[developed from 6a1 of 10/24 blueberry cybersexuality]

Cybersexuality & the Evolution of Human Nature
from 'Ardi' to 'Andy'[1] or Hominids to Hominoids

"Intellectus in formis agit universalitatem." Abū ʿAlī al-Ḥusayn ibn ʿAbd Allāh ibn Sīnā, c 1000 CE[2]

"Silva rigens, informe chaos, concretio pugnax,
discolor usie vultus, sibi dissona massa!
Turbida temperiem, formam rudis, hispida cultum
opat et a veteri cupiens exire tumultu
artifices numeros et musica vincla requirit". . .Bernardus Silvistris, c. 1147 CE[3]

We live within the fractal interfaces of the individual, nature, and culture. Modern modes of communication, technology, and globalization increase the complexity and the speed of evolution of that interface. Advances in science and technology drive much of this evolution. Some of these advances are in computer systems (cyberspace); some are in the hybridization of the human body with robotics (cyborgs); and some are in communications, artificial intelligence, cloning, genetic manipulation, stem-cell ontogenetic manipulation, pharmaceutical and molecular manipulation, nanotechnology, and so on. This evolution of both society and the nature of being-in-the-world influences the programs of emancipation suggested by many

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[1] 'Ardi' is the nickname for a 4.4 MYA *Ardipithecus ramidus* woman; 'Andy' is a nickname for androids in P. K. Dick's novel, *Do androids dream of electric sheep*?

[2] "The universality of our ideas is the result of the activity of the mind itself." Ibn Sina is also known as Avicenna, 980-1037 CE. See http://esfltwu.pbworks.com/w/page/9577677/Avicenna

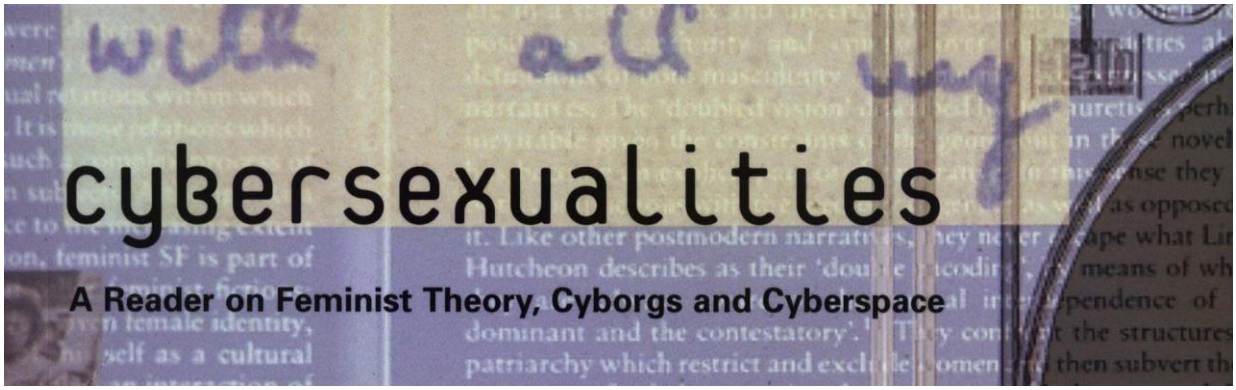
[3] "Silva, intractable, a formless chaos, a hostile coalescence, the motley appearance of being, a mass discordant with itself, longs in her turbulence for a tempering power; in her crudity for form, in her rankness for cultivation. Yearning to emerge from her ancient confusion, she demands the shaping influence of number and the bonds of harmony." (Witherbee, 1973, p. 67; see also Stock, 1972, p. 69). Bernardus Silvistris aka Bernard Silvester, c. 1085-1178 CE. These quotes are not meant to imply credence to their NeoPlatonic influences, but rather for their implications for the natural processes and self-organizational aspects of evolution of nature: the cosmos, life, the human mind, and culture.

theories of social philosophy. Cybersexuality—a philosophical, literary, and scientific genre inspired in part by new visions from science fiction—provides some prime examples (Wolmark, 1999).

This evolution also evokes some fundamental human motivations, such as our desire to optimize knowledge and stability in our world views, to know our origins and destinies, our meaning, to satisfy our ontological-existential quests. The quests for truth and for stability are at once two sides of the same tapestry, sometimes in conflict with each other, and sometimes synergistic, but always interactive, playing in the same conceptual attractors. Personal and cultural innovation lies in exploring where and how to weave within these fractal imbrications, and these involve tensions of stability and change, homogeneity and heterogeneity. Systems theory instructs us that innovation, personal and cultural, requires instability. How does the tension between the need for stability and instability resolve itself? Or put another way, why does instability beget stability, and vice versa, in a seemingly never ending chain?

Fundamental philosophical issues inform our lives, and vice versa. Basic philosophical positions affect all aspects of our personality and affect basic everyday decision-making as well as those that fundamentally direct the course of our lives. Furthermore, existential and religious ideas concern many people, and there are few areas in which independent thinking and creativity are more important, and which are exercised with greater diversity. Obviously, the evolution of human nature interacts with these ontological issues. Creative decision-making may be an increasingly important factor in this evolution, personally and culturally.

This evolution is taken up here in the context of reviewing human evolution to the present, then in considering the potential changes in human nature based on trends in modern technology, and then examining their implications for what it means to be human, and especially whether human freedoms will be liberated or constrained in an increasingly technological society.



New Perspectives

***Cybersexualities* (Wolmark, 1999) emerges from the confluence of postmodern cultural theory, feminist theory, and recent trends in science fiction, and extrapolations from fields related to artificial intelligence, which are largely due to advances in technology. That is, the gap between science fiction and reality seems to be shrinking due to advances in technology.**

Postmodern cultural theory arises in turn partly from the synthesis of Marxist theory, psychoanalytic theory, and existentialism (Poster, 1989). But at the same time, postmodern (and post-analytic, and hermeneutic) theory has challenged these and other traditional views in many ways. Consequently, each of these, Marxist, psychoanalytic, and existential theories, has undergone a transformation while being conflated into the whole. For example, Lacan's psychoanalytic concepts became more socially and less biologically founded. These confluences were heavily influenced, at least for Wolmark, by two principal texts, which found high favor in certain tech-savvy literary circles: Donna Haraway's *A Manifesto for Cyborgs* (1985), and William Gibson's cyberpunk novel, *Neuromancer* (Gibson, 1984).

Haraway, in her *Manifesto* (1985) says of the cyborg:

> **A cyborg is a cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction. Social reality is . . . our most important political construction. . . The international women's movements have constructed 'women's experience', as well as uncovered or discovered this crucial collective object. . . Liberation rests on the construction of the consciousness, the imaginative apprehension of oppression, and so of possibility. The cyborg is a matter of fiction and lived experience that changes what counts as women's experience. . . This is a struggle over life and death, but the boundary between science fiction and social**

reality is an optical illusion (p. 1).

Wolmark (1999) explains that the *Manifesto*:

. . . employs the metaphor [of the cyborg] in order to argue, firstly, for a reconsideration of Marxist and feminist analyses of the social relations of science and technology which rely on a received model of domination and subordination and, secondly, for the development of an innovative socialist-feminist political strategy that is not dependent on totalizing theories and in which the formation of new and unexpected alliances and coalitions are prioritized.

(Wolmark, 1999, p. 2.)

In *Neuromancer,* Gibson (1984) states:

'The matrix has its roots in primitive arcade games,' said the voice-over, 'in early graphics programs and military experimentation with cranial jacks. . . . Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts. . . . A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding,' (p. 51.)

Wolmark, from an interview with Gibson, said that he,

". . . coined the term [cyberspace] to describe the 'consensual hallucination' . . . 'Everyone I know who works with computers seems to develop a belief that there's some kind of actual space behind the screen, someplace that you can't see but you know is there.' " (Gibson, quoted by Wolmark, p. 3.) Wolmark continued: "In my view, this is the real significance of the metaphors of the cyborg and cyberspace — not only did they embody the lived experience of information technology, but they also offered a means of reconceptualising that experience in potentially non-hierarchical and non-binary terms." (Wolmark, p. 3).

Notice that these two metaphoric terms, *cyborg* and *cyberspace* emphasize nature and nurture. The cyborg emphasizes the innate nature, the biological (or physical) foundations of beings. Cyberspace emphasizes the importance of environmental and learning contributions to being and becoming, to the mind. The nature-nurture distinction is claimed mainly on the basis that the cyborg places a priority on replacing some of the biological aspects of being when human and machinery merge, while cyberspace changes the individual by replacing some of the environment with its virtual setting. This distinction is somewhat artificial. In the first place, nature and nurture never exist independently of each other. They interact and change in the process, a dynamical system. They do not exist independently of their mutual attractor, which one

might call the abstraction of their dynamical process. In the second place, biological systems obviously can learn from their environment just as cyborgs do. And in the third place, cyberspace has its own nature, including fixed structural elements. Nonetheless, the nature-nurture, cyborg-cyberspace distinction can provide a useful heuristic.

Brief Excursus on the Evolution of the Hominid[4] Brain and Cognition[5]

Humans share the same basic anatomical plan of the brain, which is found in all mammals (Magoun, 1963; Livingston, 1967) and even in amphibians and reptiles (Herrick, 1948, 1956; McClean, 1958). Hominid evolution retains most of the basic features of brain and behavior and overlays some important additions and elaborations. An oversimplified way of viewing this evolution is that the core aspects of the brain, such as its sensory, motor, and limbic systems and their emotional and regulatory control of basic functions in the course of evolution become increasingly under the integrative and control aspects of the associative and frontal cortices.

