Consciousness and the snare of civilisation - A reappraisal of human evolution

Summary: 5,6

Emilios Bouratinos, Ekali, Greece

To see behind the leaves, you must shift your position, not the leaves.
Felipe Fernandez-Armesto
Millennium, Black Swan, Great Britain, 1996, p XI

Only daring speculation can lead us further, not accumulation of facts.
Albert Einstein
Letter to M. Besso, October 8 1952, Einstein, 1972

The severe environmental, social, health and other particular problems our civilisation is facing right now, are usually given two explanations. The first attributes these problems to the industrial revolution. Concentration of large worker populations in the cities, ever increasing demands for raw materials, polluting transport systems, factory effluents, harmful emissions and blanket use of chemicals by farmers have all placed unprecedented strains on nature and psyche. The problems are very real but practical. They must be dealt with as such.

The second usual explanation has it that the problems stem from shameless exploitation on all levels of nature and society. The 'good old values' have been eroded by consumerism, fanned as it is by the clamouring for ever higher standards of living and the explosive population increase. Creation lures man away from the Creator. He is corrupted by his very success in evolving. The problems are mainly moral - and must be treated as such.

In this essay the current predicament is explained by a third way. The problems don't start with the industrial revolution. They are not rooted in shameless exploitation. Both the problems and their causes are rooted in something deeper: Civilisation itself. Because we assume what we assume, we have the civilisation we have. And because we have the civilisation we have, we see, understand and treat reality as we do. It is the way we think - or rather do not think - that causes the difficulties. Corrective action must start from a thorough understanding of this.

There can be little doubt that our problems have a practical and a moral dimension as well. But they are not rooted in it. They are rooted in how consciousness *operates.* Civilisation has alienated us from the dynamic through is all that can validate it. Not just what we know matters. How we know matters as much. More importantly, we need to take into account how we incorporate what goes beyond knowledge into it. The key to real understanding is in this 'how'. Our civilisation has emphasised only the 'what'.

Not surprisingly, then, the first deep epistemological point to be made here concerns verifiable intuition. It is well known that scientists rely heavily on it. Some, with Nobel prizes, even admit as much. For them understanding isn't just a question of knowing all the facts or relationships. It is a question of keeping their minds open to what suggests itself through the facts or relationships.

We are not *what* we understand. We are what *makes* us understand. And that's usually some insight derived from intuition. Intuition 1 opens us to the innate connection we all have to wholeness. In the words of Brazilian physicist Fransisco Bosco: "Science is nothing

more than the systematic working out of intuition." 2 If this be true of physics, how much truer must it be of consciousness?

Reversing the direction of consciousness

The second deep (or pre) epistemological point is inspired from the reversibility of equations. Again one may ask: If the reversibility of equations is such a fundamental tenet of mathematics, should it not equally apply to consciousness, which makes mathematics possible in the first place? Reversibility in this case would mean the movement of consciousness from subject to object and back again *in one breath.* The classical subject-object divide is abolished. It becomes impossible to investigate consciousness as a mere object.

Indeed, one realises that no account of the evolution of consciousness is possible without a consciousness of the evolution of that account; no discussion of it is valid without a consciousness of what goes into the discussion. As Heraclitos put it: "The path up and [the path] down are [one and the] the same." 3

Nothing of this implies either relativism or subjectivism. It implies being willing to remain aware of the biological, the cultural and the personal bias through which we both objectify consciousness and assess what we discover as a result.

It also implies being able to discern a possible bias in nature herself, as distinguishable from our own. Not only has nobody caught randomness in the act, as Bart Kosko puts it. Ample evidence shows that, at least in the area of organic evolution, the composition of aminoacids and proteins doesn't happen within the time-frame required for random associations to form such complex structures. It happens much faster.

We cannot rule out natural bias in the name of 'objectivity' with a capital O. As randomness is a device facilitating interpretation, so objectivity is a shortcut facilitating explication. Because we have restricted seeing to what can be seen, we have reduced objectivity to what can be objectified. We are no longer capable of understanding what Heraclitos meant when he insisted that "the real constitution of things is accustomed to hiding" 4 and that the "unapparent connection is stronger than the apparent". 5

Conveying more than you say

The third deep epistemological point concerns language. 6 By examining what happened to it, we will perceive more easily what happened to civilisation. Furthermore, a better understanding of the possibilities of language will lead to a better understanding of the possibilities of evolution. The reason for this is that evolution itself reflects the language of the possibilities inherent in physical existence after consciousness began to influence the way things change - prior to and independently of language.

