Consciousness and Process

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I wonder if is it possible to combine the view that consciousness is a flow of mental states with the view that it is not a process. I believe this combination is possible and necessary for a correct understanding and explanation of consciousness. I distinguish between a process (information-processing) and a non-process (at least not time-processed) side (aspect) of consciousness: The first consists of the neural information-process, the flow of sensations and the change of feelings. The second lies in the conception and representation of processing potentials of states of affairs, events and processes. The unity of process and non-process sides of consciousness lies in the awareness of time as an imaginary process that is the basis of all other processes.

1 Wittgenstein's challenge: consciousness is not an inner process.

The idea of consciousness as a kind of "inner process", a flow of "inner states" of an organism is very common in everyday's thinking, in science and philosophy. We often speak of the "flow of ideas", "flow of emotions", etc. We find this idea very often in philosophy, in psychology, in cognitive science, etc. James characterized consciousness as the continuous process of attention and intention (volition). He introduced the metaphor of the "stream of consciousness" (James 1950). Later, the idea of consciousness as an information process in the brain became the leading idea in the cognitive science.

The essence of this idea is: consciousness is a chain of inner states of a cognitive system of which the cognitive system is aware. This change is a permanent change of those inner states of the cognitive system which have the quality of awareness. Understanding this process depends on special philosophical standpoints.

For dualists, mental states are intrinsically inner states of each person, i. e., they are not penetrable by other people. The process of consciousness of a person is inaccessible to other people and is self-evident to the given person. For dualists, these facts indicate that inner states and the stream of consciousness are essentially immaterial. For materialist philosophers, mental states are certain states of neural structures in the brain. The process of consciousness is a neural process in the brain.

Díaz recently presented a semi-phenomenological theory of the stream of consciousness. He assumes a "neutral monist ontology according to which conscious phenomena are both brain- and mental- states of a peculiar information class; namely, patterned processes that call for meaningful correlations but not for mutual reduction" (Díaz 1996, p. 714). This is a middle standpoint between dualism and materialism.

If someone told me "Wait for me by the bank", and I asked: "Did you, as you were saying the word, mean this bank?" then I was referring to the time of speaking, not to an experience at that time. The question would be meaningless if it referred to a hidden state of meaning within us (Wittgenstein, 1976, p. 216f). The same would be true if someone asks me: "Did you intend to say such-and-such to him on your way to meet him?". The question refers to a definite time of walking but not to the experience (of intending) during that time (ibid.).[1]

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[1] In connectionism the "inner states" of a neural net structure are diffuse and mainly implicit; the inner processes are holistic and synergetic (Rumelhart, McClelland, 1986). We cannot identify everyday mental states (i.e., states of believing, thinking, experiencing something, etc.) with some definite real inner states of neural nets in the brain. There is a difference between phenomenological inner states on the mental surface and their implementation in neural nets. Some proponents of connectionism deny the usual conceptions of mental phenomena, especially intentional mental states. They are part of a "radically false theory" (Churchland, 1981, p. 67). In the classical computational theory of mind we have a relatively closer connection of the manifest mental phenomena and their implementation in the

Wittgenstein drew the following conclusions from this apparently purely verbal reasoning:

"The intention with which one acts does not 'accompany' the action any more than the thought 'accompanies' speech. Thought and intention are neither 'articulated' nor 'non-articulated'; to be compared neither with a single note which sounds during the acting or speaking, nor with a tune."(ibid.)....

"Meaning is not a process which accompanies a word. For no process could have the consequences of meaning. (Similarly, I think, it could be said: a calculation is not an experiment, for no experiment could have the peculiar consequences of a multiplication)." (ibid., p. 218).

Thinking, intending, meaning something are not real states or processes, i. e., some states and processes that have some given duration in time. They do not "happen in the mind" (or in the brain).

We have to be cautious not to overemphasize Wittgenstein's criticism of some mental states and mental processes. Wittgenstein did not deny mental states or mental processes in general. He accepted emotional states and emotional processes, perceptual states and processes, pain states, etc. (Wittgenstein, ibid, p. 59, footnote), but he denied real processes of "higher mental acts": thinking, intending, believing, meaning something. Wittgenstein criticized also the idea of some "inner mechanisms in the brain" because this idea is subject to the so-called grammatical mistake of speaking about inner states and inner processes. Instead of that, he proposed to understand higher mental acts as some necessary "grammatical" parts of human life-form, namely of the life-form where language is the essential constituent.

"An intention is embedded in its situation, in human customs and institutions. If the technique of the game of chess did not exist, I could not intend to play a game of chess. In so far as I do intend the construction of a sentence in advance, that is made possible by the fact that I can speak the language in question." (Wittgenstein, 1976, §337).

Wittgenstein's criticism of the idea of private mental states and of mental processes is Wittgenstein's challenge to modern philosophy of mind, and to cognitive science, both of which depend especially on the idea of consciousness as a "mental process" (as the flow of "mental states"). To speak of inner-, mental-, brain states or processes leads us to some logico-grammatical paradoxes. This mode of speech indicates that a large portion of conceptual naVveté is bound up with the idea of mental states and mental processes.

