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SELF-DETERMINATION AND THE BRAIN

Many a scientist has patiently designed experiments for the purpose of substantiating his belief that animal operations are motivated by no purposes. He has perhaps spent his spare time in writing articles to prove that human beings are as other animals so that 'purpose' is a category irrelevant for the explanation of their bodily activities, his own activities included. Scientists animated by the purpose of proving that they are purposeless constitute an interesting subject for study.

(Alfred N. WHITEHEAD, *The Function of Reason*, 16)

The Libet Experiment

Daniel Wegner has recently published a book entitled *The Illusion of Conscious Will*¹. Most of the experiments Wegner talks about prove only that many of our daily activities, like driving a car, are to a considerable extent governed by subconscious processes. This in itself is hardly something new and of no major metaphysical significance. The strongest evidence for the «illusion of free will» is usually taken from the so-called «Libet experiment».² The result of this experiment was that a simple conscious action like a hand movement was preceded by a non-conscious brain event, a readiness potential, that in itself was sufficient to cause the action. The conscious choice had no causal role to play.

The only power of a conscious choice is the ability to interrupt a chain of neural events that lead to an action. The conscious mind can never positively trigger an action. It is confined to the role of an observer of choices that simply emerge out of a non-conscious process. But why has nature come up with the illusion of free will? The standard answer is that the belief in free will serves the purpose of motivating us to act, preventing us from inactivity and lethargy. But that is incoherent. The false belief that I am free could only motivate me if it could somehow determine my will to act. Since, *ex hypothesi*, the will is completely powerless to determine an action, no influence that the belief in freedom could have on my will, could ever result in an action that had not already been pre-determined by a prior non-conscious brain event. So, the false belief in freedom serves no evolutionary purpose.

Now to the experiment itself: The act of will preceding the hand movement is only accessible from the inside, the first-person perspective of the subject, the brain event preceding the action is, however, accessible to the scientist from a third-person perspective. How can those two perspectives be objectively synchronized so as to allow reliable measurements? In Libet's experiment the subjects watched a very precise clock and dated the moment they made the conscious choice to move their hand. The scientist compared these self-measurements of the subjects to their external measurements of the brain events, dating the triggering brain events hundreds of milliseconds before the conscious choice. Obviously, everything depends on the synchronization of those two measurements. How can the internal and the external observation be synchronized? Libet irritated the skin of the subjects and asked them at what precise time on the clock they became aware of the skin irritation. This way he synchronized external and internal time. But: Can we be sure that this synchronization provides reliable results in the case of the hand movement? The latter is a highly artificial experimental setup, the former a natural process

1 Cf. D. WEGNER, *The Illusion of Conscious Will*, Cambridge (MA), 2002.

2 B. LIBET - C.A. GLEASON - E.W. WRIGHT - D.K. PEARL, «Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential). The unconscious initiation of a freely voluntary act» in *Brain* 106 (1963) 623-642.