There is lots of evidence for such a pre-linguistic function of consciousness in the work of William James, Richard Leaky, Terrence Deacon, Paul Bloom Oliver Sacks and others - not to mention the extraordinary case of Helen Keller. This work undermines the position of Wittgenstein, Russell and Derida who are too object-bound in their thinking to properly understand something as object-free as consciousness. 7

Human beings say what they *mean.* 8 They don't mean what they *say* . As consciousness treats language, so language treats consciousness. When consciousness locks into its

concepts, as science and philosophy do today, it gets trapped in what it says. When, on the contrary, there is awareness of the limited potential of concepts, what lies outside them suggests itself. Words or symbols become transparent to what they fail to denote. Better still, they point to the quantum vacuum of meaning - that ontological experience of wholeness underpinning the true comprehension of every individual part (or relationship) one becomes aware of.

Science, language and reality

That is not, of course, how a scientist is supposed to use language. For him to know simply means to accurately familiarise himself with the facts. Understanding science still doesn't entail a science of understanding. The scientist thinks he can explain reality simply by describing it accurately.

This is unfortunate. Einstein spent 35 years of his life searching for a unified field theory. He never asked himself whether the end-product of such a search would have any meaning. 9 Even less did he ponder how a unified field theory could justifiably be considered as encompassing physical reality in its *entirety* so long as it excluded consciousness. After all consciousnss is not just part of the universe 10 put together by the fields. It is essential for comprehending - and unifying - the fields in the first place.

So the purpose of the third deep epistemological point is to draw attention to the idea that the present self-locking usage of language shouldn't be considered the best for portraying reality. 11 It flattens out (and thereby distorts) things. Physical reality arranges itself differently on the various organisational rangs up the ladder of complexification. For example, you cannot speak about quarks in terms of particles, about particles in terms of atoms, or about atoms in terms of chemical elements.

But if describing physical entities on a level of organisation not expressive of their character is bad enough, producing such descriptions of organic entities, where dynamic self-organisation plays a more formative role, is even worse. When Daniel Dennett or Francis Crick maintain that consciousness is 'nothing but' a bundle of interacting neurones, 12 they are factually correct. However they might as well be arguing that their own ideas about this amount to no more than an agglomeration of letters and ciphers.

The data in any given system may be recognised by everyone as being the same. What differs is assessment - "the art of handling the same bundle of data as before," to use Butterfield's words, "but placing them in a new system of relations with one another, thus giving them a different framework." 13 Nature herself builds up her structures in this way. Aristotle points out that "matter...can never exist without quality and without form." 14 P. Weiss observes: "Take a gene out of an organism and it has no more meaning that a particular set of cards has outside..... a game of poker or bridge. Both information value and function are context dependant." 15

Truth has little to do with faithful account. It has more to do with character recognition and context appreciation. It is not a question of seeing *just* what is there. It is a question of discovering (and then addressing) *the identity* of what is there - and doing so within its framework. Describing faithfully what you see is useless as long as you don't comprehend what it is you are looking at - or what makes it look the way it does.

Seeing may be believing, as the old saying goes. More important is what you believe you see - and why you believe it.

Pointing to and beyond the specific

Language was once used - and can be used again - in a more sophisticated, penetrating and inclusive manner. It is capable of bridging conceptually fragmentation with oneness, contradiction with consistency, explication with implication. How something is portrayed, as a result of what, in the light of which natural or intellectual qualities, in relation to what level of organisation or description, when and why - all these aspects could (and can again) be conveyed, without changing the way we speak.

There are two conditions however: First, understanding language requires a language of understanding. This can develop only when words are not treated as stones, which somehow build themselves into houses. Stones don't build houses. Architects do - because they see in their shapes and qualities what is required for the house they are about to build.

