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## Can Science Bring Us Peace?

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**Abstract** - *The development of science and technology has made possible the killing record of this century. One must therefore ask whether science and technology are inherently murderous? It is by analyzing the sources and ideas underlying them that we will attempt to answer this disturbing question. Modern science with the technology it has spawned is a product of Western Weltanschauung characterized by the biblical message of human dominion over nature, the notion of objectivity and the distinction between theoretical and practical knowledge. All these ideas now appear questionable. Science has allowed Westerners to rule humanity and exploit nature. War has often seemed a convenient way to achieve the desired aims. Means of mass destruction and ecological crisis oblige us to rethink our assumptions and established modes of behaviour. Ecology teaches us that it is not the strongest but the most compatible that have the best chances of survival. Thus, 3,000 years after the biblical exhortation science forces us to question the message which provided the incentive for the development of science and technology. Having given us the means to obliterate humanity, science teaches us now how to assure humanity's survival.*

### Why is This a Question?

**In absolute terms, more people were killed in the twentieth century than in any period of history.** How to explain this tragic record? Has human nature changed, has it become more violent, or should we search for other explanations? The notion of human nature is very familiar, but, nevertheless difficult to handle and, in fact, quite obscure if we go beyond such obvious aspects as

sentience or rationality. We are really at a loss when it comes to the question of the permanence or change of human nature over time. It is therefore safer to leave this question aside and look for clearer causes of the killing frenzy. Two such causes are rather obvious. The first one is demographic; namely, the numerical development of humanity. There were simply more people in this century to kill and be killed than ever before. But there is

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also another obvious reason explaining this sad fact. Those doing the killing were much better equipped for the job than their ancestors.

The direct culprit in this case is technology, which is applied science, but the indirect one is pure, theoretical science. This places us squarely before a very uncomfortable question. Is science, or knowledge in general inherently murderous? If it is, then perhaps we had better stop developing science and cease vaunting our rational powers. There is no denying that the question before us is rather fundamental. It goes to the very foundation of our cultural Weltanschauung and forces us to reflect critically about some cherished beliefs. It is not a pleasant task, but we have to undertake it. The intriguing fact is that through rational development, we have brought ourselves to a situation in which we have to question the rationale of rational development itself. Hence we can formulate the following law:

Law I: *The need to question the value of rational development is proportional to the development itself.*

If someone believes that humans have painted themselves into a corner, he or she may use weighty arguments to justify this belief. But there is one problem with such a view: namely, it may be overestimating the importance of the present moment and of the present generation of humans, as well as taking a one sided view of the present situation.

### When Does it Pay to Make War?

No matter how trigger-happy and blood thirsty humans may be, they are also rational. They want to live and be happy, they don't like to get hurt and be losers. People make wars because they believe that they will win and will be better off after the war than before. No sane person starts a fight convinced that the result will be detrimental to his or her well being. So the question is: what conditions have to be satisfied to allow people to believe that fighting offers them the chance of winning and thereby improving their situation? Until recently, the answer was simple, namely, relative strength. If one side was stronger than the other, the stronger was reasonably assured of victory, and thereby of achieving the desired aim. The reasoning was straightforward and corroborated by experience. There was no need to inquire about the conditions which have to be satisfied to make the conclusion valid. The new-

ness of the present situation resides in the fact that now we have to inquire about those conditions. We have to do this because of the progress in the destructive capacities at our disposal, i.e. because of the progress of technology, and science. There are two consequences of this statement which merit discussion.

On the one hand, it became evident that a necessary condition justifying warfare is the belief that the aggressor will not be destroyed by the military activity which he initiates. Until the last world war, this condition was thought to be always satisfied. The development of atomic weapons made us aware that the relative immunity of the aggressor is a thing of the past. The global wars therefore lose their rationale. With hindsight, we became aware that the traditional bellicose attitudes were conditioned by the relatively low effectiveness of weapons at people's disposal: This leads us to a rather surprising conclusion which may be expressed in the form of a law:

Law II: *The probability of a war being a paying proposition is inversely proportional to the power of weapons.*

Since the power of weapons is proportional to the level of scientific knowledge, it means that the development of science and technology does not have uniform consequence on warfare through time.