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optimized by evolution to prevent skin injuries. The high-level process of representing my own will in very artificial circumstances may well take longer than observing the awareness of a skin irritation. There is just no guarantee that the internal and external times were reliably synchronized for the experiment. Recent experiments have conclusively shown that participants in the Libet experiment are not able to directly date the decision to act. William Banks used delayed audio and video feedbacks to make the hand movement appear later than it actually occurred. The reported time of conscious decision moved forward proportionally to the delay. This means that the reported decision time is based on a complex inference that takes into account much more than internal conscious states.³ But be that as it may, this is not the most pressing philosophical issue here. It clearly shows, however, that in any experiment there are assumptions and presuppositions that can be questioned. For too long, Libet's experiments have been taken with almost pious reverence by many in the philosophical community. What is the central philosophical issue? It is the fact that Libet searched for freedom at the wrong place. Agent causation is different from mere event causation. The logical form of event causation is: Event E_1 causes event E_2 . The logical form of an action explanation is: An Agent P causes an action A for reason R . Libet asked the subjects to not consciously plan the action but to let the hand movement happen by itself, undetermined and without specific reason⁴. Libet uses the notions «urge», «desire», «wish», and «intention» as if they referred to the same mental state⁵. The urge to perform an action is, however, something quite different from the intention to perform an action. Let me give an example: I know that my friend will arrive at the airport the next morning after a long overnight flight. My schedule for that day is already quite busy, but after some consideration, I decide to get up at 5 in the morning so as to be on time at the airport to pick up my friend, whose friendship means a lot to me. 10 minutes to 5 the alarm clock goes off, and I recall my decision to pick up my friend. But, I happily conclude, I can stay in bed for a few more minutes. While I am lying in bed, with the passing time an inner tension builds up, and suddenly I get up with an almost violently abrupt motion. Does that sound familiar? Maybe you even know the feeling that the movement of getting up was not consciously initiated in this case. It happened somehow by itself, at least not under full conscious control. It could well be that in the moment when I realized that I have to get up within the next 5 minutes, I put into action a process of increasing tension in my brain, the buildup of a readiness potential. If that reaches a critical threshold, the action is initiated. With regard to freedom in this process there are two important aspects: First, I set the whole process into motion by making the conscious decision to pick up my friend for friendship's sake. Secondly, I can interrupt the process at any time. It is completely irrelevant that the process, after being set in motion, follows its own dynamic to an extent that is irrelevant to the intended action. The Libet case is completely parallel. The participants decide for a reason, say the advancement of science, to take part in the experiments. The participants then learn that in order to follow through with that decision they have to move their hands within the next 30 seconds. An inner pressure or tension will build up in the subject and will be released in a spontaneous hand movement. Even if she decided to move the hand after exactly 17 seconds, it is perfectly plausible that shortly before that time a readiness potential would build up. Think of an athlete at a 100 meter sprint. The referee shouts the «go» signal or pulls the trigger of the gun. If the athlete were now to make a conscious decision to start, she would have already lost the race. The process is automatic, and with good reason. We would not infer from this that the

3 W. BANKS et al., «We infer rather than perceive the moment of decision to act in Libet's measurement of the time of conscious decision» in *Towards a science of consciousness April 8-12, 2008. Research abstracts*. A service from the *Journal of Consciousness Studies*, Tucson, 2006, 69f.

4 B. LIBET, *Mind Time*, Frankfurt, 2005, 163.

5 Cf. A. MELE, «Strength of Motivation and Being in Control: Learning from Libet» in *American Philosophical Quarterly* 34 (1997) 319-332.

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athlete did not participate in the competition of her own free will. So, Libet's mistake was to look for freedom in the wrong place: a mostly automatic process in the brain triggering an action which the person had decided much earlier to perform. The free decision, the decision to act for a reason, happened at a different time. It is irrelevant for the status of this free decision that it is ultimately executed by processes which are not under full conscious control. It might be advantageous and economical to delegate to a considerable extent the execution of a conscious rational choice to automatic subconscious processes. If we want to find the neural correlates of our conscious rational decisions we will have to look for a brain process that is far more complex than a simple readiness-potential. It will have to involve the neural basis of phenomenal consciousness and the mental representation of propositional content, because a free being is able to consciously reflect on the reasons for or against a possible action. In more detail, the following four elements are essential for free will:

- (1) A free being acts for a reason. Its mind grasps the mental content of an inferential relationship between propositions. It has intentional states, like beliefs.
- (2) A free being is endowed with phenomenal consciousness, a conscious first-person perspective on the world. A being that lacks consciousness cannot be free in the relevant sense.
- (3) A free being is capable of grasping normative truths. A being that is unable to distinguish between right and wrong, cannot be free in the relevant sense.
- (4) A free being must be able to self-determine its actions to at least some extent. A being that is completely determined by facts or events external to itself, cannot be free in the relevant sense.

Thus we have the following four elements: intentionality, consciousness, normativity, and self-determination.