Second, speaker and listener must try to *sense* the subject they are discussing, not just to make sense *of* it - they must expect words to convey experiences, not just to outline concepts. The fact that language doesn't operate in such a multi-aspected manner today may be why there has now developed a degree of dissatisfaction among linguists and epistemologists with the existing formal semantic theories - and a pronounced desire for preserving and understanding insights from the non-western semantic traditions. 16

Serial and non-serial evolution

The moment has come to look at how human mentation evolved. One of the most persistent views among cognitive scientists and theorists of mind is that consciousness evolved over time. It's the crowning glory of evolution. The view presented here differs in two ways.

The first concerns the evolution of consciousness itself. Yes, consciousness did evolve over time. Nevertheless, it did so only because it was there from the beginning. David Chalmers is of this opinion. 17 He has posited consciousness as an irreducible given in nature, like energy. Maxine Sheets-Johnstone surveys an even broader array of arguments for such a position. She does so both from a theoretical point of view and on the basis of laboratory tests. 18 According to these, consciousness isn't only pre-linguistic; it is pre-multi cell organisms.

The second basic sense, in which the view of evolution presented here differs, has to do with serial progression.

Most cognitive scientists and philosophers of mind believe that, at least after the emergence of Cro Magnon man some 35,000 years ago, consciousness by the ancient Greeks. But Rene Descartes (and much more modern science) managed to improve even on that. Today, the argument goes, we are better informed, better organised in our thinking and better equipped for handling nature than at any other time in the history of civilisation.

The two great phases of man's evolution

The evolution of consciousness is here understood differently. There was substantial progression from Homo Habilis to Cro Magnon. But the end of the hunter-gatherer period some 12,000 years ago, also signals a qualitative reversal in the evolution of consciousness.

It has had a restrictive influence on understanding and a progressively negative influence on the environment.

There are as many ways to evaluate - and hence to carve up - human evolution as there are approaches to reality. The one preferred here divides the entire process into two main stages. They are determined by distinctly different modes of consciousness operation. The expression 'consciousness operation' doesn't mean only what happens in the brain when it is aroused. It means the way the brain holds (or doesn't hold) to concepts in the light of how its bearer engages reality.

The first main stage of evolution, called the *wandering phase* , is by far the longest. It starts with the emergence of Homo Habilis around 2,500,000 years ago and ends with the advent of agriculture. 19 Either as hunters or fruit gatherers for the greater part of this long period, or as animal tamers, breeders and herders for a much shorter period, human beings incessantly roam the Earth. They move as dynamically as she, live by her rhythms, co-operate with her and in some ways, contribute to maintaining her ecological balance. They are content merely to *experience* 20 life.

The second main stage of human evolution, called *settling phase* , starts with the discovery of agriculture and extends to our times. People now settle in specific regions amenable to farming in the beginning and to craftsmanship later. They begin to conserve and rationalise most of the things they get involved in. Not only do they cultivate *permanent*areas. They construct *permanent* tools, dwellings and institutions. No longer are they satisfied merely to live. They live to obtain some kind of satisfaction. And they secure this by gradually transforming nature into a tool. 21 They create civilisation as we understand it.

Progression from stage 1 of evolution to stage 2 does not imply that the type of mental complexity required for our present interaction with the world is superior to the type required of a hunter-gatherer, as most specialists on evolution believe. The mental complexity required of the hunter-gatherer is probably greater, but has developed in a direction *different* from ours. This probably explains why our skulls have shrunk by 10% in the last one hundred thousand years. This probably also explains why the Bushmen's heads today are so huge.

Neither are we justified to think that reasoning constitutes a qualitative improvement over sensing, or that the mental capacity for abstracting reality is superior to the intuitive capacity for penetrating it. The ability of consciousness to target its own self mentioned earlier, means that reasoning and abstracting reflect but the manifest tip of a much larger cognitive process, which can serve the mind effectively only when perceived - and used - as a whole.

Consciousness as part-whole communication

Let's see how the two main phases of evolution influence the operation of consciousness. First a few words on consciousness itself.

Rene Descartes considered that sheep scream when slaughtered because they are like machines whose cogs and wheels squeak as they grind to a halt when the butcher's knife brings them out of joint. Only human beings, Descartes believed, possess souls.

