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De-trivializing Human Universals

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Samuel Huntington, in 'The Clash of Civilizations and the Remaking of World Order', warns his readers that conflicts among civilizations pose greater threats to world peace than opposing ideologies. If he is correct, the search for and the global recognition of human universals may be crucial to our future as such, and not just to what that that future might look like.

Modernism and Postmodernism almost made us give up on universals: modernism by trying to impose the wrong ones on the whole world, Postmodernism by finding out that Modernism didn't work out and solving that crisis of belief mainly by doing away with rationality, taste and value altogether, replacing them by a textuality that is now rediscovering the "embodyment" that Modernists gave up to begin with. Postmodernists and engineers building robots can now join in the insight that intelligence, to be intelligence, must be embodied and contextual. For the robot, "embodied" means stainless steel and plastic, electrical or optical wires, and computerchips. For humans "embodied" means biology. For some strange reason, probably having more to do with the protection of status and independence than with good research, postmodernism is not yet ready to acknowledge the latter. But at least there is some hope that one day our work will receive some recognition by what is probably still the majority of the arts & humanities community.

Human universals carry with them a strong connotation with unity. Aren't universals what unite us? From that perhaps wishful perspective a clash of cultures may look strange and undesired. Modernism, in a sense, made the mistake of assuming that a universal culture was not only possible but also beneficial and therefor should be imposed.

Of course, we could very well project universals in the future, as a project for humanity, a challenge. But unearthing, as this group is doing, the strong biological basis for culture, we seem to give up on some of our (perceived) freedom to make culture whatever we want it to be. Aggression and competition are very much a part of our biology, indeed of evolution as such, and perhaps the "wrong" part of biology has transformed into culture. In any case, we must realize that a biological foundation of culture and art is in and by itself insufficient to guarantee the intrinsic coherence of cultures.

Cultures defy the simple arithmetic of addition and subtraction that has long been applied to territories as nations slowly emerged. The cultural blending that takes place in the background of this calculus obeys its own logic. Cultures change over time. But when we read the Greek plays, we recognize the tragedy, the dilemmas, the doubts, ... What remains stable over time is probably inherited from our evolutionary past. This implies, almost paradoxically, that what we take pride in as our most valuable cultural achievements are actually our most biology-based expressions. Human universals, it seems, are mainly of the past.

The archeology of mind

This paper is part of an attempt at an archeology of mind. One of the premises of this project is evolution and its unavoidable implication, the evolution of evolution. Universality, in the context of the kind of universe we live in, does not require an eternally unchanging identity or essence.

Archeology, in a traditional sense, studies the material remains of past human life and activities. These remains include the very earliest bones and signs of human presence—a footprint left in vulcanic ashes or a piece of rock shaped to fit a human fist—as well as the contents of the garbage can that we put out just yesterday.

Another way of looking at those remains is to see them as predecessors or precursors of what we are today. Nobody believes to be the same person that she or he was as a kid. In fact, every so many years, we substitute a whole new set of molecules in our bodies for old ones. Of course, something remains constant during these changes. This tension between identity and change is actually at the core of the debate whether

criminals can indeed become better people and whether they should be punished after a certain amount of time has elapsed since their crime.

This project traces the history of what is perhaps the most precious and complex piece of equipment in the universe: the human mind. How far back will this journey take us? Should we stop looking once we reach the frontiers of what a careful search has unearthed, often quite literally? Not only does this leave us with a bunch of tricky questions about where exactly we should start counting—when did humans become human?—this also seems to trigger an endless series of questions about "and what came before that?" And then, of course, there is always the danger of legitimizing the present based on its past.

Historicism, stressing the importance of viewing things in the perspective of historical change, gained a somewhat dubious reputation precisely because of these methodological issues which led Karl Popper to writing his *The Poverty of Historicism* in 1957. But as Alexander Argyros points out, there is nothing wrong with historicism as long as we do not arbitrarily limit the slice of history under consideration to a mere two or three thousand years but understand it to include the history of the entire universe. As he puts it, "if we are the product of a combination of Darwinian evolution and Prigoginian self-organization, then a full understanding of the human world must include our total history, everything from the big bang to theories about the big bang, not just that slice of it that myopic constructivists elevate to the whole." [Argyros 1991, 282]

In a sense, this answers my question concerning how far back an archeology of mind will take us: all the way back to the big bang and even, as I would argue, beyond, to the realm of pure mathematics.

