

Healing Journeys Energy  
presents

*Imagination is  
Greater than  
Knowledge*

Damir Ibrisimovic

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*Elmarie Swartz*

*January, 2009*

<http://www-healing-journeys-energy.com>

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**Imagination is Greater than  
Knowledge**

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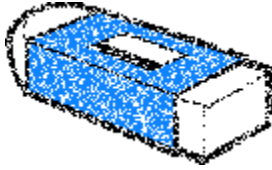


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## Imagination is Greater than Knowledge



I assume that the reader of these pages, at least occasionally, uses an eraser. (That rubbery little thing used to erase unwanted traces of a pencil on a paper.) And furthermore, I assume that it happened to the reader that this rubbery little thing fell somewhere under the desk. And you look and look and can't see **where** that damned little thing is. It just disappeared. Just like that - in thin air. You shake your head and answer the phone. Afterwards, you try again and that damned little thing **is there** - under the desk. It's just a bit off where you expected it to be - "**magic**".

This page was published in October 2000. Exactly three years later, Nature Science Update published article "Brain fakes it" on a finding in neurobiology that strongly supports the general approach of this site.

And you are not wrong - this (and other numerous examples from everyday life) is a phenomenon at the core of the magician's or illusionist's art. Not one scientist fell for it, but I did not hear of anyone taking a lesson from it. And the lesson is simple and the answer obvious - we do not see what we do not expect to see - we see what we expect to see. Obviously, there are discrepancies between our perception of the world that surround us (and ourselves within it) and what really is "out there".

For a long time, I have been bewildered by science's ambivalent approach to the observer and the reality. Timid claims of objectivity, ending with more or less implicit introduction of observer (bearer of subjectivity) were not followed by a clear statement. This ambivalent approach, of which Einstein's famous theory of relativity is a good example, lead to an uncertainty: What is the object of the scientific approach? An answer to this question may bring science to a rediscovery of its humanity with all its glory and limitations.

Some scientific evidence suggests that what we call objectivity is just a generally accepted form of subjectivity. A closer look might give us a better understanding and maybe help us to narrow the gulf between our "reality" and what really is "out there".

These pages are an attempt to imagine a science with a cornerstone of objectivity replaced by another cornerstone - subjectivity, without a denial that there is something out there. The purpose of the science is to describe the world that surrounds us and, I would add, ourselves within it. The broaden concept has numerous implications. But the most important is that it brings you, me and others into the picture with all our human elements and feelings. It replaces the dehumanised world perceived by nobody with a world acted in by us.

Would such science still be scientific? I would say - yes. It may actually gain a new vigour and respect.

## Introduction

**How do we see the "world that surrounds us and ourselves within it" and why do we see it the way we do?** are two, probably the most important questions humanity is faced with, for everything we know and everything we do is based on answers to these questions.

Current - more or less generally accepted answers (mostly behavioural) are increasingly at odds with numerous scientific findings. What makes the situation even worse, are contradictory interpretations of these findings that - more often than not - raise more questions than offering an answer.

It seems that the "objective" approach to these questions has reached insurmountable obstacles and that the introduction of the "subjective" approach is inevitable. We cannot continue to deny the enormity of the discrepancies between our "subjective" experiences and "objective" findings.

On this site - I'm trying to develop a coherent "subjective" picture of how we see the "world that surrounds us and ourselves within it" that is (partially) reconciled with "objective" findings. The introspective method that I am using is relatively simple although hard to explain - except to say that it is a kind of self-analysis. For example: We all know that any "objective" picture must have been a "subjective" picture (or a number of "subjective" pictures) before it became "objective". But how we "derive" one from another is not so clear and a kind of self-analysis is the only option. Answers I reached are not the only answers, but I do hope that they do lead to a better understanding of both.

This coherent "subjective" picture requires explorations of all areas of human experience, thought and action - and this is an immense task - too vast for a single person and a small web site. My only hope is that the approach I'm taking is sufficiently appropriate and up to now it seems to be the case as a relatively coherent picture emerges from putting together numerous neurological and psychological findings with our knowledge of language, culture, art...

The concept of the probabilistic /deterministic universe is based on the concept of a closed (finite) system and therefore entirely inappropriate in considerations of an open (infinite) system.

A difficulty I face, in better explaining this "subjective" approach, is in the currently prevailing "objective" picture of the probabilistic/deterministic universe (closed, finite system). From the "subjective" perspective "we" are unique and as such - "impossible" (probability  $1/\infty$ ) in any of the "objective" pictures we may form through a mental change of perspective. I would suggest that a "subjective" approach requires a picture of an open universe - a universe I would call opportunistic - a universe that is based on opportunities or openings and cooperation rather than on random chance or fate. (Such picture of a universe seems to be also much better suited to the hotly debated phenomenon called emergence.)



I would also suggest that radical changes are required not only in our ways of thinking but also in logic and math. The classical (static) logic and math cannot cope with emergence, uniqueness and selfreference for example. (The reason seems to be our closed picture of the probabilistic/deterministic universe.) The math in the "subjective" opportunistic universe seems to be much closer to  $1 + 1 = e$  than to  $1 + 1 = 2$ . Similarly, the logic seems to be rather "loose", tentative like proposed variant of nonmonotonic logic (see Model) - where we have a limited choice in determining what is "true", "false" or "neutral", than static  $N = p + q$ .

A possible alternative to the prevailing picture of the probabilistic/deterministic universe is outlined at Cause & Effect page (revised on 8 June 2003) under Perception.

As new findings catch my attention and as I learn about some old ones, I am trying to incorporate them or adjust my approach. However, the core concepts remained intact in these three years of the life of this website - and as time passes by my confidence in edging towards workable answers - increases. Currently, I am working on an area of human experiences - stage acting. It might be surprising to many but this appears to be a goldmine for those in search of answers - Stanislavski's psychophysical theory of acting in particular. For an actor or an actress, their bodies, emotions, memories, thoughts, other actors or actresses, the stage as they see it ... - in short all of their being and surrounding is an "instrument" they learn to "play". Their approach is per definition - "subjective" and I hope to have a few pages dedicated to their findings in near future - particularly in relation to emotionally charged memories.

I'm well aware however, that this "subjective" approach, I'm suggesting, requires a subtle "change of perspective" with far reaching consequences. I experienced it almost a quarter a century ago as a shiver that made everything looking different and yet the same. This left me "stranded" for quite a while until I started to get to terms with the change.

The simple statistics of visits to some of these pages reflect well difficulties many visitors might have. This might be partially a result of my inability to express myself well, but I suspect it is far more a result of difficulties in achieving the required "perceptual shift" (or "paradigm shift" as some would call it). It is like a "book not meant to be read by me at this stage of my life". Practically everything within us raises their voice to stop us going any further. And wisely so, for we need to be ready for the change - my apparent non-readiness or half-readiness did let me stranded for quite a while. However, if you do experience such a change - I do hope that these pages will also help you to come to terms with it more quickly than I did.

## Mystery

Since Descartes - the prevailing picture of how we see the world that surrounds us and ourselves within it was - that there is a "little us" sitting somewhere in our brain - "in charge" of everything. The line of reasoning went along the following lines:

- ❑ Our senses turn external stimuli into electro-chemical signals that are combined (or reconstructed) in our brain to form a comprehensive picture of the world that surrounds us - like an ultimate "virtual reality" machine.
- ❑ The "little us in charge" (the "real us" - a perceiving, thinking, feeling individual) "plays an ultimate virtual reality game" responding to the input and directing our actions.
- ❑ Responses travel back to our muscles as electro-chemical signals (in an amazingly coordinated way)....

This simplistic and "mechanical" picture of "little us in charge" - sitting somewhere in the brain - is slowly but surely replaced by a picture of "little us in charge" sitting "everywhere" in the brain. (Well, this "little us in charge" must be somewhere. Since we cannot find it at any single point within the brain - it must be the whole of the brain itself or the electromagnetic field generated by our brain activity...)

But even this picture of "little us in charge sitting everywhere in the brain" is recently challenged by numerous findings.

Kanwisher and Kathleen O'Craven did not even dream of tossing all current theories about "how we see things" and "why we see them the way we do" into a turmoil. But - that was precisely what they did. With their team at the Massachusetts Institute of Technology they reported that they could tell, with 85 percent accuracy, whether a person is thinking of or actually seeing a face or a place, just by looking at how his or her brain lights up. However, regarding differences between imagined and actually seen images, they wrote that fMRI images "reveal a striking similarity between regions activated during imagery and those activated during perception" (Journal of Cognitive Neuroscience). In other words, they were not able to detect **differences** in the brain activity between imagined and actually seen images.

I invite you to remember as much you can what you are seeing right now - close your eyes and try to imagine the same.

The difference is enormous and impossible to express. Even when you look without paying attention to anything in particular.

The absence of a difference is much more significant than it appears at first glance - for there is an enormous difference in our "subjective" experience of actually seen and imagined image. Many expected this enormity to be somehow reflected in the activity of our brain - but imagined and actually seen images turned out to be the same as far our brain is concerned.

Frank Werblin and Botond Roska, of the University of California, Berkeley, have discovered that the eye has around dozen channels that carry information to the brain which then "constructs" images (the "little us in charge" is still alive in their report) - "Even though we think we see the world so fully, what we are receiving is really just hints, edges in space and time."

A careful reading of their report combined with that of Kanwisher and Kathleen O'Craven reveals that what our brain sees are hints, sketches or as they are called in psychology - schemas. But we do see more than our brain sees and we witness this by simple closing and opening our eyes. Is the whole concept of the "little us in charge" - simply misleading? Do we really need to have a "little us in charge" separated from the rest of our body? Do we really need to have a mind/body division?

A closer look at hot topics in circles of scientists and philosophers reveals that thoughts of many are still in the firm grip of this mind/body division with a "little us in charge" (mind) well and truly alive. The enormous difference between open and closed eyes is "explained" as an illusion. (For example - our eyes dart in all possible directions "bringing in" to the "little us in charge" bits and pieces and creating an "illusion of the richness of the world that surrounds us". This line of thinking tries to eliminate a need for a comprehensive picture of the world that surrounds us within our brain and to maintain the picture of "little us in charge" - this time being served with an illusion. But - open your eyes without looking at anything in particular...)

A weak point in theories that are "explaining" the richness of the world that surrounds us as an illusion is that they do not make a difference between noticing and seeing. Everything is put in a mental arena of sketchy images and there is no difference between imagined, recalled and actually seen - and the richness of the actually seen is "explained away" as illusion.

Many are still uncomfortable with an alternative - that there is no mind/body division and that there is no "little us in charge" to be found in the brain or in any other particular spot within our body. We (whatever this "we" means) are simply - "all of ourselves". We see more than our brain sees (sketches, shapes or schemas) for we also see what our eyes see. We do notice much less than we see - but we do see much more than we notice.

This is not as puzzling as it might seem. This is the fact of our everyday life - directly experienced in our transient now - a unique and infinite universe full of unique phenomena infinitely rich in details and colours that could never reach our brain - except as sketches built of hints or edges in space and time. When the activity of certain regions in our brain is reduced (as in meditation) - this richness of our direct experience of the world that surrounds us is even more profound.

Even in vivid dreams there is a high activity of our eyes (REM) suggesting their "contribution" to the richness of our dream.

Direct experiences of our transient now - filled with infinity of unique phenomena are translated into sketches within our brain. This enables us to "see" similarities and differences between otherwise unique phenomena and build concepts upon concepts upon concepts... This also enables us to remember and compare sketches of our past with sketches of our present and develop our sense of space and time and to further evolve "our description of the world that surrounds us and ourselves within it".

### Description

Everything we know ("our description of the world and ourselves within it") was once based on "direct" experiences of the "world that surrounds us and ourselves within it" - our own or of others.

Our "direct" experience of the "world that surrounds us and ourselves within it" - is based on everything we know ("our description of the world and ourselves within it").

This apparent contradiction divided philosophers who followed the strict rules of (static) logic for millennia. They are known as nominalists and realists and their "silly" argument about a crack of thunder heard by nobody resurfaces every now and then (few centuries apart). Does it make a "ka-boom"?

Plato's forgeries (see Peter Kingsley: In the Dark Places of WISDOM) were the first documented attempt to tip the scales towards a vote of "yes, it does make a ka-boom even if nobody hears it". This created a belief that, phenomena we perceive exist "out there" as we perceive them (realism/objectivity). Carried by this vote, modern science went as far it could, but closing the loop by a re-introducing the observer (subjectivity) became inevitable through the weight of scientific evidence that tips the scales towards a "no" vote.

