Cyberspace as a meta evolutive step

Pierre Lévy
University of Québec at Trois-Rivieres
Dept. social communications

Introduction

The biosphere is today and will be in the future more and more a technobiosphere. A bigger part of the earth’s surface is modified by agriculture, livestock farming and urbanization. Marine and earthly ecosystems carry the ever growing weight of human intervention. Man’s activities have already affected in sensible ways the atmosphere, its composition, its temperature with all the repercussions on all forms of life that we can imagine. With biotechnologies, we rapidly create new species of plants and animals but also new ecosystems, creation on which we have lesser control.

If we consider the human society as being part of life itself, then these new situations represent an acceleration of the global evolution of the biosphere under the effect of its most virtual and powerful offspring: language (and techniques accompanying its expansion).

The human race becomes a superorganism building its unity through cyberspace. And because this superorganism is becoming the principal agent of transformation and maintenance of the biosphere, cyberspace grows, by extension, as the biosphere’s nervous system. If we can witness the evolution - organic, sensitive and linguistic - as a sole movement, if we understand the profound unity of the cultural and biological evolution and their interdependence, therefore we can discover that cyberspace is at the peak of this unified evolution.

The idea that I am introducing to you in this paper is quite simple. It can be formulated into three propositions.

First proposition: there is a cultural evolution.

Second proposition: the cultural evolution is the continuation of the biological evolution.

Third proposition: the unfolding of cyberspace is the latest step of the cultural / biological evolution and the basis for future evolution.

What is the role of collective intelligence in this theoretical framework? I would like to say that each step, each layer of the evolutionary continuum brings an improvement and a new realm of collective intelligence.

I know that these ideas are very controversial and I dont expect that you will immediately agree
with them. I just want to give you an opportunity to reflect on my point of view, hoping that this experience will help you to build your own point of view.

For a correct understanding of the three propositions above, I must first give some definitions, and particularly about the nature of life. In my definition, life is a process, an evolutionary process. More precisely, life is a process of creation, reproduction and selection of forms. When there is creative reproduction, there is life. Here, I must stress the word "forms". Of course, life is a reproduction of organic forms. But there are other kinds of forms that are also able to reproduce themselves: forms of perception, emotion, forms of experience, forms of actions, and even linguistic, technological and social forms. Because, as a philosopher, I take seriously the abstract definition that I just gave you, I must draw the conclusion that life does not stop at the organic layer. Since there is still reproduction of forms in later layers, life continues at the higher (or more virtual) levels of perceptual experience and culture.

In this expose, I will try to show you that there is a direction in the evolutionary process — or rather, as you will see, in the meta-evolutionary process — and that this direction is a progress towards digitalization, virtualization and collective intelligence. Of course, I know that the word "progress" is taboo in the academic community. Nevertheless, I see a kind of progress in the emergence of the nervous systems and bigger brains, in the emergence of the human culture, in the invention of writing, of the alphabet, of the printing press and of the computers. I do not mean that there is an almighty god planning the evolution and that everything was already written in His mind. I just notice that there is a movement towards complexity. Of course, this direction concerns only certain branches of the evolution (not necessarily the branch of bacteria or worms), and this progress is the result of a good old Darwinian process: self-reproduction, mutation and selection. In fact, the progress lies essentially in the emergence of new powerful reproductive mechanisms. New media, one could say.

The hierarchy of digital codes and of analog worlds of forms

I would like first to describe a general process of growth which begins with the first digital code, DNA, and which ends, provisionally, with the digital code of the computers. I call "digital" a code that has two properties. First, it is based on the combination of some discrete symbols or elements. Second, there is no obvious analog relation between the code and what it is supposed to describe. A digital code is "conventional".

1) DNA and the organic forms

The DNA controls the first layer of the evolutionary process, the layer of the organic forms and the circular molecular processes. DNA is a digital code because it is based on the combination of four nucleic acids and because this combination has no likeness with the proteins, which it is supposed to command the construction. You cannot have reproduction - and therefore you cannot have life - without DNA. As you know, the double helix of DNA is an essential part of the mechanism controlling the construction of the proteins that compose the living cells. The DNA includes a mechanism of self-reproduction that can be considered as the first photocopy machine and that bears the memory and the continuity of life. Thanks to DNA, forms are reproduced. But, fortunately this photocopier makes constant mistakes, which are the stochastic
base of the explosive diversification of living forms.

