Paths to the post-human: A very short guide for the perplexed

Hermínio Martins*

It were no slight attainment could we merely fulfil what the nature of man implies
Epictetus

Resumo

Caminhos para o pós-humano: um pequeno guia para os perplexos

Vários projectos e visões actuais acerca do futuro da humanidade e do ser humano, que supostamente se fundam nas fronteiras dos avanços científicos e tecnológicos contemporâneos, prevêem uma substancial melhoria, transformação ou ultrapassagem da actual condição da espécie humana, do seu genoma e do seu cognoma, da sua riqueza genética e capacidades cognitivas, uma grande mudança que é vista como possível e necessária, a ter lugar num espaço de poucas décadas.

Estas visões do futuro, analisadas de forma crítica e sistematizada neste texto, são mantidas por alguns dos investigadores e comentadores da possibilidade de uma transformação humana substancial e provêm de diferentes campos de saber em expansão. Estão todos envolvidos na tarefa de "inventar o futuro" (tal como é tão frequentemente, e de forma conveniente, referido por esses praticantes e comentadores), inventando o nosso próprio futuro, reinventando as gerações futuras, a natureza humana, o ser humano, a pessoa.

1. Paths to the post-human

Many current projects and visions about the future of humanity and the human being, allegedly well-grounded on current frontiers of scientific and technological advance, envisage the substantial amelioration, transformation or surpassing of the present condition of the human species, of its genome and cognome, of its gene-richness and cognitive competences, in pretty fundamental ways, as both possible and necessary within a time-horizon of a few decades from now.

The visions I have in mind in this text are the ones entertained by some workers in or commentators on the possibilities of substantial human transformation arising out of such booming fields as genetic/genomic engineering, the still incipient field of

* Emeritus Fellow, St Antony's College, Universidade de Oxford.

synthetic biology (or radical genetic engineering), "reprogenetics" (the combination of genetic engineering with the new reproductive technologies, including reproductive cloning), the "strong" research programmes of Artificial Life (computer simulations of organisms) and Artificial Intelligence (or machine intelligence, though biological computers give a new twist to the hardware/software contrast), the cognitivist research programme in brain-computer matching (and as the mind *is* the brain on the current orthodoxy, this is really the brain-mind-computer matching programme), as well as in immersion technologies like Augmented Reality, Virtual Reality and software simulation, especially in its more *outré* manifestos, robotics (whether in its standard or in its evolutionary versions), neuroscience and incipient neurotechnology, nanotech or atomtech. Sometimes they draw also on the more dubious scientific or para-scientific research programme of memetics (though memetic engineering need not be precluded thereby: false doctrines can inspire successful practices, as false premises can lead to true conclusions). They are all in the business of "inventing the future" (as is so often, and aptly, put, by the practitioners and the commentators)[1], inventing our own future, reinventing future generations, human nature, the human being, personhood.

Many indeed, enthusiastically advocated in connexion with scientific-technological advances and projected breakthroughs in the areas mentioned, paradoxically proclaimed as irresistible, as irresistible as overwhelming "forces of nature" like huge earthquakes, volcanic eruptions and tsunamis (as the former director of one of the powerhouses of IT advances and the digitalisation of the world, the MIT Media Lab, Nicholas Negroponte, put it, echoed by none other than President Clinton), as if technology were brute Nature in its most destructive mode (or, more charitably as a *natura naturans*), extra-human exogenous forces constraining us, rather than anthropogenic... With such proclamations of inevitability and irresistibility that, to attach even a modicum of credence to such claims, it is difficult not to entertain the hypothesis that, given the current commitments to technoscientific endeavours in these and related fields like nanoscience or nanotech/atomtech, the generic biopsychological condition of the *homo sapiens sapiens*, the current biological unity, unicity and identity of humankind, *de facto* and *de jure*, may not be sustainable for much longer, even if we think in the relatively short run, in terms of decades rather than centuries. For such extraordinary ontological shifts, even centuries would have represented amazing time-compression, or, to put it another way, acceleration and the acceleration of acceleration, of techno-economic changes, local or global, compared with the time-scale of biological evolution, with speciation requiring a time-scale of the order of magnitude of millions of years or more[2], though the ensemble of human-induced, specifically biomedical technology-induced phenomena of "hyper-mutations" bringing about the

[1] See for instance the papers by computer scientists like Danny Hills in *The third culture*. The phrase first appeared in print as the title of a book of speculation by the Nobel Prize scientist Dennis Gabor.

[2] Even on the Gould-Eldredge doctrine of "punctuated equilibrium" in macro-evolution, species creation or species selection after planetary catastrophes -the great accelerators of biological evolution, on their view- it would still take millions of years, at least on some understandings of the concept of biospecies.

rapid emergence of super-weeds and super-bugs, antibiotic multi-resistant viruses and bacteria, have been characterized by some biologists as an "evolution explosion", anthropogenic, but unintended and unwanted, quite apart from the continuous selective pressures exerted by human beings, the imperial species, on other species, most effectively through the ongoing Sixth Extinction in the history of life on Earth, to a considerable extent anthropogenic (independently of any considerations as to whether, or how far, global climate change is in fact anthropogenic)[3]. Or indeed compared with cultural change in previous epochs for a considerable number of time-series demonstrate a variety of exponentials even at a planetary level, in terms of population and in a variety of indicators with doubling ratios of a year or two in Moore's Law of the doubling of computer power every 18 months, and its putative counterparts in a variety of fields. So much so that it can be argued that we may sum up recent and ongoing trends in technological change not just in terms of a law or laws of increasing returns (to which economists have been paying more attention than ever), but even in terms of a Law of Accelerating Returns (Kurzweil 2001), or, in other words, the acceleration of acceleration of technological or techno-economic change, including the potentialities of nano-, bio- or cogno-technologies, severally and collectively.

Certainly, it is at least under threat, if not altogether doomed as so often proclaimed, if there is even a slight modicum of truth in the claims of *post-, ultra-, meta- or trans*-humanists, a small but most vocal, prolific and publicized cohort now spreading throughout the world, well beyond the confines of Silicon Valley and California itself, which now includes mainstream economists consulted by the Pentagon and analytical philosophers directing institutes at Oxford University. Indeed, a report published under the august joint imprint of the National Science Foundation (a prestigious organization of scientists) and the Department of Commerce of the USA a few years ago bore more than a few touches of transhumanist concerns, as was widely noted at the time of its publication[4].

To be sure, the idea of non-terrestrial, independent "alternate humanities" has been with us more or less continuously at least since the Copernican revolution or rather the Giordano Bruno reading thereof launched the career of the vision of the "plurality of worlds" in modern times (in fact, as it is often overlooked, in classical antiquity such speculations were not that uncommon, despite the conventional wisdom regarding the deep aversion to thinking about infinity amongst the Greeks, with a

[3] At the same time, one often finds claims that natural biological evolution has practically stopped, or is so slow, that humans have to assume the grand task of deliberately speeding it up and shaping it in conformity with some predefined aims (an odd practical syllogism). Four observations are in order: (i) biological evolution is most unlikely to stop, on Darwinian grounds, (ii) the "evolution explosion" referred to is and will go on taking place, accompanying the biomedicalisation of the world, and the widespread use of antibiotics, (iii) the extinction of species, habitats and ecosystems proceeding apace, directly or indirectly, through multifarious human actions, which may amount to a Great Extinction on a scale only matched five times previously in the history of life on Earth, although the very first one to be induced to any substantial degree by living things, let alone by the actions and general conduct of a single species, not to mention (iv) the transfer of exotic species through deliberate human agency or inadvertently, taking place on a greater scale than ever before in the last few decades, with their destructive impact on native and especially endemic species.

[4] One of the two editors of the report, W. S. Bainbridge, is clearly identified with the transhumanist movement.

bearing even on the course of Greek mathematics)[5], and is explored today in such serious-amusing fields as "space anthropology" (a field of inquiry which used to have its own journal), currently devoid of known objects, and even "exo-biology" or "xeno-biology"[6]. These fields also lack proven entities of study, despite all the efforts of SETI (Search for Extra-terrestrial Intelligence), a project cancelled by the U.S. House of Representatives in 1993[7], or SETL (Search for Extra-terrestrial Life), though the concerns that inspired such grandiose projects continue, both in the efforts at detection of pertinent signals from deep space and much more in the sphere of argumentation and speculation by scientists or scientifically trained journalists and other inquirers, though amateurs have been enlisted in some numbers if only for the aggregation of computing power, on the "grid" principle, tapping the ideal computing power of thousands of computers to secure the equivalent of the capabilities of supercomputers, a boon to academic scientists, and finance has been forthcoming from billionaires. By analogy, the study of as yet non-identified, but nomologically possible entities (i.e. whose existence would be compatible with the laws of nature, or the laws of physics), which might even be said to some extent to be already on the pipe-line along various causal trajectories, engaging the strenuous activities of the leading technoscientific "inventors of the future", inventors of the beyond-the-human future, varieties of the post-human, could be called "ultra-anthropology", and seems far more likely to encounter at least prototypes or plausible prefigurations of its objects within the foreseeable future or as one might say, the more likely future being invented, or to be invented (though some might claim that the number of would-be empirical scientific fields without referents, whose putative empirical objects may be in fact null classes, is increasing...). It indeed some already claim "existence proofs", and not merely "*possibility* proofs", for some genera within this spacious realm of extra-ordinary entities, such as the claim "I am a

[5] This is a conventional view, though Spengler perhaps made the most of it in his historiosophic scheme in which Occidental or Faustian culture is marked by its obsession with and quest for infinity (under which one could subsume the Hegelian quest for self-infinitization which the young Marx shared). Numerous texts collated by Rudolfo Mondolfo provide evidence that speculations about other worlds, infinitely many worlds in space and time, were not that uncommon in the classical world, often connected with atomism (Mondolfo 1968). Still, broadly speaking, the Spenglerian characterization holds.

[6] There are no perfect synonyms and preference for one or the other term can be well-grounded.