Hominids diverged from the other apes about 8 MYA[6]. Primates arose about 65 MYA. Recent dramatic reports from the Mid Awash area in the East African Great Rift Valley in Ethiopia have revealed evidence on all three principal periods of hominid evolution, *Ardipithecus*, *Austalopithecus*, and *Homo*. Recent dramatic reports have been made about the earliest of these; *Ardipithecus* (6-5 MYA) with known species of *Ar. kadabba* (some bones at 5.8 MYA; discovered too recently to make the two charts below) and *Ar. ramidus* (skeleton of 'Ardi' from the Middle Awash of the Great Rift,

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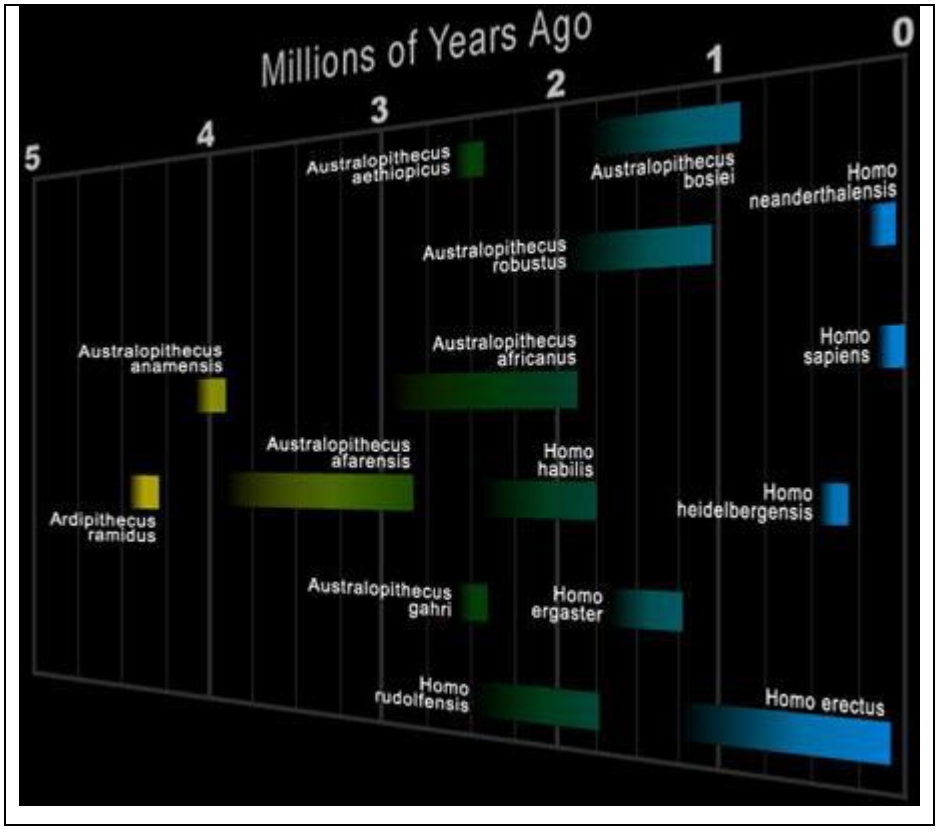
[4] For a discussion of the use of the terms "hominids", "hominines", and "early humans", see Smithsonian Institute page http://www.mnh.si.edu/anthro/humanorigins/ha/early.html My discussion is dated, while the Smithsonian and National Geographic pages can keep up with the rapidly occurring new finds and revisions.

[5] From time to time, I will insert some revisions and new findings in appendices at the end of the references.

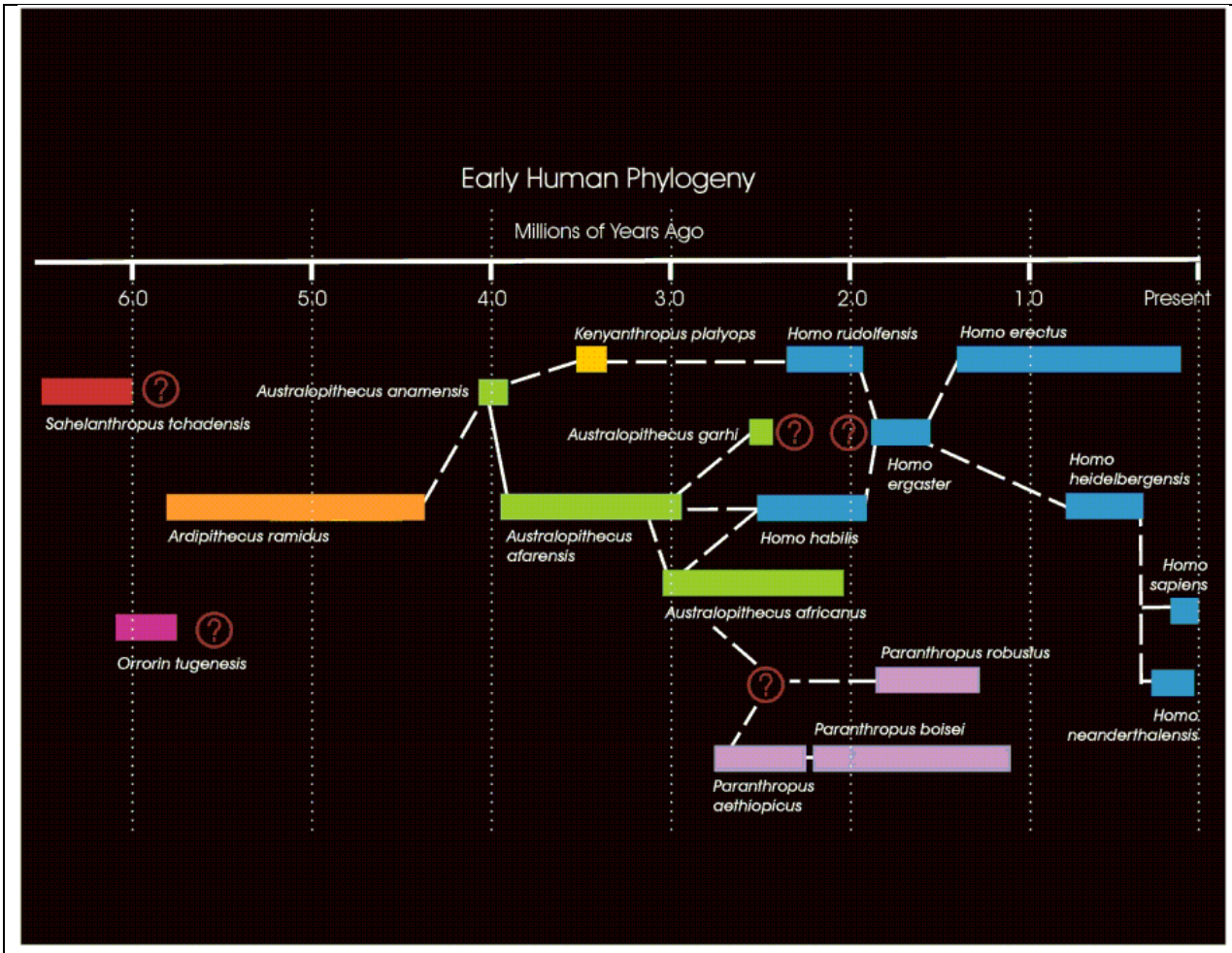
[6] MYA = Millions Years Ago; MY = Millions Years; KYA = Thousand Years Ago; KY = Thousand Years.

dated 4.4 MYA, White *et al.* 1995, 2009[7], Lovejoy, 2009; see also excellent popular reports by Gibbons, 2010 and Shreeve, 2010). Primarily forest-dwelling, their feet were adapted for both terrestrial bipedalism and arboreal quadripedalism; their diet was mainly nuts and fruits. The quadripedal conjecture is based more on the fragmentary pelvis, and thus upright bipedelasim is more conjectural. Ardi did not come out of the forest onto the savannah as did Lucy some 600 KY later (.6 MY). They are major candidates as belonging to the lineage leading to *Australopithecus* and eventually to *H. sapiens*. The earlier *Orrorin tugenesis*, a contended pretender as a progenitor to Australopithecines, was also both bipedal and quadripedal. *Au. afarensis* (e.g., Lucy) still could be the first bipeds to use the heel-strike, toe-off energetically efficient gait of modern humans, as evidenced by the Laeotoli (Tanzania) footprints (Raichien *et al.*; Leakey & Hays, 1982).