Richard Dawkins established an analogy to evolution of physical forms in biology - evolution of ideas within a culture. He also coined a new word "meme" (mental gene) - the unit of thought as a building block of our cultures.

I would suggest that both, the knowledge (culture) and the perception evolved with us - supporting each other. With this, Richard Dawkins' analogy cease to be analogy and becomes an integral part of the phenomenon we call life.

*Virtually all forms of life could be viewed either as a **cooperative society - culture** of its components or as a **unique single unit** that interacts with its environment, multiplies and evolves.*

A culture requires communication - a language. It does not really matter which form this language takes. Thus we could speak of a language in the form of electro-chemical reactions within a cell, electro-chemical reactions of another

Our spoken, human language does appear to have another dimension that could not be observed at the level of electrochemical reactions within a cell for example.

kind between cells of the same "specialisation", electro-chemical "messages" carried between societies of cells of various "specialisations" by groups of cells "specialised" to carry messages and of course - our own spoken language. From

this perspective, single units are not unique and they are replaceable.

A single unit at any level of any form of life (including us) - is unique, irreplaceable and "subjective" (self-referral). The "subjectivity" is a phenomenon that can be experienced only from within a single unit and ultimately speaking we can talk about it only on the basis of our own experiences inferring "subjectivities" of others or "subjectivities" of other forms of life. However, this is the perspective that gives life (richness of the world) to our cultural "imprint". Only through interplay of both perspectives we can reach a better understanding of each of them.

As the latest studies of orang-utans and other primates indicate, even hints of a language enable transfer of knowledge from one single unit to another building and enriching our individual "descriptions of the world and ourselves within it". This leads to the emergence of a culture in which knowledge can be passed from one generation to another - tested, revised and enriched within each individual "description of the world and ourselves within it".

This accumulation of knowledge has limits imposed by our individual descriptions of the world and ourselves within it - that have to be optimised. The optimisation "shortens" the descriptions through introduction of higher levels of abstractions and different "arrangements". Our optimised "descriptions of the world and ourselves within it" lead to further refinements of the language and enrichment of our culture - our culture evolves and with this each new individual "description of the world and ourselves within it" is enhanced from the start.

However, even these enhancements have their limits. Recognition and cooperation between cultures became necessary and that lead to the birth of civilisation and phenomenon we call consciousness.

Although overlaid by higher levels of abstractions, reorganised and optimised by the "cultural imprint" we grow into, "our description of the world that surrounds us and ourselves within it" has a different, life giving origin. Origin that gives us the "richness of the world" of our transient now.

I would suggest that "our description of the world around us and ourselves within it" emerges (see Complexity) from the interplay of countless "descriptions..." within us - on all levels and between all levels that is overlaid by the "imprint" of the culture we grew into. This might explain how we can see the richness of the world our brain cannot see but our eyes can and how we can relate this richness to our highly abstract symbols (cultural sketches) of the culture we grew into.

## Idea

Western thought and science have been led by an ideal of a single, ultimate perfection - often referred to as "Plato's World of Ideas". That perfection is seen as a driving force that improves our imperfect (sometimes considered worthless, full of sin or dirty) world. To the despair of modern "Platonists", that imperfect "out there" refuses to submit itself to that single, ultimate perfection of ours. It might or might not have its own single, ultimate perfection. If it has, we have a long, long way towards it. Meanwhile, all we can do is - to believe in it. Since belief is quite different from knowledge, it would be quite unscientific to allow ourselves to be influenced by personal beliefs. Wouldn't it? - I would suggest that we turn towards what we have and what we know. Putting those things in order will give us a much better chance of making new discoveries.

"Plato's World of Ideas" (that might be not Plato's after all) is one of these things and it might be an important part of our description of the world and ourselves within it. A circle, for example, as a concept is very simple and there is one and only one concept of the circle. The same goes for all other shapes and forms. It seems impossible to imagine a better and more economical way to



describe or memorise things around us. (A triangle, couple of circles and few straight lines could outline all there is to see in the picture on the left. However, please note that this is not the only way to outline all there is to see.) The similar concepts of colour, sound, smell, touch, taste (babies will put everything into their mouths), warmth, etc. - outline all other aspects of our sensory experience in our brains in a form of

sketchy images. To this, we need to add also sketchy images that outline our emotional and "bodily" reactions as well as cultural sketches. An established cluster of such outlines (perception + reaction + speech), their adjustments and their relations in space and time, forms a highly abstract model (concept) of an

Two American psychologists - Roger Shepard and Jacqueline Metzler devised an experiment in which they presented to subjects pairs of simple three-dimensional objects and asked them if they are identical. (If one object could be mapped with another through a number of rotations.) At the same time they were measuring delays in answers and a strong correlation was established with the number of rotations required.

object that overlays our experiences of the world and ourselves within it. A simulation of such a model would produce sets of expectations that might sufficiently correspond to "out there" to increase our chances of providing ourselves with a good dinner. (Please note that personal experiences - i.e. sketchy images of our "bodily" reactions also play an important part. A city dweller without experience in catching a chicken would have much less chance.)

I imagine that such a highly abstract model (less data), that leaves room for many other highly abstract models (concepts), enables an increase in the number of simultaneous simulations based on our description of the world and ourselves within it. Further more, it enables some of the simulations to be carried out ahead - imagination. Dreams on the other hand, (with their ability to twist things around in ways not possible in the awakened state) might be giving us an opportunity for adjustments or improvements of another kind. There might be some other aspects of dreams and dream-like states well worth investigating. (On this, I hope to have more in the near future.)

## Complexity

The concept of an emergent property (i.e. a property of a system that cannot be derived from properties of its parts) is not new. In the 19<sup>th</sup> century, George Henry Lewes (English philosopher of science) distinguished between phenomena that are predictable from their constituent parts and phenomena that are not - emergence (such as salt which looks nothing like sodium or chlorine). Jules-Henri Poincaré made significant contributions to the theory of orbits - celestial mechanics, particularly three-body problem. It turned out that it is impossible to combine solutions of three two-body systems into a single solution for a three-body system - thus turning Kepler's "laws" into approximations.

Kepler's "laws":

1. The planets move in elliptical orbits with the Sun at one focus;
2. the time necessary to traverse any arc of a planetary orbit is proportional to the area of the sector between the central body and that arc (the "area law"); and
3. there is an exact relationship between the squares of the planets' periodic times and the cubes of the radii of their orbits (the "harmonic law").

However, the theory of emergent property did not take hold. British zoologist C. Lloyd Morgan established an opposite approach - nothing should be called emergent unless it can be shown (proven) not to be a resultant. This might have appeared as a healthy approach but the trouble was that the most of those "potential" emergent properties could not have been proven to be a resultant either - and the impasse was obvious.

The last quarter of the 20th century saw a rapid growth in computing power that brought very powerful machines to many offices and homes and with them an innocent "game" called "Life". It was basically a simulation of number of "cells" that had very few rules - when to divide, not divide or die. It was captivating to observe how complex patterns of "cells" emerged and sometimes "pulsated" through sequences of other patterns. Quickly many other similar "games" appeared simulating life based on complex math originally called chaos theory that nowadays has evolved into complexity theory. However, impressive results in replicating numerous phenomena of life that surrounds us are still waiting to be translated into - what is this "more" in "the whole is **more** than the sum of its parts".

As an introduction as well as a powerful call towards new dimensions of Artificial "Intelligence", I would recommend Klaus Mainzer's book "Thinking in Complexity". To those undeterred by the unfamiliar terminology, I would suggest a comparison between prototype vector approach described in 4.3 - Brain and the Emergence of Consciousness, with the concept in which "an intention can change the intrinsic dynamics by destabilising one pattern and stabilising the other one" (4.4).

Many phenomena, ranging from quantum physics and astronomy to psychology and sociology, are being modelled in complex non-linear dynamic systems. Based on the work of brilliant mathematician Henry Poincaré and many others, the interplay of numerous self-referring variables is being modelled and simulated on a computer to catch emergence of an order from an apparent chaos.

In a highly abstract and simplified form, it could be said that a phenomenon impacts (communication) its surroundings (other phenomena within a system) while, at the same time, it is being impacted by its surrounding. It is reasonable to assume that the impact of its surrounding will modify its behaviour that impacts its surrounding, closing thus the circle in which another phenomenon emerges - a phenomenon we call emergent property.

**The emergent property is a stabilised result (split symmetry) of interplays (interactions, communications, relations) between its constituent parts.**

Depending on the "kind" of interplay, the system is initially unstable "oscillating" between few possible stable states. (Note the transition of continuum into discrete.) And then - something remarkable happens - the system "falls into" one of the states (symmetry breaking) gaining more and more stability with little if any chance to "fall back" into the initial state of instability. The only way that this could be interpreted, seems to be that the emergent property impacts the interplay between its constituent parts by amplifying interplays that stabilise the system and diminishing interplays that destabilise the system.

We cannot say, for example, that our culture (emergent property) resides at any particular physical location. In a sense it resides within us **and** among us. The fact that we cannot point our finger at it and say - "there it is", does not mean that it does not exist. Although it may sound counterintuitive, I would suggest that there is **nothing** in our world we can point our finger at and say - "there it is", for everything we see is a result of interplays between its parts. In other words, I would suggest that we do not see particles of a rock for example - but the result of their interplays that form an emergent property we call "rock".



The emergent property is often considered within terms of the phenomenon we call life. For example - the article "Flower arranging made easy" in Nature Science Update. However, the principle of the emergence extends to inanimate matter as well - saltiness, for example, of a molecule of salt that is not present in its parts (atoms/elements). Or - oscillating systems (like old fashioned clocks) that synchronise (or silence) themselves if their ticks are transmitted (communicated) between them when hanging on the same wall.

I would suggest that there are two aspects of an emergent property:

- As a predetermined (and/or evolved) way of interaction (communication) between parts that form the emergent property. (Parts themselves should also be considered as emergent properties of their parts.)
- As a unique, self-referring emergent property that continuously stabilises its parts and as a "part" engages in interaction (communication) with other emergent properties ("parts").

These two aspects are easily translated into the view from outside ("objectivity") and the view from within ("subjectivity"). Although I can only infer the "subjectivity" of others (or other species or inanimate matter), I am quite sure that it is there - in one form or another. The trouble is that I can neither experience nor prove the existence of the richness of the world and ourselves within it in others - not even in a human being next to me.

"Subjectivity", uniqueness, selfreference are "impossible" in the ("objective") picture of probabilistic/deterministic universe (closed system). A probability of a unique phenomenon in such a universe is **zero** ( $1/\infty$ ). And yet - I guess that all of us will agree that we are "subjective", unique, selfreferring human beings with feelings, a sense of beauty and humour... We all live our life taking or missing opportunities that are not a product of random chance, but rather "openings" in complexities of interactions within our world and ourselves within it. This is a quite different, "subjective" picture of the universe - a picture without boundaries around it (open system). In this picture we have something that simply cannot exist in our "objective" pictures - our uniqueness, selfreference, meanings, feelings, emotions, sense of beauty and humour... And this is that elusive "more" in "the whole is **more** than the sum of its parts".

We need both pictures, but we also need to recognise limitations of the "objective" picture and try to see how to overcome them in order to improve our "subjective" picture.

## Quanta

Heated debates about the nature of recent findings in quantum physics are spreading like wildfire across the scientific community. The dual, wave/particle nature of matter already caused many controversies and miscomprehensions that left many scientists at a loss. In such a climate, a variety of shallow (meant to be profound) mysticisms flourished and quite a few scientists slipped into them. The confirmation of Bell's theorem by Nicolus Gisin and his team at the University of Geneva in 1997 caused even more of a stir. The scientific community is still slowly and painfully digesting the implications of it.

In simple terms, it has been proven that "when particles originate under certain conditions a measurement of one particle will correlate instantaneously (in no time) with the state of another regardless of the distance between them, even though no signal can travel faster than light". Physicists were forced to conclude, "Physical reality is non-local". In other words, the space and (I would add) the time do not exist for the basic building blocks of our universe and ourselves within it. (At least not as we experience it.)

Implications are mind shattering. All our concepts, including cause & effect and mathematical principles disappear at the level of our building blocks. Strictly speaking, even the proof that confirmed Bell's theorem loses its foundations... But - is it "really" so.