The Metaphysics of Self-determination in a Physical World

How could current or future brain science provide us with the neurological basis for these four pillars of freedom? Let us begin to look at the world of classical physics. According to it the entire world consists ultimately of elementary particles and fields. The interactions of these basic entities are governed by the four basic forces of physics: the weak and the strong, the electromagnetic, and gravitation. The picture is that of a giant network of interactions that evolve according to some basic laws. Each individual particular in this universe is completely and exhaustively defined by the causal role it plays within the network at large. In this process, larger stable patterns like stars or galaxies are formed. In some regions even more complex patterns like living organisms can sustain temporary stability. We thus have a hierarchical picture, beginning with the entities described by fundamental physics, followed by the entities described by chemistry, then the entities of the special sciences like geology or meteorology, and finally the life sciences and even psychology. This entire metaphysical picture can nowadays be modeled in computer programs called «life worlds» based on the theory of «cellular automata» of the mathematician John Conway. In the information sciences cellular automata are well understood formal structures, they are a kind of universal Turing machines, capable of representing complex dynamic structures. With just a few basic ingredients and some basic rules, these programs can simulate even the most intriguing natural processes, like the emergence of stable self-replicating structures similar to living organisms and their basic mechanisms (like the DNA). The arrangement of the basic units in such a machine, plus the

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transition rules, determine all higher level structural facts. According to the classic world view, the universe is indeed such an automaton, but one of enormous complexity, to be sure. In such a world the basic physical facts determine all other facts. We may call this the mechanistic world view of classical physicalism.

I will argue that the central objective for any theory of freedom - to understand intentionality, consciousness, normativity, and self-determination - has not been and cannot be achieved in a mechanistic world view.

Intentionality

How can a cognitive system grasp the content of a proposition, let's say a mathematical proposition like the Pythagorean theorem? What is the relationship between the mind and the content of that proposition, the bearer of a truth-value? It is certainly not a causal relationship between the brain and some physical state in the world.

Consciousness

Why does a complex physical system have any phenomenal consciousness at all? Why has it any conscious experience? For any physical system that gives rise to experience, we can imagine a structurally isomorphic copy that does not experience anything at all. The connection between physical structure and consciousness is not understood. It is mysterious how a cellular automaton in the sense described above should be able to produce consciousness.

Normativity

If intentionality and consciousness are mysterious in the mechanistic view, then so is normativity. There are normative relations between propositions in the sense that we can distinguish between correct and incorrect inferences. Propositions cannot be grasped without intentionality, and intentionality is on many accounts dependent on consciousness. In ethics there may be a non-propositional conscious awareness of values, but that is, of course, dependent on the existence of a conscious mind.

Self-Determination

All states of a physical system that resembles a cellular automaton in the sense described above are fully determined by the arrangement of the basic particles according to the relevant laws. Again: the physical facts determine all facts. There is no causal efficacy of higher-level entities. Since there is no downward-causation, the notion of self-determination makes no metaphysical sense.

In the light of these difficulties the world view of mechanistic physicalism has no other option than to work with a rather minimalist notion of freedom: Freedom must be defined negatively as absence of external constraint in highly developed information processing systems. This is the compatibilist notion of freedom. As mentioned at the outset, I do not wish to tackle the highly technical problem of freedom and determinism. I will, however, ask whether a richer metaphysics might enable us to develop a more robust notion of freedom.

There is good reason to try this. Even a leading physicalist like Jaegwon Kim acknowledges in his most recent book that physicalism cannot explain the emergence of conscious experience (the qualia problem).⁶ Arguments of the kind given, for example, by David Chalmers have convinced many philosophers that the so-called «hard problem of consciousness» cannot be solved within the

6 Cf. J. KIM, *Physicalism or Something Near Enough*, Princeton, 2005, 170.

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Gregorianum 89. (4)2008, 816-831.

framework of physicalist reductionism.⁷ If only a conscious being can make free choices, then the failure to understand consciousness in physicalist terms will inevitably lead to the impossibility of understanding freedom in physicalist terms.

Mind as emergent

Among contemporary brain scientists, it has been popular to refer to higher-level phenomena like consciousness or intentionality as «emergent» phenomena. Philosophically this notion can be traced back to the work of the British emergentists in the early 20th century (Alexander, Broad, Morgan). According to emergentism there are natural laws that guarantee the emergence of higher-level properties if a lower-level structure of sufficient complexity is present. But even complete knowledge of the lower-level structure does not logically entail knowledge of these emergence laws and the resulting emergent properties. The laws that connect the two levels are additional laws, not entailed in the laws of the basic level. In more technical terms: the higher-level properties do not logically supervene on the lower-level properties.