[7] At the same time, it must be said, as it cancelled the Superconducting Supercollider, the biggest project ever conceived by Big Science in the history of the world, on the construction of which in a Texas site 2 billion dollars had already been spent. It has been argued that this last project (and perhaps the SETI one also) was cancelled largely because the end of the Cold War removed the necessity for America to constantly prove itself Number One in highly capital-intensive Big Science or even Megascience, as such projects are now being called (especially the ones since the 1970s), and Big Tech, or what one might call Conspicuous Science, in the spectacular way of the Apollo Projects, culminating in the perhaps once-and-for-all landing of humans on the Moon in the Apollo 11 voyage in 1969 (at any rate it has not been repeated, and there are no immediate prospects for doing so), and the gigantism of this venture in the pursuit of fundamental physics research (Michael Polanyi an acute commentator on the Soviet economy characterized it as one in which "conspicuous production" played an important role). We can now see what followed was a turn into deliberately changing the fundamentals of terrestrial life via agribusiness, genetic/genomic engineering, the molecularization, technologization, informatization, digitalization and marketisation of genetics and eventually the brain/mind (the orthodoxy posits their identity, whether token identity in its weak form or type identity in its strong form) into superior versions, followed this shift away from cosmic knowledge pursuits. The Bayh-Dole Act came just in time to play a midwife role in this transition from the First Space Age to the Century of Biotech, from "Cosmocracy" to Biocracy.

cyborg" in the title of a recent book by a scientist (Kevin Warwick), which may well be followed in due course by others of the same transgressive-prescriptive-propagandistic genre, such as "I am a chimera", "I am a robot", "I am an android", "I am a bionic human", "I am a cybrid", " I am a __bot", for example, even "I am a conscious computer", or "I am a machine that has become alive", as following from the "strong" Artificial Life programme, also called "neobiology" by some scientists, though perhaps no one will wish to claim "I am a disembodied mind/spirit/soul", or "I am an ensouled bodiless being", as that perhaps would sound rather archaic (or not Politically Correct). To be sure, often it is not clear whether claims of this kind are being advanced with the utmost seriousness, but the point is serious enough: the advancement of the cause of rapid directed species change, of radical human-directed or at least human-initiated evolution of organisms and robots ("evolutionary robotics"), through whatever technological frontier looks most promising, through genetic/genomic engineering, synthetic biology (and the possibilities of "reverse engineering" of viruses for example), neuroscience, robotics, nanotech and so on: humans being now prime targets for technological interventions by human beings, not just of remediation or even amelioration, but of radical change, at least potentially and cumulatively. Today, all these fields are increasingly cross-implicated, pervaded and accelerated by information and communication technology, even more than other cognitive pursuits, the convergence and synergy of current technologies, especially in the NBIC (Nano, Bio, Info, Cognitive) complex, and their overlaps and interfaces ("bionano", neuroinformatics, bioinformatics, neuroelectronics, the production of neuroceuticals and nutriceuticals, nanorobots, the merger of genetic codes and computer codes, etc.) being one of the master themes of our time. Whilst the *disunity* of the sciences as perhaps an irremediable condition has been a favourite topic of late amongst philosophers of science (Dupré, Galison), against what was for a long time the standing presumption of the unity of science, i.e. the unification of scientific knowledge, perhaps in terms of a single fundamental master-theory as in the currently aimed at TOE (Theory of Everything), as at least a regulative ideal, the students of technology rejoice in the current processes of the unification of *technologies*, one of the senses in which a pan-technological world is emerging, largely indebted to ICT or ICTs, and to informationalist perspectives in every field of scientific-technical endeavour (digital physics, digital biology, digital archaeology, etc.), and beyond (digital philosophy, computational philosophy of science) though critical philosophers of technology have long proclaimed and feared that Some argue that the unification of the sciences today can only take place through the convergence of technologies, one of the most fateful mega-trends of our epoch, specifically nano-, bio, cogno-, info-technologies: where once it had been argued that the continuity of science over time is secured to an important extent by technology, now it is argued that its unification will be brought about not by axiomatic construction of theories of the widest scope and greatest ontological depth, but by the unprecedented technological convergence taking place in our time (Bainbridge 2007). Technology is most appropriately a singular noun, that technology, or at least *la technique,* is inherently totalistic, "cybernetic totalism", as diagnosed by a computer scientist, being therefore an instance of a general pattern. All these fields are importantly ICT-dependent and

increasingly IT-intensive, ICT (information and communication technology) being to some extent today's "defining technology" (Boulter 1984), or "general purpose technology", as economists put it (to refer to the most pervasive and innovation-spawning of the technologies of a given period, affecting critically all sectors of the economy, as the steam engine and electricity were in their time), or "meta-technology", a technology that potentiates, regulates, monitors and integrates all technologies, whether of the palaetechnic, the neotechnic or of today. Note that "the control revolution" as the sociologist James Beniger called it (1986), since the information-processing devices of the late 19th and in the period 1880-1930, before cybernetics proper, could be seen in this light. Insofar as the convergence and synergizing of technologies advances, as well as the globalization thereof, we may well speak of a Syntech era.

The tragic history of "pseudo-speciations" and compulsory ideologically or politically driven imposed racialization in the twentieth century, the Holocaust, genocides, ethnocides and democides, reinforced the conviction that the unity of humankind, both factual and normative, natural and even transcultural, should be treated as a fundamental *credendum*. The biological unity of (terrestrial) humankind, has been the ground of panmixia and in part of ecumenization, but in any case the postulate of the unity of humankind in general (Ginsberg 1934), became central to liberal civilization and to the pursuit of the social sciences since the 18th c. If it were to be breached, for the first time, effectively, in the history of the species, sharp, irreversible psychological and cultural gulfs amongst sections of the new humanity would open up. Thereby, the radical conceptual or semantic incommensurability theses, strong incommensurability, incommensurability without comparability, radical meaning variance, or, at best, weak incommensurability, conceptual or semantic, allowing for comparability, across cultures and paradigms, which flourished among constructivists in the sociology of scientific (and a fortiori all other kinds of) knowledge, and amongst post-modernists, would be realized. The issue of the breakdown of this epistemological unity of humankind is not, curiously, much addressed in a world where the profession of respect for "universal human rights" has become so pervasive, and the condemnation of racism and racial discrimination universal (even if the discussion of the "natural" underpinnings of the human "race" category and achievement differentials never goes away for long, and it is quite open and unashamed amongst self-proclaimed "neo-eugenicists", and of the emergence of distinct human species as a successor to ours, contemplated with equanimity by some liberal eugenicists, or the defenders of market micro-eugenics). Indeed, the issues raised by the projects and visions under discussion drastically impact on the question of the unity of humankind *tout court,* without qualification, not just the biological unity, because they would at least in the foreseeable future divide humankind substantially into the *improved* (genetically, euphenically, prosthetically, orthotetically, bionically, cyborgically, fyborgically[8], as with the provision of new electronic senses, or super-senses, e.g. of vision microscopic and telescopic, and super-limbs, exo-limbs with superior motorial capabilities[9], neurologi-

[8] A term suggested by Gregory Stock.

[9] In which the Pentagon has shown interest.

cally) and the *unimproved* or less improved sections in accordance with the fault lines of wealth/knowledge-capital, power and technological capabilities at the time of the shifts into designed humans.

These projects and visions of higher states of being beyond the current version of the human shared by all of us at present with a very few dubious exceptions (the roughly 100,000 years-old sapient version[10], the only version alive at the moment as yet) or simply the *humanum*, overlap in so many ways that it is difficult to discriminate sharply amongst typical system-transformative trajectories and the overall end-states of such processes. What appears to matter above all for those who espouse these visions or share the matching expectations, if not directly engaged in inventing these futures, is not so much one or another version of the post-human as such as much as success in at least one of the versions of the post-human, the sharp break with the "actually existing" *homo sapiens sapiens* in one frontier or another, in one "liminality" or another of the *humanum*. Though opposed of course within this universe by the computer scientists who are also critics of the "cybernetic totalists", particularly the computer scientists Jaron Lanier[11] and Bill Joy (whose warnings received much publicity as well as much adverse comment from fellow computationalists and digerati), despite many shared assumptions and concerns about the ongoing computational research programmes, a simplified delineation of these beyond-the-current-human visions amongst "digerati", or members of the "artificial intelligentsia", especially in the computational and information sciences, and their fellow-travellers in a variety of social movements or elite *groupuscules* in a number of Western countries, would include at least the following three, often conjoined quite happily in the minds of the visionaries.

Supporters of these visions go by many self-assigned labels, and over the last five or six years a number of left-wing young adherents, beyond the core of the exponents in the computation and information sciences, such as Minsky, Hans Moravec, Ray Kurzweil, have tried to provide a left-wing, politically radical or environmentalist/Green slant to them (the Californian counter-culture of the late 1960s and early 70s has left a lasting imprint among many of the digerati, and partly accounts for the appeal of "open source" and "creative commons" movements), hence the predicates of "left" or "radical" in a number of the labels. The movement's self-assigned names include: transhumanists (the name of the most comprehensive association in being

[10] The epoch of "anatomically modern humans", the figure in the text being perhaps the most often presented: recently, significantly higher estimates for the duration of this epoch have been claimed, though the matter has not been settled according to a new scientific consensus amongst palaeoanthropologists, and for convenience we have adopted the figure in the text without commitment to its final truth.

[11] J. Lanier, cybernetic inventor, computer scientist and musician, coined this useful expression. Note that he had previously put into circulation the expression "virtual reality" in the context of electronic digital simulations, a locution which, he has adverted, he borrowed from the writings of the aesthetician and philosopher of mind Susanne Langer, wherein the terms "virtual reality", "virtual space" and "virtual time" occur in the analysis of the epistemological status of our aesthetic experience of artworks in general, but especially perhaps of paintings (Langer 1953). As is well known, "virtual velocities" was an expression in mechanics at least from the 18th c. (it got a mention in *Das Kapital*) and virtual rays in optics, whilst the Latin term "virtualis" also appeared in scholastic philosophy.

today), Extropians, Singularitarians, bioutopians or biopunks, Viridians, socialist-feminist cyborgs, left Extropians, radical futurists, cyborg democracy, non-anthropocentric personhood theory exponents, transgenderists or postgenderists, techno-progressives, democratic transhumanists, libertarian transhumanists, nanosocialists, vegan transhumanist socialists, cryonics devotees, digital or biological immortalists, radical life extensionists, radical body modifiers, "morphological freedom" advocates, technoGaians, etc. Supporters of these movements also lavish choice epithets on those who reject their visions: bioconservatives, technoconservatives, speciesists, meat(ware) chauvinists[12], substrate chauvinists, bioluddites, neo-Luddites, enemies of reason, enemies of science, technophobes, anthropocentrists, humanists (a pejorative term in these circles, as with Althusserians, Heidegerians, some environmentalists), or rather "humanists" without a prefix, body fundamentalists, etc. , though some computer scientists proudly claim to be "cyber-Luddites" themselves. Of course, they might also call them "tree-huggers", "nature-freaks", "nature-mystics" or "biophiliacs", because of their care for or love of organic life as an undesigned creation, undesigned by humans at any rate, though as the term "biophilia" was coined by an eminent biologist (or "naturalist", as he calls himself), E. O. Wilson, to designate a deep-rooted human attitude that needs reasserting in the Age of Sixth Extinction, largely anthropogenic, as he claims, there will be some reluctance among the bioprogressives to evoke it in a purely negative way. In current American usage there is a tendency to single out "technoprogressivism" and "bioconservatism" as the polar opposites in this field of controversy, though the choice of terms for two global stances can be all too easily reified (and the latter term was not chosen by the upholders of the positions so characterized, which already puts them on the defensive). Or confused with, or deemed to be neatly coextensive with, some other kind of cleavage in basic attitudes between (organized) religion and secularism, or between left and right, liberal and conservative, blue and red in political/ worldview terms.

