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Science and Progress: some Recent Views

Louis Caruana, S.J.
Pontifical Gregorian University

Abstract

Philosophical reflection on the idea of progress is undergoing a recent revival, especially because of renewed interest in the broad implications of the theory of biological evolution and in its applicability to epistemology. In this paper, the main interest lies with the following two questions: What kind of word is 'progress'? Does it refer to a process that can be detected empirically? In the first section, three ways of understanding biological progress are evaluated. It is shown that ambiguity arises in each of these ways due to the arbitrary and inevitable choice of evaluative criteria involved. The second section of the paper deals with cognitive progress. According to evolutionary epistemology, the picture we have of the world at any one time is less approximate than the ones we had before it. We are converging onto the correct description. Problems arise here because one must have, just as in the previous cases, a pre-established evaluative criterion. The third section of the paper draws some implications from these conclusions and applies them to the understanding of cultural and moral progress in the most general sense. The final section of the paper brings together the insights of the previous sections so as to highlight some logical features of the concept of progress that prevent its exhaustive analysis.

The idea of progress has been discussed in various disciplines. Traces of progress have been sought not only in social living conditions, or in moral education, or in the acquisition of scientific knowledge, but also in the material world, especially the biological sphere (Ayala 1988; Nisbet 1980). Such traces are often considered cumulative justifications for the claim that progress has indeed occurred. Moreover, progress has become one of the crucial points of discussion in some influential books intended as popularised

biological science (Gould 1996; 1988). This point in itself may not be considered relevant for research in philosophy, but, taken as an indication of what is capturing the popular, implicit world-view, it should be given its share of importance especially in its role of encouraging a particular cultural or philosophical paradigm. It seems therefore highly expedient to revisit the philosophical arguments involved in the understanding of progress, and to analyse them in the light of recent scientific research and scholarship. This paper makes no claim to giving a full treatment of all the issues involved. The main line of argument, even though it alludes to various areas of philosophical work, is kept within certain boundaries and consists essentially of four steps. In the first three, the question of progress will be considered at a particular level each time, first the biological, then the cognitive, finally the cultural level. Since the debate, even at each level, is vast, only one line of argument will be carried on from one level to the next. The area covered by this line of argument, and evaluated in greater detail in the final section, may be roughly described as one dealing with the following questions: What kind of word is 'progress'? Does it refer to a process that can be detected empirically in ways similar to the way we detect changes involving material things?

1. Biological progress

The most primitive idea of biological progress is probably that of having a number of changes which can be placed in an ordered sequence of some kind. Such a linear sequence is arranged in such a way that elements of the sequence, in some sense, get further and further away from where the sequence starts. One should notice here that such sequences of changes occur not only in the organic world but also in the inorganic world. The second law of thermodynamics, for example, describes a sequential change that is uniformly directional: within a closed system, entropy always increases. In other words, a closed system passes continuously from less probable to more probable states. This primitive idea of progress in terms of sequences of changes can offer an interesting starting point for an understanding of biological progress. An important factor must however be added. To capture the main essential features of what we normally mean by 'biological progress', giving an account in terms of a string of changes that indicate a direction is not enough. Having a systematic alteration of a property or state of the elements in the sequence is not enough. Progress occurs only when there is directional change towards a *better* state or condition. Because of this element

of becoming better, the debate on progress in biological evolution has centred mainly on attempts to identify some aspects of the process under consideration which illustrate without any doubt that the directional change is indeed making the organism better. Hence one needs, first, the objective feature according to which the events or objects are to be ordered. Second, one needs to decide what pole of the ordered elements represents improvement. A recent attempt at describing progress by taking these two steps involved referring to the amount of genetic information possessed by the organism (Kimura 1961). According to this view, biological organisms can be ordered in terms of genetic information, and the greater the amount of information, the better. Net progress can be said to have occurred if organisms living at a later time are seen to have, on average, a greater content of genetic information than their ancestors.