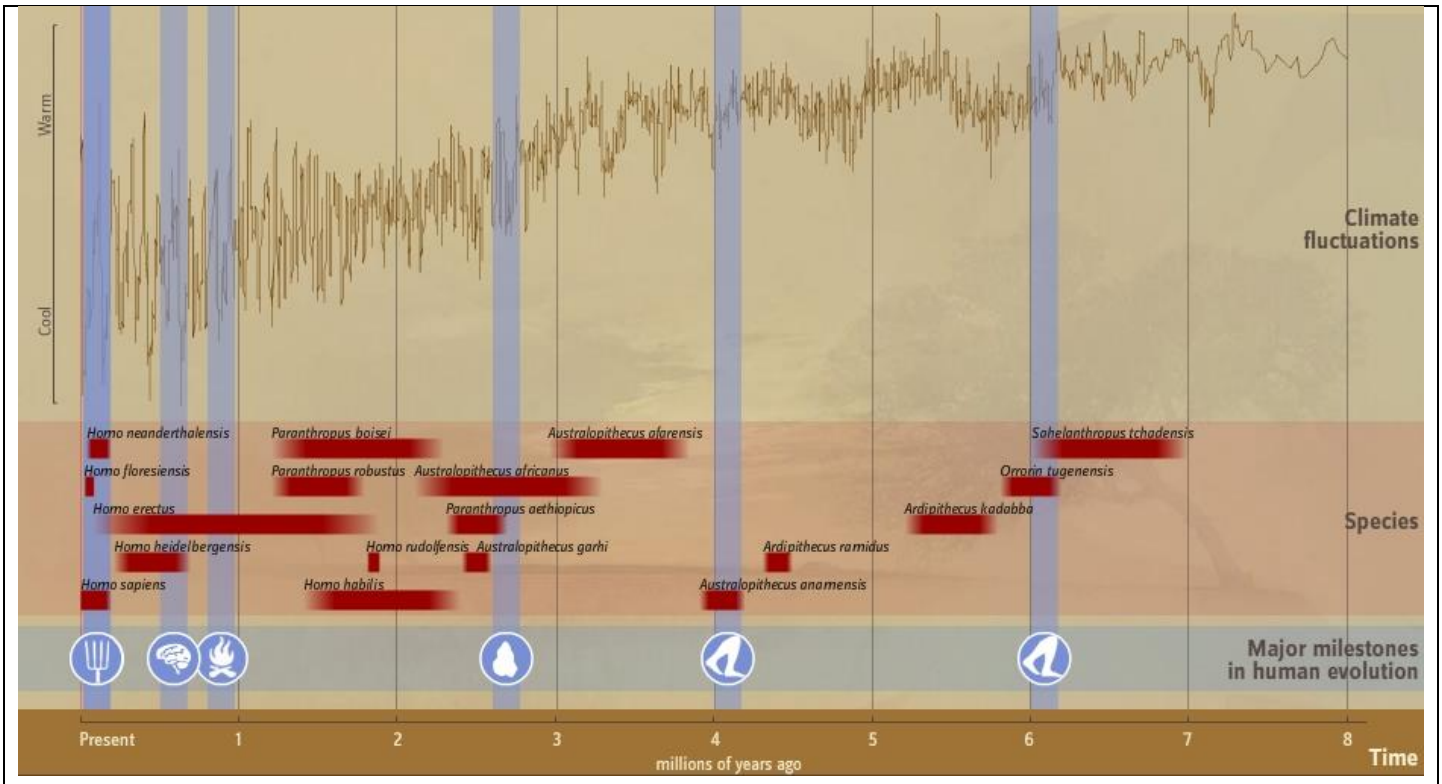
[7] **White and Lovejoy are but two of a series of eleven articles in the October 2, 2009 issue of *Science 326* (5949).**

Time Line for Some Important Hominid Species[8]



Smithsonian Institute's Human Evolutionary Timeline 2006

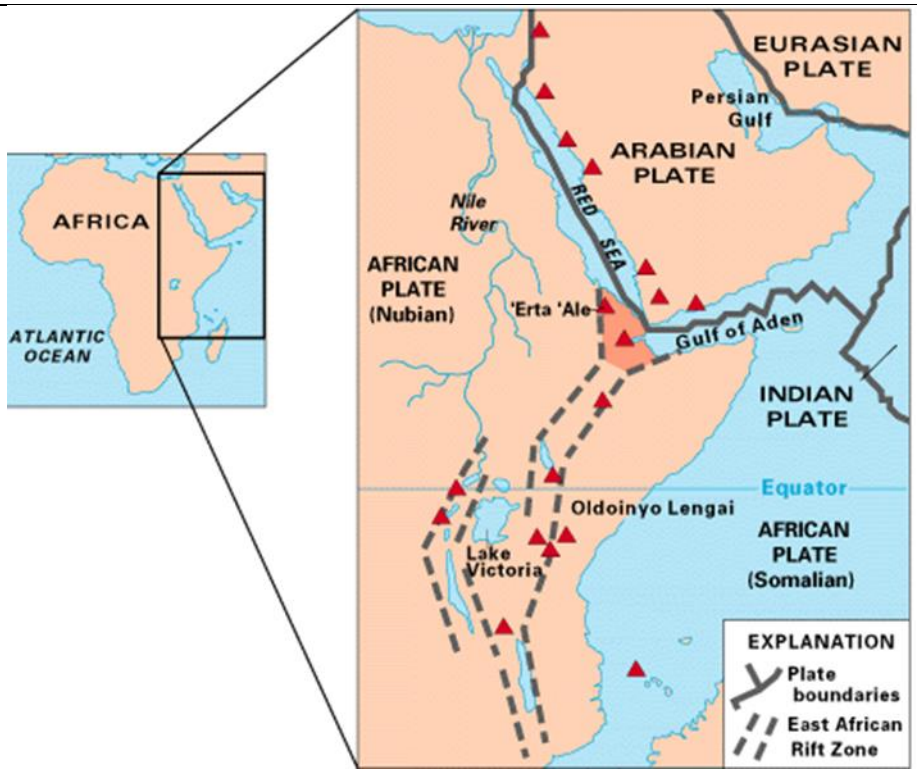
[8] **See Hominidae in endpanel of paleoantrhropological links—PL—at end of this article, retrieved 9 Nov 2010**



Smithsonian Institution's interactive presumptive genealogical tree, 2010.[9]

Symbols (blue icons), are self-explanatory, oldest walking about 6 MYA is for mixed bipedalism and quadripedalism in *Sahelanthropus tchadensis* and *Ardipithecus*. By the second walking icon at about 4 MYA the gait was mostly bipedal. The degree in *Au. aferenesis*, being disputed (Bower, 2010). Stone tools began earlier than previously thought, so the stone icon could also be moved to the right (McPherron, 2010). Climate is shown as its variability has exerted strong pressure on human evolution, especially on brain and behavior. The brain evolved greatly from *H. habilis* to *H. erectus*, the symbol could also be moved to the left, although *H. habilis'* brain evolution was slow for a long time.

[9] **For link to interactive version, see PL. endpanel.**



Map East African Rift Zone[10]

[10] **Great East African Rift System, map: http://www.indiana.edu/~g105lab/1425chap13.htm**

Afar Triangle, East African Rift System[11]

Coppens (1982, 1996) proposed that the genus Pan (Chimpanzees and Bonobos) evolved west of this rift, while the genus Homo [now we need to update, or rather backdate, that to include *Ardipithecus* and *Australopithecus*] evolved to the east of the rift, due to their increasingly diverging habitats—moist to the west, dry to the east—since the recent reactivation of the rift some 8 MYA, an example of peripatric speciation. In short, the eastern area became increasingly dry and the forest retreated—the forest migrated, so to speak, not the hominids, with Lucy (*A. afarensis*) having misleadingly providing the principal presumptive evidence for the initial migration from forest to savannah theory. These new ecological conditions favored the evolution of posture and locomotion, diet and dentition, culture and the use of tools, and encephalization and cortical reorganization. Tool making industry was conjectured to

[11] **Photo by Tim White, retrieved 12 November 12, 2010 from: http://www.geologyrocks.co.uk/forum/geology/afar_triangle/east_african_rift_system&usg=__TKVMsQmtxR1i7tkELl_IVbcqcPE=&h=500&w=750&sz=60&hl=en&start=0&zoom=1&tbnid=LXvolT**

exist earlier than *H. habilis* for which there was direct evidence, but has recently been confirmed for *Au. afarensis* (McPherron *et al*., 2010). It is significant that such complex behavior required for the tool industry occurred prior to significant allometric[12] increases in brain size. There is other evidence for reorganization of the *Australopithicine* brain that would support behavioral, cognitive, and cultural developments despite the small brain. Holloway, Clarke, and Tobias (2004, following conjectures by Dart, 1925), has maintained that an *Au. afarenesis*'s endocast suggested such a reorganization based on the posterior migration of the lunate sulcus which marks the boundary between the primary striate visual cortex from the regions anterior to it. Since brain volume had not changed, the adjacent association cortex including parietal, and even some temporal cortex had expanded. These areas, especially the posterior parietal cerebral cortex, provide a great deal of brain integration and interaction that support sensory integration, "visuospatial integration related to tool use and making, throwing objects with force and accuracy, as well as more sophisticated longer-term memory of spatial locations and qualities of self, other (i.e., facial recognition), prey and predators, including objects and resources". Tobias had previously disputed this contention for *Au. afarensis* (Tobias, 1996), but this more recent evidence with a specimen of *Au. africanus* has confirmed Holloway's speculations, and made it reasonable to assume that some reorganization of the brain was taking place in *Australopithecines*.