In order to develop a metaphysically robust notion of free choice, emergence alone does not suffice. Two other assumptions are required. The first one is downward causation from the emergent level to the basic physical level. The second one is indeterminism of the system, at least at the basic level. These two are needed if self-determination is to be at least possible. This view of strong emergentism with downward causation is by no means a classical materialist picture, but it is consistent with certain interpretations of quantum mechanics. In his last publication before his death, Karl Popper argued for an emergentism of this type.⁸ Interestingly, Libet has now argued for a similar theory.⁹ He even suggested empirical procedures to test it in the future. The philosopher John Searle argued in his 2004 lectures at the Sorbonne entitled *Freedom and Neurobiology* that the conscious self is a causally efficacious high-level state of the brain with an indeterministic dynamic due to quantum mechanics.¹⁰ Searle's ontology in these lectures seems to be a kind of emergentism. Emergentism is indeed experiencing a renaissance these days. The physicist Paul Davies and the philosopher Philip Clayton have just recently published a book with the appropriate and very telling title *The Re-Emergence of Emergence*.¹¹ Many believe that emergentism could provide a metaphysical framework for the explication of free action. The main problem with this suggestion is the concept of emergence itself. In a weak sense even in the computational «life worlds», the cellular automata, new structures emerge, even complicated DNA-like, self-replicating, stable patterns. But they can be fully explained and understood by reference to the interactions of the most basic entities. Strong emergence denies that there is such a reductive explanation. The fact that emergence laws and resulting emergent properties exist, cannot be reductively explained. It has to be accepted, as one British emergentist said, with «natural piety» as a brute fact of nature. Explanatory upward-opacity is a basic feature of nature according to strong emergentism. The explanatory gap is not due to human intellectual limitations but to the ontological gaps in nature. While this may ultimately be true, it is nevertheless hard to accept. The concept of inexplicable emergence infuses unintelligibility into the very heart of nature. It may be overcome by explaining

7 Cf. D. CHALMERS, «Consciousness and its Place in Nature» in ID. (ed.), *Philosophy of Mind*, New York, 247-472.

8 Cf. K. POPPER - B. LINDAHL - P. ÅRHEM, «A discussion of the mind-brain problem» in *Theoretical Medicine* 14 (1993) 167-160.

9 Cf. B. LIBET, «A testable field-theory of mind-brain interaction» in *Journal of Consciousness Studies* 1 (1994) 119-126.

10 Cf. J. SEARLE, *Freedom and Neurobiology: Reflections on Free Will, Language, and Political Power*, New York, 2006.

11 Cf. P. CLAYTON - P. DAVIES, *The Re-Emergence of Emergence*, Oxford, 2006.

Also: P. CLAYTON, *Mind and Emergence - From Quantum to Consciousness*, Oxford, 2004.

IMPORTANT: When citing this article, please refer to the print-version:

Gregorianum 89. (4)2008, 816-831.

radical emergence by divine intervention or support, somewhat along the lines of Rahner's notion of *Selbstüberbietung* which is ultimately based in God's creative power.

Mind as funda-mental

There is another possibility for developing a metaphysics of freedom. If the mental in some simple form is present at the lower levels, emergence could be construed without radical and unbridgeable gaps. William James has argued that «if evolution is to work smoothly, consciousness in some shape must have been present at the very origin of things. Accordingly we find that the more clear-sighted evolutionary philosophers are beginning to posit it there».¹² That is the genealogical argument for proto-mentality. Even the most complex arrangements of something that is entirely non-mental cannot provide sufficient ontological grounding for something mental. This view that the mental has to be in some way ontologically basic is indeed nothing new in the history of ideas. In his recent volume *Panpsychism in the West* David Skrbina presents a long overdue history of this tradition from the Presocratics to contemporary metaphysics.¹³