Our list of these visions, which are often jointly entertained by the same persons as if basically consonant, though they may be underlying tensions in some cases, between the individualistic and holistic strains, the "libertarian" in the American sense, or anarcho-capitalists and the green, "deep green" (Sylvan & Bennett 1994) or "deep ecology" currents, for example, is as follows:

(1) the neo-human
(2) the meta-human
(3) the trans-human

[12] All this is not spelt out, but I suppose they also mean to disparage those addicted to what is now called "treeware", i.e. paper (or indeed papyrus), print, books, libraries, newspapers and magazines in print form, print culture in general, insofar as it depends on organic matter (the end of "print-capitalism", in the famous phrase of B. Anderson, characteristic of the age of nation-states, the emergence of e-capitalism and global civilization). Though *plastic* trees would be more acceptable, no doubt, not partaking of organic life, but at present they do not lend themselves to the production of paper.

1.1. (1) The neo-human

This path would comprise essentially all the biological mechanisms, euphenics and eugenics (positive eugenics, though negative eugenics is not in fact excluded), for the substantial amelioration of the biological basis of human life, especially via genetic engineering whether somatic or germline (in addition to the ongoing Longevity Revolutions[13], the scientifically grounded immortalist projects[14], though, as Auguste Comte argued in one of his sociological theses that has come to acquire an unexpected relevance and topicality, a substantial alteration in the duration of human generations, from whatever causes, would transform the conditions of existence of human society[15]) and more particularly the eventual transformation or "bifurcation" of the species into two successor species, of *trans-speciation*. The eugenics in question is no longer state-driven, but market-driven, no longer principally concerned with mating or breeding rules and incentives or disincentives to procreation, like classical eugen-

[13] The (First) Longevity Revolution, starting slowly in the West in the eighteenth century and accelerating in recent decades, was initially due essentially to better nutrition (most clearly shown in the rising average height of Western populations generation after generation) and urban public controls of sanitation, the completion of the "demographic transition" or the shift to the "modern", post-Post-Malthusian population regime with historically unprecedented low birth rates and historically unmatched low death rates (this is of course an ideal type, though Southern European countries in the last two decades have come to practically embody it), with medical interventions playing an increasing part in the twentieth century ad even more so in the twenty-first so far. One might characterize the process as a whole as one of the increase of "physiological capital" (Robert Fogel), good health, increased ability to work over a longer chunk of the total lifetime, rising life-expectancies with still a substantial period in which the quality of life may be high ("seventy is the new fifty"), which a number of economists and economic historians have argued should be taken into account in national income accounts (or, in other words, we are richer in Western countries than the official GDP per capita statistics tell us, by a few percentage points in the UK according to some estimates) though decrease in such physiological capital have taken place in the last few decades in the USSR and its successor states as well in Eastern Europe, particularly with decreasing life expectancy for males over the last quarter century or so in Russia, and other negative health statistics, and thus the course of "techno-physio evolution" (Fogel again), or the accumulation of "physiological capital", need not be smooth and monotonic, and indeed can even be reversed. The coming of at least the currently hypothesized Second Longevity Revolution, with the eventual flourishing of innumerable supercentenarians, would be due to modern biotechnology, genetic engineering and regenerative medicine, as well as to more stringent environmental controls (this facet is, curiously, somewhat neglected among contemporary super-longevity or "radical life extension" theorists).

[14] Recently, in a leading scholarly left-wing journal someone concluded in a melancholy fashion that in the contemporary world of accelerating technoscience it will be easier to overcome death than capitalism. A recent inquiry by a biologist surveyed feasible paths to immortality, compatible with the findings of evolutionary and developmental biology, which could lead to the creation of a "*homo sapiens* forma *immortalis*", as he calls it, combining cloning and stem-cell therapy (Shostak 2002). A more doubtful enterprise perhaps, though as far as I know no biologist as yet has made criticisms of it in public, nor damned it with faint praise, is that of the computer scientist Aubrey de Grey, with his engineering approach to the treatment of senescence (SENS), discussed by a professor of clinical surgery at Yale (Nuland 2005). Eschatological, nonorganic, software immortality rather than "fleshware", embodied, immortality on the basis of speculation about the logical and physical possibilities of infinite computation has been advanced by the mathematical physicist Frank Tipler in his grandiose scheme of cyber-theology, in which the questions of God, the immortality of human persons and the salvation thereof, are reappraised in terms of a computational/informational metaphysic, though supposedly grounded in a reasonably plausible account of contemporary physics and extrapolations from computer science (Tipler 1994). A most ambitious work, though few will be able to follow the substantial mathematical appendices.

[15] A point which has hardly been taken on board by contemporary social theory, as distinct from concerns about the implications of ageing populations by demographers, though gender has been taken very seriously indeed, empirically and conceptually, though perhaps not nearly enough for some (not for transgenderists, for example). Of course, if there is no such thing as "society" anyway, there is less need to concern ourselves in a theoretical fashion with such transformations, unless of course we persist in entertaining such fictions.

ics, but with the choices made by parents in the coming "genetic supermarket" (an expression coined in a treatise of political philosophy by the American Robert Nozick in 1974, enthusiastically followed recently by a British philosopher – Gavaghan 2007) or global genetic hypermarket, not just of mates with the most suitable genetic endowments on earth (biotechnology in general, and the quest for human genes in particular, have gone global, as the Human Genetic Diversity project exemplifies), if need be from sperm banks (whose supply has become increasingly international, if very uneven in terms of the nations of origin), or egg banks (which have been spreading rapidly in the last decade, to meet the increasing demand for high-quality oocytes), but of new synthetic genes, or "super-alleles", and the appropriate techniques for germinal genetic and genomic engineering, for the improvement and indeed practically the "invention" of their progeny, according to their own criteria, generation after generation, though as generations are getting longer and longer, there may be problems arising out of the coexistence of so unevenly genetically-euphenically-neurologically improved generations. However, the prospects of genetic self-improvement in one's own life, of rectifying and improving one's genetic identity, also beckon, not to mention the prospects of indefinite tissue renewal via "regenerative medicine"[16]. Some scientists envisage the outcome of this process of market-driven genocentric "liberal eugenics" (much commended by some analytical philosophers like Nicholas Agar [2004][17]), or the Republic

[16] Ectogenesis, with the entire human reproductive process being carried out outside human bodies, or indeed any natural organisms, from conception to birth, envisaged mistakenly by the biologist J.B.S. Haldane in the early 1920s as a technology for the fairly near future (unless he was writing tongue in cheek), and was subsequently introduced as a major feature in Huxley's 1932 dystopia, has only become a serious prospect with the recent advances towards a viable "artificial womb" which may be operational within the next twenty or thirty years or perhaps earlier (Atlan 2005), though premature babies have become viable at increasingly early stages so that ectogenesis in the strict sense could be seen as the end-point of the biomedical advances along these lines. It was once proclaimed by some feminists as a key technological means for the emancipation of women, specifically from the critical burden of reproductive labour with all its social, cultural and psychological implications, though not everyone would have subscribed the Marxist-sounding formula of female emancipation from reproductive labour, female emancipation from the realm of biological necessity ("women in labour keep Capital in power": a slogan I once saw painted on the walls of Nuffield College Oxford) but more recently it has been perceived as ambiguous from a critical feminist viewpoint (the slogan cited was, to be sure, a pun which could be read also and perhaps primarily as: "women in Labour [i.e. women in, supporting or voting for the British Labour Party] keep Capital in power"). Unlike men, they would thereby transcend the realm of necessity at least partially, still within capitalism. Note that some authors treat ectogenesis as a continuum, with ever greater stretches of time for the gestation process taking place outside natural wombs, rather than the strict sense of the entire process, starting with extra-corporeal conception till birth, taking place outside human or nonhuman organic bodies.

[17] By "liberal" he means not authoritarian, fascist, communist or otherwise State-driven (he is less concerned with the dangers of the conditions of anarchy, failed states, civil war). It is refreshing that he did not call it "democratic" and indeed democratic social choice mechanisms (elections, referenda, consultations, "science courts", etc.) are not supposed to enter into the process of the evaluation or implementation of the new eugenics (no longer disguised as something else, being essentially relegitimated). The term "liberal" suggests the vindication of permissiveness as against the taboos of evaporating traditional morality, residual religious objections to NRTs and the like, and vague aversive feelings (the "yuk" factor), but some presumably "liberal" bioethicists like John Harris (2005) have been arguing not only for the licitness, but also, more strongly, for the morally binding, the *mandatory* character of practices like human therapeutic cloning, regardless of the existence or possible discovery of alternative sources of stem cells for the invoked therapeutic purposes (as yet incipient), and, by parity of reasoning, other such human biotech techniques. Harris just stops short of claiming that human reproductive cloning is also *mandatory*, but argues that it is at least perfectly sound on moral grounds, any objections being solely the result of moral confusion, prejudice or irrationality: I am not sure whether he will not be arguing that it should

of Genetic Choice as an extension of the already existing Republic of Choice, with the "reproductive autonomy" enshrined therein, and perhaps "morphological freedom" (the freedom to choose one's bodily appearance in every respect, zoomorphically for example), in which each person or couple chooses the genetic profile of their progeny so that procreation is replaced by design or invention of future beings (Martins 2007), as the break-up of the biological unity of humankind, going even further than classical eugenics (e.g. "aristogenesis", the "beyondism" of the psychometrician and personality theorist Raymond B. Cattell), though not concurring with the socialist eugenic visions of the overall genetic improvement of humankind as a whole, with the division of the human species into at least two successor species, a genetically improved or gene-rich and a gene-poor species (as advocated by at least one geneticist, with surprisingly little adverse comment: Silver 2002), in which the superior species becomes vastly more intelligent than the unimproved species, others a succession of neo-human species on earth, palingeneses without end for the foreseeable future (as the irreverent theoretical astronomer and cosmologist Fred Hoyle suggested in one of his essays on the long-term human future)[18]. It is a vision which comes close to that of the bioethicist J. Fletcher (1988)[19], in which he pointed out, several decades ago, the obvious but usually ignored circumstance that the much-vaunted enhancement technologies of all kinds could, in principle, be used in the opposite way, to diminish and downgrade human capacities, bred to serve, and thus produce "para-humans", who could fill the place of servants or serfs (a prospect that he did not find particularly distressing, though at the time he was a Christian theologian), at least until robots with sufficient