Moving on to two to three MYA, further climatic changes took place in this region of eastern and southern Africa, with a concomitant rapid and dramatic evolution of hominids. Such rapid evolution usually requires geographic isolation and a relatively small gene pool, that is, a relatively small population, a series of such bifurcations punctuating slower periods of evolution have been termed "punctuated equilibrium" (Gould & Eldridge, 1977). Here, the result was the appearance of *Homo* and two

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[12] **A*llometry* measures the relationship between sizes of different body parts and may include features of shape or growth. Of interest here is the ratio of brain size to body size, or parts of the brain to brain size, and their increases across phylogeny. Jerison (1973, 1991) has formalized the brain:body size relationship as the encephalization quotient (EQ).**

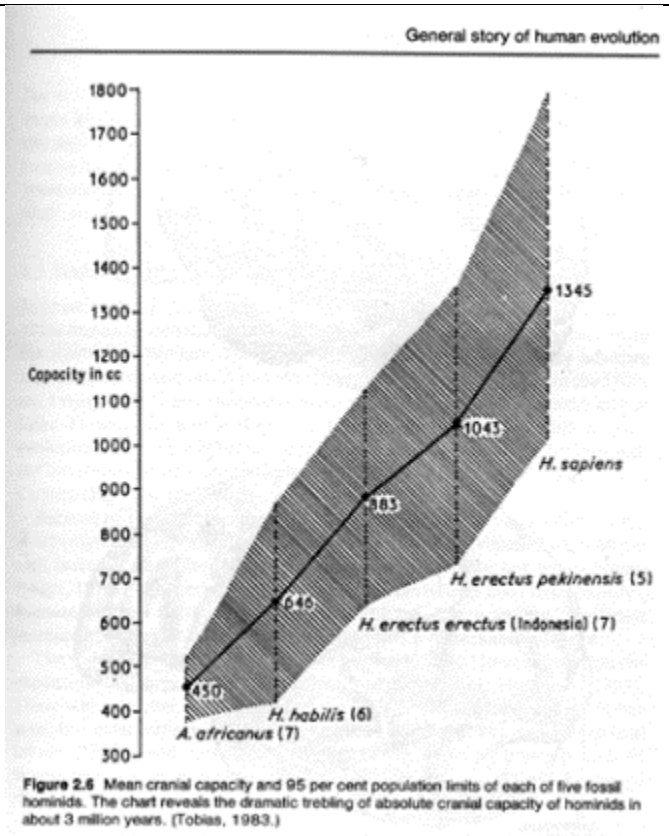


Figure 2.6 Mean cranial capacity and 95 per cent population limits of each of five fossil hominids. The chart reveals the dramatic trebling of absolute cranial capacity of hominids in about 3 million years. (Tobias, 1983.)

Evolution of Cranial Capacity 1983 Chart[13]

species of robust *Australopithecines, Au. ghari* and *Au. africanus,* which became extinct. *H. habilis,* the first *Homo,* was the "size of a chimpanzee, exceptionally intelligent, imaginative, inventive, creative, talkative, emotional, and social. . . and had a larger brain (averages of 640 cc vs. 400 cc for *A. africanus*), a more exclusive bipedalism, a new diet, and an improving culture"(Coppens, 1996, pp. 108-9). Cultural sophistication is often witnessed by the nature of stone tools, for *H. habilis* , Oldovan, roundish with few faces and more crude than those to follow. For psychosocial implications of bipedalism, see Arons (2007).

[13] **Tobias, 1983 cited in Eccles, 1989, p. 21. This graph should be modified from linear interpolation between species, to a "punctuated equilibrium" or scalloping of positive acceleration or alternation of gradual and fast evolutionary progress, both within and between species.**

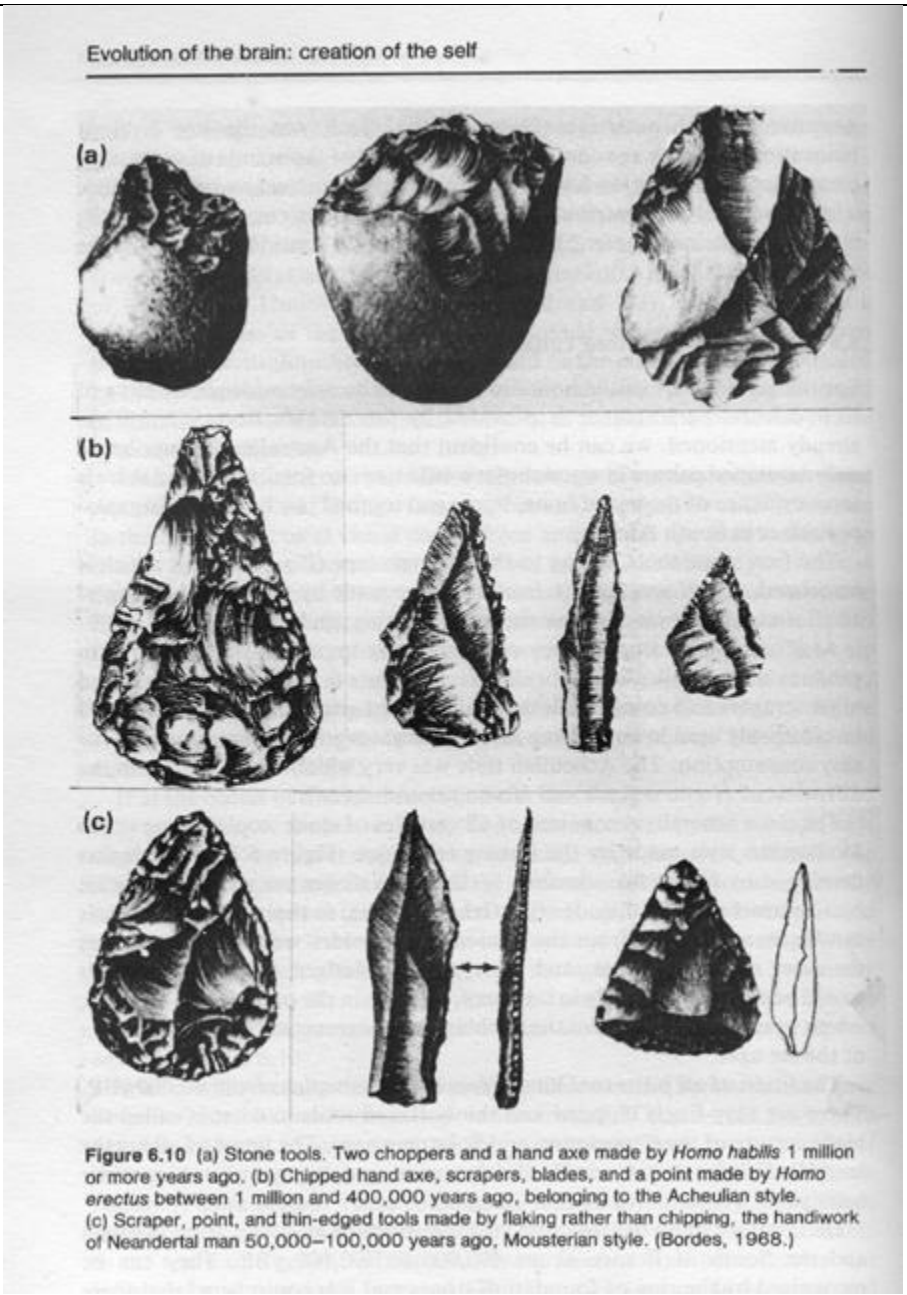


Figure 6.10 (a) Stone tools. Two choppers and a hand axe made by *Homo habilis* 1 million or more years ago. (b) Chipped hand axe, scrapers, blades, and a point made by *Homo erectus* between 1 million and 400,000 years ago, belonging to the Acheulian style. (c) Scraper, point, and thin-edged tools made by flaking rather than chipping, the handiwork of Neandertal man 50,000–100,000 years ago, Mousterian style. (Bordes, 1968.)

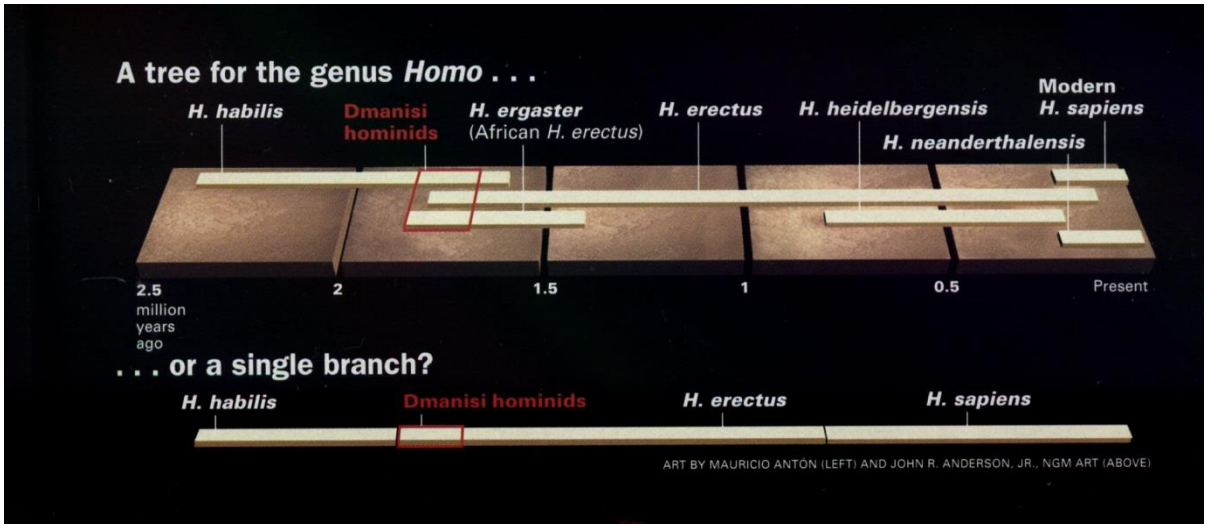
Stone Tools[14]: (a) Oldowan, *H. habilis*;