This journey is not without some puzzling problems. By the time we get down to physics, for example, we are bound to loose our interest in the very notion of time. The physical universe is largely indifferent to time. It is, in somewhat technical terms, invariant under time translations. This is, in fact, nicely captured by the equal sign in the equation: It doesn't really matter whether we read the equation from the right to the left or vice versa.

When we get to the level of quantum physics, we also loose our sense of control over what we may or may not observe—at least simultaneously. Heisenberg's uncertainty

principle restricts how much we can know about a certain property given what we know about another. More specifically, when we know the speed of a subatomic particle, we can only tell its position within a certain range of values. When we look at a moving car, we can fairly easily determine how fast as well as in what direction it is going. What Heisenberg's uncertainty principle tells us, is that if we make the car small enough—smaller than a single atom—we can no longer do this, not because our experience fails us, but as a matter of principle.

So by the time we get close to the end of our journey into the history of our minds, our archeological finds become more and more strange, defying much of our everyday experience. We look at what we dug up and ask ourselves "How did they do it? Are these really the marks of our ancestors?" We feel like Alice must have felt in Wonderland, wandering through a strange world, knowing, but hesitating to accept, that it really ours.

A temporal context

The concept of (human) universals must be seen in a temporal context. As humans, we all share everything that is older than humanity—we share the Big Bang, the four fundamental forces, the essential chemistry of life, a common genetic ancestry. Some of this history we share not only with other humans. The four fundamental forces, for example, we share with everything else in the universe.

At first sight, the folk arts figure somewhere at the opposite end of the temporal spectrum. Even now when there are probably no human tribes left to be discovered and a global culture is gradually penetrating the whole globe, the folk arts still carry to some degree that notion of a relatively high degree of cultural insularity that was once used to characterize them. Folk artists—if at all they consider themselves artists—usually make works for themselves or for a small group of people around them. They hardly ever have a clue (or care about) of what is mainstream and what is not and typically start off with little or (most often) no formal training.

Martin Gardner, in one of his 'Mathematical Games' in *Scientific American*, sneers at those cultural anthropologists that claim that mathematical rules are basically culturally determined. Eager to count mathematics and science among the crafts of a culture, they see the fact that different tribes sometimes use a different number base as supporting their

hypothesis that mathematical rules are arbitrary. They conveniently forget that all natural numbers, regardless of the number base in which they are expressed, are fundamentally references of our minds to quantities. Perhaps that is true of folk art too. Perhaps folk art too is fundamentally a culturally specific reference of our minds to something much more general. Granted, the term "folk art" has been used in quite diverse contexts relating to expressions of common people, from the arts of illiterate tribes over the "arts" and "crafts" of the "less literate" in any society to kitch or camp and other unusual artefacts. The concept may therefore defy every attempt to subsume all of its variants under a common denominator. Nevertheless, while it is tempting to consider folk art as an expression of the specificity of an individual or of a small subset of a culture, it may well be that that specçificity is no more than a specific number base to deal with quantities. In fact, to some extent this analogy may even have some quite literal foundation, as mathematics and (folk) art share an interest in space and time.

The concept of evolution is no longer confined to biology. Hahlweg and Hooker, for instance, attempt to establish an evolutionary model that is expressed as the evolution of complex (self-)regulatory systems. Such systems, they suggest, can be found not only in the genotypic and phenotypic organization of biological systems, but also in scientific concepts, methods, theories, and so forth. They understand scientific or epistemic evolution, therefore, as a "literal extension of biological evolution." [Hahlweg and Hooker, 1989, 79] But as I have argued elsewhere, the functioning of evolutionary processes in prebiological systems is seldom acknowledged, as if evolutionary processes came into existence with biological systems. [DePryck, 1993] Especially now the line between "inorganic" and "organic" is increasingly hard to draw, such an arbitrary cutoff is hard to maintain.