Until the development of weapons of mass destruction, improvements in military hardware were increasing the destructive power of the would be aggressor as well as his chances of victory. But the invention of weapons of mass destruction has completely changed this situation.

### Is Knowledge Inherently Murderous?

The other consequence of the development of science and technology is the unfortunate relationship existing between knowledge and the capacity to kill and destroy. The more we know, the better we know how to kill and destroy. Unfortunately, there exists a relationship between the level of knowledge and the capacity to do harm. Let us express this relationship in the form of a law:

Law III: *The capacity to harm is proportional to the level of scientific knowledge.*

*And the woman said unto the serpent, We may eat of the fruit of the tree of the garden: But of the fruit of the tree which is in the midst of the garden, God hath said, Ye shall not eat of it, neither shall ye touch it, lest ye die*

*Genesis, chapter 3, 2-3*

*All logical (i.e. lay, non theological) knowledge is devils invention and shall be treated as such*

*Saint Damien, 11th century. Last Father of the Western Church*

*Knowledge is Power*

*Francis Bacon 16<sup>th</sup>-17<sup>th</sup> century*

*Science thought is power thought*

*Bertrand Russell 19<sup>th</sup>-20<sup>th</sup> century.*



Thus formulated, the law may raise objections. Since antiquity, we have been accustomed to distinguish between pure knowledge and practical knowledge. The former was supposed to be a disinterested search of truth, unrelated to practical concerns and having no material effects outside the knower. This type of cognition should not contribute to the destructive powers of knowers. In this perspective, power, whether destructive or constructive, belonged to the province of practical cognition, to the realm of more or less sophisticated crafts. What practical knowledge could do, or for that matter, could not do, was of no concern to pure knowledge.

The distinction between theoretical and practical knowledge was so important and had such profound social consequences that it is worth describing it in more detail. Thus we will be able to better understand the consequences of the disappearance of this distinction taking place now. In Plato's time, there was an obvious difference between practical knowledge, the domain of servile arts and crafts, involving physical activity and muscular effort reserved for the lower classes of society, and the pure, theoretical pursuits of members of the upper, wealthy class who could afford the luxury of pure philosophising. The mental exercise was not supposed to serve a useful purpose other than to cultivate the minds of those who engaged in it. Nor was it to have observable, material results.

In light of the above, it becomes understandable why Plato introduced the distinction between the two types of knowledge and why it was accepted in Antiquity, the Middle Ages and is, occasionally, still used. It seemed to be evident and well founded. Unfortunately it was also wrong. That such an error could be committed and accepted for centuries is not surprising. A similar error, almost equally persistent, is at the basis of Ptolemy's explanation of the solar system. Moreover, Plato's distinction transcended the realm of knowledge. It was coherent with the class structure of society. They were mutually justifying and reinforcing each other.

### Science as Power

It took the genius of Francis Bacon to break out of the Platonic mould and propose a different view of knowledge. In his view, knowledge is power and its purpose is to serve the practical aim of bettering the living conditions of humanity. Bacon became the prophet of the modern age and the godfather not only of the modern, experimental method, but also of the conquest of nature and the improvement of living conditions. In our outlook, in our attitude towards knowledge and the outside world, we are all Baconian, whether we realize it or not. A clear expression of this frame of mind is Bertrand Russell's dictum: "Science thought is power thought".