The most powerful attack on the idea that the mental is a basic feature even of the physical world originated in the concept of material substance developed in Cartesian metaphysics. Descartes held that extension constitutes the essence of concrete material particulars. Indeed, Descartes claimed that spatial extension is the essence of corporeal substance, and nothing else contributes to it. For Descartes the very nature of a substance is determined by its attributes. He does not construe substances as mere substrata or bare this-ness. He argues that the distinction between the notion of a substance and its attributes is merely a distinction of reason, not a real distinction (Principles 1.63). In his critique of Descartes' notion of a material substance, Leibniz argues that extension can be analyzed in merely relational terms; but then the question about the intrinsic nature of the relata arises. Leibniz's intuition is that extension cannot be conceived in itself. Extension, for him, is not a primitive but an analyzable concept; it can be analyzed into plurality, continuity, and coexistence or the existence of parts at one and the same time (G II, 169f.). But parts of what? As Leibniz argues elsewhere, extension is just a continuous multiplicity of something that is spread out. The nature of the substance that is being spread out is not explicated by the concept of extension; on the contrary, it is ontologically prior to the repetitive multiplicity (G IV, 467). Accordingly, Leibniz scholar Robert Adams claims that we cannot imagine a shape without some chromatic property. The formal entity needs a «filling». And from there he goes on to argue: «We may conjecture that the reality of a substance must include something intrinsic and qualitative over and above any formal or structural features it may possess».¹⁴

The best candidates for intrinsic properties that are irreducible to merely structural properties are phenomenal properties. The mind has such intrinsic properties in the form of qualitative experience of colors, sounds or emotions. Can we then conclude that thinking things like us derive, at least partially, from phenomenal qualities, the kind of positive, non-formal, qualitative content that is required for something to be a naturally unified individual, a concrete particular substance?

If the answer to that question is affirmative, the idea of the mental as fundamental provides indeed significant metaphysical resources to deal with the concept of freedom. The reason for this lies in that fact that mental properties are then indispensable for understanding the nature of a true particular, a substance. The best example for a concrete particular or a substance is a person. A person has a first-person perspective based on his or her conscious experience of the world. The

12 W. JAMES (1890), *The Principles of Psychology*, vol. 1, New York, reprinted 1950, 149.

13 Cf. D. SKRBINA, *Panpsychism in the West*, Cambridge, 2006.

14 R. ADAMS, «Idealism Vindicated» in P. VAN INWAGEN - D. ZIMMERMAN (eds.), *Persons. Human and Divine*, Oxford, 2007, 35-54 (40).

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person cannot be described exhaustively from the third-person point of view. In the mechanistic model, each individual entity is exhaustively defined by its functional role in the entire system. It has no inner nature, no intrinsic properties. In his *The Analysis of Matter*, Russell argued that physics describes the world as a vast system of causal-functional relations between entities, but physics is silent on the inner nature of these entities. According to him, the only instance where we know the world from the inside is our own consciousness: «As regards the world in general, both physical and mental, everything we know of its intrinsic character is derived from the mental side, and almost everything we know of its causal laws is derived from the physical side».¹⁵ Physics construes the world as a complex functional structure extended in space-time. The relevant structures can be expressed in mathematical equations. These formal structures are, however, too abstract, too hollow to serve as a sufficient metaphysical base for the existence of a concrete particular, a substance. This insight lies at the heart of Leibniz' monadology. Adding more structure does not help. What is needed is something different from mere formal structure. Again: The best candidate we have for this is our own consciousness. The British astronomer Sir Arthur Eddington wrote in his work *Space, Time, and Gravitation*: «Physics is the knowledge of structural form, and not knowledge of content. All through the physical world runs that unknown content, which must surely be the stuff of our consciousness».¹⁶