Looking at evolution throughout the existence of our universe implies, among many other things, that we need to be open to the suggestion that a foundation for our aesthetic experiences may be found not only in our biology but also in our chemistry, our physics, and perhaps even in our mathematics. Just as we are asking questions about how much and how our culture may be based on our biology, we must ask how much and to what extent that biology has as chemical basis. And how much of chemistry is really physics? From the position of mathematical realism, we finally must also ask how much

of that physical reality really is based on mathematics.

It is hard to provide a biological description of a rock. Children sometimes believe their dolls are real but if we are honest about it, we must admit that our favorite pet-rock is not really alive. On the other hand, it is rather easy to describe a living organism as a piece of matter, subject to gravity as all matter is, and so on. Our ability to do so, to describe humans as *just* matter, even seems at the core of some of the more shameful episodes in even our recent human history. The point is: description and foundation seem to have a preferred direction along the arrow of time.

Mathematics fits all of the different levels of organization of reality: physics, chemistry, biology, and even culture. One possible hypothesis to explain this is that mathematics simply is the best and most flexible descriptive and predictive device that evolution in general and cognitive evolution more specifically has equipped us with. However, another hypothesis could be put forward, situating mathematics not at the end but at the beginning of evolution, perhaps "before" the Big Bang. From that perspective, we both "discover" and "invent" mathematics, not unlike how we not only discover chemical elements but also, within limits imposed by reality, create elements beyond those ordinarily found in nature.

But couldn't we make a similar claim about art? Can we say that we discover as well as create art? And what about language?

Adaptation

Since the late 1980's, psychologists generally view adaptation to the environment as a core concept in the understanding of intelligence. In this context, adaptation involves changes to oneself as well as changes made to the environment using a range of cognitive processes, such as perception, learning, memory, reasoning, and problem solving. Adaptation appears here as the result of intelligence, itself an effective combination of the constitutive cognitive processes. That is also the reason why most psychologists would resist the notion that for example our eyes are in and by themselves intelligent.

However, it is perfectly possible to view adaptation as the more primitive process. After all, adaptation is a process that we not only find at the level of human cognition but also, perhaps even prototypically, in biological evolution and, as in the case of the

adaptation of the eye to changing intensities of light, throughout many natural and artificial systems.

Sensory adaptation

Our perception has evolved to operate within certain ranges. Adaptation and habituation processes at the sensory level are rather well known. The distinction between both is usually made in terms of the timeframe in which they operate, shorter for adaptation, longer for habituation. At first sight, it looks as if adaptation and habituation decrease our sensory sensitivity. When we get up and open the curtains on a beautiful day in the middle of summer, we may at first be blinded by the intense sunlight (especially when stay in bed too long and only get up around noon). It is important to realize that the adaptation and habituation that go on in the next seconds or minutes are not as much decreasing our sensitivity as they are increasing it by introducing a criterion for relevancy. Out of the incredible range of intensities our eyes are capable of handling, that range is selected which provides us with the most relevant information about what is going on in our environment.[i]

In the case of movement, *range* refers to speed. We don't see flowers grow, probably for the very good reason that we don't need to see flowers grow. Without a memory to compare *now* with *before*, we would not even notice their growth. Neither do we see a bullet fly. While that might have some advantage (assuming with would have a bodily speed to match that of the bullet) we only perceive movements at speeds that we may assume were somehow relevant in our evolutionary past: the speed of the movement of pray, the speed of the movement of enemies. Technology may help us overcome some of those restrictions. We may record the flight of a bullet using highspeed fotography, for example at 128 frames per second. Playing this recording back at our usual 16-24 images per second does not produce a sense of continuity of the slow motion. That sensation kicks in at about 48 frames per second. This means that an organisms trying to survive in a world of pray and/or enemies moving at the speed of a bullet would need visual perception about twice as fast as ours.

