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radical reorientations, sometimes returning to very old observations.

Encyclopaedias are universal compendia of available information. Any new encyclopaedia must recognize the new non-Diderot world. This is the re-emergence of non-European civilizations and the merging of biological and digital information with the cultural. The new encyclopaedia must reflect this as well as the ontological and epistemological bases on which the different turning points of the knowledge tree/jungle have occurred. This would imply that ontology and epistemology should be made overt in the encyclopaedia and not implied as universal. Such ontological and epistemological concerns would also be germane to the biological and digital aspects when viewed from the point of view of evolutionary epistemology.

Moving around in this hybrid information jungle evokes a comparison with exploring the jungle by the forest dwellers. The latter are immersed in a tangle of information extruded by thousands of plant and animal organisms that surround them. They would sniff around and explore only one or two, ignoring the bulk. So it is in the emerging new jungle of information. The new encyclopaedia would help us hunt for new information that their histories suggest are inter-

esting, while ignoring other information carriers and their contents.

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Science, Technology and Society

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STS (Science, Technology and Society) has become an increasingly vital emergent field in the last quarter of the 20th century along with the transformations of the technoscientific infrastructures of the modern world. Unlike the older fields of history and philosophy of science which took as their interlocutors the idealized philosophical versions of how the universal truth of science was claimed to be established, STS has taken scientists and engineers as active collaborators in understanding how the specialized components of actually practiced science and engineering knowledge in their localized contexts can

be configured into broader, yet informed, approaches to living in a complex world. Unlike so-called policy studies which also take for granted the local political cultures in which they operate, STS places such political cultures into comparative perspective to make assumptions more accountable, especially in the disjunctions and differences that inevitably arise in attempts at global harmonizations (of clinical trials, of patent protection and intellectual property rights, of precautionary versus risk-benefit approaches to regulatory sciences).

While the intellectual lineages of STS are varied, key are (1) the early 20th-century debates about the cultural constructions of rationalities (Max Weber's notions of rationalizations of different cultural spheres, based on their own logics and differences between value- and instrumental rationalities; Ludwik Fleck's Durkheimian account of thought collectives and what would be later called by Thomas Kuhn (1962) 'paradigm

shifts' among scientists; Evans-Pritchard's (1937) comparison of how science and witchcraft systems each protect themselves from falsification, and the dialectic between physical mechanisms and social distribution of blame for disasters); (2) the mid-century structuralist accounts of cultural logics, cybernetic stabilization, and system transformation (Claude Levi-Strauss, Jacques Lacan, Roman Jakobson, Norbert Weiner, Thomas Kuhn, Marshall Sahlins); and (3) the triple stranded growth of ethnographic approaches in the UK, of the so-called new sociology of science or strong program (SSK) at Edinburgh, in France of actor network theory (Bruno Latour [1987, 1993], Michel Callon), and in the USA of the anthropology of science pioneered in the History of Consciousness Program at Santa Cruz, the Anthropology Program at Berkeley, the Science and Technology Programs at Cornell and RPI, and the STS Program at MIT.

At MIT, in 1996 three calls were placed for an STS approach that is integrative across disciplines, technically and scientifically competent, culturally resonant, and cross-culturally attentive. The calls placed were (1) to test and contest the disciplinary tools of ethnography and history, visual studies and literature, national institution building and transnational policy competitions; (2) to internationalize the conversation around the changing roles of the university and the technosciences as they globalize, exacerbate inequalities, and generate alternative modernities; and (3) to move the pedagogical sites of STS into engineering, medical, science, and law schools.

The attempt at 'integrative' weaving is not only the effort to reconnect the five cultures (of science, engineering, humanities, arts, social sciences). It is also to counter the specialization, compartmentalization and even secrecy or lack of ability to communicate among subfields of science and components of big engineering projects, both to allow checks and balances to operate and also to prevent the privatization of moral judgment, the enfeeblement of public discussion, and discriminatory restriction of access to the hierarchies of power and knowledge. It is also to contribute to the creation of multilayered institutional abilities to recognize and negotiate the differing knowledges and needs of societies and social strata.