What is, according to this ontology, the difference between a mere conglomerate, a heap of atoms or a cloud and a true individual? It cannot merely be the structural form, the configuration. The cloud is configured in complex ways, yet it is not an individual thing. A true individual has a perspective, a point of view. The philosopher who has developed this view historically to the greatest extent was Alfred North Whitehead. According to him a nexus of low-level individuals forms a new higher-level individual not only by functional interaction but by merging their information-processing perspectives, their receptive fields. Thus, the sum is more than its parts. In Whitehead's words: «the many become one and are increased by one».¹⁷ This clearly contradicts the mechanistic view where the whole is never more than the sum of its parts. A mere conglomerate, even if structured in complex ways, like a crystal or a cyclone, is not a new individual. It can be understood in mechanistic terms. A genuine individual, a living cell or an organism, has a unified perceptive field. By this I mean an informed response to the entities in its environment with which it interacts. This response is based on the information that flows from the environment to the entity. At the center of an unified receptive field we have thus always a probing of the environment based on the information given by the environment. This is clearly a mental process. Thus a genuine individual cannot be understood in purely mechanistic terms. It is important not to view information-processing as mere passive «mirroring». The mental can only be metaphysically constitutive if it is only by being experienced in a certain way that certain facts about the world would come to be determined in a certain way. It is very important to note that this ontology is compatible with non-classical physics. Quantum mechanics construes the unified whole by quantum entanglement. Non-local interaction cannot be explained if the whole is just the sum of its parts. Also, the notion of a non-perspectival reality seen from «nowhere», from no specific point of view, does not make sense in the standard interpretations of quantum mechanics. Michael Lockwood has argued in his book *Mind, Brain, and the Quantum* that perspectivity is a general feature of quantum reality.¹⁸ This is not perspectivity in the sense of an anti-realist idealism, but as an objective feature of the world. And these perspectives are not limited to fully conscious observers but exist to a lower degree even

15 B. RUSSELL, *The Analysis of Matter*, London, 1927, 402.

16 Sir A. EDDINGTON, *Space, Time and Gravitation*, Cambridge, 1920, 200.

17 A.N. WHITEHEAD, *Process and Reality - An Essay in Cosmology* (second, revised edition by D.R. Griffin and D.W. Sherburne), NewYork, 1965, 32.

18 Cf. M. LOCKWOOD, *Mind, Brain and the Quantum*, Cambridge (MA) 1969.

IMPORTANT: When citing this article, please refer to the print-version:

Gregorianum 89. (4)2008, 816-831.

in much simpler individuals. Finally, in most interpretations, non-classical physics is indeterministic. Thus we can allow for downward determination of higher-level entities on indeterminate lower-level entities.

With these conceptual resources at hand, we can now at least see the possibility of understanding the place of freedom in nature. If genuine individuals are not entirely governed by deterministic laws, they can exhibit some spontaneity, some independence from deterministic laws. The more integrated the individual is, the more of a perceptual perspective on the world the individual has, the greater will be its capacity to spontaneously determine the world by its actions (i.e. limiting the range of possibilities). This spontaneity will, of course, be rather limited in the case of elementary particles. But according to quantum mechanics they do not even behave like fully developed individuals. Elementary particles are substances of only a very weak form. Clear cases of individuals or substances in the sense developed here are living cells or higher animals.

On the other hand, mere conglomerates like mountains, crystals or hurricanes are not substances or individuals. They lack a perceptive field, a unified way to probe the environment for information. Thus, they can be explained by - mechanistic - laws because the minimal spontaneity of the small particulars caught up in them will cancel each other out. Individuals with a more complex mental life will be able to self-determine themselves by their desires, and - if they are able to form propositional mental content - by their beliefs.

Is this non-reductionist metaphysical picture compatible with physics?

In the following, the compatibility of this view with contemporary physics will be shown in somewhat greater detail. I will use as an example the interpretation of quantum mechanics by physicist Henry Stapp at the Lawrence National Laboratory in Berkeley.¹⁹ He advances a classical collapse theory in the Copenhagen tradition, but he adds an ontological interpretation to it. For him our world is bipolar – material and mental – where the Schrödinger equation describes the deterministic and material aspect, the indeterministic collapse relates to the indeterministic, perspectival and mental aspect of reality. According to classical mechanics, everything that happens in the physical world is determined by a single bottom-up physical process, and we ourselves are consequently mechanical automata. According to quantum mechanics there are two processes. One, called by van Neumann «process 2», is a bottom-up local deterministic process that specifies the way the quantum state of a system changes in time. But this process does not yield any prediction with regard to experienced reality, experienced from a point of view. Here another process, «process 1», comes into play. This process is associated with what Stapp calls «a probing action» by an entity. It is a genuine top-down process, interrupting the deterministic process 2. Its intervention is not local, nor mechanical. No known law determines which of the many possible results of the first process actually occur. Thus Stapp advances an ontological interpretation of van Neumann's quantum mechanics. In this ontological conceptualisation of van Neumann quantum mechanics, the continuous evolution via the local mechanical process 2 is interrupted occasionally by a «psychophysical» process 1. The determination of facts by process 1 relative to possibilities provided by process 2 is not dependent on the presence of human or other biological agents. The mental aspect is built into the very fabric of the universe. All levels of nature from particle physics to the dynamics of neurons are understood in one overarching metaphysical system that does not conceive matter in Cartesian terms, but as a sequence of actual events, each having physical and mental aspects.

