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Artes Liberales

An Association for the Furtherance of Liberal Education and Democratic Values in Post-communist Societies

Artes Liberales was founded in Prague in January 1997 as a cooperative endeavour of educational leaders from Central Europe, the Baltic States, and Ukraine. As a regional educational association, Artes Liberales sponsors regular professional exchanges and other collaborative programs to promote liberal education and democratic leadership among scholars and institutions of higher learning in post-communist countries. Artes Liberales encourages colleges and universities to adopt innovative liberal arts curricula as a counter-weight to the premature and often excessive specialization typical of communist and post-communist pedagogy. Artes Liberales is actively engaged in expanding cooperative ties with other liberal arts institutions, both in the region and in the United States.

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CONTENTS

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BIOLOGY, PRAGMATISM, AND LIBERAL EDUCATION

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What would a biologist consider an indispensable component of liberal education? As far as education is concerned, I myself am what a paleontologist would call a "iving fossil,"a relic of times long past. I received a classical education at a German gymmnasium where I had nine years of Latin, German, and mathematics, seven years of Greek, and history, four years of French, and no English whatsoever, also a great deal of geography, together with one-year classes in various science subjects. Now, 75 years later, how do I evaluate such a strongly classics-based education? I still think it was very valuable, but I must admit that is crowded out some subjects that would have been even more important. Although I had lots of history, it was mostly dynastic history, and I had no courses in the social sciences, about democracy and citizenship or some other subjects valuable for daily life. But ignorance is met wherever we look, not only in Germany. What struck me most when I came to the United States in 1931 was the incredible ignorance of most Americans, including college graduates, about the rest of the world. Here we are, the most powerful nation, with interests in all parts of the world, and yet when the recent trouble in Yugoslavia broke out even the New York Times completely misrepresented the situation, ascribing genocidal activities to "the Yugoslav army" when every European knew that it was the Serbs who were to blame. No matter what else we may demand, a liberal education must eliminate that kind of ignorance, which is found in many areas. Let me only mention recent encounters between Creationists and Evolutionists.

I will return to this theme with some concrete suggestions as to the content of a liberal curriculum, but I want to begin by stating that it is the foremost task of liberal education to eliminate shameful ignorance. Liberal education should prepare a young American for adult life. That, broadly speaking, is what liberal education means. I fully realize that this is a vacuous statement until we list specifically the items this person needs.

Pragmatism

The evaluation of pragmatism is difficult for a non professional because there is so much diversity within the concept. Some critics, for example, claim that James turned Peirce's ideas upside down. Dewey rejects teleology while Rorty accepts it. Lovejoy in 1908 distinguished 13 possible forms of pragmatism. Since then Rorty, Hilary Putnam, and others have added many more. By wielding Occam's razor, I distinguish for my own purposes only two kinds of pragmatism.

1. There is epistemological pragmatism, according to which truth is established or determined by its efficacy in practical application, "that which works best."

Personally, I question the validity of epistemological pragmatism. In everyday life we find it most practical to act as if the earth were flat and as if the sun circled the earth, but neither assumption is true. In ordinary physics, Newton's equations are satisfactory, but, as Einstein has shown, they are not the ultimate truth. Truth in science is established by continuous testing, verification, and falsification. The pragmatic approach is adopted only when there are competing theories. As the philosopher Laudan has said, among several competing ones, that theory is the best which produces the best results.

Early in this century, the Mendelian geneticists and the Lamarckians argued about the correct theory of evolution. Most naturalists opted for Lamarckism because it was based on gradualism and naturalists had abundant evidence for their conclusion that evolution was gradual. Mendelian evolution, as proposed by Bateson, DeVries, and Johannsen, involved saltations and required the rejection of natural selection. One might therefore say that at that time Lamarckism was the pragmatist's choice of evolutionary theory. But this is true only when there are several seemingly equally well-supported theories competing with each other. Normally in science, pragmatism is not the way to truth, as Dewey recognized quite early in his career.

2. Subjective or everyday pragmatism deals with personal actions and the adoption of value systems. Truth in the philosophical sense is not involved, but only the observable results of actions and of the application of values. The outcome of an action determines whether it is to be considered as constructive and useful. This kind of pragmatism is particularly useful in moral dilemmas.

It is now rather clear that the mistake made by the early pragmatists was to apply the same standards of finding truth to science and to ethics. Pragmatism is indeed a valuable approach in ethics, but it is not a suitable approach in science.

However, it is a valuable guide in any kind of decision making in daily life.

There is only one subject matter in science where I apply pragmatism. It is the question of realism. I adopt commonsense realism because it works. I accept that there is an outside world and that it is more or less as our sense organs tell us. Of course, we realize that our sense organs are very inadequate. We can see neither ultraviolet nor infrared light. Our olfactory sense is scandalously poor as compared to most other mammals or most insects. However, natural selection has given us the sensory equipment to operate successfully in the world we live in.