It is one thing to equate science with power, it is another to justify this statement. In other words, to explain why this is so and whether it has to be so, that is, whether it cannot be otherwise. Let us, first of all, ask another question, namely, whether science has a special relationship to power or whether all knowledge is related to power. In other words, whether Bacon was right declaring that "knowledge is power?". In order to answer this question, let us look at what has happened to the Platonic distinction in our times. Although it is still used, it has lost much of its importance. The development of science provides us constantly with examples of theoretical knowledge producing major practical results and practical pursuits leading to the advancement of theoretical science. Suffice it to mention as example of the former situation, Einstein's famous law  $E=mc^2$  and atomic power. A classical illustration of the latter is the invention of the nylon yarn, the theoretical consequence of which was the development of the chemistry of polymers.

The evanescence of the distinction between theoretical and practical knowledge went hand in hand with the erosion of distinctions between branches of science. Once distinct sciences such as mathematics, physics, chemistry, biology, anthropology, etc. lose their former clear-cut distinctness and blend into one another, science appears as a seamless web of knowledge always producing practical results. The closer we look, the more we realize that this is so. The fact is that **all knowledge is really practical knowledge**. This is as true of physics as it is of theology, of mathematics as of metaphysics. If somebody doubts the practical nature of theology or metaphysics, let us remind them of the religious wars of yore and the ideological wars of this century.

History teaches us that the most powerful ideas exercising the most profound and lasting impact on humans and the environment were religious and ideological, not scientific. Besides, until modern times, they did not really have much competition from science. Compared with theology, science and technology are a Johnny-come-lately. Moreover, Johnny's arrival on the scene was prepared by religion. Since this statement may raise some eyebrows, it merits an explanation.

### The Specificity of Science and its Roots

The basic difference between science and other modes of cognition is objectivity vouchsafed by verifiability. Objectivity may seem to us a very familiar and straight forward notion. In fact, it is a very unusual and rather new idea. First of all, it is unique to the Western culture. To be precise, it is the product of the Judeo-Christian *Weltanschauung* and has never developed in a significant way outside of that intellectual framework. Objectivity



implies an observer looking at things. To look at things, the observer must be outside of things observed, distinct from them. Moreover, and this is crucial, though not immediately evident, the observer must consider himself superior to the objects under observation. The objective look implies looking down at things, or, more precisely, considering objects observed as things. This is why objectivity is easiest to achieve in dealing with inanimate matter and most difficult in the case of other humans, our equals.

Strange as it may sound, an objective observer is not an objective fact but a culturally constructed notion, the result of the idea of human superiority developed three millennia ago by the Hebrews. The first and clearest manifestation of this view of humans is the famous sentence in the Book of Genesis enjoining humans to people the world and submit it to their domination. Through Christianity, the idea of human superiority with regard to nature became the cornerstone of Western Culture and made possible the development of the notion of objectivity which, in turn, made possible the development of modern science. This process has distinguished our culture from all other cultures. All other cultures view man as an indistinct part of nature, ours is alone in placing him above nature. It is difficult to overestimate the consequences of this belief. They bear directly on the problem we are discussing.

### Science and the Limits to Growth

The exalted view of humans allowed the development of modern science and technology which made possible the dominion of the white race over other peoples and the conquest of nature. The relationship existing between the dominion of the white race over other races and war is easy to see. It is a different problem when it comes to the relationship between the conquest of nature and war. In fact these two have more than one point in common. War consists in doing harm to people and imposing the will of one society on another society. The conquest of nature involves doing harm to nature and imposing the will of humans on it. In both cases, there is the desire to improve one's situation and the belief that the benefits will be greater than the losses. Moreover, in both cases, knowledge played a similar role. One could multiply the similarities, but it is worth stressing also the difference, namely the role which ignorance played in both cases. It played a far greater role in the conquest of nature than in making war. Until recently, we in the Western culture were blissfully unaware of the full measure of our dependence on nature, and of the fragility of the ecological balance conditioning our existence. In other words, we had not conceived the notion of the Earth system and its limits. As intellectual heirs of the famous exhortation of the Book of Genesis and of the Baconian idea of

"*imperium homini*" (the domination of humans over nature), we were exploiting nature believing that we would be able to expand indefinitely our abuse of it.