Today Descartes' way of thinking has been reversed. It has already been mentioned that not only sheep, but allot simpler animals posses some form of consciousness. For example, the

single cell paramecia displays remarkable intelligence in avoiding obstacles on its path without the benefit of a single synapse! The same goes for the amoeba when it hunts for food. So pronounced is the intelligent behaviour of these protozoa, that Darwin was convinced their consciousness was related to man through evolution! pp pp But if protozoa are conscious without a supporting nervous system, where does their consciousness come from? C.S. Sherrington says it may arise from the cell skeleton. 22 His insight, which Stuart Hameroff and Roger Penrose have taken a lot further today, concerns us here for two reasons. The first is that the cell represents the first self-referring (and self-perpetuating) whole in the history of organic evolution. The second reason is that the skeleton physically circumscribes the cell.

From this point of view then, consciousness represents that mechanism whereby scraps of organic matter tie into a functioning whole. Incorporation protects the scraps on the one hand and enhances their functionality on the other. Through collaboration with the whole, the scraps become *more* of themselves.

Perhaps it is then not accidental that in Greek the term for consciousness, 'syneidesis', is derived from the pronoun syn, which means 'together' as well as 'more' and the noun 'eidos', meaning 'species' as well as 'knowledge'. So consciousness, in the original ancient Greek sense, *describes the need of part to reconnect non-locally with the whole. It thereby breaks its conditional isolation, strengthens its practical effectiveness and enhances its functional possibilities.*

This beneficial communion isn't achieved only on the structural level. It is achieved on the ontological. The qualitative support, which the whole is able to grant the part, does the trick. 23

No objectification

Now a few words on how consciousness treats objectification. There is a level of operation on which consciousness remains unfocussed. Charles Peirce calls it "the consciousness of a moment as it is in its singleness, without regard to its relations - whether to its own elements or to anything else." 24 On this level, consciousness doesn't engage particular objects. Rather, it senses what passes in-between - or beyond them. The person *feels* an imperceptible non-objectifiable whole underlying the momentary experience, just as the physicist conceives the quantum vacuum underlying the particles. He doesn't become aware of a nothingness. He becomes aware of a *no-thingness.*

Non-objectifying consciousness figures prominently in meditation. It also figures in ancient myth. Many cosmogonies, like the Egyptian, the Babylonian and the Greek, start from the notion of a primeval ocean, out of which the cosmos emerged. This primeval ocean symbolises non-objectifying consciousness. In the Old Testament the story has it that "darkness was upon the face of the deep." 25

Mircea Eliade offers the following insight on the primeval ocean as symbol for non-objectifying consciousness: "The waters symbolise the universal sum of virtualities; they are [at once the] spring and origin [of things], the reservoir of all the possibilities of existence. They precede every form and *support* every creation. One of the paradigmatic images of creation is the island that suddenly manifests....in the midst of the waves." 26 Karl Jung has made allot of this in*Man and his Symbols.*

Self-releasing objectification

We come now to consciousness as a tool for adaptive focusing. This is connected with man's wandering phase and produces incisive, spherical and continuous awareness. It is here called *self-releasing* consciousness. Things, relationships, situations are mentally objectified only to the extent that practical need justifies it. After their usefulness passes, conceptions are psychologically released. People live in the eternal present. Included are the dead, whom the wanderer considers just as present and subject to the same needs - as the living. 27

Three types of activity force the wanderer to maintain a vigorous self-releasing consciousness.

The first is his continual movement. It is not just that hunting, fruit collecting and shepherding require the scaling of large areas and great bodily and mental agility. It is also that the wild herds move according to season, foraging needs and weather conditions.
The second type of activity for the wanderers is their continuous scanning of both the immediate and the distant environment. This requires of them an ability "to conceive unified multiplicity on its own terms", as Heidegger puts it. For that to happen it becomes incumbent on the wanderers to highly develop their senses. They don't only see; they discern. They don't only hear; they listen. Thinking for them is only an elaboration of sensing. The more all rounded their sensing, the better founded their thinking. 28
The third activity necessary for maintaining the wanderer's self-releasing consciousness is close inter-personal synergy. Whether the prey is small but fast and needs to be driven into an impasse, or large but dangerous and needs to be surrounded, the hunter is obliged to collaborate with his kin. The same goes for the fruit collector.