be mandatory or at least encouraged as very desirable, before very long. The typical moves of much secular bioethics have been to license new biomedical and biotech practices, to remove objections to their implementation, to reassure the public that such practices are morally sound and should not provoke disquiet (this kind of bioethics is a new opium of the people, at least for those without religious affiliations). Now a new phase in bioethics appears to have opened up, whereby new biomedical or biotechnological practices are not only deemed sound in principle, and thus permissible, but *mandatory*, in a very striking upward shift in the force of their typical recommendations (which have generally run in the following manner: "Accept! Accept!", even if this endorsement is generally followed by minor qualifications and cautions). The possible relevance of this new imperious deontic stance of bioethics (or rather of an important strand of bioethics) to the questions addressed in the paper seems too obvious to be spelled out. For they imply that conceivable new technologies in these fields may be seen not just as licit, permissible or meritorious, at least on balance, and with certain safeguards in place, but even as morally obligatory, a new and perhaps somewhat onerous moral burden upon mankind which had been liberating itself from the repressive demands of superegos (though some critics saw this as "repressive desublimation"), and moving towards a "morality without obligations or sanctions". But note that eugenic movements from the beginning (Galton, Leonard Darwin), in attempting to change reproductive practices to eliminate the unfit and to promote the better-quality humans, also adverted that, in order for these necessary changes for the breeding of superior humans, a strong sense of duty and sacrifice would be called for, and perhaps even a new secular religion, at least for the elites, no longer a Religion of Humanity but a religion directed towards the future, and towards higher humans still-to-come, or still to be brought into being, rather than the humans of the past and the present, at least in their biopsychical nature (as indicated by Galton for example and exemplified by R. B. Cattell's "beyondism", or Julian Huxley's "evolutionary humanism", or W. P. Montague's "Promethean religion", and of course there were other versions).

[18] Newton himself entertained the speculation that humans could disappear perhaps through some earthly or cosmic catastrophe, in accordance, of course, with divine design, and be succeeded by another human-type species, perhaps more than once.

[19] Better known for his advocacy of "situation ethics": to do whatever is appropriate in a given situation, in terms of a multiplicity of criteria, even if it contradicts conventional moral rules.

motor and other capabilities to match those of the para-humans (what one might call para-humanoid robots) came along to perform the same roles, and then they would be rendered superfluous.

1.2. (2) The meta-human

Under this heading we have in mind the visions that emphasise the emergent properties of the being, superindividual entity, or psychocultural whole, which goes by the names of *metaman, superorganism, noosphere, collective intelligence, world brain*, etc. The emergent whole that arises with the increasing connectivity and interactivity of humans through and with ever more ubiquitous and powerful computers/microchips in an expanding circle around and throughout the planet and through various thresholds of potentiation: "we are all connected now", participants in the IT ecumene, or: to be, is to be connected electronically. The humans in question are, of course, increasingly "enhanced" (genetically, neurologically, with electronic prostheses endowing us with super-senses). This would also encompass things, because on the one hand all "things", all inanimate things tend to become artifacts, or subject to control by electronic communication, thus endowed, so to speak, with a modicum of animacy, networked, participating in the Web, or the "datasphere": the so-called "internet of things", in which "things", i.e., intelligent things (sufficiently "intelligent" anyway), intelligent little machines of all kinds, or at least things endowed with microchips, and through RFID, too, all non-humans in which we have an interest, too, would be brought into a single planetary network of networks of constant information exchange an communication. In principle, not only the geospehere, but also living beings, the biosphere as whole, would also participate in the human-engineered planetary datasphere (the Earth would have its own common sensorium, although its control would be monopolized by one species). It is difficult to resist the sense that we are witnessing a world which may be characterized as one of *technological animatism*[20] or technological animism (as some commentators have already noted), in which, through ICT and the wonders of micro-sensors and microchips of varied kinds, all objects partake of some of the properties of self-movement or communicativeness which animists or animatists used to impute to them. It may be recalled that, for Durkheim, society comprised both individuals and "things", ie artifacts, machines and the entire anthropogenic world. This definition, rarely taken seriously by sociologists, has never been more felicitous than today. Of course "things" in this sense are becoming aspirants to mentation, individuation, a kind of agency, controlled evolutiveness, personhood, increasingly partaking of some of the properties of human individuals (sex between humans and robots has been solemnly predicted, not later than 2050, and indeed marriage, with all the privileges and practices that may come with it: the Chief Scientific Officer of the UK, Sir David King, has already warned that we must be prepared to concede an increasing range of rights

[20] The term "animatism", less well known than that of animism, was invented by the British anthropologist R. R. Marett, to emphasise the sense of movement of such spirit-like beings, to which perhaps corresponds the information flow, or the property of being carriers of information ("infons") that our world-view tends to impute to all beings, at least potentially.

to intelligent robots in the coming decades, moral, legal, political rights, or in other words, they will have legitimate, and perhaps irresistible, claims on us, and they will not be simply vehicles of our wants and desires[21]).

The term "metaman" is due to Gregory Stock ("metahuman" seems preferable, for obvious reasons), though this author has more recently advocated, above all, the path of genetic enrichment of humans, through somatic and germinal genetic engineering (1993, 2002).

Pierre Lévy's "*intelligence collective*" (1994), a kind of *logos* for the digital age, invokes the unicity of the "active intellect", or "agent intellect", a concept of the Aristotelian metaphysical tradition, particularly emphasised in the theological or philosophical anthropology/ pneumatology of the classical Muslim Aristotelianism which flourished in the 12th and 13th cs. "Averroism" has been, from a Christian point of view, a constant heresy in Western thought. Durkheim, for example, has been recurrently accused of it, from the time of Scheler to the present: and indeed, for him concepts and *a fortiori* the categories of thought, are social, the common possession of social beings in a given society and in principle of all social or rational beings: only sensations are individual and private. Reason, the world of concepts and categories, is social through and through, and the growth of rationality involves their purification of local colour and contingencies, and science, he wrote on one occasion, is the social phenomenon par excellence. The body, for him, is only the principle of individuation (*principium individuationis*). Similarly, for Lévy and others of like persuasion, the world of cyberspace, increasingly the most commonly shared world, is the common world in which all data, all information, all knowledge, increasingly digitalized, is deposited, stored, produced, processed, communicated. It is increasingly the medium of intelligence, rationality, science. Science, yes, the sciences *in silico*, or "sciences of the artificial", like Artificial Intelligence and Artificial Life, obviously, but all sciences tend to become to an increasing extent sciences in silico, cybersciences, or at any rate there exist programmes in that direction even of Artificial Physics, with all the more justification if we take our physical world as itself adequately represented by computer simulations, if only out of sheer necessity, but to be a computer simulation in its own right, so to speak.

The idea of a World Brain is similar, even if not directly inspired by Averroism. One of its first formulations was due to H. G. Wells in a work commissioned by the Institute of Intellectual Cooperation under the aegis of the League of Nations. The World Brain was not a singular entity but rather the aggregate of, so speak, all data banks (libraries, archives, museums, etc), everywhere on Earth, arranged, and this was the crucial and the most problematical link in the argument, so that all parts of this universe would be fairly easily accessible to all the others, despite linguistic barriers and the distances involved (faxes had already been invented, if not in widespread use, but microfilms were). Today, the new ICTs enable this vision to a considerable extent, though there is a price to be paid for digitization and the fears regarding electronic preservation are quite legitimate, and should be taken seriously by the fanatics of e-knowledge with their horror of paper. The attempts to capture all tacit, informal, un-

[21] It is true that some other scientists have sharply disagreed with him on this score.

written knowledge of, say, experienced doctors, in software program form through the methodology of "expert systems" has scored many successes though surely the dream of capturing all tacit knowledge, all informal heuristics, through digital algorithms is just a dream, if only because knowledge in action generates or re-produces tacit knowledge outside these algorithms: tacit knowledge remains an irreducible category, even though any particular item of tacit knowledge or skill, can, in principle be explicitated formally so as to be inscribed as digital information, as a software program.

To speak of a World Brain, of course does suggest a singular entity, and some recent speculators, even if with scientific training, have dared to articulate this vision, which could perhaps be better formulated as the idea of a World Mind, as there is no apparent proximate organic substratum for what they have in mind, even if at a lower level of analysis it is organic human brains in the aggregate we are talking about (though brain-computer interfaces will play an important role, as well as bionic senses, unless we were to posit autonomous, rather than auxiliary, artificial intelligence). Still it is not fashionable to speak of a World Mind, although to speak of a World Brain is more in accord with the naturalistic temper of the times (if we take the identity of brain and mind seriously, it should not matter, but even so some people have scruples). As to the concept of "superorganism", the term will surely evoke the name of Herbert Spencer, and justifiably so (the noun had gone out of circulation since his time, although the adjective "superorganic" remained in use in American cultural anthropology until fairly recently), for what is meant by some scholars today is fairly similar to Spencer's conception, insofar as a collectivist-seeming term denotes in fact a form of life directed towards increasing freedom and diversity. The superorganism's "nervous system" is identified as its global capacity, the given society's capacity, at the limit we are talking about a world society, for information processing (storage, control). The global superorganism, in an "evolutionary-cybernetic model of the emerging network society"[22] is coming into being with "the creation of an intelligent global computer network, capable of sensing, interpreting, learning, thinking, deciding and initiating actions: the "global brain"" (Heylighen 2007: 58). This implies of course a growing global consensus about values and standards, a contingency which is rather a matter of faith than of reasoned prediction, especially as coercion is ruled out as the instrumentality for bringing about such a world society.