It may look like a coincidence that the awareness of a limit to wars and of a limit to growth have coincided in time, but in fact it is no coincidence at all. The awareness in both cases is the result of the growth of knowledge and of its destructive power. It is important to realize that the destructiveness of power engendered by knowledge is not limited to one sphere, be it humans or nature. The same destructive capacity may equally well be applied to humans and to nature. As far as this capacity is concerned, humans are material objects just like trees or rocks are. We were waging wars convinced that we were independent from our enemies and stronger than they, and we were conquering nature believing that we were sufficiently independent from and superior to it. What makes the present epoch so peculiar is the sudden realization that this is not the case.

Aggressiveness against humans is a universal human phenomenon, it is not the exclusive trait of any one culture. Instead, aggressiveness against nature is specific to Western culture, i.e. of the Caucasian race. It is now obvious that the future of humanity depends on our ability to change our attitude towards nature. Perhaps someone may argue that with the Caucasian race becoming a smaller and smaller part of humanity, going down from 30% of the world population in the middle of the XIXth century to about 12% by the year 2000, the problem will resolve itself automatically. Unfortunately, this would be a vain hope. Although our race is dwindling in relative and perhaps even in absolute terms, it has set standards of material well-being which all other races dream about and try to achieve. A car is environmentally unfriendly, whatever the colour of the skin of the driver. It is the same with all the other gadgets or amenities of our way of life. Difficult as it is to transmit higher values from one culture to another, it is regrettably easy to instil the desire for material possessions.

### Domination or Interdependence

We have already mentioned the conceptualization of the notion of the Earth system and of its limits. This realization is certainly the most important intellectual discovery of our times. It brings into our *Weltanschauung* two crucial ideas. The more obvious one is the existence of limits which are inherent in nature, i.e. in the Earth system. The less obvious idea, and perhaps more difficult one to accept, is the fact or idea of interdependence. Interdependence exists on two levels, in two very different spheres, namely between humans and nature and among humans. Interdependence is contrary to dominion and injurious to our self esteem, so it is unpleasant and diffi-



cult to accept. The desire to dominate is deeply ingrained in our nature. In the Judeo-Christian culture, as far as the domination of nature was concerned, it had the additional support of the authority of the Bible.

The present change of perspective is so dramatic because it goes against a three millennium old tradition and forces us to rethink our beliefs, our attitudes and modes of behaviour, which we were used to accept as natural and biologically justified. Suffice it to mention the theory of social Darwinism, so popular a century ago. Nowadays, science undercuts this theory. The more science develops, the more it makes us aware of the limitations of the Earth system and of the interdependence of all elements animate and inanimate composing this system. That this is so is no coincidence. Reflect for a moment on the nature of the process of understanding. Let us analyze the two words *understand* and *comprehend*. *Understand* comes from standing under while *comprehend* comes from the Latin verb *prehendo*, which means to grasp, and the prefix *cum*-with, i.e. to relate one thing to another.

In both cases the words link two or more things expressing causal relationships between them, thus showing their interdependence. This is why the more we know, the more we understand, and the more we perceive things as being interrelated. If ever we were to discover objects totally unrelated to anything else, they would appear to us as completely incomprehensible. Thus we would discover an objective limit to our intellectual knowledge. Barring such an unusual event, we may formulate the following law:

*Law IV: The more we know, the more the world appears to us as interrelated and interdependent, that is, a coherent system.*

The consequences of this law are many and far-reaching. They extend to objective reality and to the sphere of knowledge. The two principal consequences concern the nature of systems and the way of knowing them. A system is a totality which is different from the sum of its parts; so it is not reducible to its parts. This well-known principle underlying the general systems theory has as its well-known consequence the inadequacy of the analytic method for the study of complex totalities. The above law therefore allows us to formulate a corollary:

*Law V: The more knowledge advances, the more analysis has to be complemented by a systemic approach.*

The law may sound innocuous, but it really signals a major change in the way we explore the world and think about it. Moreover, the law also presages a profound transformation in our attitudes and modes of behaviour mentioned earlier. This, of course, is a tall order. It merits further discussion.