Although apparently quite promising, this attempt was not a success. The main problem is to give a reasonably precise definition of genetic information. One usually assumes that all the DNA of an organism is a linear sequence of messages made up of groups of three-letter words, the codons, with a four-letter alphabet, the four DNA nucleotides. The information is usually assumed to be encoded in the sequence of bases in DNA or RNA that directs and controls the synthesis of proteins and RNA, and determines the phenotype, survival, and reproduction of an organism or virus. The very idea of information being contained within a physical arrangement of molecules, together with the corresponding idea of messages, is a strong metaphor that biologists find useful for describing the processes they discovered. As in the case of all metaphors and models, serious mistakes may be made if the people using them forget they are metaphors and models. The idea of genetic information contained in and perpetuated by the genes which constitute particular sequences of nucleic acids cannot, strictly speaking, be called a discovery. Eminent biologists working in the field prefer calling it 'the central dogma of molecular biology' in the sense of being a major working hypothesis of a research program (Crick 1970). Moreover, up to now, there does not seem to be any clear correlation between the genome size of an organism and the morphological complexity of that organism. Microbiologists tell us that many DNA sequences are repetitive and that much of the non-repetitive DNA may not store information in the nucleotide sequence. Hence, the

amount of information cannot simply be related to the amount of DNA.¹ The upshot is that, because of these problems, trying to understand biological progress by taking a molecular approach does not seem the right way.

A second, relatively recent attempt that has had great influence is closely related to the previous one because it deals again with the alleged accumulation of genetic information. According to this approach, progress may be measured by an increase in the *kinds* of ways in which the information is stored and as an increase in the number of different messages encoded.² Here, different species represent different kinds of messages; individuals are messages or units of information. In this way, the question whether an increase in the amount of information has occurred becomes equivalent to the question whether life has diversified and expanded. According to this view, general progress has indeed occurred in the sense that evolution shows a tendency for life to expand, to fill in all the available spaces in the liveable environments, including those created by the process of that expansion itself (Simpson 1949). In other words, one can say that there was indeed progress if one means that there has been an increase in the number of types of organisms, and an increase in the total bulk of living matter. In fact, in the absence of environmentally imposed restrictions, populations have the intrinsic capacity to grow exponentially to infinity. The greater the number of species, the greater the number of environments that are created for the new species to exploit. One can compare the expansion of life to the filling of a barrel. First, the barrel is filled with apples until it overflows; then pebbles are added up to the brim; the space between the apples and the pebbles can be packed with sand; water is finally poured until it overflows (Huxley and Huxley 1947). The environment can be filled in more effectively with diverse kinds of organisms than with only one kind. A more appropriate analogy should include the important point that the space available for occupancy by other species is increased rather than decreased by some additions. Hence, the barrel could be imagined made, as it were, of extendible rubber.

¹ This problem is sometimes referred to as the C-value Paradox. The C-value is a measure of genome size generally expressed in base pairs of DNA per haploid genome. Each species has a characteristic C-value. The Paradox arises because of the failure to be able to correlate closely the total amount of DNA in a genome with the genetic and morphological complexity of the organism in question. This paradox is evident both between species with apparently similar complexities but very different C-values, and between species with similar C-values but very different complexities.

² This idea, already explored in Simpson 1949, has recently received renewed attention by some scholars, for example Ayala 1988.

There is a problem however with this view of progress. Even though the objective feature that defines the sequence is well defined, and a relatively clear idea of moving towards the better is available, we can still ask: does the increase of bulk of living matter always represent a better state of affairs? It seems not. In the case of human beings for example, we are now facing the crucial question of overpopulation precisely because increasing the bulk of living matter is not always a move towards a better overall situation. Overpopulation cannot be called progress. If our account of progress obliges us to call it progress, there is something wrong. Hence we are back to square one: this description of biological progress has problems simply because it doesn't always hold.

The third and most promising description of biological progress is the one according to which progress has indeed occurred in the sense that, in the course of millions of years, there has been a definite move towards the better when considering the ability of organisms to obtain and process information about the environment. In multicellular animals, this ability to handle information depends on the nervous system. The vertebrate brain has an enormous number of associative neurones with an extremely complex arrangement. Among the vertebrates, progress in the ability to deal with environmental information is correlated with increase in the size of the cerebral hemispheres and with the appearance and development of the neopallium, which, in mammals, has become the cerebral cortex.

