



**World Academy of  
Art and Science**



**MIND  
THINKING  
CREATIVITY**

**REPORT**

**CO-ORGANIZERS**



Further details on the Mind, Thinking and Creativity Project, with the list of speakers and participants, video recordings of proceedings, and the links to the presentations made at the first and second roundtables, are available on the WAAS website [www.worldacademy.org](http://www.worldacademy.org)



WAAS and WUC Report on  
**MIND, THINKING AND CREATIVITY**  
*Roundtable Series*

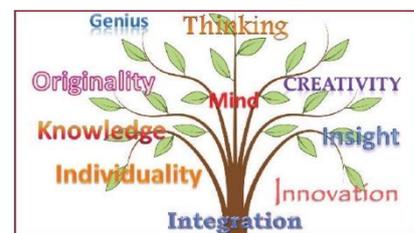


*Inter-University Centre, Dubrovnik, Croatia  
 April 2016 and November 2017*

Mind is humanity's highest developed instrument for seeking knowledge. It is the master tool that we use to comprehend the present, remember the past, and anticipate and plan for the future. From the act of striking two flints together to create fire to combining strings of 1s and 0s to design the code for supercomputers, mind has enabled humanity to create remarkable technologies and organized global institutions. The mind is the unifying foundation on which humanity's entire social evolution is based. To understand this vital instrument better, the World Academy of Art & Science and World University Consortium have launched a ground-breaking project to explore Mind, Thinking and Creativity. A greater understanding of the nature of mind, its ways of knowing, the limits to thinking and rationality, mind's untapped potential, the workings of creativity and genius are essential for addressing the challenges confronting humanity today.

In April 2016 and November 2017, WAAS and WUC co-organized two roundtables on Mind, Thinking and Creativity at Dubrovnik, Croatia to explore fundamental questions. The meeting was attended by experts from different fields of natural and social science, including medicine, neuroscience, engineering, psychology, sociology, economics, law, and philosophy. Person-Centered Approach Institute, Italy; Dag Hammarskjöld University College of International Relations and Diplomacy, Croatia; Inter-University Centre, Croatia; and the Mother's Service Society, India partnered with WAAS on this project.

The program is an endeavour to rediscover the marvellous capacities of mind as humanity has originally discovered, developed and applied them. It aims to broaden the range and enhance the quality of our thinking by making conscious the implicit assumptions and barriers that confine it within narrow boundaries and the characteristic types of errors and omissions they give rise to.



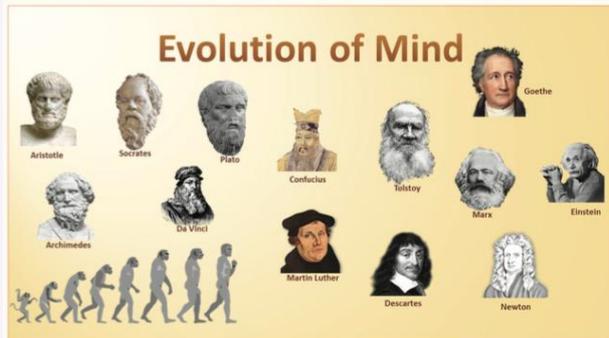
The discussions during the roundtables examined and evaluated the nature of mental processes, the capacity of mental faculties and characteristics, errors and limitations in the way they are utilized. The objective was for participants to understand the way mind works and ways it can work more effectively and creatively to see greater possibilities and actualize them. Concise case studies from different fields were presented and discussed in order to develop insights and draw conclusions on the characteristics and limitations of mind. The meeting explored ways to promote integrated forms of thinking that will foster original thinking, creativity and intuitive ways of knowing. The following are notes from the roundtable discussions.