At this stage, the collective intelligence, or the learning, occurs at the geologic scale of the species, the ecosystems and the whole evolutionary process.

2) The Nervous systems and forms of experience

Among the great diversity of the organisms created by the first evolutionary layer, some of them have developed a nervous system. The nervous system is the base of the second great digital code: the system of electrical impulses and molecular messengers that allows the communication between the neurons, the collective intelligence of the neurons. Again, this code has no analogy with what it is supposed to represent: smells, sounds, visual images, emotions and so on are all expressed with the same electrical impulses and neurotransmitters. This digital system is the matrix of the "world" experienced by sentient beings. It is like the virtual world, on one side, with its continuous and analog smells, sounds, colors, shapes… and the digital machine that computes it, on the other side.

At this layer you have not only organic forms, patterns of molecular processes, but a completely new range of forms: forms of perception and action living in the subjective experience. Here, the learning and the memory develop at the scale of the individual animals. Forms reproduce themselves in the experience, in the mind. Communication occurs between animals, and animal societies are growing more and more complex.

3) Language and culture

The complication of the virtual world of experience gives way to the third great digital code: human language, which is based on a combination of phonemes that has no direct analogy with the reference or the meaning of the linguistic expressions.

At this stage, a new sort of forms are emerging, forms of complex meaning and types of signs that did not exist in the previous animal world. Not only narratives, myths, rituals, explications, justifications, questions, but also music, dance, images, masks, gods, clothing, gastronomy, astronomy… And these forms are created, reproduced and selected by the cultural evolution. We are a society of primates constituting an adequate environment for the reproduction, evolution, and differentiation of cultural forms. These forms are subjected to an interesting evolutionary constraint: they must encourage or promote the societies that bear them. Cultural forms that lead to the destruction of the societies in which they live cannot survive. Human societies and their cultures (that are some kind of ecosystems of signs) are therefore in a symbiotic relation.

The emergence of the human race is marked by the birth of language and, therefore, by the beginning of a new form of evolution: cultural evolution. Language, along with technique and religion (or complex social institutions), is the support of a sort of collective intelligence unknown in the animal kingdom before man. Empowered by language, human collective intelligence asks questions, remembers the past, looks forward to the future, scrutinizes the invisible, creates meanings and registers new inventions and stories for generations to come. The
term "collective" does not apply only to the link between actual minds communicating by speech, but also to the communication between dead, living and (virtual) minds to come. Here, the learning is at the scale of humankind, and this learning merges with the cultural evolution.

4) Improvement of the reproductive mechanisms of the cultural forms: writing, the alphabet, the printing press and the cyberspace.

The evolution of the reproductive skills of the linguistic and cultural forms is a second order-evolution. In my view, the comprehension of this second-order evolution is the key in understanding cultural evolution in general. With the invention of writing, linguistic forms have now a memory independent from any living organism. Of course, they need a living human being to be actualized, but they can last in pure virtual state during centuries.

From the invention of writing we can acknowledge an extraordinary multiplication of linguistic "genres" (sciences, history, poetry, theater, novels and so on), and the same for iconic, musical, ritual… A genre can be compared to a species of the cultural life (let’s say the songs, the novels, the films, the video games) and a particular novel, film, or video game is like an individual of the cultural life. With the improvement of reproduction mechanisms that begins with the invention of writing, these individual cultural forms can reproduce themselves more easily and the number of their species, and therefore the diversity of forms, is constantly growing.

The evolution of organisms is the first sphere where forms widen their range. Then, an evolution of subjective experience constitutes a second sphere of forms, where evolution is faster than in the first. Culture represents a third evolutionary sphere, even faster and more diverse than the two previous ones. We must acknowledge that the cultural evolution is more and more directly and deliberately speeding the organic and perceptive evolution:
- The organic evolution in creating new forms by artificial selection, agriculture, genetic engineering.
- The perceptive evolution by instruments of communication, tools for augmented vision and audition, drugs, etc. All these tools explore new forms of perception more quickly than ever.

The alphabet represents a remarkable improvement of writing. Simpler, since it is based on the combination of less than thirty signs, it is also more universal. Every alphabet derive of the protosinaïtique (1200 BC), so, in a way, there one single alphabet. Alphabet is the first universal communication system and it strikes me that the subsequent great improvements in the reproduction of signs are based on it.

The printing press can be considered as the technical self-reproduction of the alphabet and of images (think of engravings on the first printed books).