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representational strcture of brain.

two aspects, one of which is process and the other is non-process. It is not only one of them. Here, I try to give only some first insights into this idea.

2 General characteristics of processes

It is very hard to give a clear notion of processes. I will give only an informal description of some properties of processes that are relevant from my point of view. Processes are usually conceived as some sequences of changes of states of a system (e.g. a system of some properties and relations of material objects, a system of mental phenomena) with a given pattern of changes. The first important property of processes is that at least some qualities (traits) of the states of a system that appear in processes change in time.Stationary states are events. We can in principle conceive of stationary states as elementary processes, too. Processes are then conceived of as ontologically fundamental (like Whitehead (1929)). Qualities of states that give rise recurrently and consistently to the pattern of change, are characteristic qualities of a process. The most general referential process of changes is the time-process that gives measure to all other real processes.[2]

The second important property of most real processes is the continuity of change of some characteristic qualities of the states. Each state could be presented by a valued state of affairs in a given moment of time. It could be formally described by some properties of the state (characteristic properties of the state). Material states are determined by the characteristic properties and relations of some material objects, mental states by some characteristic qualities of mental phenomena in a given time-interval. Sometimes time-intervals can be reduced to time-points (we get instant-states). Characteristic qualities and their changes in sciences are often given by some bounded and differentiable mathematical functions (of time and other variables). In the social sciences and humanities, we need some more descriptive and qualitative methods of finding the characteristic qualities of processes. In each case, we have to distinguish a process itself from its cognition by humans.

Commonly-encountered real processes are very complex. They consist of many simpler real processes and corresponding simpler real states. The measure of complexity for states and processes depends on the context, on the properties of the system of states and its connection with larger systems of states. However, concerning the state of a given system, we can speak

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[2]A similar idea can be found in Aristotle's Physics (Book 4, 219B), where he defines time as the "number of motion in respect of 'before' and 'after'." Aristotle considered motion to be any process.

of simple states and simple processes. Simple states are determined by some finitely-many, well-determined characteristics or characteristic qualities of the system to which the states belong. They could be the properties or relations of some material things, fields, space-time points, etc. or the qualities of some psychological phenomena of a person at a given time.

The conceptual necessity of a referent system of states in conceiving a process is not only a mental, theoretical or grammatical means of the knowledge of processes, but also depicts a real dependency of the process on a larger context of events or states that give some identity or quality to a process. A process is not only a pure succession of changes of events, but has its own holistic character that differentiates the process from other real or possible processes of a similar kind. In the material world, the causal nets or lawlike connections among the successive states or successive phases of a process give the necessary holistic character to a physical process. We cannot find similar determinations of mental processes, because the appropriate causal links and laws of nature are not known (or not known yet) to us. However, we "feel" the individual qualities of different mental processes in us (e.g., the process of pains, a change of emotions) and their differences. I will not discuss here the question of what are the causes or grounds for this kind of feeling. I will consider the modal properties of the process that come out of its holistic determination or appearance.

Each process gives different possibilities for changes of states (of a system) according to the properties of the states and the nature of the process. Some processes are deterministic. The possibilities for changes of states depend only on some initial conditions of the original states. The process of rapping between billiard balls is described by a mechanical system of states. Each state and change to another state could be completely described by the relative positions, masses, changes in relative position, i.e., motions, velocities, etc. of all the balls that make up a system of billiard balls in a given moment of time. The causal character of this process could be given by the initial state of the system (by the initial impulses and initial velocities of all the billiard-balls). Here, the possibilities of a state depend on the initial conditions of the system. The same state (and the same change of state, hence "state-change") could be the result of different initial conditions. The states that follow a given state (or the state-change that follow a given state-change) are, at least in principle, completely determined by the given state (resp. state-change). Many physical processes are not completely fixed by their initial conditions. Each state depends not only on the previous state, but also on some undetermined additional conditions in the given time-moment or is unconditioned to some degree. For example, the microphysical states and processes in quantum mechanics are uncon-

ditioned. However, also in this case the possibilities for a state-change are given by the nature of the process. The possibilities for a state-change themselves change by process and through time. Each new state that appeared in a process bears some new set of possibilities (giving rise to new probabilities) for the change into another state of the system. I call this set of possibilities potential for change of a state. It depends generally on the characteristics of the given state, the initial conditions of a process, the characteristics of the whole process, the characteristics of the whole system of states, etc.[3]

The change of potentials of states is not a real process because the potentials are not real states of a higher system of states. They are only sets of possibilities of changes for different states. They form the unity of a process, and give its holistic character. We would enter an infinite regress of processes if we stated that each real process owns a higher real process. Sure, we can represent the pseudo-flow of possibilities as a higher formal process, but this is only a formal device for describing the change of possibility and not a reality.[4]

Information systems in nature and some artificial information systems (e.g, the neural nets) could be characterized by saying that such systems that are sensitive to other processes. The ability to get information from the environment (or from an input device) is first the ability to react to some significant processes, not to some significant states or simple changes of states. They react to some spatial and temporal pattern of signals, not to singular signals or the momentary inputs of signals to the system. My thesis is: the evolution of life proceeds from simple systems that react only to a narrow set of simple changes, to ever more complex systems that are sensitive to different complex processes. They became sensitive to the changes of potentials of states, not only to the changes themselves. Animals, especially animals with higher developed brains are "aware" of possibilities of movements

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[3] Richard Feynman expressed this well in his discussion of the forces acting between two protons, when he said that these forces depend on as many parameters as possible. (Feynman Lectures, Vol. 2, lecture 37).