For more than 99% of their existence, human beings mentally objectified things or relationships, while at the same time *experiencing them as manifestations of a dynamic whole.* Hunting, fruit-gathering and shepherding kept them on that track. Things were observed, not isolated; relationships were specified, not crystallised; if anything at all was abstracted, it was from the experiental core of the entity abstracted.

Our wandering ancestors had elevated alertness to an art. It required of them to develop the larger craniums which have so baffled anthropologists. 29

Self-locking objectification

Now to the question of how consciousness changed during the second stage of evolution - here called the settling phase. This stage may have begun with the discovery of agriculture. It then gradually advanced through such technical innovations as the use of metals, the discovery of the wheel, alphabetic writing and in our own times, the invention of computer technology.

What the settlers do to survive is different in quality - if not entirely opposite to - what the wanderers do. The latter are in constant movement. The former install themselves permanently. The wanderers need to overview continuously a broad spectrum of factors. The settlers need to overview those alone that are pertinent to their farming activity.

This is how the road to science and technology 30 was paved. The settlers now observe the heavens to know when they must sow and harvest; they invent geometry that they may redefine the limits of their farm after the yearly floods; they weave economic relationships to satisfy their increasing needs; and they create mathematics to facilitate all the above.

A deeper change takes place as well. The fixing of abode, activity, horizon, tools and institutions make the settlers develop some feeling for all these. They not only get attached to them as such. They get attached to the *logic*permeating their sense perception. From now on they learn to apprehend reality more as a concept and less in itself.

In this way the settlers prepare the conditions for self-locking consciousness to take over. The dynamic element in their consciousness gives way to the static; the all-rounded to the fragmented; quality to quantity. They learn to fathom relations without weighing them and to abstract objects without understanding the framework in which they are imbedded. Their sense of measure transmogrifies into a need for measuring.

Above all, where human beings previously considered the partial in the light of the whole, they now consider the whole in the light of the partial. Whereas under the influence of self-releasing objectification they understood things to the extent they experienced them, after its demise they experience things to the extent they understand them.

Intelligence for growing and for computing

One distant memory of the kind of sensibilities that self-releasing objectification had cultivated in the human being, is reflected in the etymology of words that took on a different - even opposite - meaning when writing came along. For example, there is a striking difference between the current notion of intelligence and two of its predecessors from the pre-agrarian age. Since the type of intelligence cultivated by a civilisation says much about its character and direction, looking at this difference will elucidate the fundamental change in human cognition that took place when we became farmers -- and more so, when we became scribes.

The Latin term 'intelligentia' is etymologially derived from the pronoun 'inter', which means 'through' or 'in-between', and the verb 'lego', which means, like in Greek, 'to speak', or to 'put together'. In the light of this, the term 'intelligentia' must have originally meant 'to see between the lines', or by extension, 'to see through the things'. It is a far cry from the current meaning, which is informed by the obsession for computation. There is no room left for 'seeing between the lines or through the things' because lines alone are believed to outline reality and things alone are supposed to be real.

Equally telling is the story of the Greek equivalent term. The Greeks employed the word 'euphyia' to denote 'intelligence'. 'Euphyia' is composed from the pronoun 'eu', which means 'good' and the verb 'phyesthai', 31 which means 'to grow'. So in preliterate Greek to be 'intelligent' meant 'to grow well' - and by extension, to be fully integrated in nature, so that one is able to do that.

Religion and meaning

Another distant memory of the kind of sensibilities that self-releasing objectification had cultivated in the human mind is the mystical practices and teachings developed all over the world. Among them can be counted the mysteries of Egypt and Greece, Christian theoria, the eastern mind training methods and the Socratic imperative for returning to the things themselves through self-knowledge. All these teachings and practices aimed at making it possible for human beings to re-establish their broken qualitative bond with wholeness.

We have not only forgotten what it means to penetrate behind the scenes. According to Hoelderlin, we have forgotten that we have forgotten. In ancient Greek, the very word for 'mistake', *lathos* , was derived from the root noun *lethe,* which meant 'to forget'.

Finally, a third distant memory of the kind of sensibilities that self-releasing objectification had cultivated is the use of symbols - and their linear expressions, myths. An animal learns what it needs to survive. In addition to that, man seeks to make survival meaningful.