## **Is There Hope for a Change?**

It is well known that producing arms is a very lucrative business, especially when you sell them abroad; which explains in part the number of wars waged in the third world, as well as the role which the cold war played in preventing the recurrence of a major economic crisis in the post World War II era. This is why it is difficult to imagine that the major players on the world scene will, of their own accord, deprive themselves of such a powerful and effective factor in avoiding economic depressions and in maintaining the material well-being of their nations. And yet, it will have to happen. With the demise of the ideologies which shaped the history of the first half of this century, economics took their place in the minds of individuals and governments alike. And it would no doubt have commanded their faithful and undivided attention forever after had it not been for environmental problems and the growing realization that we cannot continue to do business as usual, not even the armament business.

Besides increasing our power, the development of knowledge facilitates and multiplies communication between people, making them more and more intellectually interdependent. Thus far, the development of knowledge was preponderantly the product of the Western culture. One does not have to be a clairvoyant to realize that this situation will soon change. In the not too distant future, the major players in the intellectual sphere will be the Asians: Chinese, Japanese and Indian. This will terminate the intellectual domination exercised presently by the white race and will make present intellectual masters dependent intellectually and otherwise on peoples of other cultures. It is rather obvious that the contributions of non-Westerners will have a profound impact on the nature of future knowledge.

Humans produce and shape knowledge, but the story does not end there. Knowledge in turn impacts on those who produce it and shapes its producers. The feedback relationship between knowers and knowledge increases in its impact proportionally to the growth of knowledge and becomes rapidly the most powerful factor of human evolution. It also speeds up, and makes possible, rapid changes in the evolution of the way we see the world and our place in it. This is why what may seem perfectly impossible or at least improbable today, may happen tomorrow and be perceived as self evident and acceptable. Let us express the relationship between knowledge and change in behaviour in the following way:

*Law VI: The facility and rapidity of changes in established modes of behaviour, as well as the need for these changes, are proportional to the level of knowledge.*



The greater is the knowledge construct, the greater is our power, the more rapidly and the more profoundly we change the human situation and, consequently, the more quickly we have to react to these changes if we want to survive as a species. *Homo Sapiens* is not suicidal *per se*; on the contrary, his basic urge is to live and to prosper. But to achieve this aim in a situation where the recipe for making an atom bomb may be found on the Internet, humans will have to curb their murderous instincts and undergo a profound psychological change bringing them to a higher moral level. Interestingly enough, the moral evolution will not be the work of Sunday preachers, but of the growing awareness of the dangers which we have brought onto ourselves through the development of science and technology, i.e. through the progress of knowledge. The Greeks used to say that fear is the mother of wisdom. It was true in Antiquity, and it is still true today.

As we tried to explain it earlier in this paper, current science and technology are preponderantly the product of Western culture and of the Judeo-Christian idea of the

radical superiority of humans over nature. Three thousand years after the fateful sentence of the Book of Genesis, science and technology having given us almost supra human power over nature and over ourselves. It is now necessary for us to come down from the pedestal on which we elevated ourselves while we believed the biblical dictum. Enhanced knowledge makes us realize that we are a part of a bigger whole on whose well-being depends our very survival. The spread of weapons of mass destruction tells us that the idea of selective survival of the strongest is a dangerous illusion. Ecology teaches us that it is not relative strength, but compatibility and the ability to co-operate which gives individuals and species the best chances of survival. Thus, unbeknownst to them, Polish workers in the Lenin Shipyards in Gdansk, by forming Solidarity, have not only defeated communism, but also given us a blueprint for the future of humanity. May we all heed their example, because, if we care for the well-being of the children of our children's children, there is no alternative.

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