I call this world, revealed to us by our sense organs and auxiliary instruments such as the microscope, the middle world. It extends from the atom to the solar system. Below is the world of the atom and elementary particles and above it is the world of the outer cosmos. The liberating consequence of the recognition of these two other worlds is that the subatomic and transgalactic worlds are of no relevance whatsoever to man. I know of no discovery in these two worlds that had any influence whatsoever on the biologist's understanding of the middle world. This means that the only world of any consequence for biology, anthropology, psychology, sociology, and the humanities in the middle world. Hence, the scholars in these fields occupy themselves exclusively with the middle world and do not feel in the least guilty about ignoring the other two worlds. This decision eliminates a huge number of actual and potential controversies.

Biology

I now come to my third theme: the science of biology. Until about 50 years ago, physics was the dominant science. Now it is said again and again, this is the age of biology. This change is not only due to the victorious march of molecular biology, but also to the working out of unified theory of evolution that virtually ended all strife within evolutionary biology, as well as to advances in nearly all other branches of biology up to neurobiology. Related branches of science, such as anthropology and psychology, also have become increasingly biological.

The previous dominance of physical sciences was reflected in the philosophy of science. From the Vienna Circle through Carnap, Hempel, Nagel, and Quine up to Popper and Kuhn, the philosophy of science was based on logic, mathematics, and physics. Now a philosophy of biology is developing, largely based on Darwinian thinking, moving in an entirely different direction. It reflects, among other things, the realization that theories in the physical sciences are usually based on laws but those in biology are based on concepts.

The importance of concepts cannot be exaggerated. Our own worldview, our Weltanschauung, is based on concepts, such as democracy, freedom, altruism, competition, progress, and responsibility. Concepts have a number of characteristics that have not yet been well articulated. One of them is the potential for change. Let me illustrate this with the concept of evolution. When Platonic essentialism was a dominant philosophy, evolution could take place only through the origin of a new essence. Evolution thus was a saltational process, jumping across a discontinuity. The transmutationism of the Mendelians (Bateson, DeVires, Johannsen) was based on essentialism.

This was followed by the proposal of transformationism, a new concept of evolution in which a particular object or entity gradually becomes transformed. Individual development from the fertilized egg to the adult was the classic illustration of transformationism, and the word evolution was first proposed for the development of the embryo. All so-called evolutions in the inanimate world, as in astronomy or geology, consist of either gradual or more or less explosive transformations of concrete object. Lamarck's theory of evolution was a transformationist theory.

What Darwin proposed was an entirely new, third concept of evolution, based on his equally new concept of the biological population. Instead of recognizing classes, defined by a constant, sharply demarcated essence, Darwin recognized that every population of living organisms consists of unique, genetically different individuals, no two of which are the same, not even among the five or six billion human individuals. Evolution, in this case, is the replacement in each generation of a population of unique individuals by another such population.

I am presenting this case not as a lesson in evolutionary biology, but as an illustration of the change a concept may undergo in the course of time.

Let me single out two other important aspects of concepts. One is that a concept, in the course of time, may become obsolete. Supernatural powers was still a dominant concept in science at the time of the Scientific Revolution. It played a considerable role in Natural Theology and in the thinking of

most philosophers until the time of Kant. It was, after 1859, a major obstacle for the adoption of Darwinian thought.

Another concept that is rapidly becoming obsolete is Platonic essentialism. This is the belief that the world consists of a limited number of classes, defined by their nature of essence, the members of each class being constant in time and identical with each other except for what the Scholastics called "accidents" This philosophy, going back to the thinking of the Pythagoreans and Plato, dominated not only philosophy but also the thinking of the common man. Racism is a typical essentialistic ideology. Essentialism is now increasingly replaced by Darwin's population thinking. These are two cases of concepts that have become obsolete or are on the way toward obsolescence. Others are vitalism, panpsychism, and Cartesian mechanism.

Another vitally important aspect of concepts is that a single term sometimes covers three, four, of five different concepts without the authors who use this term being aware of it. This is true, for instance, of the term teological. There are five actual or potential phenomena or processes in nature that have been designated as teleological, but they are fundamentally different from each other. Let me mention only two of them. One involves teleonomic processes, that is processes, behaviors, or activities coded in a genetic program and leading to a definite goal. The development of an individual from the fertilized egg, programmed in its genotype, is the most frequently described teleonomic activity. There is nothing mysterious, nothing transcendental, in such goal-finding behavior because not only the goal but also pathway to it is contained in the genetic program. Teleonomic processes are totally acceptable to science and can ultimately be explained in terms of chemistry and physics.

