ETHICS AND SCIENCE

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1. Ethics and Science

1.1. From Harmony to Progress

What force should future times represent in present times?

(Hans Jonas, *The Principle of Responsibility)*

Is science, applied or pure, ethically neutral? A blind force driven by its own momentum? Bluntly put, the question is absurd. Science is born of human minds, classifies observable facts of the surrounding universe according to human categories of thought, and its applications, wise or not so wise, are made to minister to strictly human needs. Such needs have always included ethics.

Past civilizations did not separate "pure" science from so-called "moral" preoccupations. Traditional spiritual leaders, in every land and age, sought to reconcile the cosmological representations and technical skills developed by their own particular culture, with the ethical values and ideal standards of behavior devised by that same culture. Intellectual syntheses elaborated by the cultural elites of previous millennia, whether orally or in writing, expressed ideals of harmony, stability, even eternity, between human beings, their surrounding world, and the cosmic powers. Traditional ethical systems defined the

proper place of human beings within a material environment perceived as basically unchanging (save in case of divine intervention). Technical innovations were few, gradually introduced, and absorbed over generations. Until only a few centuries ago, most human beings on this planet, for better or worse, expected to live out their lives in a world broadly similar to the one in which they were born—and drew up their moral codes accordingly.

No longer. The guiding ideal of "modernism," a planetary and accelerating cultural phenomenon, is not "stability" but relentless "change." The initial impetus of modernism's drive, from "stability" to "change," was sprung roughly a half-millennium ago by a peculiar twist taken by Western European cultural development (which itself, however, had borrowed heavily from the accumulated legacy both philosophical and technical of many rich civilizations on other continents). Western European and then Euro-American global expansion certainly imparted a European cultural tinge to modernism's first phases: but as technical and scientific modernism spread, took root, and was first successfully appropriated by other civilizations (like Petrovian Russia, Meiji Japan, or Kemalist Turkey), a universal, science-oriented culture of modernism did fully emerge—albeit with precious local variations—by the early twentieth century. Modernism's impact over the last 200 years on the world's traditional ethical systems has everywhere been profound, sometimes traumatic. All cultures have reassessed their ethical legacy in depth, to take their moral bearings anew and adjust to today's world.

Instead of serene immobility, modernism stresses creative tension, the capacity to adapt to constant technological shifts while absorbing endless quantities of fresh scientific data, all in a spirit of ceaseless impetus, drive, and speed. Today's modernist mood fundamentally sets value upon a state of permanent imbalance, only corrected, as it were, by self-adjusting momentum: as when one walks, runs, or cycles. "Development" is today regarded as almost synonymous with "progress," considered a virtue in itself and something desirable. "Progress" is itself basically an ethical notion: a moral abstraction, predicated on the broader idea of the need to strive, so as to ensure humanity's greater well-being through a search for—or at least welcome reception to—constant intellectual and material change.

Whatever its impartial claims, European-dominated nineteenth-century scientific speculation, and pioneering technology, retained the concept of "progress" as its ethical guideline. Material, social, political, and moral improvements were assumed by the age's best minds to proceed together, as complementary lines of development that would somehow combine and reinforce one another, almost as a matter of natural course, to the ultimate betterment of humanity's common lot. Even the period's self-satisfied colonial empires regarded themselves as ethically enlightened and fundamentally beneficial, in both material and moral terms, to those they ruled: as vectors of "progress."

1.2. The Twentieth Century Jolt

The twentieth century ushered in more sobering reflections. The colonial empires disintegrated and by the end of the century no particular civilization was any longer regarded as enjoying an inherent cultural monopoly on scientific and technical prowess.

Technical breakthroughs continued at increasing pace, radically transforming all aspects of practical life from hygiene to communications, to the point that each successive twentieth-century generation came to perceive itself as engulfed in unprecedented, indeed revolutionary, change. Science's hugely increased role in society's life in turn spurred still more scientific endeavor, with success breeding further success. The century saw exponential growth in the number of scientists and technicians, of scientific publications and scientific meetings. Scientific methodology and tools rapidly evolved. Meanwhile the rift between pure and applied science narrowed, and in many areas the distinction became difficult to discern. At this turn of the century, today's pure research may find technical application tomorrow, and become part of civil society's daily life within two years, or even less. Scientists can no longer claim that their work will have no immediate effects on the welfare of the individual, or on the policies of the state.
Twentieth-century change also showed at far deeper conceptual levels. While exploration of the farthest recesses of the human psyche proceeded apace, basic cosmological assumptions were jolted by tremendous advances in physics particularly in the first half of the century, and in biology, during the second. Evolutionism's dogmas were questioned, and while Max Planck's early twentieth-century work still deeply affects modern mathematics, the hypotheses of quantum mechanics were tested by the end of the century in relation to a possible veiled reality.

Science's own self-image was transformed. Its twentieth-century practitioners showed far less moral self-assurance than their nineteenth-century or earlier predecessors. Scientists no longer pretended to hold all the answers to the world's mysteries, and no single scholar could still claim to master every aspect of his or her own particular field, as twentieth-century research accumulated and multiplied through ever more complex ramifications. French biochemist and 1965 Nobel prizewinner François Jacob pointedly wrote in this regard, that the time when circumscribed issues were substituted for general ones is when modern science began.