The major stumbling block is refusal to closely examine our concepts of "objectivity" and "reality" that are too often taken as primary phenomena. However, the ambiguity of these concepts cannot be ignored any more. This will probably lead towards their replacement (as I'm attempting on these pages) or a redefinition and a change in focus. The following steps will lead towards radical changes in our methodologies to **formally include an active observer** (you, me and others) with all our strengths and weaknesses. (I even hope for a reduction in passive voice and impersonal expressions.) The concept of cause & effect should be also scrutinised as well as foundations of formal logic (especially the concept of "truth"). This will of course, impact math, science in general and ultimately our entire (Western) culture.

The task is tremendous and many past efforts may turn into dust but (I hope) it will bring the structure of the scientific knowledge closer to other human activities that never abandoned "subjectivity" entirely. Life and science might turn out to be the same, after a long and superficial separation.

The basic building blocks of "our description of the world and ourselves within it" are based on the time and the space as we experience it".

Consequently, even simple processes of our mind, like comparison or counting, might be entirely inadequate at the level of basic building blocks of our universe and ourselves within it.

The troubling question is then, how to reconcile the "non-locality of the physical reality" with the obvious "locality" of "our description of the world and ourselves within it"? One of the possible answers might be that the space and the time are emergent properties (complexity theory). The other might emerge if my imagination gains a bit more substance.

## Simplicity

I imagine that drawing a stroke for each goat might have been the simplest method to describe how many goats I have - as long I was poor with || or ||| goats only. However, when I imagine myself richer, with ||||| goats, the description looks a bit awkward. Something like XXIV, although more complex, looks to fit the purpose better ( $10+10+5-1$ ). Old Romans did quite well with it, but simple adding, multiplying or dividing might have had required a considerable mind power. Arabs brought us from Indians a further complication that transformed MCMXXVIII into 1928 ( $1*10^3+9*10^2+2*10^1+8*10^0$ ) and simplified even more our descriptions of quantifiable phenomena. This "complicated simplification" alone allowed for a number of pretty complex mathematical operations with much less mind power than ever before - and math and science simply flourished. The invention of calculating machines and later computers and programming languages (that enable a peculiar "description of the world") put at our fingertips an enormous computing power - and strangely enough - the first glimpses of emergence at work. A rise in complexity of our descriptive methods obviously did enormously **simplify** "our description of the world and ourselves within it" and enabled us to tap phenomena "out there" we simply could not before.

The ever evolving "our description of the world and ourselves within it" with little, if any, hope to be able to describe the world entirely - seems to be our curse and our blessing. Knowing that we will never be able to know "absolutely" everything gives sense to our lives.

I imagine that there is no simpler way in "describing our world and ourselves within it" than indicating a repetition of an item within it or a part of it. By a simple statement - "and do so again on another side" we eliminate a need for detailed description of another side creating in progress symmetry. By varying the "do so" we could achieve a variety of symmetries (including transformations) and patterns quite sufficient to address the most of our needs in simplifying "our description of the world and ourselves within it". And it does not have to end with spatial repetitions - it can be easily expanded on temporal repetitions. As a result we have cycles, rhythms, music... and such basic concepts like cause & effect or time and space.

Yoram Bonne, of the Smith-Kettlewell Eye Research Institute in San Francisco, and colleagues have been showing people a swirling pattern of blue dots superimposed on some stationary yellow dots. Focusing attention on the blue dots makes the yellow dots disappear. Jack Pettigrew, a neuroscientist at the University of Queensland in Brisbane, believes that the illusion results from the left hemisphere of the brain (parietal lobe) suppressing sensory information that conflicts with its idea of what the world should be like; the right sees the world how it really is.

Nature Science Update

An enigma described in the article "A Brain in Doubt Leaves it Out", that can be found in the archives of Nature Science Update, indicates existence of a "generator of expectations" based on "our description of the world and ourselves within it". I would caution though against premature conclusions that there is a single "description of the world that

surrounds us" within us, and that the right (irrational) side of the brain sees the world as it really is. I imagine that there are layers upon layers of "(partial)

Some patients that have that part (parietal lobe) of their brain damaged, apparently can perceive only one object at a time. This indicates an inability to construct a comprehensive "description of the world and ourselves within it" based on "lower level descriptions". Consequently, expectations raised will be partial, resulting in a partial perception that can manifest itself as perception of a single object at the time.

descriptions" that interact horizontally and vertically. In such scenario, the area in parietal lobe might be a kind of coordinator or decision maker that unifies numerous and sometimes-conflicting "descriptions of the world and ourselves within it".

A somewhat simplistic division of our brain into the left (rational) and right (irrational) sides hides many dangers. Although inconclusive, findings that indicate that other parts of our brain could take over some of the functionality of damaged parts should not be discarded.

### *Challenge*

In 1867 James Clerk Maxwell introduced an observer to challenge the pillar of the modern physics - the second law of thermodynamics. According to that law, the universe is descending towards inevitable heat death, i.e. the same temperature all over the place (entropy). Since there will not be a difference in temperature to make the energy available, life in any form will not be possible.

Maxwell imagined a little creature within a divided chamber that lets the hotter gas molecules pass from one side to another and cooler in the opposite direction. Through these simple actions, that little creature would create a difference in the temperature making energy available and running, for example, our fridge forever, without an electricity bill attached.

Unfortunately, Maxwell gave to this little creature the complete and absolute knowledge of all molecules in the chamber. Such ultimate knowledge costs. It costs more energy to gain and maintain than resulting differences in temperature could provide.

To keep the challenge alive, I would suggest that we imagine a different, much simpler and less knowledgeable living creature:

- ❑ With a simple description of itself and its surroundings.
- ❑ Perceiving and acting within its surroundings.
- ❑ Remembering, improving and communicating its description.
- ❑ Surviving and multiplying at locations with higher differences in temperature.

Obviously, such reduced knowledge would cost less. But, could such a humble mortal creature tip the balance? Could it ever evolve its description of its surrounding and itself within it to rival that absolute knowledge of Maxwell's creature? It may have a chance. Not because it is almighty, but precisely because it is not.

## Perception

Looking for the eraser under the desk (see top page) can be imagined to happen like this: "Eyes of ours, look at this place under the desk and see the eraser (it must be there)." And eyes of ours respond: "We are looking at this place under the desk, but we do not see the eraser." -- A bit less sure: "Eyes of ours, look somewhere under the desk and see something that might be the eraser (it should be somewhere there)." And eyes of ours respond: "We are looking under the desk and we see something that might be the eraser." -- YES, YES: "eyes of ours, look at this another place under the desk and see the eraser (it must be there)." And eyes of ours respond: "We are looking at this place under the desk and we see the eraser."

Decades were wasted in pattern (image, speech) recognition based on something like this: "eyes of ours, look and tell me what you see." And eyes of ours do not respond thinking: "There is a myriad of things to see. What are we supposed to see? This spec of dust? Nay... Must be something else. But what?"

Building an image of the world that surrounds us from scratch based on raw sensory input is a long and tedious process. It is hard to imagine it happening every fraction of a second of our life. Such a model of a passive reception, transmission and processing of an enormous quantity of stimuli in our brain is refuted not only by numerous neurological findings, but also by findings in psychology, anthropology, biology... A model of active perception seems much more appropriate and better supported.

A model of active perception is based on constantly refreshed "description of the world and ourselves within it". The assumption is that at any point in time we construct that description within ourselves seeking only a **confirmation** of it through our senses. As large discrepancies are kept at a minimum, there is no cause for alarm. Large or sudden discrepancies on the other hand result in a need for major readjustments. And this takes a measurable time during which our perception is distorted. (As we listen to somebody speaking, for example - we silently speak together with the speaker. We might even hear what was not said without noticing a discrepancy, but if we notice this - our hearing falls into disarray, and we either stop the speaker, or find a new starting point and continue to silently speak with the speaker.)

Attempts by psychologists to explain visual illusions led them to a concept in which: "The senses do not give us a picture of the world directly; rather they provide evidence for the checking of hypotheses about what lies before us."

Richard L. Gregory

Each of us has a unique, self-referring "description of the world and ourselves within it" rooted in our genome and crowned by our own cosmogonies and cosmologies based on our "cultural imprints". Through our genetic makeup, language and culture, it is inherited, lived through and passed onto posterity. This immense knowledge accumulated since the emergence of life (through our genetic makeup) with accelerated accumulation by emergence of our cultures - is continuously faced, tested and modified with our "subjective" experience of the richness of the world of our transient now.

## Expectation

Recently, I hurried through a large park thinking how fear might impact how we see "our world and ourselves within it". Suddenly a memory of an article in a newspaper popped into my mind. It was about a person bitten by a venomous snake in a park just like this. Instead of shrugging it off, as I usually do, I pushed my thought to revolve around it. I "worked myself into" a peculiar state of fear and the pleasant park turned itself into an ominous place. My eyes were searching the ground for signs of a snake. My steps were hesitant and pace slow despite the hurry. I was perfectly aware that my deliberate pushing of my thoughts to revolve around that article caused all those changes, but it still took me a while to get out of it. (Of course - there was no snake whatsoever - but the whole way I perceived my surroundings had dramatically changed.)

At any point in time in our life we expect myriads of things to happen only to let them pass unnoticed as they fulfil our expectations. And rightly so, since only unfulfilled expectations should be a cause for a concern. A concern that "our description of the world and ourselves within it", that gives rise to those expectations, needs an adjustment.

Our expectations, like "our description(s) of the world and ourselves within it", could be rooted in cells of our body and crowned by our own cosmogonies and cosmologies (culture). We could for example say that a molecule in our cell "expects" a light to trigger an electro-chemical reaction or that we expect the eraser to be precisely on that spot under our desk. And they are more or less rigid depending on how deep towards the roots they are.

There is a fundamental difference between the concept of expectations and the concept of subconscious processing of raw stimuli. An expectation may correspond to a whole cluster and series of vaguely expected stimuli eliminating a need for subconscious processing and binding.

These simulations within us based on "our description of the world and ourselves within it" are generating expectations that are fulfilled most of the time in a familiar environment (i.e., an environment that corresponds well to "our description of the world and ourselves within it"). It could be said that the more familiar the environment is, the more precise the expectations are. Those rare

It would be interesting to measure intensity of a "conversation" when we learn new moves (like in a sport for example) and compare them with "conversations" when we execute already learned moves.

occasions of unfulfilled expectations are mostly experienced and dismissed as noise. On the other hand, in unfamiliar surroundings we feel lost while probing with various vague expectations and adjusting "our description of the world and ourselves within it".

I would suggest that our eyes for example are not simple "senders" of hints and edges in space and time (sketchy images) to our central nervous system. It seems that sketchy images are rather a kind of words of a language used by our brain to communicate with our eyes or any other "part" of our body. This would mean that what and how we see, hear, feel... is a result of a "conversation" of our body "parts" at any point in time.

I would also suggest that this "conversation" does not need to go to every last detail of what and how something needs to be seen, heard or acted. It does not need to go into every last detail of how we will move our leg when walking for example. Our leg already learned how to move (working out all the details) on its own and only a light "conversation" is then needed for us to walk. This kind of optimised "conversation" allows us to focus on other things and simply walk while thinking about other, completely unrelated things.

## Cause & Effect

Although disputed by some quantum physicists, the concept of cause and effect is at the core of "our description of the world and ourselves within it" and it is crucial for survival of our species as well as (I suspect) of other species (even low level organisms). As a concept, it is inseparably linked in our minds with the concept of time. It also gives sense to a number of other, time related concepts: the cycle, the rhythm, the second law of thermodynamics...

In 18<sup>th</sup> century Europe a picture of a deterministic universe ruled. A picture sometimes described as a Divine clock devised and put into motion by God. Although pleasing to the church, this

"A priori" – Latin – a kind of predetermined, some would say "hard-wired", concept of our mind that is independent of our experiences. This is in contrast to "a posteriori" that is derived from our experiences.

picture also

created some problems – notably as to the question of free will. Two extraordinary minds – David Hume and Immanuel Kant – tried to address the issue of causality and to reconcile it with the concept of free will without "losing causality." Hume tried to find empirical evidence for our concept of causality in our experiences (he calls them impressions) – and failed. Kant (on the basis of Hume's failure) took a different approach and concluded that our concept of the cause & effect is what he calls "a priori".

Contributions of both of them to our civilisations are hard to overstate. Kant, for example, with his concept of a priori led us towards what we now call "active perception", while Hume led me towards, what I would call, "our concepts **only** corresponding to what is 'out there'." I do, however, think that both of them tried (consciously or not) to preserve and justify our concept of the cause & effect – and this might be an issue lingering behind many debates that echo their ideas.