(b) Acheulean, *H. erectus* (c) Mousterian, *H. sapiens neanderthalensis*

[14] **Bordes (1968 cited in Eccles (1989), p. 134.**

During the quarter million year reign of *H. habilis,* endocranial capacity increased considerably (up to about the 900 cc for entry-level *H. erectus*). Allometrically, these relative enlargements were even greater. In frontal and parietal areas of the cortex, there were increases in size and gyral details and in asymmetries. Especially, there was in a prominence at the position of Broca's area, well known for its importance in speech. Several factors suggest social communicative competence beyond any chimpanzee, according to Holloway (1996), including (a) the stronger communicative proclivities of yet higher primates; (b) the formation of a true *Homo*-like Broca's area in a small-brained hominid (*H. erectus); (c)* strong cortical asymmetry, and (d) the presence of stone tools all made to a standardized pattern. There is also greater venous cranial drainage, important for improvements in locomotion, cognition, spatio-temporal coordination, and increase in brain size. Thus while the change from *Ardipithicus* to *A. africanus* was realtively gradual, the evolution to *H. habilis* was rapid. It showed rapidly increasing brain size, organization, and the likelihood of speech in this upright early ancestor.

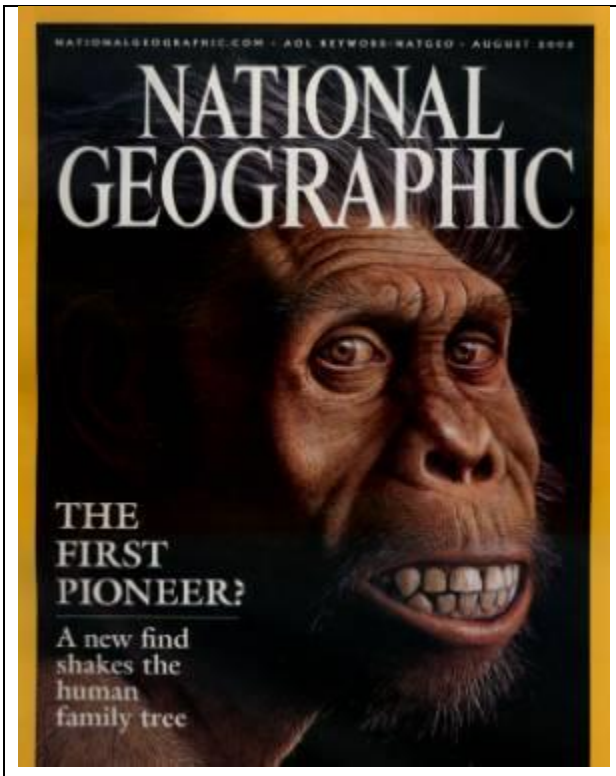
About 1.5 MYA, over a period of about a half million years, *H. erectus* appeared and migrated widely from eastern Africa to Africa, Europe, and the Far East. The Leakeys elucidated its unique Acheulian tool culture at the Olduvai Gorge in Tanzania (Leakey & Lewin, 1977). *H. erectus was* also the first to use fire. Beyond increase in brain size, there were other telling signs of sophistication, including (a) continued cortical lateralization, (b) reorganization of posterior parietal cortex for multimodal processing and for the integration important for natural selection via social pressures for increased communication, (c) visuospatial integration needed for tool-use and hunting, and (d) memory of spatial location of self, others, and environment (Holloway, 1996). Increases in meningeal vascularization also support these postulated advances (Saban, 1996).



[From National Geographic Magazine, August, 2002]

[Hominid Evolutionary Time Line including Dmanisi]

It should be noted that there was an earlier migration from Africa about 1.75-1.8 MYA by Dmanisi (Republic of Georgia) hominids, somewhat *habilis*-like but now tentatively designated as *H. erectus* (Dmanisi) by most paleoanthropologists. This early *H. erectus* was small, with smaller brain volume, had primitive Oldovan stone tools but developed new stone tools (Balter & Gibbons, 2002; De Lumley *et al*., 2006; Gabounia, de Lumley, Vekua, Lordkipanidze, & de Lumley, 2002; Gore & Tsibakhashvili, 2002), and possessed empathy and speech (Meyer, Lordkipanidze & Vekua, 2006) . Prior to this finding, the later, more evolved H. *erectus* was assumed to be the first to migrate. This suggests more competence to the smaller brain than was previously appreciated, as well as considerable evolutionary biological, cultural, and behavioral creativity.

	
Dminisi Facial Reconstruction	**Dminisi Skull**

Dminisi Images From National Geographic, November, 2002

Next, out of the radiation from Africa of *H. erectus*, there was apparently a gradual evolution of *Homo sapiens neandertalis* (500,000 – 120,000 years ago). There was a corresponding gradual increase of several skeletal features, in brain size, and in meningeal vascularization, and changes in tool culture (Mousterian). Coppens (1995) makes the point that there was more biological than technological evolution going on from *Homo erectus to Homo sapiens neandertalis*, based on a measure of the length of cutting edge per kilogram of stone tools. Yet subsequently, the evolution of *Homo sapiens* showed greater technological evolution than biological. He conjectures, "It appears that 'instinct' was more important than knowledge during initial evolution, but that the volume of data to be learnt was becoming more important than 'instinct' 100 000 or 200 000 years ago" (p. 110). Here then was a significant shift in brain priorities. One may be alert for such shifts as the story continues.

The most dominant thrust of evolution of hominid brain seems to be on neocortex, which appears most responsible for cognitive development and control over the basic mammalian limbic-emotional system. However, there was also some evolution of the limbic system itself. The evidence is based on the comparison of living primates and their relationship to evolutionary history. Within the limbic system, the hippocampus, especially parts involved with memory and cognition are greater in humans than in apes. In the amygdala, the septum and cortico-basolateral parts increased relative to the centromedial nuclei. Thus "it can be concluded that in the limbic system, evolution tended to enhance those components related to pleasurable and enjoyable experience, while the components related to aggression and rage remained underdeveloped." (Eccles, 1989, p. 106). Stated more simply, pleasure and positive emotions increased compared with aggression and negative emotions.

To approach this shift a different way, consider first that the basic limbic-emotional organization of the brain is ancient, evolutionarily speaking. And that, beyond this, the degree of expansion of neocortex with its layered and columnar organization and its multiple cortical sensory and motor mapping at first increased gradually. However, it potentially passed a critical bifurcation parameter, hastened by genetic isolation, yielding jumps in evolution called *punctuated equilibrium* (Gould & Eldridge, 1977). These developments changed the evolution of human culture from a more biological or instinctual basis to a more learning and cognitive basis. At the same time it increased the role of cooperation and altruism.

Why have I included this excursus on hominid evolution? Briefly, for at least four reasons: (1**) Hominid evolution depended on the everyday acts of our predecessors; flaking a stone tool in a new way was performed under the pressures of the need for food, clothing, and defense, (**2**) it produced a brain increasingly capable of information processing, creative thinking, and the everyday creativity we exhibit today, (3) this in turn fed back into the evolutionary process; a process which is itself inherently creative, and finally (4) it gives us a sense of our place in the universe, our place in history, a clue to our destiny, and a sense of awe, hope, curiosity, and anxiety. (See Arons; Eisler; Loye, 2007 and in Richards, 2007, for other perspectives on brain, behavior, and evolution.)**

The potential for what one calls creativity, involving the innovative generation and combination of information, could increase, both for individuals and collaborative groups. Indeed, some of the evolutionary pressures generating biological evolution could now be turned to enhance cognitive functioning. Biology thus offers new potentialities for creativity. Turning to our present and possible futures, cybersexual discourse explores some of the possible next steps in the evolution of those potentialities and limitations, and the possibilities of their contribution toward emancipation—our personal freedom, social liberation, and creativity.

Excursus on Postmodernism and Gender

Postmodern literature, despite its great diversity, has a major theme of establishing the process of discourse, rather than dominating ideologies, as a means for providing a continuing flow of society toward equal opportunity and freedom from tyranny and discrimination. Wolmark's (1999) commentary, which sets the theme of her book, seems to place science fiction literature as sharing some communality with this postmodern discourse. (This is cryptically buried in her terms, "non-hierarchical and non-binary"; quoted in the introduction.)

Such communalities can co-exist along with some differences. For example, Hutcheon (1989) has noted the communality of the theme of social liberation that is shared by feminist and postmodern agendas. This communality exists despite the difference that feminism has an agenda, an ideology, while postmodernism avoids such ideologies in favor of establishing societies based on open-forum discussion. (One might argue, perhaps, that postmodern aim itself could be considered some sort of generic or non-specific ideology, but it is at least an ongoing and flexible process that allows for alternative viewpoints toward complex, and "non-binary" resolutions.).

