the participants and the participants do not authentically share the common results.
3. "*Communicative*" organization based on unspecialized individuals who may flexibly take the roles of others. The common result is not predetermined, but achieved through communication in the process of fitting together the organizations of the

individuals in an optimal way. The result is new and even surprising: something in which the visions of all individuals join together. The main type of communication is dialogue. This organization is the basis for the development of consciousness because, through common results, participants learn new aspects of the world. In this organization the personal consciousness may develop, grow larger and approach the general consciousness.

This order of forms of cooperation may reflect a true developmental order, although this does not mean that the earlier forms disappeared with the advent of the newer ones. If we look at human societies we may probably also find these forms at the present; as the labels indicate the first one would refer to a totalitarian society, the second one to an ordinary corporation, and the third one to a new type of team work.

As indicated earlier, communication is the vehicle for creating cooperative organization and as can be clearly seen its role is different in different forms of cooperation. One could roughly say that the importance of communication increases from one to three. Thus, the development of consciousness and the forms of cooperation could be analyzed by studying the linguistic forms typical in the community.

Because cooperation presupposes dynamic changes in the common organization it is possible only within individuals who are structurally relatively similar. We cannot spin a web together with a spider, because our structural scales and significant parts of the world are completely different (cf. Keijzer, 1998). A spider can never live in a human world and vice versa. The individuals of different species differ from each other especially in how they create their world and divide it into significant parts in their life process. Therefore, it is difficult to know which parts of the environment should be shared when two individuals of different species try to cooperate. Possible common results would also have completely different meanings for the individuals. Therefore, the possibilities of cooperation between species are very limited. There are of course some exceptions, such as dogs or chimpanzees when they live with humans.

Consciousness as Evaluation of Action Results

The result of action can be defined as a possibility of a new act and as a point of comprehensive reorganization of the organism-environment system. A conscious result means that this point in action joins with the actions of the other people. Therefore, this point is also the point of estimation, values, and norms. Common results are the cornerstone in the origin and development of culture. Thus, culture is not a process originating in the heads of individuals in the form of "*memes*" (see Dawkins, 1976), for example; culture is rather based on the common knowledge expressed in the structure of the cooperating organization.

Every conscious result means a point from which behavior may acquire a new direction. Therefore consciousness "disturbs" fluent action. Every conscious result means the stopping of the ongoing action, and a point of evaluation of the achieved result. In practicing a skill, for example, conscious moments are abundant, but with the development of the skill they become more and more infrequent, so that the action goes fluently from one conscious result to another even with long intervals between them. Such "automatization" does not mean that the action becomes more and more automatic (in the sense of mechanical repetition), but it is formed in context-dependence without any conscious interference. If some part of the "automated" action becomes conscious then the fluent action is dis-

turbed. If a pianist, for example, starts to think of the movement of a certain finger when playing, his action may stop or become clumsy.

The common result is the culmination of the goals of all individuals participating in the action, and the result is an integration of organizations of all participating individuals. Therefore, the common result is also to some extent unpredictable, and cannot correspond to any goal of a single individual. Hence, social action always produces something new and may even lead to unexpected results. In fact, the same is also true for the individual: if an individual sets goals the result achieved is never exactly that which was set at the beginning, because the result is something realized in the future, with factors which were not present when the goal was set. From this an interesting paradox follows: the more one wants to achieve a goal, the less the obtained result corresponds to the planned goal. This results because an intense following of the preset goal restricts, in fact, the action possibilities of the individual.

Subjectivity and Privacy

The "mystery" of consciousness is, as a matter of fact, based on a very simple thinking mistake: to be conscious means to be able to look at one's own action, and because this action is seen as bodily movements, it is natural to think that there is somebody inside the body making these actions. However, we could also locate the cause of these movements in any other part of the world, and we could well think of a culture in which it is the tools people use, which think and make decisions through people. It is only a cultural convention that we are used to set the point of reference of consciousness in the head, which leads to the mystical idea that consciousness is inside the brain. This makes consciousness into something very subjective and private.