I think that the importance we are giving to our concept of cause & effect is increasingly untenable. There is no doubt in practicality of cause & effect concept and its (limited) explanatory power. But this should not prevent us from looking beyond and maybe find an underlying concept with a bit more explanatory power. (Altering the meaning of the concept does not seem feasible in this case.) I would therefore, suggest that our concept of the cause & effect is the product of our experiences and yet (based on our experiences) evolved "a priori" – a dynamic relation established in "our description of the world and ourselves within it." It could be summarised as (fulfilled) expectation - cause - that initiates another (possibly fulfilled) expectation - effect. In a chain, these expectations may grow so strong that even faintest confirmations can sustain them – giving us, as in

Syncopation - in music, the displacement of regular accents associated with given metrical patterns, resulting in a disruption of the listener's expectations and the arousal of a desire for the reestablishment of metric normality; hence the characteristic "forward drive" of highly syncopated music. Syncopation may be effected by accenting normally weak beats in a measure, by resting on a normal accented beat, or by tying over a note to the next measure.

The pattern is typical of much folk-dance music, especially in eastern Europe, and its use in the Western written tradition may be traced to the 14th century. It is a characteristic element of jazz and figures prominently in the music of Igor Stravinsky and other 20th-century composers.

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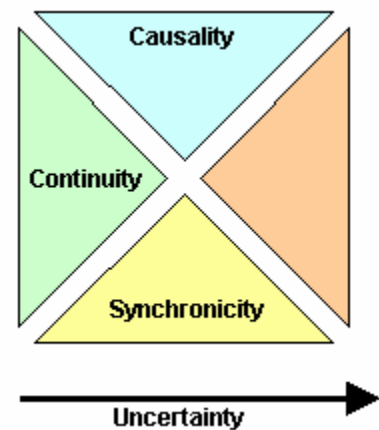
musical example of syncopation (above), an illusion of a regular rhythm. This particular concept of ours is relatively “soft” compared to some other concepts – like our concept of colour is. I would further suggest that through the interplay between our world of concepts and the rest of “our description of the world and ourselves within it” all of our concepts (even “hard-wired” ones embedded into our genes) could be “altered” or “replaced” to “fit” better to what is “out there.”

Nowadays, causality is at the core of the prevailing (closed) picture of the probabilistic/deterministic universe - with little, if any, evidence of the strength of cause & effect chains. Even in the most strictly controlled environments we are not able to predict an outcome with 100% accuracy. This should give us pause - how much our concept of causality, especially in its "pure" form, corresponds to what is really "out there"?

Carl Gustav Jung established another concept - synchronicity, i.e. similar phenomena occurring with little, if any, separation in time and notable separation in space. The notion of synchronizing is also at the core of complexity theory. And indeed - wherever we look - synchronization occurs. In living forms and inanimate matter alike. Two old fashioned clocks (with pendulums) hanging on the same wall that transmits their ticks will silence each other or start to tick in unison. Schools of fish, flocks of birds or fireflies pulsing in unison are other well known-examples. Our concept of causality could also be expressed as similar phenomena occurring with little, if any, separation in space and notable separation in time.

Considering possible space/time combinations, I would suggest an alternative to our (closed) picture of the probabilistic/deterministic universe. The alternative in which similar phenomena occur:

- ❑ With little, if any, separation in space and with notable separation in time - causality.
- ❑ With notable separation in space and with little, if any, separation in time - synchronicity.
- ❑ With notable separation in space and with notable separation in time - we do not have an established concept for this combination.
- ❑ With little, if any, separation in space and with little, if any, separation in time - continuity - this combination seems to be the most intriguing. It may indicate how we can stay ourselves during our lives while the matter that our bodies are based on is continuously replaced.



Behind all these combinations seems to be a single phenomenon - a kind of tuning across space and/or time that we interpret as causality, synchronicity or continuity. This "tuning factor" seems to be increasing as a distance in space and/or time decreases and vice versa. It is also interesting to note that an increase in space/time distance also leads to an increase of uncertainty - giving us an answer why we are not able to predict anything with 100% accuracy.

Units of space and time of our perception cannot be divided into smaller and smaller parts ad infinitum. Neither can they be multiplied into larger and larger parts ad infinitum. Although these concepts might be suitable within our domain, we should start to think about their constraints and try to adjust them accordingly.

This "tuning factor" might be emerging in the chaotic arena of quantum physics as non-local wave aspects localise particle aspects of each other (the "collapse of the wave function") in a kind of spatial/temporal symmetry. In this, the Planck's constant could be viewed as (a result of) a restraining factor that does not allow for an infinite number of possible particle positions within space/time. (Our concept of a continuum is obviously discontinued at this level.) The increase in

the "volume" of interplay when there is little, if any, separation in space and/or time might also lead towards the emergence of the phenomenon we call gravity.

As we climb the ladder from the chaotic arena of quantum physics, the "tuning factor" seems to be increasing while uncertainty seems to be decreasing - however, this might be deceiving as we witness the return of uncertainty by moving along space/time scale. This indicates a possible equivalent to Planck's constant at our (macro) "level" also and, behind both, a link to a unifying theory - a dream of many.

## Illusion

We are all brought up into an illusion defined by our human, cultural and personal differences. This illusion interacts with illusions of others and lives, evolves and dies with us leaving traces in a grand illusion shared by all of us. It is hard, harsh and very real — no wonder we call it reality. And, in an inexplicable way, it is related to a mystery "out there".



In the 1999 a book misplaced at a computer shelf caught my eye. Since then, I read it five times and chances are that I'll get back to it again. It was "The User Illusion". A wonderful attempt by Tor Nørretranders to piece together top scientific thoughts and discoveries on microcosm, macrocosm and between. Its subtitle (Cutting Consciousness Down to Size) captures its essence but it is far from the implications of its content. And one of many could be expressed as a rephrased subtitle — Cutting Science Down to Size.

I simply love the distinction between I and Me made by Tor Nørretranders based on findings of Benjamin Libet. However, there is already an obscure, but precious distinction in the language in which I has self-referring connotations. (Kurt Gödel used the same self-reference to prove mathematically that there can be truths that cannot be proved within a given closed system.)

In this book, Tor's view appears close to mine. Maybe not so much in what is said or indicated, but more in what is not said.

The science is almost ready to admit that it is unscientific - at its core. The "objective world", foundation of all scientific thoughts, disappears like a mirage under rigorous scientific scrutiny. The observer is quietly smuggled in and the world observed by nobody is replaced by worlds observed, and acted in by you, me and others - including scientists.

A deliberate motion, of a hand for example, requires (in average) 0.8 seconds of brain activity (readiness potential). Yet we do not experience such a delay between our conscious decision and the subsequent act. Libet discovered that we become conscious of an urge to act a 1/2 a second after preparations for it started. Obviously, our consciousness (I) does not initiate an action, yet it fools itself that it does. It does have though restrictive power to veto an action initiated by non-consciousness (Me).

Does it mean a death to science? I think not. But it must reinvent itself and establish foundations that will survive the test of time. The first step should be to bring into focus us, but not as an object - as a subject - together with all our irrational elements including art, ethics and aesthetics above all.

In addition to this, an entirely separate dimension - emotions and particularly humour, as main contributors to the observer's well being should not be forgotten. This dimension, I call it colour, brings life and realness to the observed.

## Out There

Some would say that what is "out there" is very close to "our description of the world and ourselves within it" - only a few phenomena cause illusions. Some would say - it is very far, even questioning the mere existence of it. The rest will glide within the spectrum of those two extremes. What is "out there" appears to be a question of a personal belief. We actually **do not know**.

This uncertainty is highlighted in areas outside our everyday experience as in quantum physics where our concepts of time, space, cause and effect or matter and energy dissolve into nothingness. Such difficulties indicate flaws in "our description of the world and ourselves within it" that governs what and how we perceive. This line of thinking leads us to some interesting

Some organisms have enormous genomes and studies indicate an accumulation of "junk DNA" created through mistakes in multiplications. Humans appear to be on the "tidy" side and a possibility of a better "DNA Expression" replacing a previous, bulky one should not be discarded.

systematic and interdisciplinary effort should yield much better results. (I would refrain though, from interfering with our genetic makeup in an attempt to resolve contradictions in quantum theory. We might end as Schrödinger's cat.)

Our instruments are constructed on the concepts of our everyday experiences. Consequently, the same phenomenon - the electron for example - is either detected as a particle or as energy. A possibility of phenomena that belong to neither of these two concepts **should not be excluded**.

detect them. Before the change we may have our **beliefs**, but after the change we will have the **knowledge**.

Changes in "our description of the world and ourselves within it" occur naturally and could be followed through history even to the genetic level. However, a deliberate,

## Culture

The 19<sup>th</sup> century anthropologist (or ethnologist as he would be called in Europe) Edward Burnett Tylor described the concept of culture as follows:

Culture ... is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society.

In the 1930s, Ruth Benedict found that the ways in which the Pueblo Indians thought and reasoned were **strikingly different** from the ways in which their immediate neighbours thought and reasoned, although their geographical environment was identical. It appears that each culture over the ages had evolved and given to its members a unique "mind set" or orientation toward "reality" and that this set actually determined how the members saw and acted "in their world".

The concept of evolution was for the first time spelled out in 1840 - almost twenty years before Charles Darwin published his celebrated "Origin of Species" (1859). This concept provided a starting point for anthropology as a science. However, more than 160 years later, anthropology seems to be still at the margins and many anthropologists admit that a "science" of culture seems possible only if (cultural) anthropologists could free themselves of ethnocentrism and produce concepts and other elements that are universal, "objective", and theoretically significant. Its aim - to enable cross-cultural comparability - makes things even more problematic. I would suggest that these efforts are considered in the light of the fact that "objectivity" is nothing more than commonly agreed "subjectivity". Just like in language, the meaning of any symbol within it is a product of meanings of ultimately all other symbols within the system and as such, it could be fully grasped only by a "subjective" speaker of the language.

Anthropologists are not alone in facing difficulties in addressing issues of ultimately "subjective" nature. The same problem is encountered in ethics, linguistics, psychology, sociology, economy, history, biology... Virtually any science that involves life has exactly the same "problem" - how to deal with "subjective" phenomena in an "objective" manner. This, coupled with inability of so called "hard" sciences like physics, to even start contemplating the complexities of the phenomenon we call life, should give us a pause.

Did we miss something important - indeed very important, by insisting on "objectivity"?

Field investigations of many cultures (practically living within a culture) led many anthropologists to speak about culture in terms of a living organism in constant adaptation to its environment (evolution) that also includes other cultures. Exchange of "cultural traits" (diffusion) between cultures seems possible only if a "cultural trait" can be fully incorporated within a culture; anything else seems to be superficial and in the domain of civilisation (see below).

How it may have started in us - humans could be seen in "The Pleistocene and the Origins of Human Culture: Built for Speed" by Peter J. Richerson and Robert Boyd.

Even hints of a language (like those noticed in

apes and other species) lead to emergence (birth) of a culture - i.e. transition of an accumulated knowledge from one generation to another by other means than genetic makeup - and the stage for another kind of evolution is set. Each new individual, born and grown into a culture, receives (by means of language) a "cultural imprint" that forms his "description of the world and himself within it". Although constantly reinforced by other members, the "cultural imprint" is also continuously tested and altered by the thoughts of each individual member and the newly acquired knowledge is shared with others. Direct experience, although desirable, is not necessary as long a full understanding is reached. The "cultural imprint" also brings in memories and stories of others before us and leaves to our imagination the world after us - and this gives raise to our notion of time. The nomadic nature of early cultures could have also contributed to our notion of space.

The "Out of Africa" theory suggests that the first cultures of homo sapiens evolved for at least 70,000 years before starting to migrate around 50,000 years ago. National Geographic article "When did 'Modern' Behaviour Emerge in Humans?", presents the current debate among archaeologists and anthropologists that also raised a question of "what" made cultures to move and spread all over our planet.

I would suggest that an emergent culture needs time to evolve a sophisticated "social imprint" for a culture to flourish. Migrations and trade on a small scale within Africa probably provided sufficiently changed environments for further development of the language and the culture. The final "push" was probably provided by inventions of the fishing and of the boat and I would suggest that first migrations on the large scales might have started in boats along the coast of Africa. Note, however, that Neanderthals also migrated – what was their "push"?

civilisations were born. (No cities yet - but probably large meeting and trading areas with some structures likely to be a representation of a culture that may have later evolved into what we call temple.) It is important to notice the difference between the culture and the civilisation. While within the culture the full understanding between its members is an imperative, this is not required between members of civilisation that belong to different cultures within it. (I would suggest that the turning point was when a culture started to allow for parts of other cultures to be incorporated.)