As to the concept of noosphere, this was formulated jointly by the mathematician and philosopher Édouard Le Roy and the theologian and paleontologist Teilhard de Chardin in the 1920s, though it is associated today mostly with Teilhard's name, with some justification, as Teilhard went on to elaborate it in a number of works spanning over several decades. The inspiration for it came from the lectures given at the Sorbonne by the Russian geologist, Vladimir Vernadsky, where he introduced the concept of biosphere (1998). Although very conscious of the increasing geogonic role of humans, and as a materialist and socialist, stressing the radical potential of human

[22] As Pierre Moussa has argued, the conception of networks in social thought emerges with the Saint-Simonians who envisaged the entire planet as covered by networks of transport and communication, enabling the flows of free trade and commerce to encompass the globe, and the exploitation of all resources of the Earth.

transformation of humanity's conditions of existence, he did not posit an extra realm of human ideation and cognition, capable of self-action and surpassing the material substratum of human life. Teilhard's noosphere, the realm of ideation and its material realizations, was constantly growing as part of an evolutionary cosmology. The human *totum* was in part is product, and increasingly the vehicle for is realization. The telos was the Omega Point, a key to the process of Christification of the cosmos, which has now become a key concept and symbol of transhumanists who do not often share a traditional religious vision or affiliation. But the legacy of Teilhard, insofar as one of the greatest exponents of the cult of technological sublimity (he regarded the atomic bomb more as an extraordinary manifestation of human powers rather than a disaster for humankind) in the 20th century, albeit in a context of a theodicy which resembles more that of Spencer ("the evanescence of evil") than standard Christian views, has been well received.

1.3. (3) The trans-human

Under this heading we have in mind the focal concerns of the trans-humanist movement (subsuming such variants as the Extropians), which international movement, whilst not refusing, but endorsing, *(1)* and to some extent even *(2),* or cryogenics and other immortality projects, addresses particularly the issue of the "symbiosis"[23] (a term launched in these contexts by the famous 1960 paper of the computer scientist J. R. Licklider, in the phrase "man-machine symbiosis", the kind of machine he had in mind being electronic computers, so what he envisaged was that humans and computers should pursue *mutual* adaptation rather than unilateral adaptation of one to the other, with the development of suitable interfaces), or "fusion" of humans and machines (a version of the "fusion of flesh and machines", the organic and the inor-

[23] The semantic history of this term in European intellectual life deserves a full-fledged scholarly monograph which should take into account its considerable importance in Russia, already in the late 19th c., in evolutionary biology and speculative thought by scientists and philosophers, in part owing to the opposition to the emphasis on the ubiquity and primacy of struggle and competition, especially intra-specific competition, an the struggle between *individuals*, and indeed *conspecific* individuals, in Darwinism, and in recent neo-Darwinism, and on the competition, the permanent war to the death of nations and races in Social Darwinism; whilst the history of holistic modes of thought in Germany has received considerable attention, the history of holism/organicism/ symbioticism in Russian thought, important in the elaboration of the concept of biosphere by the geologist V. Vernadsky (even if the term had been coined before him), has not received comparable attention in the West (there are many styles of holism, as there are many variants of moral and political individualism, and the cultural tonalities of holism can vary widely too, from Nazi racist holism, to the corporatist Catholic holism of Spann in Austria, the symbioticist holism of Russia, or the holism of the emergent evolution theorists, or the holism identified by Louis Dumont in India, and in Germany). In recent years, the use of the term "symbiosi" by influential biologists such as Lynn Margulis, with some impact on evolutionary biology, or Joël de Rosnay, the latter, though, affiliated to the cybernetic tradition where talk about symbiosis really got started with Licklider (the "metaphysical pathos" of the respective uses being rather discrepant), has been widely followed. "Symbiosis", in these texts, tends to be seen primarily as *mutualistic* symbiosis, to the advantage of all the symbionts, or so it is implied quite often. It is interesting to find this valorization of symbiosis at a time of great emphasis on intensified, continuous and globalized competitiveness (world labour arbitrage) and institutionalized individualism in the economy and work life, as if somehow they could be conjoined comfortably. In Russian thought, where the emphasis on symbiosis in biology, ecology and human geography flourished, even if not entirely dominant, in the period between the 1880s and 1917, it presented itself as a counter-movement to Darwinism and to Malthusian population theory, as well as to some extent to Western individualistic civilization and competition or struggle, ubiquitous and unrelenting, as the sole motor of progress.

ganic, which has been as much an artistic theme, among the Futurists particularly, as a technoscientific or science-fictional one), perhaps via the "upload" of the contents of human mentation in superior intelligent machines, endowed with autonomous intelligence[24], if not in their current biopsychological version, at any rate in a more bionic one, and intelligent machines, or human brain-minds and intelligent or super-intelligent machines, "Avogadro machines", or inorganic minds (at the limit, "Artilects", in the expression of the scientist Hugo Garis, who constantly warns us to prepare ourselves for the emergence of such beings, to whose invention he has devoted his life, on the grounds that they will want to take over from us, if not eliminate us), undergoing a mix of Lamarckian and Darwinian evolutionary processes (only the artificial world undergoes this mix of evolutionary processes according to the Darwinian engineers, the natural world being exclusively Darwinian according to the orthodoxy). Some of those who originally embraced only (1), subsequently joined the transhumanists (such as the bioethicist Joseph Fletcher, once a Protestant Christian theologian at Harvard, more recently an atheist), once more demonstrating the overlaps amongst these currents of thought[25]. The overall world-picture this movement entertains is that of a

[24] A metaphysical stance of brain-mind identity, in one version or another (token identity or type identity as forms of supervenience, where "type" and "token" are used in Peirce's sense), has become practically taken for granted in these circles as well among neuroscientists, contrary to the situation even as recently as a decade ago or so (where "emergent materialism", "neutral monism" à la Mach, or even neo-Cartesian dualism had distinguished followers in the neurosciences; Roger Sperry of comissurectomy fame, and Sir John Eccles, for example subscribed to the former, or to some version of the autonomy of the mental or consciousness), though this kind of view has been strongly held in medical and psychiatric circles since the middle of the nineteenth century, to go no further back. The main difference today lies perhaps in the widely held postulate of what one might call *global ontological informationalism,* that the basic stuff of the universe may be said to consist in information, or what one might call "infomorphic" processes, if not "infons" (T. Stonier), more fittingly than matter or energy, which underlies, or is conjointly held with, the counterpart of *generalized methodological informationalism* (according to which the basic scientific heuristic consists in viewing all natural and human processes as varieties of information-processing, and information-related or infomorphic activities) which has served as the matrix of vigorous research programmes in practically every major field of scientific endeavour today, often called "cognitivist", and the practical maxim of *fundamental Archimedean informationalism,* information as the paramount world lever, especially digital information technology as the motor of science, technology, economy, changing the inner world of mind/memes, brain/neurons and genes particularly (Martins 2005/2007). The use of the term informationalism in this context is not directly related to that of Castells, who uses it to characterizing contemporary societies in which the ICTs play an ever increasing role and shape new forms of life as well as the mode of production.

[25] However not all these projects are equally favoured by the enemies of the human status quo. For instance, the academic biologist S. Shostak, who has outlined at some length a fairly technical programme of research on immortalization, refers to what he calls the "human-machine lobby" committed to cyborgification as the royal road to beyond-the-human, but suggests that the "growth of an immortality lobby will ultimately overwhelm resistance" (Shostak 2002: 197), not to mention the publicity generated by Anthony de Grey's SENS research programme aiming to overcome human ageing, which is targeted as a preventable disease, within the next two decades, along several research tracks, even though this has received very mixed informal notices from academic biologists, in part perhaps because de Grey is a self-taught would-be biologist coming from computer science (Nuland 2005). Shostak also anticipates in the same work that there will be a good market for "immortality services" (as he puts it), just as there has been for the new reproductive technologies (*in vitro* insemination by partner or anonymous donor, proxy gestation, post-menopausal pregnancies, etc., whilst we wait for the coming of ectogenesis or the artificial womb, completely outsourcing human reproduction), though perhaps even wider, for the NRT-assisted are still a tiny, if steadily growing, minority in the world (sex pre-determination of progeny by parental selection of the appropriate embryos will probably be legalized and widely practiced in the UK in the coming decades, as appears from reports issued in August 2005, yet another biotech "service" to the populace out of the genetic cornucopia, given that one could also in the same fashion require other qualities than sex, such as eye colour, potential height, native

cosmic evolutionary process in the which the most intelligent species (on Earth at any rate) completes its vocation by its self-engineered, ever tighter association and even fusion with and eventual surpassing by such machines, entering a post-biological, rather than merely a post-zoological or a post-human stage, on an macro-evolutionary trajectory critically assisted by nanotechnological molecular manufacturing, towards the "Rapture" (Alexander 2003), the Vingean Singularity (often abbreviated simply to "the Singularity"), or the Technological Singularity, and the Teilhardian Omega Point, often now simply the Omega Point (these are only some of the terms in the rich special transhumanist lexicon, though they are now entering the mainstream).

Even leading scientists, in no way identified with the general thrust of the transhumanist movement, and generally regarded as quite respectable or "sound", wary of going beyond the normal discourse of "public science", argue either that fusion with the ("hyper-intelligent", or "ultra-intelligent") machine is our only survival option on Earth (as the physicist Stephen Hawking argues in his latest book, or the neurologist W. H. Calvin), or that the ever closer interrelations, mutualities, amalgamations of humans and machines will lead to a post-biological, discarnate human or post-human condition in some fashion (the Astronomer-Royal of the UK, and currently President of the Royal Society of London, Martin Rees, now Lord Rees, an Establishment figure surely, *ex officio* to speak, argues thus in his most recent book). It may be noted in passing that such distinguished scientists as Hawking, Calvin and Rees can hardly be dismissed as obscure cranks…Certainly, the classical conception of human technology (or technoscience) as essentially and necessarily prosthetic or instrumental, still advanced today by the more credulous enthusiasts, could no longer be held in such circumstances, if indeed such a conception has been warranted since 1945, if not earlier.

intelligence, etc., one is certainly on the slippery slope to overall genetic choice of progeny, though still somewhat behind the full expectations of reprogenetics proper). In any case, it is interesting to find a militant of the neo-human using the language of "lobbies", lobbies for the neo-human and for the trans-human, which makes one realize even more acutely than before, that even though there are strong animal welfare/defence/rights lobbies, or lobbies for the defence of various endangered non-human animal species, there are no lobbies for the *humanum*, for the conservation of the human species, under the constant pressure from post-human projects of a far-reaching scope and depth of species-transformative and species-surpassing or species-replacing intent.