Meaning doesn't imply just definable content. It implies experiencing *indefinable being in the heart of definable content* . That is the wellspring of creativity. That is also the source of human curiosity. In animals creativity manifests through bringing forth ever new species and through adaptive response to environmental pressures over many generations. In man creativity manifests through producing ever more unique individuals - and through getting to know and to recreate the environment.

Terence Deacon goes so far as to call this fundamental aspect of human creativity the "beginning of virtual reality". 32 He sees it as a direct outcome of the symbolic impulse, which he considers as the defining characteristic of man.

The deeper function of myths and symbols

Deacon puts forward a very serious point here. However his insight begs the question: Why did humans develop the taste for - and the practice of - using symbols and myths? The answer could be: Because symbols and myths re-establish the ontological relationship of part to whole and of quantity to quality. Man alone - not animal - can experience such a relationship.

This explains the great allure - and healing power - of symbols and myths. If attention is focused on objects in an*exclusive* manner as today, we *sense* the power of wholeness manifesting in the symbol 33 or myth, but don't realise that this power comes from the whole informing it. If, on the other hand, attention is focused on objects in an*inclusive* manner - as happened before the agrarian revolution - we sense the indefinable power of the whole working through the particular symbol or myth, without confusing what emanates *from* them with what *informs* them.

In either case, the symbol or myth has expressed on the phenomenal level what the universe, as a qualitative whole, impresses on its parts. Through consciousness, both universe and symbol or myth reconnect what is split apart when time and locality erupt into existence - and infuse it with ontological power.

That is why one can describe consciousness both as being the product of physical reality and of physical reality as being the product of consciousness. That is why, furthermore, one can speak of quality arising out of quantity and in the same breadth, of quantity arising out of quality. That is finally why one can declare determinism to be the outgrowth of randomness and simultaneously declare randomness to be the outgrowth of determinism. Symbols and myths came into existence when we began to move away from wholeness. Their purpose was to reconnect us therewith.

To choose or not to choose

Jose Ortega y Gasset writes: "To excel the past, we must not allow ourselves to lose contact with it. We must feel it under our feet, because we have raised ourselves upon it." 34 Nature

didn't discard the older sections of the brain as she developed the neocortex. She built the new on top of the old.

That's why there is such plasticity in our neuronal interactions. Nature has given us an abundance of conceptual tools wherewith to open a path through the jungle of her numerous (and conflicting) possibilities - or if the tools are insufficient, she has enabled us to create additional ones, adequate to the task. But it is the need for the old conceptual tools to do a better job that calls the new ones into existence. *Where* the path itself cuts through the jungle of possibilities and how this is trodden, depends on us the walkers - not the tools.

We are in a position to re-sensitise ourselves to the practice of self-releasing objectification that is still very much alive in us - when we realise why we need to. More importantly, we are in a position to achieve this re-sensitisation without discarding any of the intellectual, technological or organisational advantages we gained since the inception of civilisation. Through self-releasing objectification we can even develop these advantages further, tailor them to a more qualitative way of living 35 and find ways for discarding the dangerous tendencies that have followed in their wake. In the end it was Hephaestos, god of technology, who saved Prometheus from his tortures for inventing a civilisation capable of producing that technology.

Nevertheless, how to re-sensitise ourselves to the use of self-releasing objectification will require lots of perseverance, lots of mutual respect - and lots of ingenuity. In other words, it will require going into what Jonas Salk calls "meta-biological evolution". This new type of development, according to his philosophy, will no longer involve survival of the fittest, as did biological evolution. It will involve "survival of the wisest." 36

Salk's belief represents the best hope for a meaningful future.