This view has attracted the attention and approval of innumerable philosophers and theologians in the course of history because it explains how *Homo Sapiens*, at least in some respects, occupies a place at the top. This privileged place is due not only to the heightened human ability to obtain and process information about the environment but also to the fact that the human brain provides *control* over this environment. The capacity to control has ushered in the new, typically human, mode of adaptation. Whereas other organisms become genetically adapted to their environments, humans create environments to fit their genes. This creativity is only a small part of the human potential resulting from the capacity to harbour abstract thoughts, thoughts that go beyond the individuality of the thing encountered in experience. We discover, through a simple examination of our knowing experiences, that what we call 'understanding' corresponds to the knowledge of the form of external things not as an individual this or that, but absolutely, for example when we understand 'horse' over and above the knowledge of this individual horse here, or that individual horse there. Understanding is the

typically human capacity of dealing with abstract thoughts.³ There is ample reason therefore to accept the view that, at the biological level, there has been a definite move towards the better in the course of biological evolution when considering the ability of organisms to obtain and process information about the environment, and moreover that, for all we know, *Homo Sapiens* is the peak of this progress.

Although apparently very plausible, this view of progress can be criticised somewhat like the others mentioned before it. Some philosophers of biology have recently pointed out that it can be described as a kind of progress that is intentionally anthropocentric – and perhaps unjustifiably so (Nitecki 1988). Their argument, even though far-fetched, merits some attention, because it manifests the nature of the concept of progress that is the main focus of interest in this paper. These philosophers claim that, in order to put order onto the biological landscape, humans are here simply choosing those criteria that guarantee their place on top. According to them, in order to attain a certain degree of objectivity in this matter, one needs to see whether other criteria are possible. In fact, according to other criteria, some non-human organisms can be considered a better success of biological evolution. Bacteria for example can be considered a much better species than human beings because they are able to synthesise all their own components and obtain the energy they need for living from inorganic compounds. They are thus autonomous living systems in a way that humans, because of their dependence on other organisms for nutrition, are not.

Moreover, as regards biomass, bacteria seem to be better than any other known species in another sense. After the discovery of bacterial biotas in superheated waters deep in the ocean emanating from the sulphide mounds known as ‘smokers’, and after the further discovery of bacterial biotas deep within the earth, bacteria appear to represent the one form of life that can

³ It may be useful to highlight the difference between the various ways one may speak of the non-measurable dimension of human nature. To designate this dimension, natural scientists, empirical anthropologists, psychologists and sociologists tend to use the term ‘mind’, while theologians and theological philosophers tend to use the terms ‘soul’ or ‘spirit’. These terms have some overlap, but only some. It would be a serious oversight to assume that they are all identical. Those working within empirical constraints nearly always use ‘mind’ in an operational way, as referring to a set of empirically determinable phenomena. As opposed to this, theologians and philosophers who use the term ‘soul’ situate themselves within intellectual traditions that value an understanding of human nature founded not only on empirical considerations but also on introspection and abstraction. During discussions and debates crossing disciplinary boundaries, one needs to avoid equivocation by clarifying such subtle but important shades of meaning.

most readily utilise energy from a great variety of chemical sources. We do not know at present how to make a realistic estimate of the subterranean mass of bacteria now living, but, according to some researchers, one can safely claim that it is possibly comparable to all the living mass of all the species at the surface (Gold 1992). On the strength of this evidence, the commonly held assumption that the main weight of biological life lies in forests has to be abandoned. Moreover, the kind of chemically supplied bacterial life mentioned here, being independent of solar energy, may be very common in the Universe, not only in the solar system but also beyond. Having said all this, one must make a cautionary remark. To conclude abruptly from these reflections that bacteria are certainly better than humans would be naive. What may be drawn as a conclusion is that, *in some respects* bacteria are better than humans. The crucial point for the line of argument followed in this paper is the following. The possibility of a choice of evaluative criteria entails the fact that the view of biological progress in terms of mental skills, although *prima facie* very plausible, is still vulnerable to counter-argument.

In fact, if the three preceding tentative descriptions of biological progress and their evaluation are now considered together, one can draw at least two conclusions. First, one can safely hold that the concept of progress is two-dimensional. In one sense, the concept is descriptive: it refers to the fact that directional change has occurred, or is occurring. In another sense, it is axiological, or evaluative, because it refers to the fact that the change represents a betterment or improvement. It is clear now that a value judgement must be made *before* deciding on the presence of progress. This value judgement must be precisely about what is better and what is worse, or about what is higher and what is lower. The second conclusion concerns the debate about biological progress. It was shown that various evaluative criteria are possible, and these often result in conflicting conclusions as regards what constitutes progress. One can draw the conclusion that the case for the occurrence of an obvious, overall progress in biological evolution is not a very strong one. If one desires to show that evolution shows progress, and that human beings are at the peak of this progressive movement, then one should really start the discussion by showing that the guiding evaluative criterion, in this case the ability to deal with environmental information, is the correct one, as opposed to other possible evaluative criteria, such as being autonomous living systems.