Finally, telegraph, photography, musical recording, telephone, cinema, radio, television and the isolated computers can be considered as the dispersed beginnings of the embryonic process of the creation of cyberspace. When we get to cyberspace, all the semiotic forms are becoming ubiquitous. If they are somewhere, they are everywhere. In addition now, writing has not only an independent memory, an autonomous system of reproduction and a virtual ubiquity, it also has an autonomous capacity of action. What is software? It is a piece of writing that can act by itself,
interact with other software, create other combinations of signs, trigger a machine, activate a robot, and reproduce itself in a way even more autonomous that the printed word. We can consider the cultural evolution as the progressive improvement of the reproductive, living, evolving properties of the cultural signs. This improvement carries away in its movement the human society that constitutes the environment of this life of forms.

**Anthropologic mutations and the history of language**

**Introduction**

Writing, the alphabet, the printing press, the cyberspace, each stage, each layer integrates the previous one and leads to a new diversification and expansion of the cultural universe. The more communication and interconnection there is, the quicker and richer the cultural life will be, with a wider variety of genres.

**Writing**

The invention of writing represents the cultural continuation and improvement of language and, therefore, of human collective intelligence. As I said earlier, with writing, some linguistic forms can last for centuries without the presence of any speaker. Language has now a memory of its own, independent of any living individual. But it is dependent of traditions of interpretation. Since its invention until now, writing is even one of the main supports of many persisting collective intelligence lineage (religions, artistic traditions, universities, etc.). Writing is the crowning achievement of the Neolithic revolution that encompasses agriculture, breeding, city, state and elaborate religions. Also, the knowledge extends beyond myths and rituals. It is the beginning of systematic organization and classification of knowledge in medicine, astrology, mathematics and so on. Writing involves a new kind of space: the territory extends over the nomadic open space, with its boundaries protected by the state. And a new kind of time: history, because of the open ended possible accumulation of information.

People who have adopted writing (and the whole civilization that comes with it) have been dominating cultures. Great cultures have great writing systems: cuneiform, hieroglyph, Chinese characters, Aztec ideograms, etc.

**The Alphabet**

The Alphabet is a further development of writing and, therefore, of language. Alphabet represents the reduction of the writing signs to a simple phonetic combinatory system, escaping to the scribe’s monopoly. The alphabet has made democracy possible (every citizen can read the laws). The invention of money is contemporary of the birth of Phoenician and Greek alphabet. Philosophy, demonstrative mathematics and knowledge with explicit universal claims are also linked to the alphabet. Last but not least, the three monotheistic religions and buddhism are based on alphabetic scriptures. Now, there is not only history but also consciousness of history and questions about its direction. Again, great and powerful cultures have bonded with great literatures written in alphabets: Hebrew, Greek, Latin, Arab, Sanskrit, etc.
The printing press

After its autonomous memory (writing) and its easy writing and reading (alphabet), the printing press represents the next stage in the history of language: its ability to reproduce itself mechanically. The printing press is the communicational base of the scientific community that self-organizes and grows since the 16th century. Recent studies show that printed reviews and books containing accurate data have insured an efficient communication inside a large international network of scientists. This was one of the necessary conditions for the birth of modern experimental science. (It must be noted that the scientific community is the first to organize itself with principles explicitly based on collective intelligence). As a consequence, technological development was enhanced and a positive feedback loop began to bring together communication, exploration, commerce, science, technology, industrial revolution and capitalism. The printing press is also related to religious revolutions. The Reform, and the ideologies of terrestrial salvation like liberalism, democracy or socialism, were supported by the printing press communication system. It is also linked to political revolutions. The growth of public opinion was supported by the press and this led to the emergence of modern democratic states and, afterwards, to socialist and fascist social movements. Printing press coincides with the time of revolutions: scientific, industrial, political revolutions.

One the main effects of the printing press revolution is the widening of horizons, not only from an intellectual point of view, but also in a very practical way since the improvement of transportation is (up to this day) almost always parallel to the development of communication technologies. The domination of Europe — that is to say, the civilization of the printing press — over the world, corresponds to the first interconnection of mankind. Thus, the possibility of a global collective intelligence of the species can be envisaged. But it will only be achieved in the next stage of the history of language.

Cyberspace

Cyberspace integrates all the previous media like writing, the alphabet, the printing press, telephone, cinema, radio, television, and furthermore, all the improvements of communication, all the mechanisms ever designed to create and reproduce signs. Cyberspace is not a medium, it is a metamedium.