I think Wolmark inherits this usage of the terms *non-hierarchical* and *non-binary* from French feminist, philosopher, playwright, and poet Hélène Cixous (Cixous & Clement, 1986). For Cixous, as for Jacques Derrida, oppositions (binaries) can be dangerous, a source of oppression. For those of us involved (and many who are not so involved) in dynamical systems theory (see Schuldberg in Richards, 2007), we have a great deal of admiration for the Heraclitian model of oppositions as creating a process

that produces a new dynamic of greater complexity (an *attractor*—a pattern of activity created by mutually interactive agents) that surpasses each component of the binary (Bird, 2003; Greeley, 1990; Sabelli, 1989).

At the same time, we have to understand that the dynamical process may produce maladaptive or harmful cultural attractors, as well as desirable ones. This can happen especially when the relative strength of the influence of each part of the binary is asymmetrical. "A" clearly dominates "B." This is the meaning of her term, 'hierarchical'. A healthy social process should minimize the asymmetry of the binary to produce possibilities beneficial to all participants in the binary opposition. It is probably no coincidence that creative thought also goes beyond polarities and favors the complex thinker who can tolerate ambiguity (Montuori, Combs, & Richards, 2004).

Some of her hierarchical binaries include culture vs. nature, form vs. matter, speaking vs. writing [to which I might add, conscious vs. unconscious, and logical vs. emotional]. These binaries can also be related to the opposition between man and woman; and all have one element of the binary as privileged over the other. (Sarup, 1993). Also, creative thought seems characteristic of individuals who are relatively more free of gender stereotyping, a tendency which has been called *androgynous* (Montuori, Combs, & Richards, 2004), and which is syntonic with the writings of Cixous.

> **[Cixous] argues for the possibility of sustaining a bisexuality: not as a denial of sexual difference, but as a lived recognition of plurality, of the simultaneous presence of masculinity and femininity within an individual subject.**
> **For Cixous, writing is a privileged space for the exploration of such nonhierarchically arranged bisexuality. . . . she favors texts that are excessive in some ways, texts that undermine fixed categories.**
>
> **(Sarup, 1993, p. 111).**

If two or more agents in a network are more symmetrically coupled, then instead of evolution to fixed positions, that is, where one of the agents and its ideological position of a binary or multiple network wins over the other(s), that is, where one agent (ideology) becomes an *absorbing state* or *fixed point attractor*), there ensues a complex dialogue or, in chaos theoretical terms, dynamics that exhibit a strange attractor. (See also Eisler in Richards, 2007, on gender and partnership.)

Instabilities play a role, and these in turn can open the door to social change, a paradigm shift, a bifurcation, a 'road not taken'. The instability caused especially by challenge to oppressive institutions has often led the most dramatic social and cultural changes (West, 1953). In my class on the psychology of creativity at Silliman University in the Philippines, one of our projects was to investigate politically oppressed people, principally, individuals incarcerated or executed by governments, such as Martin Luther King, Benigno Aquino, Nelson Mandela, Jesus, Joan of Arc, Galileo Galilei, Giordano Bruno, Tomas Paine, and others whose creativity is unquestionable, as well as their bravery. Rollo May's (1975, p. 16) discussion of Alexander Solzhenitsyn, and also his noting that creativity "involves potential conflict with those in power, be they gods or parents" (May, 1953, p. 159), prompted our classroom inquiry. To conduct such discourse surely requires Tillich's "Courage to Be" (Tillich, 1952; Abraham, 1996, May, 1975). It can also further enhance creativity.

Now, Some Incursions into Cybersexuality

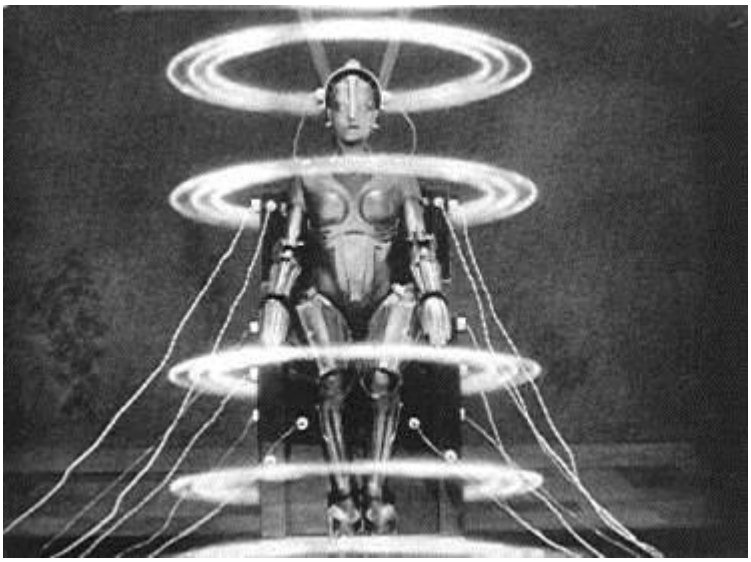
The word *topoi* (Crucius, 1991) refers to a sense of community and home, of belonging and meaning from both the point of view of our place in the universe and from the point of view of our place within various contemporary communities in which we dwell. One source of such meaning in our lives derives from being a participant in the long evolutionary development of our species. This includes the evolution of our cultures over numerous generations of *Homo sapiens*.

In science fiction, many authors examine disruptions in the roles of reproduction and parenting. By doing so, they force a reexamination of those roles and their implications, both for understanding our human nature, and for providing guidance in the emancipation from some of the psychosocial aspects of those roles that have become repressive. This flexible understanding can help, as well, to nurture creativity in our own everyday lives, and this creativity is greatly needed. Science fiction is by no means the only literary genre dealing with these issues, yet the advances of modern science and technology has made many of these fictional disruptions a reality, giving them added urgency.

Mary Ann Doane (1999) states, "[for] some contemporary science-fiction writers—particularly feminist authors—technology makes possible the destabilization of sexual identity . . . " (p. 20) As an example, she discusses *L'Eve Future* by Villiers de l'Isle-Adam (1886) in which a mechanical Eve, a perfect (but sterile) replica of a woman, reveals the dissociation of sexual desire from reproductive capability and motherhood. *L'Eve* also exhibits the "compatibility of technology and desire," themes which have been repeated in much science fiction since then, for example, in the films *The Stepford Wives* (1975), *Alien* (1979), *Aliens* (1986), and *Blade Runner* (1982). According to Huyssen (1986), in Fritz Lang's film, *Metropolis* (1926), the replication engenders fear rather than desire:

> **The fears and perpetual anxieties emanating from ever more powerful machines are recast and reconstructed in terms of the male fear of female sexuality, . . ." (quoted by Doane, p. 24).**

Huyssen also claims that the 'ultimate technological fantasy' is creation 'without the mother'. (Doane, p. 24.)



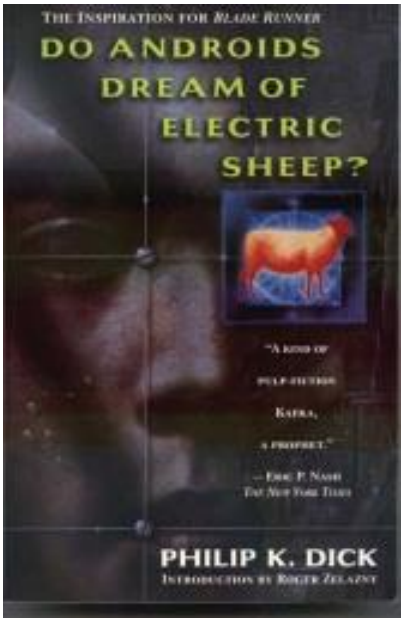
The heartbreaking female android, Maria from Fritz Lang's Film, *Metropolis* (1927)

For other similar tales, see Adrian Mourby, 2004.

http://www.adrianmourby.com/pages/articles/article-detail.asp?News_ID=4

In some science fiction, empathy/sympathy for the other gender is, instead, promoted. In Ursula Le Guin's *Left Hand of Darkness* (1969) sexual partners undergo, occasional, synchronous, gender reversals. Thus knowledge and empathy with the partner is greatly enhanced compared to the human experience. Empathy can also be appreciated in the pair of *Alien(s)'* movies in which there is stereotypic gender role reversal seen in the strength of the character of the female protagonist, and in the amplified violence of the human male giving "birth" to monstrous alien creatures.

As dynamical systems" theory suggests, large changes occur when there is large instability. Doane's discussion of destabilization of sexual identity, the sexual transformations of La Guin's *Left Hand of Darkness,* and "births" in the movie sequence, represent such instabilities. Reproduction is diabolical in its very nature, "it makes something fundamental vacillate." (Baudrillard, 1981, 1983). Doane pushes this concern one step further: "What makes it vacillate are the very concepts of identity, origin, and the original . . ." *a là* Benjamin (Benjamin, 1969; Doane, 1999, p. 31.)



In *Blade Runner,* the android, Rachel, tries to prove her authenticity as a human to Rick, a human. This raises the issue of the difference between an android and a

human. What is the critical significance of the difference when so many human traits are encompassed in the android? The movie is based (with many themes left out), on Philip K. Dick's novel, *Do Androids Dream of Electric Sheep?* (1968) to which we now turn. This novel could be construed to be skeptical of human nature, by creating a society in which overly commercial religion, over importance of pets, but most importantly, and androids become more exact replicates of humans. Android evolution toward the human includes their everyday creativity, and their desires for self-preservation, love, etc. While the novel questions many aspects of human nature, it can also be taken as an affirmation of those human qualities even when exported to machines.