However, according to the present formulation the starting point of these subjective and private experiences is our cooperation with other people, our common experience, and coordination for the achievement of the common result. If we agree that the basis of "*I*" is the set of relations within a system of communication, then "*my*" subjective experience *is not really private, but also includes other people.* To have an "I", to be a conscious agent, means that the individual is the whole of humanity, but only from a restricted point of view.

The question of subjectivity of consciousness is the question of the contents of consciousness. What determines the content—the qualia—of the conscious experience? It is nowadays usual in cognitive science to answer this question by referring to a certain area of the brain: a visual sensation differs qualitatively from a tactile one, because the former is processed in the visual cortex and the latter in the somatosensory one. Such an answer, however, is only a repetition of Muller's law of specific nerve energies from the nineteenth century in a modern form. Muller thought that each nerve contains its own specific energy which makes it understandable why, for example, any stimulation of a visual nerve produces a visual sensation. According to Muller, the nerve contains a "specific energy" related to the evoked sensation. Nowadays nobody believes in such energies, but in fact this concept has been replaced by the concept of the locus of activation. Visual sensation appears, because neurons in the visual cortex are activated.

However, the neurons in the different parts of the brain function in a similar way even if there are some anatomical differences in their constitution. There is nothing "visual" in the visual cortex, or nothing "tactile" in the tactile cortex, and there is no reason to think that the quality of the sensation would be determined by the locus of activation *per se*. Thus, Muller's original problem has still not been adequately answered in cognitive science.

According to the present consideration the problem is wrongly formulated. If I ask "What determines the content of my consciousness?", the answer cannot deal only with the brain, but must include much more. What makes me feel like a human being does? The first condition for this possibility is precisely that I am a *human* being, that I belong to the human species. I am a human being only if the contents of my consciousness are typically human; if they are something totally different then I am no more a human being. According to the present formulation this is self-evident, because the content of consciousness is determined by the common results, by the possibility of cooperation with other human beings. Thus, the content of consciousness is shared with other human beings; otherwise cooperation would not be possible.

The basic problem in cognitive science is the fact that it treats conscious and unconscious mental "functions" in a similar way by locating them in the individual's brain. However, when consciousness appears the mental processes change: not even in their unconscious form were they located in the brain, but in the whole organism-environment system. In their conscious form they have still less location: every conscious image, memory, and thought is not something individual only, but belongs to the whole cooperating system in which it gets its significance as a shared image, memory or thought. These forms of the reorganization of the organism-environment system simply lose their content if man is separated from his fellow humans and from his culture.

Conclusions

Human action is the process of the intertwining of the body and environment in cooperation with other people, and the results of human action are an inseparable part of this process. The human being belongs together with the other human beings and may only in this context have his own existence. Individuality is possible only in a social system. However, all conscious things are common; therefore the whole human world as it may be described is a social world. All conscious experiences are common experiences. What relates to one human being relates to all of them. The separation of man from his environment means also the separation of man from the results of his action and thus denial of the developmental possibilities of the human being, as all development goes through positive results.

All science must start with certain assumptions. It is maintained here that in psychology the critical basic assumption concerns the character of the systems with which we are dealing when we speak about man and his environment. This means that the organism-environment system should not be regarded as a system which concretely exists, but rather as a conceptual tool and a monistic methodological principle. The organism-environment system is something that can never be never observed directly, just as with atoms or molecules. There are, however, possibilities of developing empirical research on this basis. For example, the organism-environment theory opens possibilities for a new interpretation of the role of electrical recordings from the brain in explanation of mental activity. When recording an EEG we may get an impression of how the brain is organized as a part of the organism-environment system in behavior. What is of especial importance here is the determination of what the subject is really doing, how his action is divided into phases and behavioral results. Provided with these data we may relate some individual measurements to the whole process of reorganization of the organism-environment system.