Science and technology are often thought of as having a center-periphery structure. A focus on (and from) the peripheries can often also ipso facto be a focus on the histories of exchanges in scientific knowledges, e.g. the Kerala toddy tappers who provided the Portuguese material medica/botanica compiler Garcia da Orta, and his Dutch successor Hendrik van Reede, with the knowledge on which Linnaeus was trained at

Leiden; on hierarchies and access to centers of calculation (e.g. strategies used by Japanese women physicists to get resources from their international mentors to circumvent their lack of leverage within the patriarchal Japanese system); and on alternative genealogies of knowledges too often codified in textbook histories as universal, as if one could simply build science modularly in any place (a kind of naïve trickle-down modernization theory of science) without attention to the embeddedness of science and technologies in both sociopolitical factors and cultural imaginaries. The scientists and politicians who built the elite science institutions of India, China, Russia, Brazil and elsewhere in the post-World War II period were hyperaware of leveraging comparative advantages, of playing off one power against another, and of building particular kinds of niches.

The question is thus raised whether STS should not be integrally woven into the technoscientific curriculum, as questioning counterpoint, as a recombinant reagent, rather than in the old imagery as marginal critic, idealistic vanguard, elitist irritant, off to the side, out of the way, easily dismissed. Are these a better way to develop cultural critiques of the biosciences, bioengineering and biomedicine than, for instance, the new discipline of 'bioethics', whose socializations, formulations, and positionings institutionally and intellectually push it toward being part of the public relations legitimation for medical centers and corporations? Are these a better way to develop practical understandings for engineers and applied scientists of their roles in shaping contemporary institutions than simply adding to their curricula new courses in management or business?

At issue is perhaps what Michel Foucault might have recognized as an emergent new episteme, not totally divorced from older ones, but reconfiguring them and us in new cultural, social and material logics. At issue are conceptual analogues to the third generation fiber-optic cables that were being laid in the 1990s around the globe, expanding the connectivity and bandwidth of the new technological infrastructure, at the same time challenging and forcing reorganization of the old national postal systems by new multinational telecommunications corporate structures.

STS in this vision is not just a para-site commenting from the sidelines, but together with the principals figuring out how our technoscientific worlds should operate with what sorts of regulatory structures, pedagogies and accountabilities. The principals here increasingly are scientists, engineers, bureaucrats, entrepreneurs and other professionals, but also patient groups, community organizations, and other affected and

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concerned members of the public sphere, civil society, governance and the reflective arts.

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The Human Sciences

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A persistent theme of the human sciences is the reduction of socio-psychological human life to the study of the material basis of the human organism. One of the best examples of this was La Mettrie, who was the first person in the modern era to give expression to the idea of man as no more than a machine. He did not, however, employ the term 'a science of the human'. This concept owes much to the English translation of *Geisteswissenschaft* which, in its German form in the late 19th century, contained a large ambiguity. It could either mean a 'science of the spirit/human' and lead towards materialism and monism, or it could mean more generally the humanities. The humanities, which are a celebration and expressive elucidation of the human condition as non-reducible to any materialist base, have been in retreat since the late 19th century with the emergence of Darwinism as the valid scientific account of the origin of all species of life. So, a science of the human would seem either to have the capacity to be inhuman or, alternatively, to be humanistic but hardly scientific. In all of the many and various attempts to construct a 'human science' these two possibilities represent polar opposites and they are reflected in the two readings below.

I

Julien Offray de La Mettrie (1709-1751), a French physician, was the first philosopher to state that not only body but also mind and soul were determined by physiological constitution. His *L'homme machine* is taken as the starting point of a materialist science of life. In a religious age he attracted notoriety for stating that the soul was not immortal. Today he can be seen as a precursor of attempts to reduce human consciousness and behaviour to biochemical states and inherited traits.

I reduce to two the systems of philosophy which deal with man's soul. The first and older system is materialism; the second is spiritualism.

The human body is a machine which winds its own springs. It is the living image of perpetual movement. Nourishment keeps up the movement which fever excites. Without food, the soul pines away, goes mad, and dies exhausted. The soul is a taper whose light flares up the moment before it goes out. But nourish the body, pour into its veins life-giving juices and strong liquors, and then the soul grows strong like them, as if arming itself with a proud courage, and the soldier whom water would have made to flee, grows bold and runs joyously to death to the sound of drums.

Words, languages, laws, sciences, and the fine arts have come, and by them finally the rough diamond of our mind has been polished. Man has been trained in the same way as