2. Cognitive progress

The foregoing discussion leads naturally to a more general one dealing with knowledge in general. It is a commonly held belief that knowledge about the world at large, accumulated in the course of history, has shown steady progress. Units of information and localised patterns of repeatable experiences have been integrated into networks of theories that often show a remarkable coherence with each other. One often describes this overall cognitive progress as a slow but steady process of charting the world. Such a process is seen as guaranteeing that the picture we have of the world at any one time is less approximate than the ones we had before it. We are converging onto the correct description. To explain this process, some scholars have shown that the mechanism behind biological evolution can be useful as a background model even in epistemology. Put simply, an evolutionary epistemologist claims that the development of human knowledge proceeds through some natural-selection process similar to Darwin's theory of biological evolution. In the biological case, the major components of the theory are three: firstly there is variation in some particular biological trait, often the result of blind mutations, secondly there is selection, brought about by environmental factors acting upon the organism, and thirdly, retention, which means that the trait under consideration can be reproduced in the offspring.

A direct, naive application of the principles of biological evolution to epistemology would have us believe that biological evolution is the main cause of the growth of knowledge. According to this view, the human species has the knowledge it does because precisely that kind of knowledge was once the result of blind variation. It was then selected because only those individuals who had it could survive, and finally it was passed on from one generation to the next, as a mind-set or as a kind of innate knowledge. This view may be plausible for some basic laws of thought, like the Law of Excluded Middle in logic. But it is not very plausible when dealing with scientific theories. It would certainly be naive to hold that, say, the knowledge that galaxies are in mutual recession has been gained because those who discovered it some decades ago survived in the *biological* sense, while their opponents did not. Believing that galaxies are in mutual recession is not biologically crucial. It is not like, say, having the long neck of the giraffe which is very plausibly explained by saying that the species which had it survived because it had more to eat.

A more promising way of arriving at evolutionary epistemology, therefore, is to go beyond a direct application and hold that the development of human knowledge is governed by a process *analogous* to biological natural selection but not by an instance of the mechanism itself (Popper 1972; Bradie 1986; Ruse 1995). On the analogy, instead of species we have theories. The selection process will not involve biological survival but will involve the evaluative process that theories are submitted to until they are accepted by the scientific community. The actual nature of what constitutes this evaluation has been a bone of contention in philosophy of science, especially as regards the question whether it involves only verification or only falsification, or a combination of both. What evolutionary epistemologists need for their account is a system whereby theories are accepted because they resist falsification. The scientist's job is to conjure up decisive tests which could bring down the proposed theories. If the theory in question passes the test, then it survives. In this way, one can easily note the analogy: slow zebras are captured by lions. Fast zebras are not. These are the ones we see grazing. Similarly, vulnerable theories are 'caught' by scientists. Robust theories are not. These are the theories we see in our text books.

Obviously, one has to avoid over-simplification. At least two major aspects of this simply analogy need refinement. The first refinement concerns the evolutionary model itself (Cambell 1974; Stein and Lipton 1989). There is a major difference between biological evolution and what happens when various theories have to be evaluated. As was said above, the first condition for evolution is variation of some trait. In biological evolution, this variation is random, except, of course, for the exceptional cases of artificially induced processes in the laboratory. In the process of the growth of knowledge, however, the variation of proposed explanations of a given phenomenon is not a random process. Theories are not spewed out of research centres and published in journals without any constraint whatsoever. The variation involved in the growth of knowledge depends on prior human intelligence, namely the researcher's insights and ingenuity. Biological variation is blind, human ingenuity isn't.

A second refinement needed by the naive falsificationist version given above concerns falsification. The falsificationist strategy described so far gives the impression that the process of scientific growth is a simple application of the logical principle that any general statement is refuted by a single counter-example. Scientists, however, know very well that one experimental result contradicting a given theory does not infallibly show that the theory is false. It

could be that the experimental result itself is not trustworthy. It could be that the theories behind that particular experimental result are false themselves, and so on. Scientists will not be acting irrationally when they persevere with the theory they want to defend. This point shows that the survival of the fittest theory does not simply depend on a definite criterion of a logical kind, but on criteria that introduce the relations between groups of scientists. Hence, some aspects depend on factors of a sociological and even sometimes of a political kind, especially for radical changes of scientific world view (Kuhn 1970).