This situation required planning, record keeping, diplomacy... The invention of early writing quickly followed. I would also suggest that this is the period when the first notions about how members of other cultures see "me" - in other words

Culture obviously lives longer than an individual member and although it may die, it is much more likely that it survives and evolves. How old our cultures might be is hard even to contemplate. Some would say hundreds of thousands of years - and this would mean hundreds of thousands of years of continuous evolution - constant testing, altering and refining of "our description of the world and ourselves within it" and means it is transmitted with - our language and our music.

At certain points in history, the survival of cultures of a region might have been threatened by rapid changes in our planet's climate (end of ice age estimated around 10,000 years ago). A tighter cooperation between various cultures became an imperative and early

looking at myself from the "outside" - emerged and the door for emergence of the phenomenon we call consciousness was open.

Early civilisations were probably not very stable since they were dependent on voluntary participation of variety of cultures. However, they did bring variety of cultures together and the obvious benefits to all were a strong unifying factor that in time have been incorporated within each of the cultures. Similarities in languages used in various cultures might not have been initially important, but as civilisations flourished - the emergence of the single, shared language was a matter of time only. This unifying force of the civilisation is also reflected in early polytheism gradually edging towards monotheism.

By the time of early civilisations, cultures were evolving and accumulating knowledge for more than 100,000 years. The combined effort of cultures within a civilisation brought astonishing results like this one described in the National Geographic article "Was Maya Pyramid Designed to Chirp Like a Bird?" It seems that Steven J. Waller got it right by relating acoustics to cave paintings.

Once established, civilisations were growing as the improved organisation, centralised planning and record keeping enabled establishment of control over greater distances (ancient Greek civilisation, if we can speak of a single civilisation in this case, with its city-states seems to be a different case). This growth went gradually and probably with little if any force until two or more civilisations met. The fact that in a civilisation we have a large number of different cultures cooperating without fully understanding each other, some levels of force in maintaining the civilisation have already been established and probably considered necessary for the further growth. The Roman empire flourished on the basis of the strength of its military power, innovations, politics and centralised administration until the sheer weight of record keeping and increased senseless violence made ruling practically impossible. Political differences led to a variety of rearrangements between cultures and internal infighting split it first into the Eastern and Western Roman Empire and later into even smaller units.

The invading cultures with their own ways of cooperating (emerging civilisations) had probably more vigour than those that lived for centuries under Roman rule and the whole structure simply collapsed leaving us with almost half a millennia on the fringes of the civilised world (the Ottoman empire meanwhile grew on the remains of the Eastern part).

Out of the ashes of the old Western empire, new civilisations were born. Initially, the shrunken horizon often did not go further than the next village, monastery or the castle of the local ruler. Only the privileged few (mostly merchants, clergy, nobility, their soldiers and servants) would hold some knowledge unfathomable to ordinary people. (No wonder that many consider this a "dark age" and a few think that the phenomenon we call consciousness practically disappeared in this period.) With the renaissance, larger political structures emerged and the horizon was pushed further away. The new civilisations-states and later nations emerged inspired by the richness of the almost forgotten Roman Empire. Latin was still the lingua franca (thanks to the church) and the broaden horizon demanded social changes (rearrangements

between cooperating cultures). The discovery of the new world also shifted the centre towards western European countries like Spain, Portugal, Dutch and England that also had established a large number of maritime cultures. The concept of a "maritime civilisation" emerged and English gradually gained an upper hand. Colonies under British rule could keep some of their customs and laws enabling thus a "smoother" cooperation between radically different cultures. It also enabled a transfer of knowledge between cultures and the understanding grew - unfortunately at one place only - at the centre of the empire.

Engineering and science flourished bringing in new knowledge and inventions that led towards industrial revolution and further changes in society (democratisation, literacy) that have not stopped even now. However, the rapid pace of technology and science (that was partially followed by art but not by humanistic sciences), especially in the last 20th century, shrunk the world bringing face to face all our civilisations and their cultures. I would suggest that nowadays, practically all cultures of our planet feel threatened facing "alien" ideas and concepts. There is not much difference in the threat some Christian cultures experience when faced with the concept of evolution, from the threat some South American tribes experience when faced with deforestation.

It seems to me that we are witnessing emergence of a meta-civilisation - an entirely new concept on the planetary scale. However, our own cultures appear not to be ready. An idealist or a person in power might think that these are just minor hurdles. I would caution against such a lightly approach - for each culture survives on a coherent "description of the world and ourselves within it". If this is not respected, our Western civilisation(s) will collapse just like Roman Empire did - and with it a number of other contemporary civilisations may fall. I would also suggest that current levels of international cooperation are not at satisfactory levels nor are our own understanding of our cultures and ourselves. We need to re-establish equity between our cultures as well as between our nations and civilisations.

I would suggest that our planet is still big enough for all of our cultures to cooperate and live in peace next to each other. This of course involves a degree of trust and understanding of each other on many levels and I hope that these web pages of mine will contribute their little bit to this. But this also means that old concepts that our civilisations (nations) and cultures were based upon need to be changed.

## Language

Eighteen years ago, upon my arrival to Australia my belief in the quality of my English was shattered. My index finger spoke better than my tongue (and it was much better understood). My ears, so accustomed to hear distinctive sounds of Croatian, were desperately trying to make sense out of sounds produced by Australians. On top of that, I got a co-worker - a Scottish highlander. (I'm still unsure - was it English she spoke to me?) My tongue blindly followed my ears despite all my attempts to impose distinctions my ears simply refused to hear.

After eighteen years of often hilarious or embarrassing misunderstandings I find myself in a bit less trouble. But a lingual or cultural clumsiness occasionally surfaces as it must have somewhere on these pages. (I'll have to ask somebody to edit them for me. All suggestions are welcome.)

a language and a culture noticed in orang-utans and other species (the bee "dance" for example). It seems that the turning point was a construct of an entirely different type of psycho-physiological reactions that was loosely related to our direct reactions to the world that surrounds us and ourselves within it. This parallel "mechanism", manifested in us - humans as speech, enabled transition of knowledge without a need for direct experience. In other words, the "power" of symbolism came into existence and the human species emerged. (Our sense of space and time is also closely related to this turning point and it could be argued that a great deal of all of our languages is based on these concepts.)

It should be noted that deaf and mute persons also acquire the language of a culture they grew into, but sometimes with the speech component replaced by other psycho-physiological reactions.

Although I would not go as far as the article "The Culture of Autism" by Harvey Blume (Boston Globe) suggest, individuals that have difficulties to symbol (and imagine) may give us a better understanding of this largely non-conscious process.

Language is often described as a system of spoken or written symbols by which we, as members of a culture - communicate. It is often linked to our thought; however our thought and language (although strongly impacting each other) are two separate things. Our unarticulated thought that could be related to the sketchy images our brain sees appears to be a non-conscious "mechanism" that attends contradictions (tensions) within (parts of) "our description of the world and ourselves within it".

Our spoken language (closely related to our sense of rhythm and music) evolved through history and its beginning could only be imagined based on hints of

For further studies related to the language and its importance I warmly recommend the web site of Robin Allot.

It could be said that when we listen or read, we silently speak. Measurable tensions of our vocal chords reflect very well what we hear - not what was said. Sometimes, we hear an entirely different word and this is also well reflected in tensions of our vocal chords. This practically constant speech of ours (silent or aloud) that occurs even when we sleep, follows all the rules and vocabulary of a language we internalised by growing into a culture. It constantly refreshes and adds to the accumulated knowledge of our culture we internalised building a "parallel world of symbols" superimposed on our transient now.



As the culture evolves, so does the language. Each symbol is defined by its relation to or association with other symbols. As new knowledge is constantly obtained and accumulated, continuous adjustment is necessary. A set of similar symbols may get replaced by a single symbol or with rearranged relations between other symbols. A single symbol may get replaced by a whole set of symbols if a distinction between them is considered important. Maritime civilisations for example have a richer vocabulary of winds, ship parts, fishing...

The anthropological linguist Edward Sapir put it well: "The 'real world' is to a large extent unconsciously built up on the language habits of the group."

Thus we have ever-evolving language that transmits accumulated knowledge of generations past and present. The invention of written symbols enabled transfer of knowledge over greater spans of time and space than the oral tradition was usually capable of although there is historical evidence of very strong oral traditions that lasted for thousands of years like Indian Vedas. But writing and later press, newspapers, radio, television, the internet,... also slowed down the evolution of our languages and our cultures. With this our own evolution is slowed down or even brought to a halt. Nowadays many people feel the pressure of partial if any understanding of how a computer works, for example. Many people feel the pressure of numerous contradictions within a culture (or science) or between cultures. The cumbersome weight of the accumulated knowledge has its consequences and it is hard to predict when and how it will break if long overdue reorganisations do not happen.

## Music

The music and the language are very closely related. The expressiveness of our speech, for example, is heavily dependent on its rhythm and pitch. Now known oral traditions with long history like Veda, for example, shows that "stories" were practically sang (chanted) while some Australian aborigines would say that "the world was sang (chanted) into existence" by their ancestors.

The poetry of ancient sages was full of rhythm, pitch, rhymes and other "poetic tools" that would establish in listeners' minds associations across sometimes huge poems like Homer's Iliad. A rhythm would sometimes represent a character (or an emotion) without explicitly mentioning him (or emotion). A rhyme would invoke previously spoken words bridging time passed and forming "many-word concepts" that would otherwise be impossible to express in the spoken language.

The important part of our languages as the emergent property is considered by Lee McCauley in "Grammar as an Emergent Property of the Human Brain".

Impaired sense of rhythm (tuning, empathy) might be at the core of dyslexia and hyperlexia as the article "Studying Hyperlexia May Unlock How Brains Read" in Washington Post indicates (registration required). Hyperlexia, however, indicates that the meaning, although impaired, could be grasped through visual forms only. It also indicates that literacy might have had a higher impact on our genetic makeup than previously thought.

Few studies found that our problem solving abilities are significantly increased if we listen to some classical music, especially works of Mozart.

These "poetic tools" of old sages were very much aimed at causing repeated invocations (associations) of previously expressed thoughts/images directing thoughts of listeners (through repetition) towards a "picture as a whole" of the whole poem in which each of the "elements" was re-enforcing all others. This enabled new levels of consistencies in evolution of culture.

Music also has other even more important aspects. Through the rhythm it enables listeners to feel and act (dance) in (cooperative) unison that increases a sense of belonging (or togetherness) to almost magical levels. Some kinds of (shamanistic) music seem to be also tuned to "pulses" of nature (as we perceive them) increasing a sense of togetherness with everything that surrounds us. Emotions of listeners also breathe in unison under the spell of the music raising the levels of togetherness to new levels and it is not surprising that it was (and still is) considered - magical - just like language was.

In a "reversed" sense, music is an expression of our internal rhythms, emotional flows and feelings that stem from "our description of the world and ourselves within it". Just like language - it is also an important "tool" in the transfer of the accumulated knowledge - but in a non-verbal form - more suitable for the transfer of knowledge of feelings, emotions, sense of beauty and humour than our spoken language is. (Knowledge should not be understood as the "knowledge of pure reason". I would strongly suggest that there is no "knowledge of pure reason" and that all of our knowledge is a blend of reason, emotions, feelings, sense of beauty and humour... and psycho-physical reactions.)

There are also other dimensions of music (sound) that played (and still play) important part in the evolution of our cultures. Chirping pyramids and caves paintings at sites with acoustic effects indicate something David Dunn might be rediscovering as shown in the interview "Music, Language and Environment" (PDF) by René van Peer. The importance of the music for our cognitive processes and in evolution of our cultures is also realised by Ian Cross in "Music, cognition, culture and evolution" (PDF).

The importance of music in the birth and evolution of our cultures cannot be overstated. However, I would suggest that accumulation of irrational knowledge is not always constructive - especially nowadays when we are trying to focus solely to our "rational side" and sweep under the carpet our "irrational side". We should be aware that the music impacts emotions, feelings, sense of beauty and humour much more than we are usually ready to admit to ourselves. An this makes us even more susceptible to the impact of music and the raw emotions it may invoke. They are already some indications that some types of music induce violence and hatred. Unfortunately, I haven't heard of any study that has addressed this possibly negative impact.