From the point of view of the dynamics of mental activity the organism-environment system is the smallest unit of analysis. As mental activity is a process always comprising

the whole organism-environment system, it is not possible that a part of the system alone contains intentionality, meanings etc. If we take only the organism/brain, or if we take only the environment we destroy the object of our study. In a practical investigation, however, we may study processes of the brain in behavior and locate there some components which seem to be necessary for a certain kind of behavior. This type of conceptualization means that we artificially render the system stationary and look for the necessary conditions (components) for a certain result of behavior. Such analysis will never provide an explanation of intention or mental activity, because for this end we need a complete description of the whole system, but it may provide us with some aspects necessary for understanding the functioning of the system.

The theory of the organism-environment system attempts to save objective science from the mysticism which is necessarily entailed by different forms of *idealism* or *physicalism*; it tries to preserve the rationality in science in the sense that it is possible to understand the world within those limits which are possible for humans. This may sound odd, because it is precisely physicalism that is maintained to have this task. However, there is a strange contradiction: although people who speak for objectivism maintain that the world consists of physical *things* there is no physical way to describe any of these things as a whole. We may measure their dimensions, record reflectance etc., but these recordings are not the *thing*. Only an observer may connect all the properties that make a thing and here we are already outside the bounds of physics. For the physicist there does not exist an environment in the sense it exists for any organism.

Idealism and physicalism are similar in the sense that both of them locate the human being at the center of the universe. This also explains why they are defended so vigorously. Although the human being lost his position as the center of the universe with sun-centered astronomy, something was still left: man as a dictator of the "objective" characteristics of the environment. The universe is still "governed" by humans, in idealism in the form of inner constructions and in physicalism as projections of these constructions into the environment. Idealism, of course, goes here even so far as to deny the reality of the world altogether, which is really an extreme case of omnipotence. In any case, both start with an absolute separation of man and environment, and have as a criterion of reality those properties of the environment that may be experienced or measured (which is the same thing). To say that the world would objectively exist with those properties which we know even if we did not exist is only a reverse way of saying that the world is our construction. It sounds, of course, very objective, but it is in fact only an extremely subjective point of view. It is so subjective that it may freely assert that the only objective point of view is the observer's own.

Conscious perception means the possibility of describing the world around us and determining its properties from the point of view of the human being. It is also the possibility of monitoring our own existence, our feelings, pains etc. The "two system theories" of perception regard perceptual activity as something which reveals to us, first, the basic features of the world which exists "out there" independent of human beings and which is then reproduced in the human brain as some sort of representation. The properties of the "objective" world are outside, and they are constructed in the head of the observer by computations in the neural nets.

If the world is a dynamic and ever-changing system there cannot be any permanent properties of the organism or of the environment. William James pointed out that things change when they enter into new relations; thus, there is no fixed "essence" of things. Earlier it was thought that the essence of a thing might be seen when we look at what stays

constant when the thing is set into new relations, and it seems that a chair is a chair whether it is in front of the table or on the table. But what is forgotten in such thinking is that with these new relations there is one relation that does not change and which preserves the "essence," and this is the relation of the human observer to the thing described. If you imagine (we may only imagine) that this relation would also change and a spider, for example, would give the description, then there would no more be any chair. This shows that the "essence" or "nature" of a thing is the same as the human "essence" or human nature. Such things were not realized before the advent of relativity theory, although Spinoza (1677) already pointed at them: the nature of the thing is more determined by the structure of the human body than by the "external" thing itself.

The organism is born, not into a physical or ready-made environment, but into a world of possibilities, and the environment changes continuously with the actions of the organism. Heavy turns to be light when the muscles grow, difficult turns to be easy with enough training and the bad turns out to be good when more knowledge is gathered. Something light is for someone else heavy, something good for somebody may hurt somebody else. The evil or goodness does not inhabit human beings, but they are created in human relations. The bad or good is as well in the inspector as in the object of inspection. Beauty is in the eye of the observed and there is really no sense in disputing about matters of taste!