Some of the implications of immortalization drawn out by Shostak concerning sexuality are rather reminiscent of the sexual utopias of Herbert Marcuse and Norman O. Brown, among the theorists of sexual radicalism of the 1960s, particularly of the former, with the termination of allegedly repressive genital sexuality and its existential concomitants, which have played such a large part in human life, and the exclusivity of the "polymorphous perverse" sexual being as it appears in the English translations of Freud (the expression will have to be replaced, obviously), non-genital, non-reproductive sexuality, in a kind of perpetual childhood (as it used to be, perhaps, given the contemporary trends in sexualization of childhood): perhaps its time has come at last, not via cultural change, or the triumph of the sexual radicals of the sixties, or the merger of the late Freud with the young Marx, but via techno-biology. In any case prophets of immortalization, or at least radical extensions of the human lifespan, well beyond the Biblical limit, through science and technology, from Descartes to the present, rarely draw out so clearly such implications which seem to reduce, rather than augment, choices, and the diversity of ways of life, though "choice" (the expansion of choice wherever there have been givens, or binding ties, or filial piety) is a master-symbol of legitimation for technoscientific as well as other endeavours in the West today ("free to choose", or, as a critic pointed out, "free to lose"). To be sure, in the past, such matters were protected by a certain prudery, and even radicals such as the philosophical anarchist Godwin or Condorcet, or marginalized thinkers like Comte, did not dwell too much on them.

In what sense indeed could the escalation of the lethality and the accumulation of the stocks of nuclear weapons be regarded as a continuation of *instrumental* technology? Only if the ends in question were extra-human...

The general concern for the fast and substantial technologically enabled "improvement of human performance"[26] in work, sport, war (an ever-present concern), in scientific and other competitive achievements, in general sensorial and motorial ways also. This was shown very plainly in a joint report of the National Science Foundation of the USA and the Department of Commerce of the Federal Government (USA) published in 2002, will certainly entail at some point as human bodies become increasingly "techno-bodies" (not necessarily plugged-in, not necessarily in cyberspace), brains technologically implanted or enhanced (e.g. through neuropharmaceuticals), the crossing of some of the critical boundaries of the existing human biopsychological condition[27]. It invokes a Human Cognome Project to follow the completed Human

[26] The pervasive obsession with "performance" in microeconomic terms, in the polity, in society and not least in personal or sexual life in the last decade or so, as in the concern with "benchmarking" in firms and industries, with records in sports, the whole thrust closely associated also with the permanent demand for the "enhancement" of body, physical appearance, genes, intellect, and every kind of capacity (*except* moral and affective ones, such as compassion, sympathy, benevolence, reverence for life or biophilia), seems to partially vindicate retrospectively Marcuse's expression "the performance principle" as a master principle of contemporary life, if not quite in his sense (1974). Recently though a "genetics of virtue" has been advanced, i.e. the notion that genetic technology may be used to promote a virtuous or at least a more virtuous generation, so that the Republic of Genetic Choice might lead on, surprisingly, not to a Republic of Selfish and Very Selfish Genes, but to a Republic of Genetic Virtue, though, commendable as it may appear, surely this is only one of the end-states that one may envisage, and not necessarily the most realistic. One may recall that among geneticists who were the most vocal in the promotion of positive eugenics, H. J. Muller always insisted in the necessity of promoting compassion, benevolence, altruism as well as intelligence. Altruism in the commonsense meaning, disinterested sacrifice for others, kin or nonkin, compatriots or not, friends or strangers, not in that promoted by the biologist W.D. Hamilton, of kin altruism, now standard and exclusive in evolutionary biology: sacrifice, yes, but only for those who share the most genes with one (the degree of sacrifice to be incurred will be measured accordingly), so that the greatest possible number of one's genes will be perpetuated, and for that reason only: curious how a word invented by a sociologist, Auguste Comte, taken up especially in the sixties by Sorokin and latterly by others influenced by his teaching in their concerns with "creative altruism" in contemporary life, has now been taken over and given a completely new and ethically impoverished sense by biologists, a sense which is becoming quite dominant.

[27] If one can enhance, one can also downgrade, *ceteris paribus*, in technological terms: now there is a symmetry of technoscientific potency which is rarely adverted!. "*Enhancement technologies*" of phenotypes, genes/alleles, genome, germ cells, the brain/mind, of performance levels in sport, work, war and other areas of life (sex, gaming), are all the rage, in the quest for the perfect body, the perfect baby, the perfect copy, not by chance but through design, not so much accomplished as engineered according to pre-set procedures, and the like, but if the symmetry maxim just enunciated is valid, one should beware of the reverse potential, the potential for *diminishment technologies*, to produce suitably downgraded humans for a variety of practical purposes. The bioethicist Joseph Fletcher's candid advocacy of the biotechnological/genetic production, the design of *inferior humans* to serve the needs and wants of the superior humans provides a startling example of the path that could be followed, for he simply extrapolated the potentialities of emerging biotechnologies at the time he wrote in the 1960s (at the time he was a Professor of Theology at Harvard University, but subsequently, when he became an atheist he subscribed with equal, if not greater enthusiasm, to the goodness, perhaps the sanctity, certainly the necessity or inevitability of radical human transformation via biotechnology and genetic engineering). Quite apart, analytically speaking, from the downgrading effect that the technological enhancement of some provokes socially, psychologically, culturally on the not yet enhanced in commensurate measure in the relevant areas (what used to be called "relative deprivation", but more recently phrased in terms of the concepts of "positional goods" or negative externalities). The technologies of biological and specifically neurological engineering in question could presumably be deployed for both ends, for enhancement or perfecting as it is almost exclusively advertised, but also for the manufacture of truncated, specialized, versions of human beings or human-animal or human-machine chimeras (Artificial Zoology too, is definitely conceivable, and Artificial Ethology a rec-

Genome and the ongoing Human Proteome Projects[28], and an "engineering of the mind" or "cognomic" engineering, to follow genetic, genomic or biological engineer-

ognized field of scientific inquiry already, either as a study of virtual reality zoomorphic beings or as the design of ground-level, robotic, performance-equivalents of varied animals; incidentally, for Shostak the production of immortal living beings –such a contradiction!- will start with animals, very likely with sheep, a guess presumably inspired by the notorious creation of Dolly, the most famous sheep in world history). The symmetry of these biotech endeavours is rarely considered from an analytical point of view, but the Harvard professor, one of the earliest bioethicists to acknowledge the far-reaching import of the new reproductive technologies, was perfectly prepared, thirty years ago, to entertain a scenario in which downgraded humans, sub-humans, or what he called "*para-humans*", "chimeras" of a kind, would be produced to order through these technologies, to serve a variety of economic purposes, a proposal which would seem consistent with some critical tenets of bioethical casuistry, and the one thing he was not accused of in reply was lack of consistency (Fletcher 1974). Why is this symmetry principle of *modes of dehumanization* (as we might call it), or in a more neutral fashion, *modes of alterhumanization*, "upwards" and "downwards" in a scale of physical and mental capacities with homo sapiens sapiens as the benchmark, not taken more seriously at a time when symmetry principles, or at least their simulacra or soft versions, are so fashionable in the social studies of science and other areas? It can be argued that there is no market demand at present for bioengineered self-downgrading services certainly of a genetic kind. Indeed self-mutilation in phenotypical terms can be not only legal, but sought after and even fashionable in some affluent circles, as in the notorious recent case of the demand for (literally) forked tongues as a fashion accessory and sex aid, in New York and elsewhere, and the pursuit of more zoomorphic phenotypes. Perhaps for procuring engineered sub-humans or chimerical part-humans other than pure robots, only for perfecting or enhancement or performance-improving technologies, but one cannot foresee all the vagaries of market demand (or indeed the oddities of technology-push developments as opposed to market pull). It can be argued also that in a democratic polity and society such processes could not occur, or would be discontinued, or prohibited, though legal restraints on the market and on the widest freedom of choice of consumer goods and services, especially of a technologically intensive kind, are normally under attack , given the prevalent ideology of the Sovereign Individual, the Absolute Individual (today a libertarian concept though the historian Frederick Maitland long ago observed of the Western European despotisms before 1914, that the Absolute Individual and the Absolute State were complements), and the strong animus against any legislation or the public policies or indeed any public discourse redolent of "paternalism" (a powerful epithet, a curious vestige of old times, for "maternalism", or "maternalist feminism", which is rarelyused in this context, could convey equally the same hints of protectiveness, tender loving care, even disrespect for others'autonomy, allegedly for their own good, but of course without the same negative charge, with a more benevolent aura perhaps), even towards very young children. Possibly, a recent development by American law professors of a current of thought self-described as "libertarian paternalism" (a seeming oxymoron, of course, which they are at pains to rebut) may signal a weakening of this animus, which has pervaded the moral climate of public policy formation and general social attitudes in the West, though still a minority position amongst libertarians (Sunstein & Thaler 2003), thus resuming the sense of the importance of the "protection of the inept" analyzed long ago by the sociologist W. J. Goode, not least in the connexion with the major transformations in the systems of social security stemming in part from the changing age profile in the populations of most Western societies, and the state's declaration of its incapacity to address these matters in the classical welfare state fashion any longer. It could also be argued that the classical dystopia *Brave New World* discredited for ever such vision, and one need not be too concerned with such things outside horror movies, though the film *Matrix* , whilst it seems to have engaged the attention of many sociologists, it did not do so, it should be said, to judge from conversations, *qua* sociologists, unfortunately, that is it did *not* engage their distinctive sociological imagination ("science fiction!": but as a scientist observed decades ago, we live in the science fiction of yesterday). Still, a sense of unease regarding these matters would be salutary and of course none of the foregoing considerations addresses *normative* questions properly so-called. In a more mundane setting, away from the more sinister scenarios, the race for biotech-engineered enhancements of many kinds (turning chance to choice) reduces many to social inferiority, at least temporarily, and this quest is very much part of the infernal spiral of the quest for "positional goods" that marks contemporary economies and societies in an epoch of technological acceleration. Not just acceleration but as a notable inventor, and leading post-human prophet, Ray Kurzweil, argues, of "the acceleration of acceleration", and therefore of more-than-exponential, hyperbolic growth of knowledge and technical capacities of information-processing and storage, for example (this a kind of generalization of Moore's Law). Indeed it suffices the media exposure of mostly natural-born (if partly artificial too) female and male models to lower the self-esteem of the majority of women and increasingly of men as well, and not just in the West, at least according to a number of surveys. The new *treadmill of genetic improvement*, as we might call it, that is likely to emerge, added to the "treadmill of production" (Schnaiberg 1980) in capitalist economies, would radicalize the pursuit of positional goods which had been tempered by the universality of provision of basic goods by the social-democratic welfare states, or what still remains of them.

ing in general (in fact "biological" and "genetic/genomic" tend to be equated, not only outside academia, but even within). This includes the provision of bionic sensors and actuators for, and cerebral implants in humans, to go with this new technological sensorium and motorium, more specifically, a bionic sensorium and motorium (Geary 2002), enabling the successors to the current version of *homo sapiens sapiens* more direct sensorial access to the microscopic and megaloscopic (a new turn of the "oculocentrism" diagnosed by the historian of ideas Martin Jay as prevalent in the modern West, or at any rate constantly denounced in French philosphical thought, more recently in Bachelard, Sartre and Foucault), thus deracinating the human from the mesocosm, the middle world, it has dwelled in, as its "natural" habitat or *Umwelt*, as well the theatre of its *wirkwelt*, even with all the scientific "scopic" instrumentation developed and generalized since the seventeenth century, from the classical optical telescope or microscope to the latest devices that will enable us to see atoms. This involves, in principle, a kind of transcosmicization of our species, which might seen as yet another instalment of Piagetian decentration, the point of the exercise, or at any rate a substantial correlate of it, "the effecting of all things possible", in the words of Francis Bacon, in the shape of transspeciation, the ingression of a new successor species, or more than one.