## Orchestra

A conductor taps with his wand, waves his hand and lights dim as a discord of variety of instruments fall silent. In a semidarkness he gently waves his hand again and a sweet melody emerges from a flute hidden in the dark. On another

wave violins join in tune and then others and others. Sounds and their rhythm, formed by groups of instruments, start to build a variety of distinctive "characters" or feelings that gradually start interplay. Sometimes dramatic, with a conflict - our Western preference - that results in a cathartic finale or a resolution of a conflict that brings a relief and opens the door to new levels of our understandings or feelings. Sometimes - it is simply cooperative. Building upon and refining an initial theme (feelings) until a grandiose structure emerges that is often "summed up" in a grand finale.

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A conductor in our brains is called "master circadian clock" - a small patch of brain cells that "ticks" - rhythm - a "skeleton" of music... And everything else within our bodies, even brain, follows the rhythm as well as "clocks" within our genes in **each** of billions of cells of ours.

A really impressive array of "clocks" tuned to each other and "ticking" in unison... And when we add to it our feelings, sketchy images and cultural sketches something like "music" emerges - a "music" played by an immense "orchestra" no conductor ever dreamed of.

But there are also other "clocks" around us. Cultural "clocks" for example. Although I can't point my finger at a "master circadian clock" of our cultures - our individual "clocks" do "tick" in unison. (An abstract, we call time, for which we constructed our timepieces, might be such "master circadian clock" of our cultures.) People do appear at a meeting at about the same time and place. People do play music, sing and dance. In a basketball game they do pass the ball to a team-mate without looking. People do tune themselves to each other...

And so, our cultures "tick" - rhythm - and "sing". Even more impressive arrays of "clocks" tuned to each other.

But there are also other "clocks" we tune ourselves with. Sun and Moon are only the major ones known to us and to the rest of the life on this planet since the beginning. A theory we call Gaia only indicates a "song", of staggering proportions, we are just starting to "hear" - in bits and pieces.

There is an infinity of "clocks" around us that is likely to go far beyond our capacity to imagine. The "music" we, and everything around us, might be playing is well outside of our reach. Will it stay so? Well, I would say, this depends on us.

## Together

For more than a couple of centuries physicists and chemists were trying to derive saltiness from properties of sodium and/or of chlorine. And despite modern, state of the art, equipment and math - **they have failed**.

On every step, as we climb from quantum arena, we witness properties emerging from interplays of its parts. Properties (qualia) that cannot be derived from any particular part - like in left or right orientation of some carbohydrates. On every step - there is something new added to our universe and, gradually, our world, of infinite varieties, emerges.

As agents, in complexity theory terms, we also participate in interplays - not only between us, humans - but also with everything that surrounds us. These interplays shape and maintain emergent properties that are entering into interplay that shapes and maintains, what we call, our culture.

A "psychology of obedience" (diminished responsibility) enabled emergence of Nazism that marked the darkest hour of our recent history. **The similar trend, we witness today, must be reversed.**

The simple fact that we (through our thoughts, feelings, actions or inactions) participate in shaping properties (qualia) of our cultures has staggering implications. It establishes our own, personal **responsibility** for any quale that is maintained or emerges from our thoughts, feelings actions or inactions. Our own, **personal** responsibility for **everything** we like or dislike in our world. Our consciousness does have a veto power and with this it **can** nudge our thoughts, feelings, actions and inactions towards a participation that shapes better properties (qualia) of our cultures.

Taking up responsibility is nothing new. Despite strengthening property of excuses in our cultures - people do refuse plastic bags and use environmentally friendly reusable bags. People do protest about irresponsible cutting down of trees for new developments. The issue of environmental impact is growing stronger on a daily basis. In this, indigenous cultures might be of particular interest. Some indigenous people are practically teaching environmentalists and biologists about interplays between everything that surrounds us (including us) - and their results.

Willy-nilly, we are all in this together. And this "we" does not only include us - humans. It also includes algae, salt, mountains, rivers, oceans, birds, clouds, trees... This brings us to another staggering implication - our sense of **togetherness**. We do shape our cultures together and we are responsible for the result. The lower the sense of togetherness is, the more unstable properties that shape our cultures are - until our cultures (our worlds) simply collapse. (Plenty of historical examples.)

I have chosen the title of this page to emphasise the importance of our sense of togetherness. And this means full, uncompromising, respect for views of others. Divisive issues only lower our sense of togetherness. Instead, I would suggest, a focus on what we agree upon and the rest will eventually come to an agreement - on its own.

An emergent property, that enhances coherency of our culture, will promote a better understanding between us all. This will raise our sense of togetherness and enhance our sense of personal responsibility - and this will in turn lead towards more emergent properties that enhance coherency of our culture.

A simple philosophy, I would suggest, for - how to enhance "our description of the world and ourselves within it"?

## Diversity

Introspection as a method failed at the time of positivism because it could not provide uniformly consistent results. Yet we witness extraordinary results of inner workings in science, art, business, technology ... Not a single discovery would be possible if there were no insights of individuals that rearranged "their description of the world and themselves within it". Things somehow click and hang together in a new, unexpected but beautiful way.

Although "our descriptions of worlds and ourselves within them" have a lot in common - they differ. Each of us evolves our own, unique "description of the world around us and himself within it" from the moment of conception when our own, genetic makeup is constructed. As newborns, we are guided in adding to it and refining it by adults and peers of a particular culture, of a particular language, of a particular time... But all the time it is our own, unique "description of the world around us and ourselves within it" that we will pass to our children and our grandchildren and our grand, grandchildren...

Our "descriptions of the world and ourselves within it" is not only inherited and passed to future generations. As we interact, some aspects of "descriptions of the worlds of others and others within it" may impact ours with sometimes very deep consequences - even maybe at the genetic level. But the most valuable impact (with a lot of hidden dangers) can be expected when we give a good hard look at our own and try to rearrange it, giving it a beauty, humour and a sense of well-being.

The multitude of "our descriptions of the worlds and ourselves within it" (although synchronised on a number of levels) allows for improvements and should be cherished. Consequently, the introspection must yield inconsistent results, but those inconsistencies may tell us a lot about inner workings of "our description of the world and ourselves within it", even down to the genetic level.

In a similar way we should cherish the cultures we grew into and respect others we did not grow into. Nowadays, many cultures are endangered by emergence of the global civilisation that is more imposing than incorporating - thanks to the approach many members of dominant cultures have. Little, if anything has been learned from the fate of many Australian aborigines, for example, that found themselves in a limbo between two worlds (one of which is quickly disappearing or has already disappeared). I would suggest that we need to offer some room in our civilisations for these endangered cultures to evolve into.

Should we look into "descriptions of the world around other species and themselves within it" as well? I think we should. Although it might be possible to a degree only, the results might give us a better understanding of our own.

## Thought

It may come as a surprise - but the fact is that we do not think consciously. Our thinking is entirely non-conscious and very little filters down to our consciousness with a half a second delay. However, our consciousness through its "veto" powers may direct our non-conscious thoughts in a chosen direction.



Although in the above illustration I use lingual elements, our thought should be considered in non-lingual terms, i.e. in terms of sketchy images our brain sees. Sketchy images should not be considered in visual terms only, but in terms of combined sensory "input" and our reactions to it. I would suggest that the sketchy images are built from sketch-elements that invoke other sketchy images in a perpetual chain of associations based on patterns, feelings, emotions, sense of beauty, humour... A "parallel", also largely non-conscious world of symbols – cultural sketches – established by our language and the culture we grew into is in a constant dynamic interplay with our non-conscious thought, so much so that it is often difficult to notice a difference. However, I would suggest that there is a difference - an important difference that enables our thought to address our experiences that are outside of boundaries established by our language and culture. (This is particularly noticeable in cases when we are searching for words to express something.)

"Our description of the world and ourselves within it" is incomplete and full of contradictions that need to be resolved. I would suggest that our non-conscious thought is a "mechanism" that does exactly that - roams through (parts of) "our description..." identifying contradictions (tensions) and their patterns and altering parts of "our description...", especially cultural imprint, in order to remove or minimise identified contradictions (tensions). This "mechanism" should be understood in terms of the stabilising impact an emergent property (thought) has on its "parts" (sketchy images).

As we sleep - we dream. Vivid dreams, full of visual effects are caused by significant activity of our eyes (rapid eye movements or REM). But we also dream when our eyes are inactive and such dreaming state is often experienced as a kind of dialog with "somebody" or monolog that sometimes "loses" its verbal component and continues in a "sub-verbal" mode that is later difficult to recall. I would suggest that this is the closest we can get in directly experiencing our thought in action.

Whenever our consciousness intervenes (with a half a second delay), our thought pauses for a moment and then starts again with its rapid pace in attending contradictions within an area of "our description of the world and ourselves within it". Interventions "tame" our otherwise wild thought, by restricting it to an area and "direction" of associations, but as soon our consciousness stops intervening, it flies on its own. The

"parallel" world of symbols (that should be considered in terms of sketchy images

of our speech – cultural sketches) also interferes as soon a cultural sketch is touched upon with its own chain of associations. However, there is always an underlying rapidly paced activity that gradually forms sentences of our spoken language.

The written form of our language requires even more (largely non-conscious) effort to form a coherent sentence. This is easy to notice when we simply write down what is said during a conversation. Although we do not notice this as we speak, the recorded conversation yields very few coherent sentences.

The page you are reading now, just like any other page on this site, did not just come out of my head. A general idea based on "subjective" experiences and some scientific findings were there - but it did not have this shape and structure. Many sentences were started and scrapped even before they were written. After they were written, they were read and reread again and again. Whole paragraphs were scrapped or rewritten and new ones were added. When it looked complete checks were made to see if there are any contradictions with other pages on this site as well as related scientific findings - again resulting in some changes to establish a satisfactory level of coherence. A skilled professional writer may have internalised this process up to a degree, but the basic outline is probably the same - and this outline indicates well internal workings of our thought.

### *Imagination*

Wonderful fruits of our imaginations can be seen everywhere and in everything we do. Detaching "our description of the world and ourselves within it" from the "real time" (our transient now) it may carry us into future or past like the time machine of H. G. Wells. With some of its elements modified it may create wonderful worlds that will question "our reality" prompting some adjustments.

Daniel Margoliash and Amish Dave at the University of Chicago recorded the firing patterns of neurons in the brains of young Australian zebra finches. He found that patterns the birds produced while they were awake and singing were repeated with very slight variations while they were asleep. "The young zebra finch appears to store the neuronal firing pattern of song production during the day and reads it out at night, rehearsing the song, and perhaps improvising variations." (Silent Song)

New Scientist

Kanwisher and Kathleen O'Craven of the Rotman Research Institute in Toronto, Canada used functional magnetic resonance imaging (fMRI) to look at the brains of volunteers as they looked at images or imagined them with their eyes closed. The obtained fMRI images "revealed a striking similarity between regions activated during imagery and those activated during perception".

Journal of Coanitive Neuroscience

Imagination has a moody wife - dream. She sometimes takes us beyond the boundaries of the comprehensible leaving us perplexed and in trouble to remember. However, both of them are probing, testing and adjusting "our numerous descriptions of the world and ourselves within it". And sometimes it is hard to say: do we have submarines because Jules Verne dreamed about such things or Jules Verne dreamed about such things because they were in his future. (Is it possible that the "or" is superficial here?)

The importance of imagination and dreams in our daily lives as well as in science, art, business... cannot be overstated. It drives our lives and shapes our future. Its importance in science is well presented and documented in the book - "Insights of Genius" by Arthur I. Miller. A genius might be a bit better at it, but everybody uses his imagination and dreams with a various degree of success. Whatever we do (or not do), casts a shadow of imagined (expected) outcome next to it. (We may not be aware of it - but it is there.) Sometimes it is wrong and we feel confused or embarrassed. Most of the time its nearly there, but sometimes its a bulls eye and we are at the top of the world.

Imagination is greater than knowledge. It tests the limits of our knowledge through its excursions beyond - opening our eyes to wonders we never saw before and broadening "our description of the world that surrounds us and ourselves within it".

Imagination should not be taken as wishful thinking. Our imagined "description of the world and ourselves within it" also needs coherency - and this requires focus, meticulous examination of each detail and practice above all.

It could also wander through "our description of the world and ourselves within it", picking up interesting bits and pieces, playing with them and arranging them in different patterns until they click together in a beautiful way that makes sense.