If these two refinements are included in the previous account of evolutionary epistemology, it is not difficult to justify the commonly held belief that cognitive progress has indeed occurred in the course of history. This is done simply by drawing attention to the fact that the main task of scientists is to suggest conjectural theories and then to see which one conjecture resists most to experiments designed to falsify them. When a theory passes many tests, it becomes well-corroborated. Hence, on this view, there is a directional change towards the better in our overall knowledge, because a given theory, say, the theory of General Relativity, passes more and more tests and thus becomes more and more corroborated. One may legitimately say therefore that our theories about the world gain in credibility as time goes on.

Does this however show beyond any shadow of doubt that there has indeed been cognitive progress? The account just presented will certainly not satisfy those who take the historical facts seriously. The complexity of the development of natural science has already been mentioned. It should not be taken lightly. Periods of normal science may indeed enjoy a certain kind of progress as regards the corroboration of theories. If longer historical periods are considered, however, one encounters also some striking examples of scientific revolutions. As is well known, some philosophers and historians have argued convincingly that during a scientific revolution, like the jump from the paradigm dominated by the Ptolemaic system to the one dominated by the Copernican one, the theoretical content of the old paradigm changes to such an extent that the two world views cannot be compared to each other anymore. Especially as regards theories about the deep nature of material reality, one cannot assume that a given generation of scientists is always building on what its predecessors had discovered. This can be understood better by recalling that, in the view defended by evolutionary epistemologists, it is difficult to see how scientists could be directly concerned with whether a

theory is true or not. Their main concern is rather whether a theory is well-corroborated or not. Corroboration does not mean truth. When the deep implications of the theory have to change, as they do during a revolution, the scientific community usually retains the superficial structure of the previous theories. The deep implications of these previous theories, usually involving unobservable entities, are replaced.

The only way that cognitive progress may be said to happen during scientific revolutions is in the sense that there is an increase in problem-solving capacity. This is so because the new paradigm must contain theories that are able not only to solve a large portion of the problems covered by theories in the old paradigm but also to cope with the anomalies which brought about the crisis state in the first place (Kuhn 1970, p. 8; pp. 167-170). In other words, only as an instrument can science be said to progress (Kuhn 1970, p. 206). There is no guarantee that knowledge of the deeper structure of reality grows hand in hand with the degree of corroboration of existing theories.

It is not difficult to realise that what is happening in the line of argument being followed here is similar to what happened in the previous section. In the very process of determining whether progress occurred or not, one becomes aware of the need to fix an evaluative criterion before making any decision. On the one hand, if we take the evaluative criterion of cognitive progress to be problem-solving ability, then progress seems certainly to have taken place, even though there have been a number of significant scientific revolutions in the course of history. If, on the other hand, the criterion is knowledge of deep reality, as is often assumed, then progress is either non-existent or, at best, so slow as to be practically imperceptible. Every scientific revolution means a drastic readjustment of the foundations of our epistemic framework. From this brief overview of general epistemological views, therefore, the conclusion to be drawn is that applying evolutionary principles to understand knowledge results in a situation which clearly shows, again as in the strictly biological case, that to talk of progress one must have a pre-established evaluative criterion.

3. Overall progress

If a similar discussion is now engaged in at the most general level, the question would be whether one can find any justification for the claim that there is overall progress in the world as we know it. 'World' here does not

refer only to the material aspect of what can be perceived and measured, but also to the specifically human dimension of this material universe. The overall progress under discussion includes therefore the betterment of the entire world of things and meanings, including human beings not only when considered as individuals but also when considered in their communitarian, ethical, cultural and political dimensions.

Before delving into the discussion, one point needs to be clarified at the very start. One can adopt a philosophical position, sometimes referred to as the cyclical view of history, according to which every event will inevitably repeat itself sometime in the distant future. How this happens is assumed inconceivable by us because of the limited time scale we operate in. This claim has been implicitly assumed or explicitly proposed by a number of thinkers in the course of history, as seen most notably perhaps in the writings associated with Eastern Religions and also in some works of Plato (e.g. *The Laws*, Book 3). It constitutes an interesting account of history that excludes any kind of progress – by definition, as it were. Any positive indication that could count as justification for the claim that progress has indeed occurred would be refuted by the claim that such an indication of progress is an illusion. Although there may be indications that give the impression of immediate betterment, the entire universe of events will inevitably return to square one, given a time-span that is long enough. Such a position may have some beneficial effects on society in general, encouraging people perhaps to live their lives with a certain sobriety, calmness or even, as the ancient sceptics would say, a certain imperturbability. In the strictly philosophical sense, however, it cannot be considered a position based on a reasonable assumption, still less a convincing argument. It is so constructed as to be blatantly irrefutable by definition. It is like saying: whatever you say, you will be proved wrong in the long run.