The question which has never been properly put to the general intelligence of humankind (or indeed to the citizenry of any nation) the moral Parliament of Humanity (with appropriate virtual representation of future an past generations, for at least half of the members of Humanity are dead), is whether the substantial improvements of human performance in this fashion, turning every willing human who can afford it, for the market is supposed to decide in the end, into a kind of all-round super-athlete in body and brain-mind (with suitable optimizing brain implants, somatic genetic engineering, and more)[29], by comparison with even the best performance of today's "natural" athletes (though in fact they are often doped with a variety of performance-enhancing drugs, increasingly more sophisticated, eventually being impossible to detect, appearing identical to natural substances), or the smartest of today, should become the commanding goal or even a major priority for a planetary civilization, even a planetary business civilization. The same might be said, of course, *mutatis mutandis*, about all

[29] The collapse of the undoubtedly well-intentioned Human Genetic Diversity Project shows that even though there is no actual Party of Humanity in defence of the preservation of the generic identity of *homo sapiens sapiens* (and clearly the hour is late, in terms of the famous clock in the cover of the journal *Bulletin of the Atomic Scientists*, which is still being published, although it originated as a response to the Cold War, and its ever-present threat of nuclear warfare, it would be a couple of minutes to midnight, if that much) the defence of ethnic and ethnically grounded cultural identity can mobilize enough effective opposition in defence of the preservation of sections of humanity, of its boundaries vis-à-vis other sections and especially the politically, economically, and culturally dominant ones. It is more plausible to speak of a Party of Gaia, as in deep ecology or those who hold some version of biospheric egalitarianism, or of a Party of Animals, as well as of many identitarian parties, than of a Party of Humanity in the sense indicated. The world peace movement in its demands for general or at least unilateral nuclear disarmament could have been said to have operated as a Party of Humanity in its aim to reduce or eliminate the threat of nuclear war, which at the time could indeed have come close to destroying humankind: the threat of "exterminism", as E. P. Thompson called it, has moved on, and has assumed other guises, not physical extermination of humans, strictly, but of a transformation which would radically alter the relations of filiation between the generations, the wholeness of Humanity, and lead on to various modes of alterhumanization.

the techno-gnostic mega-projects referred to in the previous paragraphs, targeting one or more if not all the basic structures of human existence, deemed as mere negativities, particularly corporeality, vitality (organicity), mortality, which have accompanied the growth of human knowledge so far, but which the growth of knowledge, according to these movements, renders obsolete and indeed obstacles to the further growth of knowledge today and in the future: it often seems that, for them, knowledge, understood exclusively as *scientific* knowledge in its modern highly technicized sense, the pursuit of complete and total scientific-technical knowledge/reengineering of the world, is seen as the supreme, *overriding* endeavour, trumping, if indeed not removing completely, all other concerns, for humans, or at least quality humans, and their legitimate successor species (the choice of a legitimate successor remains an important matter in this domain)[30]. Not on the way to the Absolute Spirit (Hegel), the identity of subject and object (Schelling), with its Western Marxist version, as in G. Lukàcs, for example and others (Jay 1986), the metaphysical historicism, the thesis of the radical historicity of the human being, which envisaged radical self-transformation of the human spirit in history, in a meontological perspective (Fackenheim 1961), or the more mundane project of a self-determining humanity (as many sociologists envisioned, in the wake of Comte, as the central concern of sociology as the integrative social science, and its time was even the "LSE tradition" for example: cf. Ginsberg 1934), but to what one might call the *Absolute Epistemic Subject* (where the epistemic would be strictly equated to the technoscientific, excluding therefore any noetic, contemplative, "intellectual intuition"-type modes of cognition), at any rate an inorganic epistemic being seeking absolute all-embracing knowledge in (or as) an electronic-mechanical vehicle of very high, better-than-human intelligence, whose habitat will not be the Earth, and which might indeed roam the cosmos in the quest for the most complete knowledge of the world, until it dissolves in pure light, as Bernal put it (Bernal 1929). Some ethicists have argued recently that a paramount duty, indeed the supreme duty, of human beings is the pursuit of scientific knowledge, the maximization of such knowledge, operative knowledge (not just one of their duties, even a high-ranking one at that) from which they also deduce that is the strict obligation of parents to maximize the genetic capital of their progeny, providing them with all the genetic enrichment available in the current armamentarium of genetic/ genomic/ reprogenetic technology, so as to provide their descendants with the highest levels of general intelligence and of cognitive capacities all round. Or in more general terms it has been argued (for example by

[30] And not least a super-warrior (defence looms large in the above-mentioned report of the National Science Foundation and the Department of Commerce, one of the "enhancements" of the prospective superior humans being the ability to function perfectly without sleep for many days, something only dreamt of by military commanders since time immemorial, not to mention almost complete invulnerability in war situations. In some ways a variant of the Futurist steel-rich man, always a male though that can surely be remedied (they envisioned more metallic, and concomitantly less organic, humans for the new age, in part certainly because of their apotheosis of war in general, and industrialized war in particular), or Ernst Jünger's mechanical or armoured soldier, formulated independently of the Italian Futurists, though more comprehensive soldier cyborgs are under active consideration in the USA at least. The linking of metal and flesh, the enrichment of the flesh and the human body with mechanical metallic equipment has in fact been a theme if not an obsession of vanguard artistic movements for the last hundred years or so, the cinema, and meta-political projects, both Soviet and Nazi, (Dyens 2001; Hellebust 2003; Theweleit 1987/89).

the evolutionary biologist John H. Campbell) that it is our strict *duty* to assume the conscious direction of human evolution in the first instance, and insofar as it is within our power, of the evolution of life. It is not just a question of possible worlds, of desirable worlds, thinking in the optative, of alternate scenarios of the human future to be pondered, but of an overriding *imperative* to control evolution and to steer it towards the maximization of knowledge and power. Already in the 1960s when the potentialities of genetic control were becoming clear, the sociologist and demographer Kingsley Davis exclaimed: "We shall be like gods!"

The ongoing changes in the computational thought-world involve the conceptual recognition, a categorial shift, in some ways a restructuring or overcoming of folk taxonomies, naïve ontologies, or "our [commonsense] conceptual scheme" (Strawson 1959), of vitality, animacy (Artificial Life), mentality (Artificial Intelligence), personhood (Artificial Persons,[31] nonhuman persons generally, for above all they want to extend the well-established entitlements of personhood, due to Christianity and the Enlightenment, to various categories of nonhumans[32], even as they exclude some categories of humans from the universe of persons, so that the universe of human beings becomes only a subset of the universe of persons, and the universe of persons extends beyond that of human beings[33]). They even implicate the issue of the putative or potential soulfulness of their "bots": the "theology of robots", an investigation into the question whether artificial beings may become ensouled (thus Artificial Souls, as

[31] This was the very core of what we can now see was one of the most acute prophetic tracts of the twentieth century to be written by a scientist, really a polymath, John Desmond Bernal's extraordinary 1929 pamphlet *The world, the flesh and the devil* which sketches a path of systemic transformation of the human species to a post-human future in which the successors to homo sapiens sapiens engage exclusively and unrelentingly in scientific-technological research, scientific inquiry in this vision always involving engineering realizations, a quest throughout the universe till the end of time (though a residuum of corporeal humans would be left on earth, incorrigibly addicted to the pleasures of the flesh, of the table and the bed: at any rate the human vanguard now turned into mechanized post-organic beings, would have left). The paramount conviction of the author seemed to be that the point of human beings, in the last analysis (or to put it in more traditional terms the answer to the question "what we are here on Earth for?", or if you like, our species-*Beruf*), is the pursuit of scientific knowledge to the utmost extent, and therefore when the biological limitations of humans stand in the way of this pursuit, dehumanization or transhumanization should be instituted by some humans to let intelligence develop through other vehicles than the human body, or indeed any organic body, a merely provisional medium for this pursuit, now outdated. In recent decades this extraordinary visionary work (the vision was never abandoned by the author but also never elaborated in the rest of his active life) has increasingly gained topicality and relevance to the post-humanist projects of our time, although written long before the computational, cybernetic and molecular-biological revolutions (however, Bernal did promote work in molecular biology in his laboratory, known worldwide for its exceptional gender equality and non-hierarchical relations, a laboratory where Rosalind Franklin, a key figure in the story leading to the discovery of the double-helix model of DNA, was able to work, and was a pioneer of studies in scientific communication and documentation: Bernal 1939).

[32] Given the long history of the word "artificial" it is apposite to recall just two examples: that Hobbes wrote of states or Leviathans as Artificial Persons, and according to the US Supreme Court in an epoch-making decision, business corporations, legal artifacts, were just like singular natural persons insofar as that could help their profit-making activities and diminish their fiduciary responsibilities. A provision which has stood the test of time despite the anti-trust movement and the various surges of Federal regulation of business corporations and recurrent episodes of trust-busting, as in the breakup of the Bell Telephone Company, whose laboratories did power the cybernetic revolution as well as much science of a fairly pure kind.