*Our greatest achievements are products of our minds. So too, the existential problems confronting humanity today are products of the way we think.*

## ASCENT OF MIND AND CIVILIZATION

Mind and civilization have evolved in tandem since the dawn of humanity. New discoveries, inventions, ways of life and forms of knowledge arose with the evolution of humanity's capacity for observation, imitation, symbolic thinking, intuition, logic, organization, analytic, quantitative and systems thinking. The development of these mental powers has given rise to an endless stream of new tools, art forms, symbols, oral and written languages, inventions, social organizations, ideas and beliefs, religious and spiritual experiences, economic and political systems, educational and scientific endeavors.



*A new paradigm in human development must be based on a different type of thinking.*

In spite of these monumental achievements, humanity confronts persistent and seemingly insoluble existential threats that arise from the prevailing mental monoculture of mechanistic, reductionist, materialistic, analytic thinking. These challenges call for rediscovery of long neglected mental powers and the quest for more holistic, organic and integral ways of knowing capable of comprehending the growing complexity of life in the 21<sup>st</sup> century.

## PRISONERS OF THOUGHT – TRANSCENDING THE LIMITS OF OUR CONCEPTUAL SYSTEMS



William Byers

The truth or validity of any statement depends on the conceptual system within which it is viewed. Our conceptual systems are bounded, incomplete and usually unconscious. Insoluble problems and irreconcilable contradictions are indications we need to transcend the limitations of the constructs through which we view reality.

**There is no knowledge divorced from the experience, assumptions, perceptions, perspectives, beliefs and values of the person who knows.**

## INTEGRATING IDEAS IN SCIENCE – THREE PILLARS

We need integrating ideas that transcend disciplinary boundaries in the physical and social sciences. The task of philosophy is to find the connection between different fields in order to integrate all knowledge.

**Conservation, Selection and Unification are integrating ideas in Physics, Biology and Neuroscience.**



Carlos Blanco

## CHARACTERISTICS OF CONCEPTUAL SYSTEMS



*Self-referential*



*Relative to Perspective*



*Mistaken for Reality*



*Rule-based Models*

## TRUST IN THE INVISIBLE HAND

Adam Smith's invisible hand is a classic example of a conceptual system that has been mistaken for reality and reinterpreted in countless ways to support different economic theories.



A moral philosopher committed to enhance human welfare and opposed to mercantilism, Smith would be outraged by the uses and abuses to which his vaguely defined notion has been applied to justify unparalleled concentration of economic power, inequality, and persistent poverty.

**-Garry Jacobs**

## PARADIGM CHANGE AND DEEP THINKING



*Ivo Šlaus*

Change is of three types—incremental, revolutionary or paradigm. What we need today is a comprehensive paradigm change that integrates different fields of knowledge and integrates science with society, human values, social welfare and well-being.



## REVERSING COPERNICUS

The Copernican Revolution moved earth from its dominant position at the center of the universe to the status of a mere satellite.



The paradigm change needed today must flip the model. It must liberate humanity from enslavement to the instruments it has created—money, technology, organization and power.

**The new paradigm must place human welfare and well-being at the center.**

## 'REALITY' IS A SOCIAL CONSTRUCTION



*Alberto Zucconi*

Karl Menninger famously said that people make self-fulfilling prophecies. We construct and determine our psychological, social, emotional, mental realities ALL the time.

The understanding of how reality is socially construed and how individuals and organizations construe their experiences is relevant for an effective promotion of change as well for the understanding of some defense mechanism like denial.

*We do not live in reality but in the social, individual constructions of experiences that we call reality. Even science is a complex process of socially construed experiences.*



Chandra Sekaran

## INTEGRATED CONCEPTION OF HEALTH

Fragmented, compartmentalized knowledge is totally inadequate to reflect the intricate interconnectedness and complexity of our rapidly evolving human civilization.



The perfect organic integration of every cell, tissue, organ and system in the human body is a close parallel to the integration of modern society and the need for integration of knowledge.

Ayurveda, India's traditional herbal system of medicine, is based on a positive, integrated conception of health—not merely as the absence of disease. Its aim is to enhance the general health of the whole body.