The setting for the main theme is that androids are produced by the Rosen Association for export from a radioactive post-apocalyptic earth (in year 2021), to be used as slaves in extraterrestrial colonies. Many of them don't like the bleak conditions there and sneak back to earth, where they are *persona non-grata*, to be hunted and destroyed. There are psychological scales to discriminate between real humans and androids, employing psychophysiological measures (facial capillary and muscle reactions). Continual improvements of androids are made up to the current model, the Nexus-6, and a continual evolution of the sophistication of androids attempts to defeat the tests used to detect them. To complicate matters, the issue of false positive identification of a human as android could lead to the destruction of innocent humans. Some androids are running around northern California and Rick, the protagonist, a bounty hunter for the San Francisco Police Department, inherits the task of finding and destroying them. His predecessor had been shot by one of them, a very smart android. Rick heads for the Rosen factory in Seattle to check the adequacy of the test discriminating between some Nexus-6 androids and humans.

The critical difference, to which the test is directed, is that androids only lack one human trait, empathy. The test detects this by finding an emotional "flattening of affect" to empathic questions. Schizophrenics fail the test (i.e., show the flattening as if an android, rather than the emotional response a human would show), but are housed in mental institutions where they would not be tested for being android. If androids foil the test at Rosen Associates, the production of the Nexus-6 will have to be stopped (it

would not do for the test to falsely exonerate an android—false negative, nor accuse a human of being an android—false positive). Rachel Rosen, presented as niece of the president of the corporation, meets Rick. The Rosen factory has an android group and a control group waiting for testing, but as Rick is about to start, Rachel says "Give me the test."

> **Rachel no human emotional response to empathic test items and Rick concludes she is android. Eldon (the president) counters that she is actually human, and the test has failed. He claims she has lived on a spaceship most of her life, the appropriate affect has not developed, and she has missed police checks by staying in the factory. She is one of the non-institutionalized schizoids. Eldon then charges that the use of the tests is unethical, as they probably have made false identifications before, leading to the killing of real humans. Eldon does not want a test around that can detect the androids, and presumably a test capable of false positive identifications would lead to disuse of the test. [Such an analysis overlooks the possibility that the government would stop production until a better test could be developed.] The Rosens also try to bribe Rick with the gift of a "real" owl. If the test is bad, he is temporarily out of bounty income until better tests can be created. Actually, like Rachel, the owl is a fake, being palmed off as real. The over importance of pets, real and artificial is an important sub theme of the book that also raises other important issues on the meaning of humanity, and the desperation and contortion of it by a post-apocalyptic world. Rachel refers to the owl as "it" and Rick gets suspicious. He puts the apparatus on her again and asks one question while referring to his briefcase as being made of human babyhide. She reacts incorrectly (flat, no**

> **emotional response}, revealing that she is android. The test is exonerated, Eldon "slumps." Rick says to Eldon, "Does she know [that she is android]?" (False memories in the past failed to defeat the test.) Eldon replies "No. We programmed her completely. But I think toward the end she suspected." Then, to Rachel he says "You guessed when he asked for one more try" (Dick, 1969, p. 59) Rachel nods affirmatively.**

To summarize, the meaning of being human is largely revealed in the history and future of the human-android-pet relationships (where religion, incidentally, is yet another subtheme of the novel seen in the struggle between Buster Friendly, a mindless continual TV show and Mercerism, a mindless religion based on an over inflated empathy via mind-meld empathy boxes, which among other things shows that a good thing, empathy, can be absurd when taken to extremes). There is also a lot of everyday creativity as the protagonists spar around these issues in this narrative, with the chance to expand their vision of human identity and possibility, in this nexus between everyday life and ontology. Indeed, these issues go beyond shedding gender or other specific features of body and psyche. Hiroshi Ishiguro, a leader in the use of cognitive, behavioral, and neuroscientific work in Japanese android science, also has stressed the implications of androids for understanding the meaning of human nature (Hornyak, 2006a,b; Ishiguro, 2005).

> **To make the android humanlike, we must investigate human activity from the standpoint of [cognitive science, behavioral science and neuroscience], and to evaluate human activity, we need to implement processes that support it in the android.**
>
> **(Ishiguro as quoted in Horrnyak, 2006a.)**

[Ishiguro's Repilee, A Modern Eve? Are we her serpent, her tree?]

Claudia Springer (1999) observes that much of cyberpunk popular literature, including comic books, has cyborgs or individuals entering the matrix (cyberspace) seeking to get rid of the "meat", the organic body, to become pure consciousness. That change should eliminate gender differences. She mentions Haraway's (1985) optimism that this situation makes the cyborg a "potentially liberating concept that could release women from their inequality under patriarchy . . . " (Springer, 1999, p. 41).

However, Springer also points out that, paradoxically, gender becomes stereotyped and exaggerated in the popular cyberpunk literature, despite its transformation from organic to mechanical imagery, for example, with Robocop, and with Topo and Neon Rose in the comic book, *Cyberpunk* (Rockwell, 1989). Or as Anne Balsamo (1999) puts it, "Cyborg images reproduce limiting, not liberating, gender stereotypes" (p. 153).

Hans Moravec (1988), a leading robotics expert at Carnegie Mellon, envisions downloading human consciousness into computer networks. Here is disembodied consciousness. Lyotard (1998–9) poses the related question, "Can thought go on without a body?" (quoted by Springer, p. 35). To which he replies that "the most complex and transcendent thought is made possible by the force of desire, and therefore 'thinking

machines will have to be nourished not just on radiation but on irremediable gender difference'" (quoted in Springer, p. 41). Baudrillard (1988)

> **sees the collapse of clear boundaries between humans and machine as part of the same postmodern move toward uncertainty that characterizes the collapse of difference between genders: 'science has anticipated this panic-like situation of uncertainty by making a principle of it'**
>
> **(Quoted in Springer, p.41).**

Cyborgs epitomize the oppositions of immortality and death, an opposition that implies uncertainty, a theme Springer (1999) goes on to explore, saying "not even death is a certainty" (Springer, p. 52):

> **William Gibson (e.g., 1984) and Rudy Rucker (1982, 1988) have made immortality a central theme in their books, raising questions about whether nonphysical existence—which can continue vastly longer than physical existence, or even indefinitely—constitutes life. Especially in Gibson's novels the question arises whether capitalism would allow only the extremely wealthy class to attain immortality." (Springer, ibid.)**

Cyberpunk fiction is not without recognition of the paradoxes and dangers of immortality; "characters who become immortal are usually surrounded by a tragic aura of loneliness and decay. (Springer, ibid.).

> **Even Topo, in the comic book *Cyberpunk*, rejects the idea of leaving his meat behind and remaining permanently in the Playing Field when he is offered the opportunity. (Rockwell, 1990.) What he rejects is immortality. But the comic book also reveals that the loss of his human body would be tantamount to death. Still, in this experience for Topo, something remains which may be relevant to evolution. "[Nonetheless, Topo says,] 'after all, I'm only a data construct myself, now. Nothing equivocal about it. We live. We are forms of life, based on electrical impulses. Instead of carbon or other physical matter, we are the next step.'**
>
> **(Rockwell, 1990; Springer, 1999, p. 52).**

> **"These examples," according to Springer (1999), "show that cyborg imagery revolves around the opposition between creation and destruction of life, expressing ambivalence about the future of human existence" (ibid.).**

Thus, we see (a) that human nature may come to share some qualities with (or adopt them from) the cyborg and our environment with cyberspace; (b) that this may call into question previously unchallenged assumptions about what makes us male or female, or, for that matter, even human, or alive, and science fiction can help us evaluate these assumptions; (c) that such advances in scientific technology offer us new chances for freedom and redefinition of who we are; while (d) at the same time

manifesting a process of evolution, from hominid brain into the cyberworld, in which deliberate innovation and creativity play a growing role, where one (e) can manifest higher creative possibilities through a non-hierarchical, non-binary, and multiperspectival orientation. The resultant ability to produce higher level creative truth also fits well with phenomena in nonlinear dynamical systems and complexity theory—notably, bifurcation, emergence, and self-organization. Thus, (f) it behooves us to consider broader views of humanity and human nature as human nature becomes increasingly intertwined with the cyberworld of the future.

Epilog

There have been opposite approaches in Western philosophy to the search for truth. One seeks absolute knowledge (the Eleatics, Plato, Confucius). The other seeks diversity and change (Heraclitus, Gorgias, Protagoras). These approaches have been involved in almost every philosophical inquiry from the Greek cosmologists to contemporary postmodern and gender-oriented literature. An early stage for this distinction was really set by

> **Heraclitus of Ephesus (c. 544-484 BC) [who] argued that the entire substance of the world is in a ceaseless process of change, while the Eleatic philosopher Parmenides (c. 540-470 BC) held to the opposing theory that the ultimate substance (Being) is unchanging and unchangeable, permanent.**
>
> **(Sahakian, 1968, p. 6).**

Could the distinction be partly true and partly false, or even both fully true, as the Zen master says (Nhat Hanh, 1998). Many have tried to reconcile them. Xenophanes, made an early attempt, viewing them as problems of being and becoming, and of rest and motion. (Sahakian, 1968, p. 6). Due to my interest in nonlinear dynamics, I have viewed them as **aspects of stability and instability (change).**

In dynamical systems theory (see Schuldberg in Richards, 2007), patterns emerge in time and space from the interplay of one to many variables, each stretched out between oppositions, or ends of a continuum. When the interplay is complex, the patterns of potential interaction form "strange" or "chaotic" attractors, such as the well-known Lorenz attractor from a model of atmospheric activity (Lorenz, 1983; see

Abraham, Abraham, & Shaw, 1990, pp. II–71–75) or those conjectured for creativity (Abraham, 1996). While usually described by deterministic equations, the trajectories of these patterns are often characterized as uncertain. From a given starting position, trajectories can diverge from each other in the short term, due to the impossibility of getting infinite resolution in time and space for the starting coordinates. Thus, what is deterministic in theory may become predictable only in a probabilistic, not an exact, sense. Systems that possess this "strangeness" of "attractors" (pattern of activity to which a system settles down) exhibit two interesting characteristics: (a) this characteristic uncertainty, and more importantly, (b) large dramatic changes in their behavior with small changes in environmental or control conditions, a feature called "bifurcation."