[33] Some of the higher primates, as in the Great Ape project, possibly also dolphins, as has been argued at considerable by a philosopher recently, potentially some robots as argued in a recent report by the Principal Scientific Officer to the UK Government, Sir David King, who asked us to be prepared to recognize the civil, legal and even the political rights of the intelligent robots to come (he did not, I think, anticipate conjugality and sex between humans and robots).

we might call them, by parity of denomination with Artificial Minds, Artificial Intelligence, Artificial Persons, Artificial Societies), so far only pursued, as far as I know, by Christian theologians, though there should be no reason why, for example, Shinto believers or practitioners should not ascribe spirit-status to them, not to mention the long-enduring Golem tradition in Judaism, once evoked by Norbert Wiener[34], has comprised one of the research fields once pursued at places like MIT[35]. Thus they would be placed on a par at least with that "moral considerability" typical of the members of the human species, and the granting of rights, moral, civil and even political rights to their creatures, or the most evolved variants thereof, should follow. And not just as fellow "actants" (the Greimasian semiotic term, once confined to narratology, recently popularized by Bruno Latour to stipulate that we encompass agents and non-agents in human societies in the same tightly coupled domain, though the implication that we and our artifacts are all discursive items in an unfolding narrative without a narrator does not appear to have been followed through), but as fellow militants in the "war against terror" (the number of American book publications on "citizen cyborgs" as well as "cyborg warriors", conscripts, not volunteers, conscripted through programming, one might say, is increasing[36]). This at the very time when the curtailment of the rights of human citizens, even in the USA, in the name of "homeland security", is all too likely, for alleged reasons of national or global security against many varied, insidi-

[34] These may comprise fetuses, the incapacitated aged, the severely handicapped, children with a number of genetic defects, and more. The disfranchisement of these categories of persons or putative persons is quite striking, given the expansion of the status of personhood advocated by the same philosophers to nonhuman and even nonalive or anthropogenic categories of beings.

[35] One of his books was entitled *God and Golem.*

[36] Even if to the disgust of such salient and tireless critics of human " speciesism", "species chauvinism", or "meat chauvinism", as Moravec and Minsky, despisers of the biological brain as but "meatware" or "fleshware", and of the organic body in general compared to life *in silico,* to electronic calculating machinery undergoing accelerating progress in terms of years and not biological generations let alone evolutionary time, expected to shortly catch up with and overtake natural human intelligence, even if this has been rising steadily over the last forty years or so in Western countries and Japan, according to the thesis of the so-called "Flynn effect", so as to generate the greatest "intelligence explosion" (intelligence here not meaning not so much enhanced human intelligence via neurogenetic or brain-enrichment means, as artificial intelligence with the super-exponential, hyperbolic growth of information-processing, calculation and computational capacities in general), and information explosion on earth propelled by Moore's Law, the solar system, perhaps even in our galaxy if not indeed in the cosmos (numerous estimates have appeared of the total information stored in our computer memories and other media such as libraries, of the aggregate information stock on Earth, and sometimes even of the total amount of information stored by living beings or the totality of biospecies on Earth). Among the most vocal exponents of this outlook can be found computer and robotic scientists such as Minsky and Moravec, who, in addition to antihumanism, profess atheism, reject the autonomy of the mind, the soul, and anything remotely spiritual, ruled out by their strict physicalistic ontology. Their strict physicalism, as that of many other computer scientists, excludes positions like that of emergent materialism (in which mental phenomena depend on their neural base but cannot be explained or predicted entirely on the basis of the state-description of the brain) and it is not clear whether they would concur with the well-known "anomalous monism" of Davidson, according to which whilst brain-states and mental states are identical no strict laws connecting the two can be found (strict laws in the sense of enabling one to predict mental phenomena, at any rate "propositional attitudes", like beliefs and desires, from knowledge of brain states, not to mention the vexed problem in the philosophy of mind of the intractability of qualia). I fear even anomalous monism would be too much of a concession to ghostliness.

[52] Some 5 000 robots are serving with the American Army in Iraq and Afghanistan, and there are reports of "undue" emotional attachment of soldiers to "their" robots, i.e. robots entrusted with their protection, as evidenced in their reactions to the destruction of the robots by enemy action or otherwise.

ous modes of terrorism, through biological warfare or cyber-threats, the deployment of radioactive substances, as in the recent cases of polonium-210 poisoning in London and elsewhere (undetected at first by the scientific instruments deployed, such as the standard Geiger counters), not to mention the miniaturization and easy availability of sophisticated science-intensive weapon systems of every description and ever increasing precision, lethality, and especially the capacity for inducing mass terror for every terrain and circumstances. This has expanded with recent and ongoing advances in today's irretrievably decentralized, worldwide market economy (both legal and illegal) of sophisticated weaponry for a very wide range of niches (Rolo 2006).

In these visions the strain of "technological gnosticism" (a term coined by the American philosopher of technology Victor Ferkiss, which I have applied to the analysis of some contemporary technologies in previous texts: cf. Martins 1993) reaches perhaps its culmination, to the point of concluding that we are living in an emergent techno-gnostic civilization. At the very least, it could be argued that these demonstrations of technological gnosticism (which have become very self-conscious in recent years when variants of gnosticism has been embraced consciously and openly) by militants of biotechnological intervention looking towards the comprehensively "genetically modified planet"[37] and other forms of technological intervention in biospecies modification or creation (a start has been made with synthetic bacteria), and the surpassing of natural, carbon-based intelligence (and indeed carbon-based life at large) by silicon intelligence or silicon life (though admittedly even silicon might be replaced by another physical substance, substrate or process), in the pursuit of what has come to be known by transhumanists, generally radical disbelievers in transcendence in conventional theological terms, as a highly desiderated "technological transcendence", transcendence of an atheological and supposedly unmetaphysical kind, in and through technology, or rather through a particular constellation of contemporary technological frontiers, above all through the technologies of "strong" AI, a not wholly unfaithful mirror to our microchip-saturated, computer-ubiquitous, through the WWW of today to Web 2.0+ (or even to the already outlined 3.0, or the coming Semantic Web, and so on), 4G+ mobile phones, increasingly RFID-pervaded technological civilization. Adding to the internet or WWW, semantic or otherwise, of humans, "the internet of things", where, as noted previously, every terrestrial object (and every manmade object in outer space, already somewhat polluted by us) would be tagged, or at least could be tagged in principle, and thus in communication with every other object and potentially every subject or every putative actant, in the Latourian twist, too, within the planetary datasphere: to be an actant, in this sense, is to be an integral part of the planetary datasphere or a kind of pansophic medium, if one were to equate, wrongly, in my view, the "sophic" with the informational in the sense of "information" which occurs in the expression ICT. In current management literature, of all places, it is common to draw a fourfold distinction, in a definite hierarchy, between data, information, knowledge and wisdom; one might, following this hierarchical set of categories discriminate between four spheres, with the datasphere, strict sense of data in this context, as the first and

[37] This is actually the title of an enthusiastic, annunciatory book (Stewart, 2004).

lowest, the infosphere the next highest, the cognosphere the third, the wisdom sphere the highest. Most writers on these matters are not that ambitious, and the very idea of a planetary pansophic sphere would seem metaphysical nonsense (as if informationalism itself were not without metaphysical commitments, sensical or not).

There does seem to be a prima facie case that such visions should be taken seriously, and not, as the more glib or defensive or disingenuous might like to claim, as the ravings of a cybernetic lunatic fringe, or of a tiny minority of utterly unrepresentative, minor or marginal scientists, engineers, science journalists and commentators indulging in media-hype, of digerati and the "artificial intelligentsia", "cyber-totalists", who merit no serious attention, and whom we need not fear (and may even laugh at). Or, as some like to say: "it's never going to happen". *Something* will happen on the way (unless one or another of various ecological calamities or societal collapses, or even the fatal impact of astronomical bodies from outer space, so much stressed by a number of scientists in recent years, enjoining us to permanent vigilance, occurs first), so there is a good case for reviewing these visions and exploring scenarios associated with them.[38] [39]

Alas, the matter cannot be brushed aside so easily, indeed so flippantly and arrogantly. I claim that it would be utterly irresponsible with regard to both science and society to try to ignore the potentialities and scenarios we have reviewed, far-fetched and fantastic as they may appear to those endowed only with tunnel vision or ineradicable Panglossianism. We say science and society, in the conventional locution, though science *is* in and of society, as well as, in its truth-content, *out* of it, if only in another region of the Popperian world 3, i.e. the realm of the products of the human mind, whose implications over time are never foreseen in full, and often unwanted and undesigned, and society bound more and more to technoscientific conditionalities, as to belong, as it were, *in* science, or at any rate *within* the technoscientific way of world-making (with an animalish residuum, ontologically speaking, still to be domesticated), with all it portends, for good or ill, now or in the future. In any case, we live already in the science fiction of yesterday, as the biophysicist J. R. Platt, once put it, and with the acceleration of acceleration in ICT, and other technologies, perhaps we will be living soon, not just in the science fiction of yesterday but also closer to the science fiction of today.

Or perhaps some will feel just a sense that our stance must always be *pas d'ennemis dans la technoscience*, no matter what, as in: "my country right or wrong", "the Sovereign can do no wrong", or *pas d'ennemis à gauche* (none of these watchwords were invariably conducive to the greatest good of the greatest number, to put it mildly). *Fiat scientiae, pereat mundus,* though of course only under some specialized

[38] These remarks will seem bizarre to the cognoscenti, but I have added them in the light of comments made to me by distinguished natural and social scientists in a certain country. Of course, there are always intelligent and alert people who, somehow, have not heard the news, whatever the news is, no matter how long ago, and however bad. Or have perhaps forgotten it.

[39] As the transhumanist movement has grown, and has become more international (with offshoots in various parts of the world, including Latin America, and I have no doubt will recruit supporters in Portugal) and more formalized, it has naturally attracted wider public notice, and a non-technical critical work by a Christian scholar has already appeared on the subject (Smith 2005). For a basically admiring review of the movement see Alexander 2006 and for a spirited defence see Bailey 2006.

though not wholly idiosyncratic interpretations of the potentialities of science and technology, especially the alleged supreme *duty* to pursue its implications to the utmost, even to the point where the concept of duty could no longer have any meaning (certainly the *mundus* of natural humans, organic humans, still made up, too many of them, largely of "meatware" or "fleshware", dwellers in "meatspace", earthbeings). At some point the surviving humans would no longer be able, in principle, to say of such beings "*mon semblable, mon frère, ma soeur*", as we can now say, in a perfectly good sense, of and to every one of our coeval human beings on Earth, of all our species predecessors, and of our undesigned posterity. It would shatter the unity of humankind, the unity of human and nonhuman life, the bond with the biosphere which has defined the Blue Planet, possibly a singleton, a *unicum* (according to the "Rare Earth" hypothesis). Perhaps the last *tremendum* we could contemplate as humans. Though for some, even now, it would count, not as a calamity, not as a tragedy, not as The End, potentially, of the most predatory species on Earth, but as "The Rapture" (Alexander 2003) which they long for now, no matter at what cost to most natural humans (bundles of meatware, no matter their bionic prostheses, living in "meatspace", the lived space of our *umwelt* or hodological space, or the Euclidean space of commonsense), for only a few would be "saved" to enter, irreversibly, the disembodied "computational plane of existence" and mostly prescind from the biosphere (Smil 2006).

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