It is therefore reasonable to leave the cyclical view of universal history aside and deal with other views that can be called directional. According to these accounts, there is indeed irreversible change as time goes on. Just as irreversibility occurs in the physical universe where total entropy increases, so also in human history. In the vocabulary of Christian thinking, this view is expressed by the claim that changes in history are not blind: there is a goal to all creation, there is a final cause. In St. Paul's words, 'creation itself will be set free from its bondage to decay and obtain the glorious liberty of the children of God' (Romans 8: 21). Such a directional view of changes in history can apparently be easily confirmed by what has happened in overall standard of living of people in the world, and also in the realm of technology and

medicine. One may think of the betterment of modes of transportation, or of the cures for various diseases, and so on.

This view of progress, however, with its suggestion that there has been in the course of history a steady, continuous, incremental betterment of the overall condition of humankind and of the universe as a whole, would be, if accepted without any kind of refinement, a very simplistic suggestion. Although there certainly have been innovations in the realms of modes of transportation, or of the cures for various diseases, one may legitimately ask whether such tangible development implies a corresponding betterment in other, less tangible realms, such as that of happiness or that of morals. Can we sincerely claim that people in the twentieth century are happier than they were in the first? In spite of all the progress as regards transportation, communication and medical practice, there have been periods in history when people became worse off than their predecessors. It is enough to think of the ways several well-organised civilisations have degenerated after their periods of glory. Humans have gone through periods of light and success, but they have also gone through periods of darkness and failure.

To be realistic and take into consideration both the periods of darkness and the periods of light, one needs to refine the idea of a steady, incremental progress. The suggestion that naturally comes to mind is to substitute it with the idea that sits, as it were, halfway between the cyclical non-progressive view and the simplistic incremental view. This half-way model is that of a spiral cycle, according to which, through the rise and fall of each civilisation, there is a constant betterment of that part of humanity which genuinely seeks the good. Some of the most prominent philosophers of history have adopted this more sophisticated view (e.g. St. Augustine, *The City of God*, Book XI; Giovanni Battista Vico, *The New Science*, §§ 1097-1112). What one finds expressed in such a view is an emphasis on the familiar aspect that through suffering one can learn — God guides the soul of humanity to a definite end not directly but through great trials and through the continual conflict between what St. Augustine called the two cities. It is useful to recall that his main aim in adopting this vocabulary of two cities was to show that the fall of the Roman Empire should not be used as an argument to undermine the Christian belief that God is bringing all creation to perfection. Using the parable of the wheat and the weeds in Matthew's Gospel: 'Let them grow together until the harvest' (13,30), he developed his interesting doctrine of two superimposed cities each progressing toward a separate consummation. He emphasises the necessity of conflict between these two cities as a motor cause

of change and development. This idea goes back to the pre-Socratics, and has been elaborated further in modern times by such influential thinkers like G.W.F. Hegel and K. Marx. The fundamental idea, however, is always the same. It corresponds to the model of a spiral that guarantees an upward movement towards betterment even though there are occasional periods of failure along the way.

Does the plausibility of this model supply the justification we are looking for? In other words, can one argue that, since the model of Augustine seems to correspond very well with what actually happens in history, then the question about the occurrence of progress is settled? The simple answer is no. There is still space for doubts, for a total reinterpretation of events. In the process of making sense of the sequence of past events, it is not at all clear how much importance should be given to the periods of failure, to the periods of obvious regress as regards the normal aspiration of civilisation. Should one consider, say, the Holocaust during World War II a major setback or just a passing hiccup? The extent to which the periods of obvious regress are to be considered important is not at all clear. If one were to give priority to the negative periods of human history, and concentrate exclusively on them, one would have to abandon not only the simplistic idea of continuous, incremental progress, but even the idea of progress in the Augustinian sense. One would end up with a picture of pure regress. Thus, for instance, the fact that the twentieth century has seen an enormous build-up of technology, could be considered dwarfed by the negativity of such unprecedented problems like the two World Wars, the holocaust, the real possibility of total nuclear annihilation, the ever-growing gap between rich and poor, global environmental problems, and so on. One should notice that this view is not denying the occurrence of change. It reinterprets the directional view of history to arrive at a movement in the opposite way. In its strongest form, this thesis will essentially hold that the world as a whole is always moving towards further decadence.