References

1 A typical example of how intuition works in science is that of Murray Gell-Mann's postulation of the quark structure of matter. Though neither the quarks themselves nor the gluon exchange particles that mediate the strong nuclear force have been unequivocally identified in isolation, the predictive power of his insight in experiment after experiment is such that his theory about the ultimate structure of matter is considered proven.
2 Opinion expressed in personal discussion with the author in Brussels, November 1997.
3. Fr. 60, *Hippolytos* Ref. IX, 10, 4, as translated by G.S. Kirk and J.E. Raven. It may appear strange to some that I quote from a philosopher who lived well after civilisation was established to argue for a way of thinking informed by what went before. I would like to point out that, in my understanding, the pre-socratics mark not the beginning of rational philosophy, but the end of pre-civilisational wisdom.
4. Fr. 123, *Themistios* Or. 5, p. 69 D, as translated by G.S. Kirk and J.E. Raven.
5. Fr. 54, *Hippolytos* Ref. IX, 9, 5, as translated by G.S. Kirk and J.E. Raven.
6. Language is closely connected with narrative and both evolution and science are in fact narratives -- evolution of how physical existence complexifies and science of how the structure of this complexity can be fathomed. That may be the reason why one of the two terms used in ancient Greek for science is 'historie' -- 'to tell the story of something'.
7. There is a complaint among early Greek philosophers that only one hundred years before Xenophanes, words still mattered more than athletic feats. It is obvious that in those days -- before the advent of writing - words conveyed allot more than in literate societies. This is

attested to not only by the substantially richer vocabulary of pre-literate peoples. It is attested to by their often far more complicated grammar and syntax. In his Primitive Mentality, anthropologist Lucien Levy-Bruhl treats extensively of this. He observes that non-literate man participates personally in inanimate entities through their names. Thus these don't appear to him mere objects, as they do to us. Non-literate man always expresses something more than can be vocalised -- something which places words in a context beyond semantic content, as we understand it. Merleau-Ponty goes even further. He maintains that participation is a defining attribute of perception itself.

8. Lewis Carroll presaged this in Alice In Wonderland, where he presented the following dialogue between Humpty Dumpty and Alice: "'When I use a word,' said Humpty Dumpty in a rather scornful tone, 'it means just what I choose it to mean -- neither more nor less.' 'The question is,' said Alice, 'whether you can make words mean different things'. 'The question is,' said Humpty Dumpty, 'which is master -- that's all'".

9. This point is well argued in John D. Barrow, *Theories of Everything,* Vintage, London, 1992, p 210. His concluding sentence runs as follows: "There is no formula that can deliver all truth, all harmony, all simplicity. No Theory of Everything can ever provide total insight. For to see through everything would leave us seeing nothing at all."

10. The logical inconsistency of Einstein and other theoretical physicists, who have tried to produce unified field theories with no consideration for the conceiving mind, was pointed out to me by theoretical physicist Vasilios Basios in a verbal exchange during the summer of 1998.

11. Once Niels Bohr was discussing this subject with a friend. The latter was puzzled by Bohr's insistence that language, not observation or calculation of facts, plays the more fundamental role in understanding physical reality. "After all", pointed out the friend, "nature is more fundamental than language". Bohr objected. "Oh, I don't think so. We are suspended in language in such a way that we cannot even tell what goes up and what down." (This discussion was reported in Lars Loefgren, *Meta-linguistic Views of Quantum Mechanics,* University of Lund, 1997.)

12. The reference here is mainly to Crick's *Astonishing Hypothesis* and to Dennett's *Consciousness Explained.* The two volumes are variations on the same theme -- that consciousness is "no more" than the action of its physical substrate. Crick is a little more subtle in his argumentation than Dennett, but both commit the epistemological error of mistaking correct description of what occurs for adequate explanation of what is.

13. H. Butterfield, *The Origins of Modern Science* 1300-1800, New York, 1961, p 32.

14. De gen. 320b15.

15. Mentioned by R. Root-Bernstein and P. Dillon, 'Molecular complementarity I: the complementarity theory of the origin and evolution of life', *Journal of Theoretical Biology* 188, p 449.

16. See pertinent thinking in Jens Allwood and Peter Gaerdenfors (editors), *Cognitive Semantics,* University of Gothenburg, 1997.

17. David Chalmers, *The Conscious Mind: In search of a fundamental theory,* Oxford University Press, 1996. 18. Maxine Sheets-Johnstone, 'Consciousness: A Natural History', *Journal of Consciousness Studies,* Vol. 5/3, 1998.

19. This statement needs to be qualified. Not only does agriculture appear at different times in different regions. The particular operation of consciousness associated with it appears in many cases before agriculture, while some vestiges of the wanderer's consciousness survive well into our times.