Of great interest is the fact that change, from one stable attractor to another requires, initially, the creation of instability in the system. Hence, change, and creativity, whether in cosmological evolution, biological evolution, cognitive, or cultural evolution, and whether on a massive scale or in the details of "everyday" creativity, involve both uncertainty and instability (Abraham, 1996; Abraham et al., 1990; Sabelli, 2005).

Postmodernism and critical theory are heavily concerned with the relationship between emancipation and theory (Marçöl & Dennard, 2000; Poster, 1989) as follows

> **[Foucault, Derrida, and Lyotard claim] "that the quest for certain truth and the claim of having attained it are the greater dangers. The logocentric philosophical tradition, with its strong assertions about truth, is complicit, for them, in the disasters and abominations of the twentieth-century Western history. On this difficult, even tragic issue of the relation of politics to truth, poststructuralists in general strive for a cosmopolitan position that makes every effort to recognize differences, even uncomfortable or disagreeable ones, and for a theory of truth that is wary of patriarchal and ethnocentric tendencies that hide behind a defense of reason as certain, closed, totalized. Above all, poststructuralists want to avoid forms of political oppression that are legitimized by resorts to reason, as this kind of legitimation has been, in their view, one of the paradoxical and lamentable developments of recent history.**
>
> **(Poster, 1989, p. 16).**

Systems theory suggests that change and choice are dependent on having a certain amount of instability, of abandoning rigid ways of thinking and being. It thus, at least metaphorically, supports a Heraclitean and postmodern social theoretical view

of the inherent importance of change, and thus, the ability to think flexibly and creatively and make choices. The discourse of change is an essential part of emancipation, of establishing an open society. But the essential source of change comes from within (self-organization, in systems language, including options for creative change). These conditions of flexibility best flourish with a great deal of personal courage in the face of our existential-cyborgian anxiety, and often despite conditions of inequality and oppression in a society.

> **What then about intelligent life that can self-reflect and even transcend our limited consciousness?**
> **Humans have indeed come forth in our manifest cosmos. And humans, as evolving life forms and cultures, are surely not finished. How might we personally develop; how might life forms evolve? At this dangerous crossroads for planet Earth and our own individual futures, how can we better live for ourselves and for all of creation, while manifesting the underlying beauty of a cosmos that holds the mysteries of life? Perhaps everyday creativity can help show us the way.**
>
> **Ruth Richards, 2007, concluding paragraphs, p. 314.**

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Some Good Links for Paleoanthropology

http://www.archaeologyinfo.com/species.htm (Hominidae)
http://darwiniana.org/hominid.htm (Darwiniana)
http://humanorigins.si.edu/evidence (Smithsonian Institute)

Appendix 1.

Jamie Shreeve, July 2013, The Case of the Missing Ancestor, *National Geographic* (pp. 90-103) details the finding of three small bones (tip of finger, two molars) in the Denisova Cave in Siberia found in 2008. The finding was surprisingly, neither Homo sapiens nor Homo sapiens neanderthalensis, but thought to be a new species, H. sapiens denisovans. This led to the DNA analysis that showed that these Denisova hominins, H. sapiens, and H. sapiens neanderthalenesis interbred on their various migrations. Neanderthal DNA is evident in modern humans outside of Africa. Denisovan is evident in modern Australiasians. [Shreeve (2010) was cited on p. 6, this article.]

From Denisova hominin, in Wikipedia, retrieved 30 November 2013:

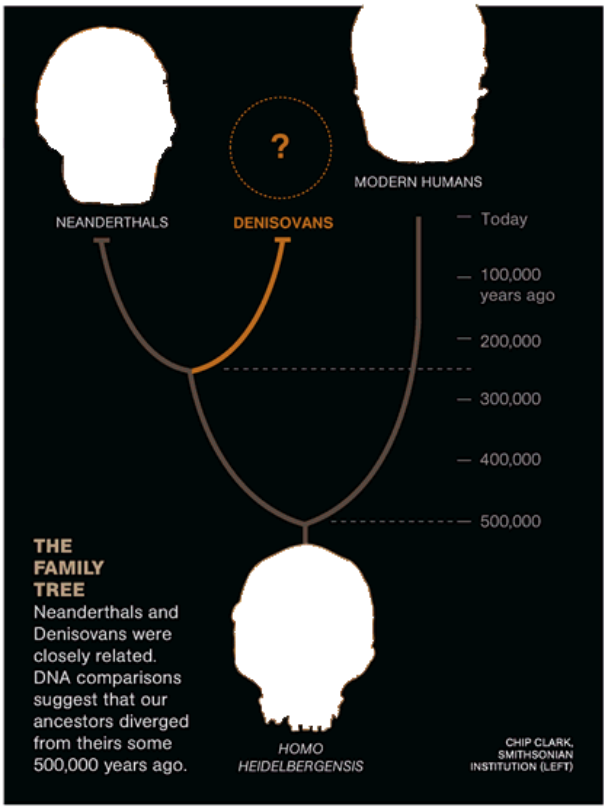
"Denisova hominins /dəˈniːsəvə/, or **Denisovans**, are Paleolithic-era members of a species of *Homo* or subspecies of *Homo sapiens*. In March 2010, scientists announced the discovery of a finger bone fragment of a juvenile female who lived about 41,000 years ago, found in the remote Denisova Cave in the Altai Mountains in Siberia, a cave which has also been inhabited by Neanderthals and modern humans.[1][2][3] Two teeth and a toe bone belonging to different members of the same population have since been reported.

Analysis of the mitochondrial DNA (mtDNA) of the finger bone showed it to be genetically distinct from the mtDNAs of Neanderthals and modern humans.[4] Subsequent study of the nuclear genome from this specimen suggests that this group shares a common origin with Neanderthals, that they ranged from Siberia to Southeast Asia, and that they lived among and interbred with the ancestors of some present-day modern humans, with up to 6% of the DNA of Melanesians and Australian Aborigines deriving from Denisovans.[5][6] A comparison with the genome of a Neanderthal from the same cave revealed significant local interbreeding, with local Neanderthal DNA representing 17% of the Denisovan genome, while evidence was also detected of interbreeding with an as yet unidentified ancient human lineage.[7] Similar analysis of a toe bone discovered in 2011 is underway,[8] while analysis of DNA from two teeth found in different layers than the finger bone revealed an unexpected degree of mtDNA divergence among Denisovans.[7]"

Follows are graphics giving the conjectured lineage from H. heildebergensis, and assumed migration and loci of interbreeding, pp. 98-99 of Shreeve, 2013.

A TALE OF THREE HUMANS

A third kind of human, called Denisovans, seems to have coexisted in Asia with Neanderthals and early modern humans. The latter two are known from abundant fossils and artifacts. Denisovans are defined so far only by the DNA from one bone chip and two teeth—but it reveals a new twist to the human story.



THE FAMILY TREE
Neanderthals and Denisovans were closely related. DNA comparisons suggest that our ancestors diverged from theirs some 500,000 years ago.

THE JOURNEY

500,000-250,000 years ago After the common ancestor of Neanderthals and Denisovans left Africa, the population split. Neanderthals spread into Europe, Denisovans into Asia.

100,000-60,000 years ago The Neanderthals' range expanded east to overlap with the Denisovans'; evidence of both kinds of human has been found in Denisova cave in Siberia.

Encounter in Southeast Asia

No skulls or tools have been found to reveal what the Denisovans looked or acted like. No one knows what happened when modern humans who had migrated from Africa first set eyes on them. What's certain, from genetic evidence, is that such encounters produced offspring.

Graphics by Juan Velasco and Maggie Smith, NGM staff

Art: Jon foster. Sources Svante Pääbo and Bence Viola, Max Plank Institute for Evolutionary Anthropology, Chris Sringer, Natural History Museum of London, Over Bar-Yosef, Harvard University.

70,000-40,000 years ago After migrating out of Africa, modern humans met Neanderthals in the Middle East and later the Denisovans in Southeast Asia.

THE LEGACY

Today traces of Neanderthal DNA in all non-Africans and of Denisovan DNA in Aboriginal Australasians show that our ancestors mated with both kinds of vanished human.

JUAN VELASCO AND MAGGIE SMITH, NGM STAFF
ART: JON FOSTER. SOURCES: SVANTE PÄÄBO AND BENCE VIOLA, MAX PLANCK INSTITUTE FOR EVOLUTIONARY ANTHROPOLOGY; CHRIS STRINGER, NATURAL HISTORY MUSEUM OF LONDON; OFER BAR-YOSEF, HARVARD UNIVERSITY