

CREATION AND CREATIVITY – REMARKS ON THEIR PHYSICAL SIGNIFICANCE

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In this article the author discusses such questions as: "What is meant by Creation?"; "What is meant by calling a person creative?"; and "How can creation be reconciled with the laws of conservation as they are considered in physics?" It is concluded that on the human level, creation consists of giving a form to matter which already exists. Thus, what is called creation on the human level does not conflict with the laws of conservation. With respect to a level higher, human beings can see that both the matter and the form for it could be created; and this is the kind of creation described in Genesis.

What is the physical significance of the words: "creation" and "creativity"? What would be the consequence of the hypothesis that the phenomena described by these words obey the laws of physics, and do not occur except in physical systems?

Standard definitions in a dictionary¹ give these: (a) creation—the action of creating; to form from nothing (the creation of man), also the result of the action of creating; the creations of dressmakers. (b) creativity—the character of a creative person.

Might it be that the phenomenon of creation follows from a physical law or that it has been described, plainly and sufficiently explicitly, by such a law? First of all, let us try to find the physical significance of an act of creation.

Creation and the Laws of Conservation of Energy and of Matter

Creation, according to the definition, is the act of making from nothing. (Many philosophers have explained that "from nothing" means "not from something", i.e., not from pre-existent matter.) According to the physical laws of conservation of energy and of matter, in a closed system, the total amounts of energy of various sorts, and likewise that of matter, remain constant.

Might one conclude, then that the act of creation is essentially a metaphysical act, outside the domain of physical theory? Does it suppose, in fact, an origin and cause which is beyond the boundaries of this world?

That will depend on what is understood by the expression "make from nothing". If one states that a lake has been created, that could mean that the water—the matter contained in the basin of the lake—had been transported from the place where it existed before the creation of the lake. The same could be said about the energy necessary for the work. The amount of energy and of matter remains the same; things were merely moved from one place to another.

One might say the same about the appearance of living organisms. Suppose that there were no living organism on the face of the Earth, nothing but rocks in various geological formations and water without any trace of organic material. Still, all of the atoms of the chemical elements which would later enter into the structures of living beings would already be there. Likewise, there would be already in the Solar System all of the energy which would later animate the world as it is now known.

It is forms, then, which appear, develop, and disappear. But the matter of the universe seems to remain in the same amount. The creation of a form adds nothing to the amount of matter, nor does its disappearance take away anything. The law of conservation of matter is not involved.

The word "form", it will be noticed, is being used here in a sense much like that introduced by Plato and Aristotle, and developed by the Schoolmen.

But, it might be asked, is creation the appearance of a new form or of supplementary substance?

It is a matter of ordinary experience, as well as of scientific knowledge, that throughout an individual's lifetime the phenomenon of the appearance of forms is repeatedly observed. They come about by the passage of something from an amorphous, dispersed state, to a state in which the matter and energy are concentrated, and expressed in a structure.

Forms perpetuate themselves. One gives birth to another. They multiply, organizing matter into thousands of copies like themselves. This happens in the birth of living organisms, also in the production and reproduction by men of thousands of artificial objects.

But it is evident that some forms appear which have no precedents. To these forms one can apply the term "creation". It seems justifiable and useful to define creation as the act of making "not from a (preexisting) form".

If this definition is adopted, what physical law would be involved? Is there a law of conservation or non-conservation of forms? Is there a general law which governs the processes of the origin, reproduction, and disappearance of forms?

Creation, Conservation, Origin of Forms, and the Law of the Disappearance of Forms

There is indeed such a law in the exact sciences. It is stated in information theory as Brillouin's principle. In statistical physics it is known as Boltzmann's formula of the increase of entropy in a closed system. In thermodynamics, the science which is concerned with exchanges between thermal and mechanical energy, it is named after the great French scientist Sadi Carnot; it is called Carnot's principle.

The various statements of this principle are all to the effect that in all closed systems the average internal order decreases with time. The natural development of such a system tends to an amorphous, homogenous state, in which all of the initial structure or order has been dissolved or has disappeared.

But it is plain that in the birth and development of a living organism the opposite happens. Order increases, at least locally; the structures develop and become more complex.

However, as long as an organism lives in an open system, what has just been noted does not contradict the law of increase of entropy. This is because the law has been formulated only for closed systems. Due to exchanges with the environment, the principle of entropy increase is not violated, although locally order increases and entropy decreases. Calculation or physical observation show why: the increase of entropy in the environment is greater than the decrease in the organism itself. (The environment will include everything with which the living organism comes into contact. In particular, it includes the nourishment which the organism takes in.) There are, then, no phenomena known which are in opposition to Brillouin's (or Carnot's) principle.