It is important to realize that the technological "correction" doesn't do away with the limitations of our perception. It merely substitutes one kind of uncertainty for another. (This intentionally is made to sound like Heisenberg's Uncertainty Principle) As Joseph

Schillinger puts it, "we have two choices: either we see fast moving objects at a stretched time period, wherein we perceive all the details that we can perceive in continuity; or we see the actual image of a fast moving object realistically restored, something we cannot actually see." [Schillinger, 1948, 19] In mathematics, when we calculate the derivative of a function, we give up on some of the information about that function. Tracing our steps back, integrating the derivative, we are unable to locate the initial function unless we are provided with some specific information, for example a point on its trajectory.

Cognitive adaptation

Just as our perception has evolved to function within a certain range, so have our cognitive abilities. For example, we have a specific pictorial (rather than semantic) memory for things that remain relatively stable over evolutionary time, leading to better spatial capabilities with respect to those things. Our spatial abilities, it seems, are to some extent hardwired to deal with a specific type of environment.

It is remarkable how insights and innovative approaches are rarely expressed in novel forms. Many of our profoundest insights are cast in the simple grammatical structures such as "A is B" ("My life is a sinking ship", the metaphorical scenario—metaphors, given the depth of what they may contain or express, are syntactically amazingly simple), "A is like B" (or the analogical scenario), "A causes B" (the causal scenario), and so on. Prosodic features may also code for such cognitive scenarios ("If I were your father, I would punish you" is an example of a counterfactual scenario, compare with "If it rains, the streets get wet."). Also: is it a coincidence that these examples are prototypical of abstract reasoning based on or applied to concrete situations? We obviously did not need to develop highly sophisticated grammatical structures or means to express what probably once were revolutionary cognitive operations.

Could we say that operations in folk art also correspond to fundamental cognitive operations? In that sense, folk art really is a language, a device to select relevant cognitive operations. Pushing the terminology somewhat, we could perhaps say that our verbal language is a special case of a such folk art, grown out of attempts to select and process relevant auditory information and to relate that information to information from other senses.

Just as new ideas rarely come in a new form, novel forms rarely code for novel content. If such grammatical forms are connected to conceptual or cognitive scenarios then we must ask where these scenarios come from. From our evolutionary past (biological or other)? If so, then we must constantly adapt or recombine them to deal with ad hoc situations that are different from the past in which they developed. Such scenarios prompt us for integration or change when they are by themselves insufficient to handle current situations.

The index of words, gestures, shapes, ... constitutes the vocabulary from which to choose when we speak, dance or paint. Folk art, including verbal language, explores and filters that index while art, in a more traditional sense, expands our vocabulary, sometimes in ways that perhaps never will be useful. Art explores the edges where we loose our sense of continuity of our perception and our cognition (if such a distinction is at all meaningful). Art adapts and expands our vision, trying, so to speak, to teach us to see the moving bullet. Picasso, himself to some degree elaborating on folk art, has taught us how to perceive what was ordinarily, in a rather literal sense, not perceived before. Now any six-grader can paint his or her Picasso. In fact, Picasso himself is showing up in folk painting.

Categorization, not communication

Most theories of language take for granted that language is primarily a tool for communication. At first, that assumption seems reasonable. After all, we do talk a lot-sometimes even too much-and we constantly use words to convince others of our own perspective on things. On the other hand, we do use words to think about something without necessarily communicating those thoughts. Also, we communicate with each other without using language, at least not language in the traditional sense. Not only gesture but also intonation (not present in written language) and smell (hardly something that we can consciously control, except for perfumes that cover up undesired messages as well trigger a response by themselves) are essential elements in our communication with each other. At the very least the connection between language and communication, however present and important in our daily experience, seems rather arbitrary.

It is for that reason that in my recent work I started to defend a rather different position, suggesting that language is fundamentally a cognitive or epistemic tool. Of

course, the evolution of laryngo-anatomical mechanisms has greatly enhanced the function of language as a tool for communication, up to the point where we mistakenly assume communication to be language's primordial function. But while language induces and facilitates communication, and while communication and cognition probably co-evolve in a very close, symbiotic relationship, communication is probably not its primary and definitely not its sole function.