Nowadays, our capacity to imagine seems to be decreasing - so much so that our cultures seem to be stagnating despite accelerated technological advances. The imagination was also too often suppressed in the name of "reason" inhibiting our ways to find "new answers" for "old questions". I would suggest that we need to learn to imagine as children and evolve this capability of ours as we live. Our children are too much exposed to TV and computer games that leave little if any room for imagination. The foundations ancient sages established with their poems that expressed coherent views of the "world and ourselves within it" are shaken and we have nothing to mend these "gaps". "Our descriptions of the world and ourselves within it" are increasingly incoherent and full of "gaps" while the primeval ocean of too often contradictory information threatens to shatter them entirely. (I hope and the indications are that this will change soon.)

## **Consciousness**

As we grow into a culture our consciousness emerges between age four and six. Some of us might even remember how suddenly everything changed for a moment or two and later occurring more and more frequently until it was established in our minds. In my case the first such change happened in late summer - a month before my fifth birthday. In a game of hide and seek with other children, I hid myself well and moments of solace suddenly produced a change in a perspective in my mind that startled me in a form of question - What am I doing here?

The change in perspective in my mind was giving an impression of looking at a "picture of myself and my surrounding" as me being "outside" of it. I would suggest that this internal change of the perspective - that also gives rise to our



sense of being "objective" - is at the core of the phenomenon we call consciousness. The "picture" we look at from such perspective is surprisingly sketchy in its appearance. This might be hard to notice when complemented by the richness of the world of our transient now, but it becomes obvious when we close our eyes.

Throughout history, the extensive use of the mirror was always related to the emergence of consciousness. The mirror enables us to look at the image of ours from the "outside" thus facilitating a mental change of perspective.

The half a second delay of our conscious experiences made many speculations on nature of consciousness, our cognitive processes etc. practically irrelevant. Now, almost 30 years after the discovery many still find it hard to accept and the questions like - Do we have a free will? - still dominate many discussions.

The "picture" we see is composed of sketchy images of our brain of a half a second before, i.e. there is a half a second difference between our transient now and the "picture". Benjamin Libet investigated the phenomenon of consciousness extensively and many followed. Their findings about consciousness found that all our non-reflexive actions require 0.8 seconds of preparations. (Brain activity called "readiness potential" seems to be a major part of these preparations.) However, we become conscious of these preparations only 0.3 seconds (or less) before the action is carried out. The established "mechanism" of Backward Referral of Subjective Experience gives our consciousness an illusion of initiating an action. It is however important to notice that, our consciousness can abort an action (or a thought). Although our consciousness does not initiate an action - it can "veto" all the actions that do not lead towards a predetermined action (thought) and thus impose a choice - free will.

"Vetoing" actions (thoughts) results in a halting, insecure performance (very much like actors' rehearsals) until a desired action (thought) emerges. In this, our imagination, feelings, emotions, sense of beauty and humour (that are also to a large extent formed as we grew into a culture) play important roles. In the familiar situations of our daily life already established actions (thoughts) occur practically on their own. In unfamiliar situations however, an occurrence of desired actions (thoughts) requires hard work not only from our consciousness but the whole of our being. (For further explorations on how we "train" ourselves I would suggest the extremely rich source of experiences - the performing art of acting. In this Bella Merlin's "Beyond Stanislavski" would be an excellent start.)

I had an honour of training a young and very intelligent lady to drive. It took me three months to make her stop thinking and start driving. When she started to act without thinking (and conscious interferences), the natural process of accumulation of experiences took over and she passed the test with flying colours.

As an illustration of how even a minor change in our familiar situation impacts our actions (thoughts), I would suggest to the reader the simple experiment of changing the hand that wears a time-piece.

The capacity of our consciousness is very small. The estimates range between 5 or 7 to around 40 "items" (cultural sketches) per second depending on the type of measurement applied. But this, in combination with the half a second delay, is its power - to further steady our thought enabling us to focus at what is important and to acquire a new knowledge/skill much quicker.

Consciousness, as our mental phenomenon, seems to be a relatively recent "invention" of our minds. There is a number of quite convincing arguments on consciousness emerging between three and four thousand years ago, disappearing between the eighth and the twelfth century, and then re-emerging in the renaissance. I would suggest that some aspects of consciousness may have appeared even earlier with early civilisations. The question would then be how stable were those early emergences. I would also suggest that our consciousness as an emergent phenomenon is still relatively unstable (as regressions towards bicameral mind suggest) and that other forms of it might evolve in relatively near future.

As to what was in our minds before emergence of consciousness, a theory of bicameral mind was suggested by Julian Jaynes. According to this theory, when people found themselves in an unfamiliar situation, they would stop and wait until a divine voice "tells them what to do".

Consciousness, as we know it nowadays, also has shortcomings - some of which could be a cause for alarm. The change of perspective that brings us "outside" of the "picture" results in an implicit "framing of the picture" and this in turn often results in the following illusions:

- Seeing the world and ourselves within it as a closed (finite) system.
- Being "above" (or outside of) this closed (finite) system.
- Being "objective" and able to know everything there is to know. (Not really a big deal - since there are very few symbols within the "picture".)

These illusions, although in some aspects helpful (like the "thought experiment" for example), might be also very misleading. Especially young minds are easy to indoctrinate and lull into such concepts as "absolute truth" or "material world" (we are of course outside of it and if anything happens to it - we are "safe").

These illusions I consider to be "weaknesses" of our consciousness that will hopefully disappear as our consciousness evolves further. As it is now, we should be aware that this mental change of perspective results in an inanimate picture with no life in it. Such a picture always requires our intervention (from outside of the picture) for a change within the picture. (Quite similar to some of our dreams when we observe the inanimate dream-scene from outside and then find ourselves within it with dream starting to unfold.)

## **Knowledge**

It could be said "our description of the world around us and ourselves within it" is made of two "parts" - our transient now and ever evolving cultural imprint. Our transient now appears to be an emergent property of interplays of "descriptions..." (our sensory "apparatus", central nervous system – sketchy images – and other organs, cells, our genetic makeup...) that "resides within us" and the cultural imprint, also an emergent property, that "resides within us and outside of us". Thus, we live in the world in which we have a constant interaction

between the richness of the world of our transient now and its symbolic interpretation of the culture we grew into.

Our cultural imprint carries evolved, accumulated knowledge of hundreds of thousands of years in a symbolic form that needs to be integrated with our subjective experiences. As babies, for example, we need more than a year to learn how to walk while a calf runs around a few hours after birth. It is obvious that we have here two parallel "mechanisms" of knowledge transfer - through our genetic makeup and through our cultural imprint. The transfer through our genetic makeup is practically instantaneous. However, the accumulation of the knowledge is limited and very slow. Our cultural imprint though appears to have almost unlimited capacity - but it does require more time for transfer. The evolutionary shift in transferring the knowledge predominantly through genetic makeup towards a balanced combination of both seems obvious.

Homo erectus of 800,000 years ago skipped into adulthood at an estimated age of eight. Some estimate that homo sapiens of 50,000 years ago was a fully grown individual at the age of twelve. Nowadays, age of 18 or later is considered to be the age of a fully-grown individual. Obviously the volume of the accumulated knowledge has significantly increased in this period requiring a longer period of our growing into a culture.

The breakthrough in our evolution appears to be in the dissociation between those two "mechanisms" for the transfer of accumulated knowledge. When this happened in our history is still debated, but the emergence of the FOXP2 gene that enables us to speak seems to be the turning point. Before its emergence, we might have a limited capacity to symbol, but very much related to our transient now and very little to the passage of time. The current discussions on how homo sapiens (Cro-Magnons) overwhelmed Neanderthals might shed a bit more light on this.

The cultural imprint probably made redundant some of the previously genetically transferred knowledge. Did we lose some genes or parts of them? Did we develop some genes or parts of them under the impact of our cultural imprint? Indications are that we did, but I'm not aware of a study that could say something more conclusive. I would suggest however that our cultural imprint did have some impact on our genes. It seems for example that the invention of writing impacted our genes as a genetic base for dyslexia indicates. (Dyslexia is of course a much more complex phenomenon also related to speech and sense of rhythm as the article Poor rhythm 'at heart of dyslexia' suggests.)

I would also suggest that our knowledge is not a "pure" symbolic form that could be entirely rationalised. It is rather a combination of our "subjective" experiences with symbols established by our cultural imprint. This is obvious when we examine how we grow into a culture - in other words - learn. The cultural imprinting is a slow ongoing process and there is not much difference between learning to play basketball for example and studying physics. Although we could say that learning to play basketball is more physical than studying physics, the fact remains that both involve all of ourselves - and body and mind so to speak. (As we saw in Mystery our mind/body divisions should be left out of our considerations.)

Once we grow into a culture (a culture of physicists for example), the process of the cultural imprinting continues but at much slower pace. In research, we try to confirm or challenge some of the concepts imprinted. In fencing as another example, we grow into a team (a kind of small culture) where we learn (internalise) sets of body movements (and a whole philosophy around it) required in this sport. Every new move of our bodies, just like a new concept, takes time to entirely internalise. This time always depends on how much we need to unlearn to re-establish a kind of equilibrium within our modified cultural imprint and "subjective" experiences of our transient now.

In a sense, we could say that our knowledge is a **complex network of "habits"** – originated in "habitual" (learned) interplays between our genes and other "parts" of our cells and crowned with "habitual" (learned) interplays of concepts of our cultural imprint. However, we – made out of our "habits" – **can alter** what we are made of, even at the level of our genetic makeup.

## Model

**A model of any aspect of a human being, in all of its complexity, will definitely miss many important things about us. However, a partial model, despite its obvious deficiencies, may tell us many interesting things about us and maybe enable formation of other models that will leave out less than this one does.**

When an expectation of ours is not fulfilled, we are obviously surprised and we may act (if we do not decide that it is better to turn a blind eye). We may act in two ways to eliminate a surprise depending on the energy required:



**Outwards** - rearranging our environment.

**Inwards** - adjusting our "description of the world and ourselves within it."

Acting outwards is a temporary action with a limited scope. It makes sense to tidy up a room but we cannot move planets or galaxies around until they start behaving, as we would like them to behave. (It does seem, however, that some are trying precisely this.)

An acting inwards yield better results but poses a problem as to how to adjust "our description of the world and ourselves within it".

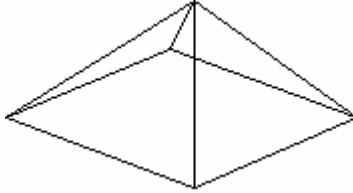
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We all probably watched once on TV endless rows of domino pieces, tirelessly placed in chains for weeks or months, only to see them falling in a matter of a minute or two. As one piece falls and triggers the fall of another, or another two or three, whole chains of domino pieces gradually fall until the whole landscape of chains lays down - motionless.

I imagine tireless work of our thought, continuously trying to resolve contradictions within "our description of the world and ourselves within it, in a similar way...

Chains of our cultural sketches (habitual patterns of our thought developed as we grew up into a culture) are constantly risen, depending on situation we are in, seeking confirmations (experiences, feelings). Other sketchy images, like those

used in communication between our brain and our eyes, try and usually bring in confirmations and chains of cultural sketches fall with very few (unnoticed) contradictions (oddities or exceptions) within, that could be imagined as "domino pieces" of a chain that did not "fall", but rather stayed upright, in an unresolved state.



However, contradictions sometimes cannot pass unnoticed - like in this ambiguous drawing on the left. Is it a transparent pyramid viewed from above or from below? Two similar, but contradicting cultural sketches, may seek confirmation - surprisingly finding that both of them can be confirmed as we mentally "push lines into background". Note, however, that we cannot see both pyramids at the same time because we can intent or expect to see only one at the time.

Contradictions, like in this example, are hard to resolve without radical changes in our cultural imprint since they involve our basic concept of space. But there are others that can be resolved much easier.- and the resolution is found in chains of cultural sketches falling differently than before. (The drawing itself, does not have a meaning – but it does give a meaning/confirmation to one of the two cultural sketches at the time.)

When a challenging "piece" is inserted into a cultural chain it triggers an iterative "process" of constant rising of the chains (unlearning) and letting them fall along different paths (exploring, learning). A "success" of a path of falling within each iteration can be measured by combined emotional charge of "domino pieces" forced to stay "upright" - in an unresolved state. (No "piece" is dropped easily since each of them has an emotional charge gained by numerous falling "true" in the past or by reflecting an important event in our past. This emotional charge, however, may be weakened under the onslaught of challenging contradiction and eventually the "piece" falls "false" and it is simply "dropped" - forgotten. Note also that a challenging "piece", if not sufficiently emotionally charged, can also be weakened and ultimately dropped - forgotten.) An outcome of iteration may, therefore, result in:

Our "reconstructed" memories, based upon what we usually do or upon kept records, have a very weak, if any, emotional charge. However, they should also be considered, especially when keeping records itself is highly emotionally charged.