This is obviously a framework that is very close to the one Whitehead had envisioned almost a century earlier. The notion of an «actual event» or an «actual occasion» is indeed the central

19 Cf. H. STAPP, *Mindful Universe*, New York, 2007.

IMPORTANT: When citing this article, please refer to the print-version:

Gregorianum 89. (4)2008, 816-831.

category in Whitehead's ontology. Because of its mental pole, it is capable of self-determination within the limits given by the underlying process 1: «Whitehead's fundamental process is the process of combining the pre-existing psychologically and physically described aspects of reality together to form a new psychophysical actual entity, or actual occasion, that is identifiable as an actual event (à la Heisenberg), whose physical manifestation is represented by a von Neumann process 1 action».²⁰ Stapp's theory is not essential for the argument in this paper. It is simply meant to show that a metaphysics that considers the mental as fundamental is compatible with our most advanced empirical theories. (From a philosophical perspective this view has seen its most elaborate defense by Gregg Rosenberg²¹).

An ontology of the kind suggested here could be classified as a form of dual-aspect theory. Any concrete entity has both mental and physical aspects. It is also a hierarchical ontology. Higher level individuals come into being by the joining of the receptive fields of lower level individuals (Whitehead would speak of joining their «prehensions» in a nexus). There is emergence of new properties and genuine novelty, but not unexplainable radical emergence of something mental out of something entirely devoid of any mentality. Rather we have a gradual, smooth development of higher-level psycho-physical entities out of lower-level psycho-physical entities. A higher-level individual develops a richer mental aspect, becoming more aware of the world, being able to more actively probe the environment for information. In this interpretation of non-classical physics, these mental activities are not passive picture-taking of the world; they are actually involved in the constitution of reality itself, the collapse of the wave function. The mind has thus a causal role in the world. It is not the causality of classical mechanics, maybe not even efficient causation. It much rather resembles the classical notion of formal causation, because in the process of gathering information certain possibilities granted by the underlying laws become actualized. It is very important that this relationship does not only hold between the entity and its immediate environment but also «top down» from a higher-level individual to the lower level individuals it is composed of. Thus persons can, to a limited extent, determine the state of cells in their own brains. If this process of downward causation is of an indeterministic nature, not governed by known deterministic laws, then we have some of the most important ingredients for free action already assembled in our ontology.

Conclusion

It is still a long way from here to a full understanding of freedom. In particular, I have deliberately not talked about the metaphysics of intentionality. That is a vast new topic that I cannot even begin to tackle here.

Closely connected to this is the issue of normativity, especially the awareness of values. Finally, there is the deep metaphysical problem of freedom and determinism. In a deterministic world nobody seems to have a choice about anything, because everything is predetermined by the past and the laws of nature. Adding indeterministic chance events to this picture does not seem to help because nobody has a choice about indeterministic chance events. I have not addressed this vexing question at all. Let me add just this: Freedom, I would argue, is incompatible with determinism by external constraints (past events and laws of nature).²² Spontaneous self-determination from within the agent that is not governed by deterministic causal laws seems to me, however, to be compatible with freedom. The spontaneous decision to act for a reason is not determined by any outside

²⁰ *Ibid.*, 104.

²¹ Cf. G. ROSENBERG, *A Place for Consciousness. Probing the Deep Structure of the Natural World*, Oxford, 2004.