Every case that seems one of progress could turn out to be a case of regress. Technological achievement can result in the arms race or in environmental problems, efficient co-operation and communication among peoples can result in more effective exploitation of some nations by others, the antibiotic revolution may produce more antibiotic-resistant pathogens than it counters, and so on. One can readily understand, therefore, why

progress has been compared to a double-edged sword.⁴ Progress, in some sense, is necessary for humanity to move forward, to develop all its potential, but the same things that are taken to manifest progress can also become a source of self-harm or enslavement.

It is not difficult to see that the essential nature of this line of argument is the same as in the previous sections. The reasoning engaged in is essentially of the following form: if one concentrates exclusively on one particular aspect of modern life or culture, say the efficiency of transportation, then some idea of progress can be defensible. Once the evaluative criterion is fixed, the occurrence of progress can be discussed. Other evaluative criteria are apparently always possible, even for the limited area one is concentrating on. And according to these other criteria, what was evidence for progress becomes dubious. For instance, for the case of transportation, if the state of the environment is also taken into consideration, one will have second thoughts about claiming that more efficient means of transportation are an undeniable indication of overall progress in civilisation. The evaluative criteria, which are distinguishable from the events themselves, determine how we constitute the narrative we call history. They determine whether this narrative will be one of progress or of regress.

Concluding Analysis

It is clear by now that the main line of argument throughout this paper has been reiterated in all three sections discussed: the first section about biological progress, the second about cognitive progress, and the third about overall progress. Two questions were set at the very beginning to introduce the discussion: What kind of word is 'progress'? Does it refer to a process that can be detected empirically in ways similar to the way we detect changes involving material things? The answer one can give to these questions has to start from the conclusion drawn at the end of each section. It has to start from the fact that one cannot be fully justified in claiming that progress has occurred or is occurring. For whatever area under discussion, the very use of the idea of progress requires a prior value judgement as to what represents a betterment. This need for an evaluative standard shows that, every time a discussion

⁴ The analogy is used by Pope Paul VI in *Populorum Progressio*, §19: 'Every kind of progress is a double-edged sword. It is necessary if man is to grow as a human being; yet it can also enslave him, if he comes to regard it as the supreme good and cannot look beyond it.'

regarding progress is engaged in, questions about higher-level assumptions will become inevitable.

The very idea of progress therefore needs to be an open one. It should not be taken to allow formal definition, or reduction into simpler concepts. This is not an unfamiliar situation in philosophy. For instance, in ethics, what has been called the naturalistic fallacy has been described as the fallacy committed when one identifies goodness with any natural characteristic, such as pleasantness or being the object of desire (Moore 1903, chapters 1-4). This example from ethics can supply some useful insights about the nature of the idea of progress. The familiar argument in ethics goes this way. Suppose one makes the following claim:

‘X is good’ is equivalent to ‘X is pleasant’.

The everyday idea of good forbids this equivalence because we can always ask: is being pleasant really, or always, good? The question makes sense, and the answer is no. The conclusion therefore is that goodness cannot be exhaustively analysed into other concepts once and for all. Making the above equivalence, therefore, is to be considered a fallacy. The discussions of the previous sections show that the kind of recursive argument at work in the elaboration of the naturalistic fallacy in ethics will certainly throw some light on the correct and incorrect use of the term ‘progress’, and thus on the very idea expressed by it. In fact, the same kind of argument holds for the idea of progress. Suppose one makes the following claim, using X to designate any identifiable aspect of a sequence of events:

‘X is progress’ is equivalent to ‘X has characteristics C_1, C_2, C_3, \dots ’.

As in the ethics case, further reflection will readily enable one to see that the equivalence can never hold. One can always ask: is possessing characteristics C_1, C_2, C_3, \dots really, or always, progress? The question makes sense, and the answer is no. In this way, one can see that the idea of progress is not fully analysable into other categories.