- A higher combined emotional charge, than before, of "domino pieces" within a chain forced to stay "upright" - in unresolved state. This is followed by immediate rising of the chain in attempt to find an alternative path of falling. Iterations that follow may stop without finding an appropriate path as our attention turns towards other cultural chains - but such chain will pose a challenge within our landscape of chains and iterations will resume whenever the chain becomes active again.
- A lesser combined emotional charge, than before, of "domino pieces" within a chain forced to stay "upright" - in unresolved state. This may be "satisfactory", but it is highly likely that another challenging "piece" could be inserted in future triggering the process anew and further weakening "pieces" forced to stay upright.

A "method" that shows a higher success of letting "pieces" fall along a particular path, may gradually evolve in a cultural chain that replaces or simplifies a number of other cultural chains - simplifying even more "our description of the world and ourselves within it". Highly abstract chains, like our sense of space and time, are almost constantly active - even in our dreams. However, their distortion and diminished activity could be followed as we "sink" from visual (REM) phase into verbal and non-verbal phases.

How "domino pieces" fall within a chain of cultural sketches and paths of falling are not random and they follow certain rules that could be best described by a three-value variant of nonmonotonic logic. This would be a significant simplification compared to neural networks. However, the combined emotional charge of "domino pieces" forced to stay "upright" should provide weighted input to fuzzy logic to decide which other chains of cultural

sketches are impacted by "inserted" contradiction, exception or oddity.

An inserted "piece" though, does not necessarily pose a challenge within an active chain of cultural sketches. It does not necessarily challenge other active chains either. We do not always "connect all of the dots". And yet, one day, active chains may "clash" exposing a contradiction, exception or oddity and triggering a re-evaluation that might lead to an "aha" in which things click together in a new and beautiful way.

Whenever an "aha" connects two dots a cultural chain is simplified. And with this, "our description of the world and ourselves within it" becomes **simpler (shorter)**. Altered cultural chains will invoke different sketchy images and we will start to see differently and notice phenomena we did not notice before. And, chances are, that with them new contradictions, exceptions or oddities will seek a resolution. And maybe, one day, we will be able to look at the drawing and see both transparent pyramids at once.

## Information

Claude Shannon, an engineer at Bell Laboratories, proposed to measure a "surprise" value in communication and named it "information entropy" - a measure of **disorder**. (More surprise - more disorder.) That quickly degenerated into "information" followed by a complete reversal of the meaning (and the sign in the equation). Decades of confusion followed this magical transformation of a measure of disorder into a measure of information/order (like a frog turning into a beautiful princess when kissed by Norbert Wiener and Leon Brillouin). By now nobody really knew what information really is and concepts of complexity and logical depth were put forward in an attempt to resolve the issue.

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There is a fundamental difference between information entropy and information that questions some of our assumptions/expectations about "world and ourselves within it." Information entropy is a noise (with no meaning) that erodes patterns, upheld by redundancy, we receive as information that has a meaning to us. Regardless of what kind of turmoil information may cause in our

“description of the world and ourselves within it” (surprise) it always has a meaning.

The distinction has been lost by a theoretical assumption that all of the noise has a potential meaning. And indeed - big strides have been made in physics and other sciences by discovering regular patterns in an apparent noise. But, what we were always looking for, and what we will continue to look for, are **regular patterns** to which a meaning could be attached. (Etruscan inscriptions, for example, are surely regular patterns to which we still did not manage to attach meanings.) Only when we attach a meaning to a perceived pattern - it becomes information. And this is a far cry from (information) entropy...

The difference could be explained in terms of misplaced or broken glass. While a misplaced glass may surprise us, just like a broken glass does, we can put the misplaced glass back to its place. However, the broken glass has only one destination - a rubbish bin. Like all other rubbish - it has lost its meaning.

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Recently, a friend of mine was very surprised to learn that there was a hardware shop in the shopping centre she frequented for years. This could be considered as simple addition of an “item” to what to expect in that shopping centre. However, when she later found herself at home, pondering about shopping trips, she needed to make, a number of things started to “click together” in a different way – like why she did not see neighbours in another shop or how inconvenient it was. A number of oddities (exceptions, contradictions) were gradually removed significantly **simplifying** “her description of the world and herself within it.” And this is where, I will suggest, we should look at what information really is and how to estimate its value.

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Each time an “aha” connects two dots (see Model) one of the active chains is simplified. A single inserted “cultural sketch” could therefore have a potential to simplify a great number of cultural chains in time. The value of information is not, however, in insertion - but in the resulting “aha” that simplifies a chain. (An “aha” may happen upon insertion, but it also may happen years later.) An insertion of an “item” only has a potential value (theoretically infinite) that may, in fact, never result in an “aha”. Only when an “aha” happens is the value of the insertion realised and a cultural chain within our landscape of chains is **simplified**.

An "aha" that enables describing "more" with "less" - is a realised value of an inserted cultural sketch. If we quantify this "more with less" before and after an "aha" we might be able to produce a figure between 0 and 1 - as in classical "information" theory. However, things look rather complex when we consider that alternation of a single active cultural chain is, as a rule, accompanied with alternations within other active cultural chains. And when we add to this immense complexity of "our description of the world and ourselves within it" - the math also becomes rather complex. Great Russian mathematician - Andrey Nikolaevich Kolmogorov devised a math that is now called Kolmogorov Complexity along similar lines of thought and, I guess, a mathematical synthesis might give us better means in calculating (assessing) a value of information.

I will also suggest that the breakthrough thinking is a gradual process that lifts a large number of "chains" in the unresolved state (unlearning) until a resolution is found that initiates series of "fallings".

The complexity of our "description of the world and ourselves within it" - is hard even to contemplate. However, when we consider our culture and language only (cultural imprint), we might be in a somewhat better position. A culture of an individual and the vocabulary this individual commands could be assessed. This could provide a base (but only a base) in the "reconstruction" of an "individual description of the world and himself within it." (I think that we actually do this as we get to know somebody -- but mostly in a non-conscious way.)

Damir Ibrismovic's concept of chains, with insertions being new perceptions with emotive content, deletions being forgetting, and the wholesale rearranging of chains of thought being intellectual "aha"s resulting from past insertions provides an interesting, informal semantics for nonmonotonic logic. It does need some emendations, though, to quite qualify.

Joseph S. Fulda, C.S.E., Ph.D.

Describing "more" with "less" seems to be our eternal struggle. Although the landscape of "our description of the world and ourselves within it" is both vast and very complex - I think that we could start looking into it and start modelling. The suggested variant of nonmonotonic logic does offer a significant simplification in comparison to neural networks and weighted fuzzy logic could be easily emulated using existing hardware.

When developed, such a model could be left to "evolve." However, I suggest that it would need constant human supervision, especially in the form of reconciliation with our human, "subjective" experiences. Sufficiently refined and reconciled with our "subjective" experiences, it could then provide a platform for numerous applications as well as a good inkling into workings of our minds.



## Why

Two psychologists tracked activities of the brain in progress of comprehending a joke using two different techniques - fMRI and EEG. (Vinod Goel at the University of Aberdeen and Peter Derks at William and Mary College in Virginia.) Both of them produced clear evidence that understanding a joke involves a sudden creative shift. An awkward relation or inconsistency within "our description of the world and ourselves within it" strikes us as funny and prompts an adjustment.

There is obviously plenty of room for improvement of "our description of the world and ourselves within it" in which the humour plays a small but important role. A rigorous scientific approach serves the same purpose as an artistic painting, a drama in theatre or good fiction do. The enrichment of "our description of the world and ourselves within it" enables us, quite literarily, to see (perceive) in a better, more fulfilling way.

A transition from English-like landscapes to landscapes of Australia as we see them now is easy to follow in Australian art. Land did not change much in these two hundreds years, but our perception of it definitely did.

In the other hand, if we take those phenomena we perceive, exist "out there" as we perceive them today we reject a possibility of perceiving them differently tomorrow. We apply brakes and loose ourselves in more and more contradicting details and producing more and more complex theories to explain them. (Reminds me of the ever-increasing complexity of the Ptolemaic system used to maintain earth at the centre of the universe.)

Willy-nilly - things change. The constant speed of light or an effect preceding a cause are not taboos any more and a grand unifying theory might be just around the corner only if we could change how we see things. The fact that some nagging details will spoil our celebrations should not discourage us. There might be another, even better grand unifying theory just around another corner only if we could change how we see things. In this, looking into how we see things and why we see them the way we do might be more significant than we suspect.

Shall we ever rival Maxwell's creature? Who knows? We might have a chance.

## About

I, speaking under condition of anonymity, start my official CSC resume as follows —



*Mr Ibrisimovic has more than 25 years experience in consulting, formal project proposals, estimating & costing, planning, quality control, monitoring and execution of projects using various programming languages (lately Pascal - Delphi) on numerous platforms (lately Windows and Open VMS).*

*In various roles (including small project and team management) his experience in all aspects of a project covers: system integration & interfacing, reporting control, hospital billing, financial accounting, purchase/customer ordering, macro-economic simulations, monetary and inventory management, foreign exchange operations, statistical text analysis and design of an interpreted query language.*

*He also has knowledge of COBOL, ALGOL, BASIC, FORTRAN, MODULA-2, RPG 400, PL/1 and various ASSEMBLY languages on the following platforms: Digital Alpha, IBM 3900, IBM AS/400, Honeywell DPS6, DPS8, L6, L64 IBM PC and compatibles and UNIVAC 1100.*

It continues detailing my professional experience, projects and years of employment with CSC (15), Coopers and Lybrand (2), National Bank of Croatia (8) and Institute of Linguistics at University of Zagreb (2). Two biographical details - born in Zagreb on 30 September 1949 (10 PM) and Degree in Socio-Humanistic Information Sciences (Hons), University of Zagreb (1980) round it up.

## Reviews & Comments

This page is dedicated to reviews, reactions, comments, suggestions and criticisms I received, that authors *approved* for publishing.

There was a review related to the first edition, I recently became aware of. It was in Current Opinion in Neurobiology included in article Cognitive neuroscience - A selection of World Wide Web sites relevant to papers published in this issue of Current Opinion in Neurobiology (Volume 11, Issue 2, April 2001, Page 145) by Martin G. Todman (Laboratory of Neuroendocrinology, The Babraham Institute, Cambridge CB2 4AT, UK) and Philip J. Benson (Department of Psychology, William Guild Building, King's College, University of Aberdeen, Aberdeen AB24 2UB, UK). It was placed as second of nine reviews.

### "Imagination is greater than knowledge"

<http://users.zipwold.com.au/~damir/>

Nicely presented home pages written by Damir Ibrisimovic expressing his thoughts and concepts of objectivity and subjectivity and how this may relate to the world and what is really "out there". As yet, the opinions expressed in these pages are not referenced by actual scientific discovery.

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The first review I received was mailed to me on 15 June 2003:

Dear Mr. Ibrisimovic,

Thank you for sending me your 35-page paper "Imagination is Greater than Knowledge," taken from your Web site. I read the paper in its entirety over the last two months and found it interesting, often extremely so, intelligently and sometimes persuasively argued by a bright and articulate writer. Beyond this general remark, I cannot go further because I lack expertise in metaphysics, epistemology, and the philosophy of science and your paper is at the intersection of these three disciplines. I will say, however, that I found the sections of your paper that did not deal with these areas but rather with anthropology much less insightful and at times even platitudinous.

Wish best wishes,

Joseph S. Fulda, C.S.E., Ph.D.

The first comment I received was on 9 April 2003:

Dear Mr. Ibrisimovic,

Thank you for bringing our attention to your stimulating website. The picture you are painting is indeed refreshing, but while it is quite different from that painted by the prevailing world view of the Western world, it bears delightful similarities to our own here at PEAR. If you are not already familiar with our program, I invite you to look at our web site, including some of the papers that can be downloaded from its publication page. In particular, I think you will find the one entitled "Science of the Subjective" (PDF) strongly supportive of and resonant with your own approach.

I applaud your efforts to pull all of these diverse threads into a comprehensive tapestry and wish you every success in your desire to share it with others.

With all best wishes,

Brenda Dunne

PEAR Laboratory Manager