However, particularly in philosophy, the term has been used most frequently for so-called "cosmic teleology." This is the postulate that there is some force in this world that leads it on toward progress and grater perfection. Cosmic teleology played a large role in pre-Darwinian thinking, for instance, in the philosophy of Immanuel Kant. All modern researchers in the physical and biological sciences have failed to find any evidence for the actual existence of such cosmic teleology. Various claims notwithstanding, Darwin clearly rejected it, and so did John Dewey after a certain amount of hesitation. On the other hand, Rorty has clearly expressed teleological sentiments? Indeed, he stated "teleological thinking is inevitable."

On this occasion I want to rescue the reputation of Aristotle, who has often been called a cosmic teleologist. This, however, he was not, as clearly demonstrated by the recent Aristotle scholars Gotthelf, Lennox, Balme, and Nussbaum. Aristotle described the teleonomic processes that take place in embryonic development. Max Delbrück has pointed out that one achieves a remarkably modern account in Aristotle's embryological analyses if one translates his term eidos as "genetic program."

The use of the same term for entirely different processes has been the cause of many controversies in science and philosophy. Reduction, which has at least three different meanings, is another typical case.

Permit me to say a few words about Darwin's conceptual breakthroughs. I have already mentioned the replacement of the essence by the biopopulation. Darwin was one of the first philosophers who credited chance with the importance it is now given in science and philosophy. He ended, Jacques Monod notwithstanding, the controversy over "chance or necessity". Darwin showed that in the first step of natural selection, the production of literally unlimited variability, chance is supreme. The second step, the actual selection, is an anti-chance process. Hence, the truth is that in selection both chance and necessity occur. There is no doubt that Darwin greatly contributed to the end of straight determinism. Furthermore, through his theory of common descent, Darwin led back to a single origin of life on earth, and this has now been confirmed by molecular biology, which has shown that all living organisms, down to the simplest bacteria, have the same genetic code and the same cellular mechanisms. It is curious how long, owing to the prominence of physicalism, it took to recognize Darwin's greatness as a philosopher.

In closing, let me now say a few words about John Dewey and his relation to some topics I have discussed.

Dewey and the Gap Between the Two Cultures

In addition to its monumental achievements, the Scientific Revolution of the seventeenth century created one serious problem for the Western world, the often-decried gap between science and the liberal arts (humanities). C. P. Snow, in his Two Cultures, has given us a vivid picture of this seemingly totally unbridgeable chasm. Dewey was keenly aware of this and he had a remarkably

sound intuition when he thought Darwinism might help in building a bridge between the two cultures.

The time was not yet ripe for building such a bridge, and Dewey failed. Ninety years ago, the image of "science" was still that of the architects of the Scientific Revolution, including Galileo, Newton, and Descartes. For them, science was physics, mathematics, and logic, as it was for Snow as recently as 1959. But physics is only one science and not the science. In the nineteenth and twentieth centuries, another science developed, in many respects very different from physics, which was, in various ways, ideally suited to filling the gap between physics and the humanities and to forming a bridge. This science was biology. In a recent book, I have shown the many different ways biology forms such a bridge. Indeed certain biological disciplines are, to a great extent, actually closer to the humanities(particularly history)then to physics. Thus, there is an unbroken chain from the most mathematical and deterministic branches of physics to the "softest" branches of the humanities. Indeed, if we had to draw a line of demarcation between science and the humanities, we could make a good case for drawing it right through the middle of biology, placing evolutionary biology with the humanities. Evolutionary biology shares with history a number of attributes historians have always considered to be diagnostic of history: uniqueness of the treated entities, inability to predict, frequency of tentative (subjective)inferences, and relevance to religion and morality.

In short, the demonstration by contemporary philosophers of biology, that biology is an autonomous science that shares a large number of concerns with the humanities, helps to solve many of the puzzles with which the humanities have struggled for many generations. This is of the utmost importance for liberal education. Dewey groped for it unsuccessfully, but we now have the information to reach the goal he had in mind.

Dewey and Darwin

In 1909, Dewey wrote his famous paper, "The Influence of Darwinism on Philosophy. "It was, of course, written to celebrate the onehundredth anniversary of Darwin's birth and the fiftieth anniversary of the publication of On the Origin of Species. Ironically, the first two decades of the twentieth century saw about the lowest point in the prestige of Darwinism. The leaders of the new genetics, particularly the Mendelians-Bateson, DeViries, and Johannsen- but prior to 1910 also T.H. Morgan, rejected Darwinism and believed in saltational evolution, that is, evolution by major mutations. It was in those years that papers were published with titles such as "At he Deathbed of Darwinism." Remarkably, at exactly that period, Dewey declared himself a champion of Darwinism. Just exactly why did Dewey think that Darwin and Darwinism were so important?