This implies that to understand what language is about and how it functions, we should focus on how language fits in our cognitive framework. The problem in doing so is that language provides us with only partial clues about what goes on in cognition. Our brain has evolved such a wide scope of cognitive operations and has become so sensitive to such a wide range of stimuli (not just sensory inputs but also stimuli generated by the brain itself) that it needs a device to focus on relevant information and on relevant processes. In this paper I suggest that language is the tool our brain uses to focus on a specific range of inputs or a specific range of mental operations. When we complain that there are so many things that we cannot express, we make it sound as if our language (or languages) were very poor tools to express the complexity of our thoughts. But imposing such restrictions is quite likely what languages are to a large degree all about.

All adaptations, including the ones mentioned above, require a degree of categorizing. A simple adaptive feedback device, such as a thermostat, categorizes its environment in terms of temperature. The eye of the horseshoe-crab, one of the oldest organisms around, categorizes its environment in terms of horizontal and vertical features. A frog categorizes in terms of stationary or moving (and thus edible) objects.

No two languages implement categories in exactly the same way. So differences among languages are based on distinct systems of categorization, all of which nevertheless involve simplification and a reduction of diversity to a limited number of categories.

The categories involved are not always very clear nor very stable. The resulting variability exists within as well as among people. In biological systems, variability is functional. The amount of genetic variation that exists in a population is positively correlated with the chance that evolution or change by natural selection may occur. Around 1930, R.A. Fisher, a British geneticist, expressed this [illegible] mathematically in his

fundamental theorem of natural selection, stating that "The rate of increase in fitness of any organism at any time is equal to its genetic variance in fitness at that time" It is not unlikely that similar theorems may be formulated in other fields. Cultural diversity, for example, has been credited with such a functionality. However, too much variability may lead to a dysfunctional loss of stability. Here too some one cannot but notice some striking resemblance with what is going on at the cultural level.

Williams syndrome

Let us now introduce a genetic element in our story. A hot topic in the study of relations between language development and cognitive development is Williams Syndrome, caused by a deletion on chromosome 7. Among other traits, this leads to the absence of the protein that makes bloodvessels elastics, characteristic facial features, overly friendliness, and mental retardation (but 5% has an IQ of about 80, so there is a fairly wide range that could be characterized as a systematic shift of two standard deviations to the left). Also, people with Williams syndrome typically score better on language-test than on non-language test and display more specifically a rather extreme weakness in visual-spatial construction. In their relative strength on language items, they are the opposite of children with Down syndrome. In fact, one often refers to them as having language (communication) without a cognitive development to make that language useful.

Normal children point at object before they can talk. Children with Williams syndrome talk before they point. In the process they destroy the often-accepted hypothesis that pointing is a cognitive prerequisite for labeling language. But studies by Carolyn Mervis, Michael Tomasello, and others strongly suggest that pointing is just one of the possible precursors of labeling language, and by no means the only possibility. In general, joint attention apparently is the real prerequisite and joint attention can be accomplished in many ways. Eye gaze and other ways of drawing attention will equally do, even when pointing is obviously a quite efficient tool.

Focal and automatic attention

In the late seventies, psychologists Richard M. Shiffrin and Walter Schneider formulated a "two-process" theory of attention-one focal, the other automatic-attempting to explain

the selective and intensive aspects of attention and its links with both awareness and more automatic processes of visual search and detection. The difference between focal and automatic modes may be illustrated by a driving example. A new driver has to attend to gear-shifting in a focal way—actively thinking about it; an experienced driver, on the other hand, changes gears automatically—not having to think about it.

Focal attention comes with heightened awareness, conscious control, and selective handling of sensory phenomena. Focal attention is highly flexible but makes great demands on brain capacity, especially on short term storage. By contrast, automatic detection, or automatic processing, makes fewer demands but is relatively inflexible. It operates in long-term memory and is dependent upon extensive learning. It requires almost no active control and is therefore difficult to alter, although its workings may possibly be modified by changes in the threshold at which it is triggered.

It might be interesting to consider the two attention processes described by Richard Shiffrin and Walter Schneider as really one and the same process (Ockham's razor strikes again), but with a shifted range of stimulus intensity.