Let’s list some of the main features of the cyberspace, and particularly those leading towards a better collective intelligence.

Cyberspace supports many intellectual technologies that enhance memory (with databases, hyper-documents, Web), imagination (with interactive visual simulations), reasoning (with artificial intelligence, knowledge based systems, simulations), perception (with images computed from data and generalised tele-vision and tele-audition), and creation (words, images, music, and virtual spaces processors). These intellectual technologies augment not only individual but also collective cognitive systems (companies, organizations, all types of virtual communities and humankind in general, which is the biggest virtual community…).

The cyberspace - which is the communication space opened by the global interconnection of...
computers - brings a new large scale "many to many" communication configuration. The printing press, then radio and television, organize the exchange of information in a "one to many" way, creating large audiences and a sense of community; but they prevent real interactive communication. The postal system and the telephone have built a "one to one" communication system, allowing dialog and interaction; but they prevented the communities to manifest themselves and grow in the communication space that they have created. Cyberspace allows not only a "one to one" and a "one to many" communication but also a "many to many" and the real time articulation between the three modes, which is very conducive to collective intelligence. These new possibilities are already used at a large scale for scientific, business, political, artistic (and so on) purposes.

Fourth, the World Wide Web can be considered as a unique global polyglot hyper-document written and read by — virtually - everyone. This is the first time that any text can be — virtually — considered as a part of an actual language sphere. The center of this sphere is nowhere, its circumference everywhere and each of its elements is related to all the others. This huge unique hyper-document is a kind of dynamic reification of the global human cultural context.

The main signification of cyberspace is the general interconnexion of everything in real time, the realization of the virtual space where the cultural and linguistic forms are living. Where did cyberspace begin to grow? Ten years ago, at the time of the invention of the WWW? At the time of the first Internet connection? With the first computer? With the first communication in real time with the telegraph? With the European republic of scientists, philosophers and artists of the Renaissance? With the Printing Press? With the Alphabet? With the virtual world of perception and communication? With DNA? In my view, there is one single evolving process, one single energy of life from the first cell to the collective intelligence of cyberspace. And beyond, towards the noosphere of the future.

The economy is now based on information, ideas, creativity and collective intelligence. In politics, we are slowly marching to a planetary democratic government, with probably a domination of the people who continue to invent and make the best use of the cyberspace. Our knowledge is more and more based on precise maps and databanks, simulation and direct vision. Complex data and processes are transformed in interactive visual models. Telescopes show us the remote stars and the events of the beginning of time. Microscopes are showing us the shapes of the molecules and the way they behave. We have more and more medical images of the body every day. Satellites views of the earth and web cams everywhere create the real tele-vision…

Leading global evolution

As you know, the technological, scientific and economic advances give us the power to destroy and create biological species and ecosystems, for the best or for the worst. Human culture is now the main factor of the biosphere’s evolution, but also the main factor of its own evolution. Of course, until now, the evolution had no goal. Its multiple and diverging directions were just the result of the Darwinian mechanisms of reproduction, mutation and selection. But we are forced to recognize that, from now, evolution is more and more up to us.

We do not know the precise goal in advance, but we know that the human race has in its
collective hands, in its collective brain, the fate of the biosphere and its own destiny. The more we evolve, and the more we know that we are free. As an advanced spike of the biosphere’s evolution, we are progressively joining our minds to create a greater mind, a mind able to watch the global life, organic and cultural, a mind able to lead the global evolution organic, experiential, cultural and post cultural.

The techno-noosphere modifies the organic and perceptive evolution

The cultural techno-noosphere is now directly affecting the two previous sphere of evolution. The genetic engineering directly modifies the DNA of the plants, the animals and maybe soon of the human race. The knowledge and control of the molecular processes of the organic life is on the verge to create nanorobots, biological computers and modified hyperbodies. The advances of the cognitive sciences and the research on drugs will contribute to modify our mental abilities and our perceptions. We will probably find ways to connect more directly to the noosphere, maybe by neuroconnexion. The progress of augmented perception; multiple users virtual realities and communications will also contribute to the further evolution of the forms of perceptions. Finally, the software evolution, which is probably just at its beginning, will continue to create new forms, much more autonomous than those that we know today. We are creating a complex of artificial-natural life and of artificial natural intelligence that gives birth to a greater than ever diversity of forms. The world of the ideas will progressively appear as the ultimate space explored by the evolution. But this evolution must of course maintain its own organic and experiential base.