²² I have argued for incompatibilism in G. BRÜNTRUP, «Der metaphysische Begriff der Willensfreiheit und das Transferprinzip des Keine-Wahl-Habens» in D. GREIMAN (ed.), *Wahrheit - Sein - Struktur. Auseinandersetzungen mit Metaphysik*, Hildesheim/New York, 2000, 102-120.

IMPORTANT: When citing this article, please refer to the print-version:

Gregorianum 89. (4)2008, 816-831.

influence. And the action in the light of reasons is more than a mere chance event. But again, this would be a topic for another lecture.

The topic here was much more narrow: «Self-determination and the brain». It was argued that a reductionist physicalist picture cannot allow for any kind of self-determination of higher-level entities like persons. All of their actions are micro-determined by their brain states; and each brain state is caused by a previous brain state. There is only physical efficient causation. Since this ontology does not allow for causally efficacious higher-level entities, there is no room for genuine freedom. It will thus construe freedom simply as absence of some specific external constraints (not being locked up in jail, etc.), while paradoxically allowing that «free» actions are externally determined by events in the remote past and the laws of nature.

The alternative ontology proposed here gives each actual entity an irreducible mental aspect. Without it, it could not even exist as a concrete entity. It is thus possible to explain the emergence of higher level entities endowed with their own causal powers. Via downward-causation this picture allows for the possibility of self-determination of entities. It was then argued that this picture is at least compatible with modern physics, for example with an ontological interpretation of the standard Copenhagen view, like the one proposed by Stapp. It may even be compatible with other interpretations of quantum mechanics. It is thus, at least to the extent it was presented here, still in a weak sense a naturalist picture. A naturalism that denies the reductionist ontological constraints of traditional materialist naturalism. I am fully aware, however, that I have barely scratched the surface of the problem of freedom. Much progress needs to be made. But no progress can be made if the metaphysics underlying our empirical research in the neurosciences is basically a 17th century mechanistic atomism that is most likely incompatible with contemporary physics. This metaphysical picture cannot explain the mind and thus it cannot even begin to understand freedom. In the metaphysics of nature here suggested, partly inspired by Leibniz, but even more so by Whitehead, we can at least begin to understand how we as natural entities in a physical world, endowed with a brain developed by evolutionary processes, can enjoy freedom of the will.

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Summary

The main topic of this paper will not be the notoriously difficult metaphysical question of freedom and determinism. An act of will is either determined by a causal chain of previous events or is a mere chance event. In either case there seems to be no room for freedom. This question is of such a high level of conceptual generality that it applies not only to human freedom but to any being that acts for reasons, even beings that lack a brain. In this paper I try to answer the question whether freedom is possible for beings endowed with a brain. Can a being whose mental life involves a functioning brain determine its own actions? I will proceed in two steps. First, I will discuss a recent experiment that seems to prove empirically that freedom of the will is an illusion. I will argue that this kind of research is methodologically misguided. Then I will go on to discuss some of the metaphysical issues that must be dealt with if one wants to address the question whether freedom of the will is possible for a being endowed with a brain. And then I will ask if such a metaphysics is compatible with our best empirical theories.

L'article ne vise pas principalement la question métaphysique, difficile, de la liberté et du déterminisme. Si un acte de volonté est déterminé par une chaîne causale d'événements antérieurs ou par des événements purement casuels, il n'y a là de toute façon aucune place pour la liberté. La question est toutefois d'un tel niveau de généralité conceptuelle qu'elle ne se pose pas seulement pour la liberté humaine, mais aussi pour tout étant qui agit avec des raisons, me me s'il manque de cerveau. L'article tente par contre de savoir si la liberté est possible pour un étant quelconque pourvu de cerveau. Un étant dont la vie mentale implique un cerveau en état de fonctionner déterminé-t-il ses propres actions? Je procéderai en deux étapes. Dans la première, je mets en discussion une expérience récente qui semble prouver de manière empirique que la liberté du vouloir est une illusion; je montre que cette recherche est mal conduite méthodologiquement. J'envisage ensuite quelques problèmes métaphysiques à traiter quand on veut savoir si la liberté du vouloir est possible pour tout étant qui jouit d'un cerveau. Je pose enfin la question de la compatibilité d'une telle métaphysique avec nos théories empiriques les meilleures.