Language

Since learning language starts of with focal attention-joint focal attention more precisely-and moves toward automatic attention, it is tempting to introduce language as a device for cognitive attentional adaptation. Language is what allows not our senses (or perhaps not only our senses) but our brain to adapt to a wide range of stimuli. This is not only true for verbal language, but also for other, older languages (involving olfaction, touch, gesture, sounds, etc.), some of which have become hierarchically more complex as the host organisms evolved and increased in cellular complexity. The older and newer systems remain relatively independent, implying that they can either diverge and contradict each other or converge and reinforce each other. This allows us to "talk" to our pets on the one hand and on the other to detect if a speaker is sincere, a liar, or a sincere liar. (Joseph, 1993, 8) According to C.M. Johnson of UCSD, gaze or eyecontact is indicated as a good predictor of subsequent interaction among bonobos. It is obvious that gaze is a fairly demanding and exclusive way of interaction, not unlike the intense labor

of an infant trying to draw its mother's attention to something. Language makes this work much easier, as it facilitates the shifts in range of attention of both speaker and listener.

Art

Art, on the other hand, invites focal sensory and/or intellectual attention. Art, as Ellen Dissanayake points out, makes special, it engages us. Interestingly enough, Dissanayake sees the highly focal mother-infant interaction as a possible precursor to artistic interest.

One of the conditions for becoming aware, or selectively engaged, is when current expectations are violated. Listening to certain types of poetry, it is first the meter or the rhythm which draws our attention, perhaps, as Frederick Turner suggests, because they engage our brains in specific cognitive modes. Later, once rhythm and rhyme are established as a range, it is the deviance from the pattern that draws our attention. Drawing on what was introduced earlier, it is perhaps more appropriate to say that in general we become aware when a stimulus falls outside a certain range set by adaptation/habituation.

Art, I suggest, is a tool to explore ranges, either by narrowing or broadening. It is also a tool for building an inventory of ranges. In that sense, we could say that the category "art" groups sensory as well as cognitive ranges that are of potential problem solving interest.

If it is true that our aesthetic pleasure functions at the highest level of sensory and/or cognitive integration, then aesthetic pleasure teaches us, and teaches us well, about relevance: often the relevance of specific aspects of our environment (when we take pleasure in the cultural patterns that were shaped throughout our evolutionary past but also when contemplating the beauty of a landscape—cfr. the remark on a specific memory for features that remain relatively stable throughout evolution), sometimes the relevance of the integrative processes themselves.

Nature - Culture

Whereas the tools themselves (language and art) have a strong genetic basis (as is obvious from our understanding of language and other learning disabilities), the inventories are transmitted culturally, with obvious advantages over genetic transmission. Nevertheless, the inventories probably have little or no evolutionary value without the

tools to access them. The questions relating to the feasibility of artificial intelligence can be rephrased in these terms. Additionally, questions concerning the range of attention of machines should be raised. Obviously, the ranges of attention of a computer are not those of a human brain. This suggests that human intelligence and artificial intelligence are likely to be structurally similar but perhaps to unique to be translated into one another

Coevolution of art and language

To conclude, a brief word on my hint at coevolution of art and language. Coevolution is a term coined by the American biologists Paul R. Ehrlich and Peter H. Raven to describe the process whereby two or more species depend on the interactions between them. Later the meaning of the word was expanded to include such interactions as those between life and climate, referring to complex interaction and mixture of forces causing the mutually induced climatic change as well as biological changes during the past 4 billion years or so.

If a language, through natural selection of the tool and cultural selection of the inventory, becomes swifter or more agile in categorizing, an art may develop, also through natural selection of the tool and cultural selection of the inventory, capabilities for better problem solving. This will in turn lead to an expansion of language, and so on. The coevolution of language and art is, I believe, a perfect example of a positive feedback-loop.

One of the results of such a coevolution is convergence, defined as the acquisition, through natural selection, of similar structure, function, or behavior. In the case of the coevolution of language and art, convergence takes the form of convergence of the tools and therefore perhaps also convergence of the inventories. This may help explain the increasing difficulties we have to explain the difference between "ordinary" language and "artistic" language, between "folk art" and "art".

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