Towards the biobrainsphere

All life forms make up an interdependent unity. So, the more language and techniques will affect the organic and mineral life of Gaïa, the more Gaïa as a whole will act upon the technolinguistic world. Of course, the organ of this feedback will be the cyberspace, capable of collecting and synthesizing data coming from the biosphere in order to inform the action of human collective intelligence. Organic life and techniques will blend very finely, and shall do so because they have no distinct essences.

The living beings of our planet cooperate to create the atmosphere we breathe in, like the biosphere we live in, that knows no frontiers of species, neither of nations, nor of disciplines. We are becoming the conscious regulators of the biosphere, looking to maintain constant atmospheric and other important variables. With each new day we have better knowlwedge of how we must strengthen and even improve this general cooperation, thanks to our communication and collective intelligence technologies.

In order to manage the most efficient feedback, cyberspace will inform us in real time of echoes of our economic activities on the biosphere. Investment and consumption will become tools for a global piloting of Gaïa. Cyberspace will finally deserve its name (´ piloting space ´ if we follow the etymology) because it will become the driving tool (the dashboard and the wheel) of our voyage towards a conscious biobrainsphere.

The closer we get to this goal, the wider freedom will open its space, and the more we will need
to run a multidimensional collective intelligence in real time. As the movement will increase speed, it will become more and more turbulent and chaotic. The unexpected will appear suddenly and we shall react quickly and collectively, in a sort of virtual reality videogame where all participants, humans and software, must maintain a balance in the biotechnological universe that they create and on which they depend. And nobody will know, in the end, who is running this cybernetic self-creating loop.

Evolution grows towards a biobrainsphere that thinks more freely, opening faster and faster the space of meaning and the range of cooperating and competing forms. This biobrainsphere will reach out infinite wisdom and infinite madness. It will foster a sort of virtual double, the noosphere, kingdom of forms and ideas, that will be the guiding light for its own evolution. Or may be it will be the reverse. The noosphere — an expanding universe of ideas in a infinite space of consciousness — will carry away in its movement the technobiological evolution.

Technology and information economy will merge in an ecobiology monitored in real time by the collective intelligence coordinated in cyberspace. Centralized and bureaucratic structures will loose their meaning and their power. Cooperative and open attitudes will become the moral standards while claims, accusations and censorship will be perceived as cultural backwardness. The national, linguistic, professional, cultural, and discipline barriers will be overcome. Cultures will combine themselves and multiply their powers in an Earth Spirit that will bring together animals, plants, microorganisms and minerals as well. Such a perspective implies that we stop wars and invent together a new kind of life.

May be we will genetically modify the human race so it’s able to breathe (on Earth or on other planets) an atmosphere created by a biosphere almost completely fabricated to resolve our material problems. (Biosphere becoming self replicating bio-industry, hydrogen economy, photovoltaïc silicon based artificial life). Then we will only be left with intellectual, ethical and spiritual problems.

May be the religion of the future will integrate every previous spiritual tradition and will emphasize our responsibility in the evolution of the whole biosphere, including the three spheres of evolution: organic, experiential and semantic. The religion of the future, the science and art of collective intelligence, will orchestrate the extraordinary adventure and fate of a biosphere becoming a technosphere then a noosphere, creating and recreating itself more freely forever.

Humankind is achieving a cosmic self-knowledge loop. The universe is a huge intelligence awakening to itself thanks to a language evolution that extends its own movement. This process is just at its beginning. The mission of the human race: growing the world’s brain. A brain more and more powerful and free that will include the world in its substance. A cosmic brain that will bloom like an infinite flower made of love.

Two books in english by Pierre Lévy

http://www.amazon.com/exec/obidos/ASIN/0306457881/o/qid=957729680/sr=8-1
Some texts on line:

http://www.uiah.fi/bookshop/sea_proc/nextgen/01.html

http://www.chairetmetal.com/levy-ang2.htm

http://www.doorsofperception.com/doors//doors3/transcripts/Levy.html#1

One text of Marc Pesce

http://www.telefonica.es/fat/epesce.html

Kevin Kelly (author of Out of Control) site

http://staff.hotwired.com/kevin/

Joel de Rosnay’s site

http://194.199.143.5/derosnay/e-index.html