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It would seem well founded, then, to say that neither birth (reproduction) nor creation (of form) can be accomplished except in open systems.

The existence of an open system, however, while it seems to be a necessary condition, is not always a sufficient one. There are two points to be considered here.

First of all, a supply of energy, and of matter, whether it be food or something else, are not enough to cause entropy to decrease, even locally. Consider the Sun's rays falling on a pond of water. There is a supply of energy, all right; but the effect is to heat the water and increase its entropy. But the same rays might be focused on the boiler of a Servel type refrigerator, and then the water would be cooled, and the entropy decreased. (Even so, entropy would increase elsewhere.)

What makes the difference? The refrigerator is already a fairly ordered, complicated, structure. It would appear that for order to increase, even locally, there must already be a considerable amount of order present. So the claim, sometimes encountered, that a supply of energy, such as that from the Sun, is a sufficient cause to effect such an increase in order as would have to occur in alleged evolution "from molecules to man" is not scientifically founded. (Or proved.)

Here we can clearly see what is the thermodynamical difference between Creation and creation. The former can appear anywhere while the latter only in zones—or in relation to zones—where an order is already present. Both can operate, however, *within* the framework of the second law, although for none of them that law constitutes a *sufficient* condition.

As for the second point, consider algae, floating in the ocean. They need only free access to the water containing minerals and to solar radiation. To them, to be open means to be surrounded by a membrane which is semi-permeable to water and to mineral salts, and which is transparent to light.

The decrease of entropy of the algae is possible because of the increase of entropy of the system of Sun and Earth as a whole. This comes about through radiation. One might thus say that the algae absorbs from its environment a negative entropy, or, negentropy.

The algae is an example of an open system—open to the flux of negentropy. It is also an example of a passive system. Among more complex animals it is otherwise. Among them, one may observe an active pursuit of that flux of negentropy. For instance, complex animals hunt for regions where food is abundant, the supply of oxygen sufficient, and the temperature suitable. This is in a way a creative attitude. While the animal is presumably not conscious of it as such, only the animal's involvement makes the work possible.

These things become more complicated when the analysis is extended to human beings; but the complication can be turned to the advantage of the creationist viewpoint.

Among human beings, this work of creation is realized on two levels: both by interior development, both of the body and of the spirit, and by external works, carried out by man either individually or collectively.

But here, too, such an achievement is not possible on either level unless through being coupled to a source of

negentropy. This coupling may be realized if the man constitutes an open system and moreover, as experience shows, an active one.

Here the words "open" and "active" signify more than in the plant or animal kingdoms. A man, like other living organisms, needs to be open to the circulation of nourishment, of water, and of fresh air with sufficient oxygen. But it may happen that, despite a mechanical access to the source of negentropy, there is no real, profound access. This may come about for the most subtle reasons, such as inhibiting thoughts, bad states of spirit, or others.

It may come about that although a man has physical access to that source he may yet remain far from it, on the surface of things. Indeed, he is using only a small percentage of the flux of negentropy which he might if his trouble did not exist. Such a small percentage permits him only to perpetuate his existence; all his faculties, all his possibilities, and indeed all in him which is really man, are "asleep". By considering such a case, one may see the significance of the word "active". Active means striving to approach the source.

Thus by doing all in his power to ensure first a mechanical access, and everything possible toward a real access, a man may approach the source and find himself illuminated and in harmony with the law of increase of entropy.

Christians, of course, see the Source, of negentropy as of everything else, as God Himself. And they try to approach by being in the right relationship with Him. Most other monotheists would agree in this.

Others seek the same thing by external works, such as scientific, artistic, or artisanal creativity. Yet others turn to internal methods, such as the formation of character, meditation, the practice of yoga, and other such ways. (It is not the purpose of this article to inquire how well such attempts succeed.)

Now it is possible to give a precise meaning to the word "creativity". Creativity is the character of a creative person. Who is creative? A creative person is one who does communicate with the source of negentropy.

May one final point be made? Human beings know that they can create in a limited way, as has been noted; the individual can put the form into the matter. Then, it is natural to suppose that there is One more powerful, Who can also create the matter itself. And this One, as Thomas Aquinas used to say, is He Who is called God. And this work of creation, of matter as well as of the forms which it then took, was His work of creation in the beginning.

Reference

¹Since this article was translated from French, the reference is to the *Nouveau Petit Larousse*, 1969, p. 269.

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