It is evident that this argument against the exhaustive analysis of some concepts, such as the concept of goodness and that of progress, holds in so far as the common usage that gives rise to our intuitions is taken seriously. Some may be tempted therefore to mount an attack on this way of reasoning by undermining the authority of common linguistic use as a determining factor in the understanding of concepts. A possible objection therefore could be the claim that nobody should really feel bound by common usage (Frankena 1939). If we feel that common sense is pushing us to hold that pleasant things are not always good, we have the right to refrain from

submitting to such pressure. We have the right to resist common usage, to be original. We have perhaps even the right to *change* it. On some reflection, however, one can easily see that this objection does not offer a substantial challenge. If we allow ourselves the right to change common linguistic use, we easily fall into the trap of thinking that speakers of a language can, as it were, stand back so as to engage in thinking at a level that is allegedly more fundamental than language itself, and thus independent of it. This is a grossly distorted caricature of how our intellect works. We cannot detach ourselves completely from common use in its entirety. Our language depends on it, and thus also our very reasoning. If we want to change some *part* of this common linguistic use rather than another, we have to justify why we are choosing that part rather than the other. To do this, one needs to resort to language again. We are moulded intimately to language to such an extent that we cannot act as if we were independent of its inter-subjective dimension.

We can safely conclude therefore that the idea of progress is akin to that of goodness, at least as regards the impossibility of arriving at its exhaustive analysis. This means that, when discussing progress, we are not making an empirical judgement at all, but one that involves an evaluation of some kind. It is a common mistake to consider progress as something we can *discover* in a specific area of inquiry, just like, say, we can discover new facts in biology or in archaeology. The mistake is to forget about the axiological dimension of the concept and to treat the question: ‘is there progress?’ just like, for example, the biological question ‘are there specific functions for all the repetitive sections of the DNA molecule?’ or the historical question: ‘was the mathematics of Ancient Greece mainly borrowed from Pharonic Egypt?’ The question of progress is completely different, precisely because, for every sequence under consideration, an evaluative criterion must be brought into play. The best description of the kind of concept progress is still remains perhaps the Kantian notion of a regulative ideal.⁵ On this view, the term ‘progress’ stands for a directing principle of intellectual activity determining to some extent the social consequences of such activity. The major component

⁵ See for example Kant A 643, B 671 – A 668, B 696. One may recall here that, for Kant, an empirical argument is valuable only in a relative sense. What is really important is the transcendental argument whereby one arrives at the conditions of possibility of rationality. Hence, the main Kantian view on progress is of the following form: for us to be rational, to perceive, understand and act according to the categorical imperative, it has to be the case not only that God exists, that the soul exists and that there is life after death, but also that there is progress of the human race.

seems to be the engendering of a critical spirit. Since its use supports the belief in the possibility of betterment, in some sense or other, the term 'progress' is akin to 'optimism'. To the extent that this regulative ideal we call progress is expressed in the realisation of social structures, in ethical norms, and even in the way historical scholarship is conducted, these realisations will contain deliberated space for self-reform.

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La science et le progrès – quelques positions récentes

Résumé

La réflexion philosophique sur l'idée de progrès est en train de subir une reprise, surtout à cause de l'intérêt renouvelé pour les implications larges de la théorie de l'évolution biologique et dans l'applicabilité de cette théorie à l'épistémologie. Dans cet article, l'intérêt principal se situe autour de deux questions : Quel type de concept est en jeu quand on emploie le mot 'progrès'? Le mot réfère-t-il à un processus qui pourrait être découvert empiriquement? Dans la première section, plusieurs manières de comprendre le progrès biologique sont évaluées. Une manière est d'employer l'idée de quantité d'information génétique appartenant à l'organisme, présupposant qu'une plus grande quantité d'information signifie un état meilleur. Une autre manière est de faire allusion à l'augmentation de la variété d'espèces biologiques. Encore une autre manière est de considérer la capacité des organismes d'acquérir et d'élaborer l'information sur leur environnement. La question du progrès, pourtant, reste ambiguë à cause de l'élément arbitraire du choix du critère évaluatif impliqué dans chaque perspective. La seconde section de l'article s'occupe du progrès cognitif. Selon l'épistémologie évolutive, l'image que nous avons du monde à un moment particulier est toujours moins approximative que nos images précédentes. Nous sommes en train de converger sur la description correcte. Des problèmes se manifestent ici parce qu'on doit toujours pré-établir un critère évaluatif, exactement comme dans les cas précédents. La troisième partie de l'article tire quelques implications de ces conclusions et les applique à la compréhension du progrès culturel et moral au sens le plus général possible. La section finale ensuite rassemble tous les aperçus repérés dans les sections précédentes afin de souligner quelques caractéristiques logiques du concept de progrès qui empêchent son analyse exhaustive.