We cannot answer this question until we have determined exactly what the word Darwinism meant to Dewey. As I recently showed, there are at least seven different concepts of Darwinism in the literature. At the present time, of course, Darwinism means an evolutionary theory based on the principle of natural selection. But at other periods, the word meant rather different things. For instance, immediately after publication of On the origin of Species, Darwinism meant nothing more than a belief in evolution not guided by a supreme being or any other supernatural factors. Therefore, the geologist Charles Lyeff and Darwin's friend T. H. Huxley were considered by everyone to be Darwinians, even though neither accepted natural selection. Under these circumstances, it becomes important to determine just exactly what John Dewey meant by Darwinism.

I cannot analyze Dewey's entire essay. However, it is quite clear that he saw in Darwin a champion of anti-essentialism. "Up to now," said Dewey, "the conception eidos, species, a fixed form and a fixed cause, is the central principle of knowledge as well as of nature. Upon it rested the logic of science. Change as change is a mere flux and lapse." For Dewey, the gist of the Darwinian revolution was the introduction of evolutionary change, the refutation of the fixed and constant. Because this was already foreshadowed in the writings of Copernicus, Kepler, Galileo, and their successors in astronomy and chemistry, said Dewey,

Darwin would have been helpless in the organic sciences [without these predecessors]. The influence of Darwin upon philosophy resides in his having conquered the phenomenon of life for the principle of transition, and thereby freed the new logic for application to mind and knowledge and life. What he said of species, what Galileo had said of the earth, e pur se muove, he emancipated once for all, genetic and experimental ideas as an organum of asking questions and looking for explanations.

Essentialism means constancy in all dimensions. All early evolutionists, for instance Lamarck, rejected fixity in the time dimension. They accepted the idea that the essence changes over time.

Darwin, through his population principle, rejected constancy also in the geographical dimension. Even though Dewey accepted natural selection, he made a number of statements indicating that he had not yet fully understood Darwin's population thinking.

Dewey was more or less a transformationist. Again and again he compared evolution to the development of the fertilized egg into an adult, but he realized that he had not yet grasped the whole of the story:

Through a description of the ontogeny of the individual the whole miraculous tale is not yet told. The same glamour is enacted to the same destiny in countless millions of individuals so sundered in time, so severed in space, that they have no opportunity for mutual consultation and no means of interaction. This formal activity keeps individuals distant in space and remote in time to a uniform type of structure and function. This principle seemed to give insight into the very nature of reality itself. To it Aristotle gave the name eidos. This term scholastics translated as species.

Here Dewey refers to what we now call the genetic program of a population or species. It is an anticipation of population thinking but not yet fully articulated.

Dewey completely rejected cosmic teleology , which was so popular among philosophers right up to his time. Here again, he followed Darwin. Alas, I don't have the time to develop this theme; and I would rather say a few words about Dewey and ethics.

In 1898, under the title "Evolution and Ethics," Dewey published an answer to T. H. Huxley's famous Romanes Lecture (1893) of the same title. "Right up to modern times, Huxley's lecture has been almost universally considered the authoritative view of ethics by a Darwinian. This, however, is a great mistake, as Dewey saw quite clearly (Let me add parenthetically that Darwin, in 1871, in his Descent of Man stated that the possession of an ethical system was the most decisive difference between man and any animal.)" Ethics requires the high intelligence needed to be able to foresee the consequence of any action. This is one of the basic conditions for the development of ethics. If only the individual were the target of selection then indeed, as the opponents of Darwin claimed, only selfishness would be rewarded. However. Hominids and primitive men lived in small groups of hunter/gatherers, each group in severe competition with the others. Therefore, in addition to individual selection, the social group also became an object of selection. Those social groups have the greatest probability of survival and prosperity that have the most harmonious and altruistic interaction of the individuals of which the group is composed. Hence, contrary to the view expressed by many authors, there is indeed a selective premium placed on benign ethical behavior and a selection of those social groups that consisted of the most cooperative individuals. There is no difficulty in explaining the origin of human ethics in terms of Darwinian natural selection. Huxley, therefore, in rejecting natural selection as nebulous "cosmic force," also rejected this ethical basis, a point Dewey saw clearly.

Throughout the second half of this paper, I have continuously dealt with concepts, their origins and changes. It is concepts that are the scaffolding of our Weltanschauung. It is the change of concepts that characterizes change in the zeitgeist periods. It is the misunderstanding of concepts and the conflict among opposing concepts that is the cause of most strife in this world. If I were to suggest what should be emphasized more strongly in an up-to-date liberal education , it is more room in the curriculum for the study of the concepts that make up our Weltanschauung and a more fine-grained analysis of the concepts that are the basis of our belief in democracy.

Notes

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