1.3. Science at the Moral Crossroads

One of the most wrenching upheavals in twentieth-century science was moral. Humanity's demonstrated capacity to put its new tools to the most evil use—to dominate or kill—took on appalling proportions by the first half of the century, shattering complacent assumptions that scientific, technical, and ethical "progress" went naturally hand in hand. The twentieth century's searing experiences have taught us the very worst that human beings are capable of inflicting upon one another, regardless of technical sophistication, when all ethical standards lapse.

Since the mid-twentieth century, humans have faced an awesome realization. We have multiplied technical means not only to cure more hitherto fatal illnesses (though tragically not yet all), convey ourselves farther in space, or speed our mail, but also to destroy ourselves and the planet we occupy. We live from now on in moral awareness of our own power permanently to soil, or altogether to annihilate, our environment—and to abolish not only our own species, but every other living species as well.

No previous group of human beings in history has ever wielded such power. No traditional human civilization has ever thought it necessary to focus its main attention in

the way that we must now, on issues of science and applied technology. Nor were the ethical leaders of past centuries, guardians of the world's great spiritual traditions, called upon to face quite the same the stark moral choices that we must urgently make today: to deal, that is, with natural surroundings no longer stable but in constant flux. Hence the crucial issue before us today: to define the ethics of science and technology as the necessary moral guidelines of our age.

1.4. The Threat to our Planet

At the time of writing, fear of nuclear self-destruction has receded through what we hope will prove a durable thaw in international relations. But this menace which darkened four previous decades has now given way to other perceived, and hardly less deadly, threats, at least over the long term: such as rapid depletion of irreplaceable natural resources; extinction of whole animal species; irreversible pollution and degradation of the oceans, rivers, and inland seas, of the plant cover, and of our common biosphere; and finally, global warming as a consequence of our thoughtless emission into the atmosphere of the fossil fuels that we burn daily. Desiccation of whole swathes of the planet's surface, a dangerous rise in sea levels, and a permanent shred in our protective ozone layer, were some of the ominous warnings seriously repeated by many sober, scientifically fully qualified observers of human industry's impact on nature as the twentieth century ended.

We know that our globe makes up a natural unit whose precious biodiversity ignores political frontiers. But will leading industrial nations show the necessary self-restraint and mature responsibility to reduce looming perils to our environment over the coming decades? Transcending immediate economic interests, ecology is really a *moral* option, one of *ethically* deciding what we wish to do to our earthly home, over the long run, with our knowledge and tools. Hopes raised by the UN-hosted Summit in Rio de Janeiro in 1992, then by the Kyoto Summit in 1997, were temporarily dashed when the Hague Summit in 2000 failed to yield a consensus of views among the great economic powers. But other meetings will, of course, follow. The search for a comprehensive solution to environmental threats will be pursued, because it must. A growing number of citizens and leaders are realizing that the ethics of science is not only a moral imperative, but also one that addresses human survival. The issue of global warming is truly becoming a question, not only of extra-human cosmic accident, but, to repeat, of human choice: hence of ethics.

1.5. Tinkering with the Alphabet-Blocks of Life

Eugenics is another case in point. Breakthroughs triggered by rapidly developing disciplines like computer science, embryology, medically-aided procreation techniques, neuroscience, or robotics are opening up an entire new era of surgery. Healthier babies are delivered every day thanks to our astounding new tinkering with the fundamentals of human biology. We are now in a position to read the basic "alphabet-blocks" of life itself, as many scientists like to phrase it. The imminent completion of human genome mapping makes hitherto undreamt-of therapies and preventions possible.

But is everything technically possible also morally admissible? When recent experiments in cloning raised possibilities of application to humans, shock waves jolted the media and rocked public opinion. Governments have generally agreed not to authorize reproductive cloning for humans. But what about cloning for therapeutic purposes? And will future medical or, indeed, political authorities always resist temptation to manipulate genetics in order to produce the "perfect child"? Tomorrow is the proverbial looking-glass, through which we only see darkly; will the ruling powers of an age to come, for benevolent or malevolent reasons, wish to twist the chemical make-up of human beings into serving their own purposes? The Asilomar meeting in 1975 was a milestone in the bioethics movement. For the first time, scientists publicly stated their awareness of the new powers and consequences of science, particularly in the area of genetics, in view of enhancing potential benefits for the human race, but controlling potential hazards.

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Biographical Sketch

Koichiro Matsuura of Japan was appointed on 12 November 1999 to serve as Director-General of UNESCO. Mr Matsuura, born in Tokyo in 1937, has served as Japan's Ambassador to France since 1994. He was educated at the Law Faculty of the University of Tokyo and at the Faculty of Economics of Haverford College (Pennsylvania, USA) and began his diplomatic career in 1959. Posts held by Mr. Matsuura include those of Director-General of the Economic Co-operation Bureau of Japan's Ministry of Foreign Affairs (1988); Director-General of the North American Affairs Bureau, Ministry of Foreign Affairs (1990); and Deputy Minister for Foreign Affairs. He also served as the Chairperson of UNESCO's World Heritage Committee for the year ending November 1999.