The changing of properties with changing relations is nothing fictional or "interpretative", but real. Things change into other things when the purpose of their use changes. The fact that the "physical" features of things seem to be the same independent of their use seems to show only that physical measurements are pretty trivial in relation to the descriptions of the real use of the environment and in description of its significant parts. However, changes also occur in such properties when we move fast enough: things shrink, their mass increases and time slows down, as shown by the special theory of relativity. When we move from one set of co-ordinates to another, our possibilities of measuring things and with that also the results of measurement, i.e. properties, change.

Any organism may be defined only in the frame of the system to which it belongs. If the organism was absolutely alone it would have no properties, because there would be no relations defining it. When we are perceiving different organisms, we are joining them into the human living system which means that these organisms acquire properties which have significance only from the human point of view. Therefore, we will never be able to understand thoroughly how the worlds of other organisms would look or what such organisms would be from the point of view of their species. Some possibilities we have, however: by investigating the behavior of different organisms we may see which parts of our world seem to be important to them also and through such observations we may, to some extent, understand their behavior.

It is precisely the main problem when studying the living system that its environment can be determined only by the system itself, not by the observer. The environmental parts of the organism-environment system are not physical, because we may use physical description only for those parts of the world that we include in a physical experiment. Thus, "physical" is subordinate to consciousness, and consciousness cannot be reduced into biology or physics.

In cognitive science the environment is not seen as a problem, and therefore the environment used in research is the environment of the researcher, and has a strictly defined significance in the experimental form for him alone. The basic mistake then is that the experimenter gives to his own environment a generally valid existence. However, such generally valid environments do not exist; the environment is always somebody's environ-

ment, it belongs to a certain organism-environment system. The objectivity of the environment is not possible in any absolute sense. For humans the objective environment exists, because the human environment is a shared environment; it is independent of the existence of a certain spectator. It is, however, not independent of the existence of the human species. The description of the environment may be objective only in the sense that this description is based on consciousness and on common knowledge about the environment. In such description the "scientific" analysis of the environmental features does not give the basic materials for perception, but presents the most derived and abstracted features, the analysis of which already presupposes the existence of conscious perception. It is therefore questionable whether such an analysis may give any basis to the psychology of perception or to sensory physiology.

When we perceive the world, stimuli do not jump into our brains from the outside to cause perceptions, but in conscious perception we are joined to certain parts of the universe in order to act together with other people. Hence what we concretely and consciously perceive is always related to the possibility of cooperation, to potential common results and hence to language. This does not mean that perception is some kind of social "construction" realized by a single brain, or that it is only "subjective." Each percept is the realization of an aspect of the real world. In each conscious perception the world turns one of its sides toward us, a side which can be used in joint action with our fellow humans in our culture.

The problem of consciousness has probably always been difficult precisely because consciousness has been sought in a person artificially abstracted from the environment and other people. From this point of view also, social activity means at best only some sort of "interaction" between separate individuals, and therefore it is necessary to postulate a consciousness or "sociality" within each individual separately. If, however, consciousness means something in common, e.g., common knowledge, it is impossible to see how this sharing could develop separately within each individual.

Thus, modern brain research, for example, is faced with an impossible task when trying to find in the brain special areas for consciousness. This attempt is something similar to the effort of trying to find "steering" by looking only at the steering wheel of the car. This doesn't mean denial of the importance of the brain or the nervous system when consciousness is studied. However, locating consciousness in the brain leads to questions which cannot be answered, because for consciousness to exist we need much more than the brain alone. Of course, if we remove the brain one loses consciousness, but the same also happens if all other parts of the body, or of the total environment (with other people) are removed. On the other hand, even large parts (e.g., one hemisphere) of the brain may be dissected without any permanent loss of consciousness. The development of the nervous system was most probably important from the point of view of the advent of consciousness in the phylogeny, but this does not mean that consciousness is located in the neurons. Consciousness is something that cannot be explained by more "basic" concepts, although we may trace its possible development in the evolution of nature.

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