20. Anthropologists tell us that hunter-gatherers worked no more than 15 hours a week. The

rest of the time they simply enjoyed living. (BBC World documentary 'Beating the Clock', broadcast on Nov. 7, 1999.)
21. Martin Heidegger calls this the "toolification" of the Earth in many of his papers and books.
22. C.S. Sherrington, *Man and his Nature,* Cambridge University Press, second edition, 1951, p 98.
23. This is a very old idea. Anaxagoras' pronouncement, which was repeated also by Democritus, goes as follows: "Appearances are a glimpse of the unseen". (Fr. 21a, Sextus, adv. math. VII, 140.) The 'unseen' here is the ancient equivalent for wholeness in its sense as the most basic quality of being.
24. Charles. S. Peirce, in C. Hartshorne, P. Weiss, A. Burks (editors) *Collected Papers,* Harvard University Press, 1931-35, Volume 7, paragraph number 540.
25. Genesis, 1,2.
26. Mircea Eliade, *The Sacred and the Profane: The Nature of Religion,* A Harvest Book, Harcourt, Brace and World, Inc., New York, 1959, p 129.
27. It is the inability to conceive linear time rather than belief in an after-life that underwrites the wanderer's attitude toward the dead. Spengler believed that death is a human invention. It can be pointed out (a) that this invention occurred only after the discovery of farming and (b) that the concept of death depends on how the concept of time came to be conceived. The parallel existence of the dead and the living (because of eternal now-ness) was translated into a life after death only when serial time was discovered.
28. In his book *The Symbolic Species: The co-evolution of language and the human brain* (published by Allen Lane, The Penguin Press, London, 1997), evolutionary anthropologist Terrence Deacon writes on page 291: "This is consistent with the fact that the innermost tiers [of language formation] are located adjacent to primary tactile, auditory and motor areas, and the four outer tiers are distributed within multimodal and association areas."
29. It is interesting that in August 1972 the discovery of a human skull near Lake Rudolf in Kenya obliged anthropologist Lewis Leaky to tell journalists: "We either discard this skull or discard all our theories about primitive man. The cranial cavity housing the brain is extremely large, shooting down the notion that the fossils of primitive men can be neatly taxonomised along the line of evolutionary change". Even Neanderthals have since been found who possess larger craniums than our own of the same period. (Cranium size is measured against body-size.)
30. It is probable that the deeper reason Prometheus was punished by Zeus for his gift of fire to human beings, is that he prided himself on doing so - and at any rate, didn't show human beings how to use fire with measure. Prometheus may have been kind-hearted, but as a Titan had no sense of measure - which was considered by the Greeks as the key to sane and intelligent living.
31. The word 'physis' -- and by extension the word 'physics' - is derived from the same root. Martin Heidegger makes allot of this. He draws attention to the fact that whereas in Latin 'natura' implies 'that which has been born', the equivalent Greek (physis) implies that which is being born - and will always continue to be born.
32. Terrence Deacon, *The Symbolic Species: The co-evolution of language and the human brain,* Allen Lane, The Penguin Press, 1997, p 22.
33. One might as well use the term 'object' here. From this particular point of view, objects and symbols are interchangeable because, to the extent that objects appear as mental entities, they really constitute symbols of what they are in themselves.

34. Jose Ortega y Gasset, *The Dehumanasiation of Art and Other Essays on Art, Culture and Literature,* Princeton University Press, Princeton, 1968, p 204.
35. One way to discover what we should retain from current technology might be to ask whether the way we use it actually does for us what its publicly stated promise says it should. For example, does the time saved through the use of time saving devices really set us free? Does all that new available information really make us more knowledgeable? Furthermore, if the answer to these questions - and one thousand additional ones - is negative, what can we do about it? Is the gadget, the system or the information at fault? Is it us? Or is it a bit of both? Where does the truth lie - and how can we access it?
36. 'A Conversation with Jonas Salk', interview, Psychology Today, March 1983, p 50-55. In another section of this text, Salk says to the interviewer: "We should begin by trying to understand the forces at work, to recognise, first, that we can do something about the situation, and second, that we must do something about the situation."

Emilios Bouratinos is an essayist