[4] Modern science, especially quantum mechanics, developed a new view of processes as intrinsically modal phenomena. Microprocesses could be interpreted as "interwoven" into a field of potentiality which is formally described by the complex function (of states. Schrödinger's equation is the central law of the temporal evolution of the quantum states. However, in the classical Copenhagen interpretation of the evolution of quantum states, they are only "mathematical devices" for calculating physical processes, thus the reference of the so called superposition of quantum states is purely formal, not ontological. There are some other, more ontologically oriented interpretations of quantum mechanics where the concept of quantum potential as a kind of information potential of microprocesses is emphasized (Bohm, Hiley, 1993). It is a very interesting question wheter the notion of the superposition of possibilities (of a quantum state) in quantum mechanics might be useful in the general theory of the modal characteristics of processes, too.

of their victims or their natural enemies, not only of their actual movements. This is necessary for survival in the dangerous and dynamic world. A lion, for example, is not attentive to the actual movement of a gazelle but tries to control its attempts to escape. This means the lion has to be sensitive to the possible movements of the gazelle, not only to the actual movements of the gazelle. Sure, the lion has no idea of possibility, he is not aware of possible movements, but it has somehow to be sensitive to it.

Humans and perhaps also some other highly developed animals (apes, dolphins, wales) also have the ability for conscious sensitivity to potential dimensions of some processes in the environment (and in the organisms themselves). They can really be aware of processes and their inner flows of possibilities. Humans possess a symbolic system (language) for representing processes and their potentials. Thus, we can think about them. We create ideas of possibilities, make expectations, plans, hypotheses. We can articulate our fears. This activity is frequently a conscious mental activity. Human consciousness is the highest achievement of the natural evolution of the sensitivity of some systems to processes.

3   Is consciousness a process?

It seems that consciousness is a process in a system that can represent other processes, especially their pattern of potential changes. Consciousness can represent some alternative to a given process, not only a fixed process. If the flow of mental states was only a kind of a process, then, by our reasoning, it would be a chain of changes of a certain system of mental states. There would also be a pseudo-process of changes of mental state(potentials that is internally "linked" to the process of consciousness. We could conceive of consciousness as a "system" which is incredibly sensitive to the "potential aspects" of the events in the world. We can comprehend this sensitivity as a similarity between the inner possibilities of change of mental states and the possibilities in the processes that a conscious being is aware of. A "conscious brain" must be enormously flexible to acquire similarity between its own inner processes and different outer processes simultaneously. Some PDP models and neural-net models of the brain could help us in modelling that kind of flexibility.

However, even the human ability of consciousness for depicting (some) potential aspects of processes has its non-process aspect. The ability of conscious beings to perceive or be aware of some potential aspects of processes is more than any process, more than any state (of brain or elsewhere). This ability of consciousness is not only sensitivity to potential aspects of events respectively to the information aspects of the events, but it also represents those possibilities to the

brain and to the human being. The conscious representation of some possibilities to the brain, or better, to the human being, has some internally-logical aspects which are neither real states nor processes. They are no real parts of mental states or mental processes either.

It is not enough to find some appropriate "symbols" for this representation; one has to put them in an appropriate logical frame, where certain possibilia actually "appear" as possibilities of states-changes, and certain information as contents. This surpasses the powers of any state, and of any process. We became really aware of possibilia and information, not being merely sensible to them, only with the help of a complex language-system that knows different forms of logic frames of events. At this point, I see a deep meaning of Witggenstein's theses that language games are necessary to the human mind and consciousness, and the reason why he denied the process nature of some mental acts.

I conclude that consciousness is two-sided: process and non-process. The process (aspect) of consciousness lies in the neural information-processing, in the flow of sensations and the change of feelings. The non-process aspect of consciousness lies in the conceiving and representing of processes, especially in representing the potentials for change of states of affairs and events and in representing the holistic traits of processes. These "traits" lie over the real processes. We can get to them only through abstraction from states, from processes.

My last thesis is: the unity of process and non-process sides of consciousness lies in the awareness of the time. It is consistent with some theses in phenomenology on the time-consciousness (Husserl, 1928). We conceive time as an imaginary process that underlied all other processes. The "feeling" of pure succession of time-moments is not a real process. It is only the time-dimension for representating processes in consciousness. Our consciousness of events or processes is necessarily consciousness of some events (processes) in time. It includes necessarily a modal frame of identification and diferentiation of processes. A conscious presentation of processes refers explicitly or implicitely to some future processes which can happen. We refer also to some possible processes which could happen instead of those which actually happens or which have happend. Consciousness of time is thus the indication of our ability to be aware of processes in a modal sense, that means to be aware of their possibilia and to be aware of this ability itself.

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