## MIND AND ITS FACULTIES

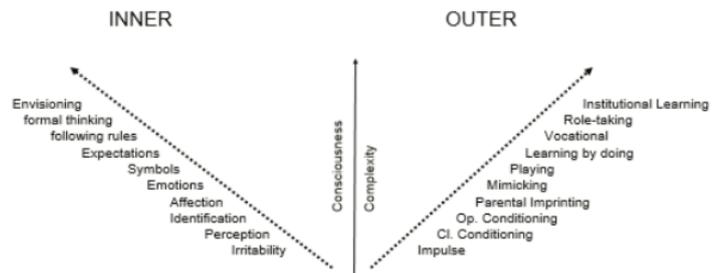


Stefan Brunnhuber

The mind is not the brain. The human mind tries to know reality by dividing, reducing and compartmentalizing it.

A unique capacity of the human mind is the capacity to envision the power of planning, inner probing, anticipating the good and bad.

### Consciousness & Learning



## VARIETIES OF THINKING

Over millennia, humanity has been enriched by the development of diverse ways of knowing—mimetic and symbolic thinking in prehistoric times, intuitive thinking in ancient India, logical thinking in Hellenic Greece, analytic and quantitative thinking during the Enlightenment, systems and holistic thinking in the 20<sup>th</sup> century. Only a diversity of mental powers will enable us to comprehend and respond to the increasing complexity and interconnectedness of modern life.

Analytic



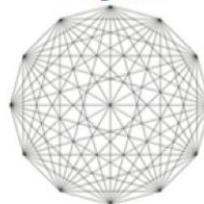
Reduces complex reality to its basic constituents

Systemic



Recognizes interrelationships and complexity

Integrated



Sees the whole as greater than the sum of its parts

- Garry Jacobs

## THE OBJECTIVITY MYTH

*All knowledge is subjective in its origin.*

The true solution for all problems lies in reconciling the subjective and objective

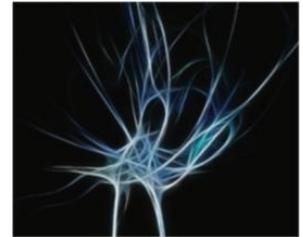
dimensions of reality.

FDR solved America's worst financial crisis by restoring the country's confidence in itself and its institutions.

- Chandra Sekaran

## THREE TOOLS FOR NON-LINEAR THINKING

Analogy, metaphor and symbol capture the richness of life and complexity of reality that are missed by the linear, logical and literal language of science.



The three words "emperor's new clothes" convey a profound truth about prevailing social science.

## CREATIVITY AND SCIENTIFIC DISCOVERY



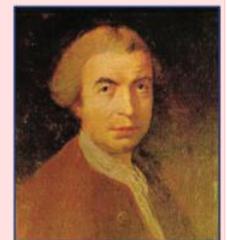
Francis Brassard

The individual and the society, the subject and the object do not exist independently of each other. In order to fully grasp reality, they must be viewed in an integrated way. This is exemplified by the extraordinary creativity of Ruđer Josip Bošković.

Bošković was a Croatian physicist, astronomer, mathematician, geodesist, philosopher, diplomat, poet, theologian, Jesuit priest, and a polymath. He produced a precursor of atomic theory and made many contributions to astronomy.

The Secrets to Bošković's Extraordinary Creativity:

- He recognized that two contradictory explanations can be reconciled and integrated at a higher level, from another conceptual system.
- He studied the basic elements of reality not as separate objects, but as relations, thereby gaining a comprehensive view of the whole.
- He looked at reality as if it were a living organism, not separated and isolated from the rest.
- He valued the subjective experience as well as objective knowledge.



Ruđer Josip Bošković  
1711-1787

## CREATIVITY AND PARADIGM CHANGE



Winston Nagan

Ambiguity is closely tied to creativity.

All human change and progress has been a result of creativity. The solutions to pressing global problems that we face require disciplined deep thinking and an ability to mobilize creative solutions.

"Harold Lasswell, a creative social scientist of the 20<sup>th</sup> century and former President of WAAS, believed that creativity is an indispensable component of problem solving."

## INTUITIVE MATHEMATICS



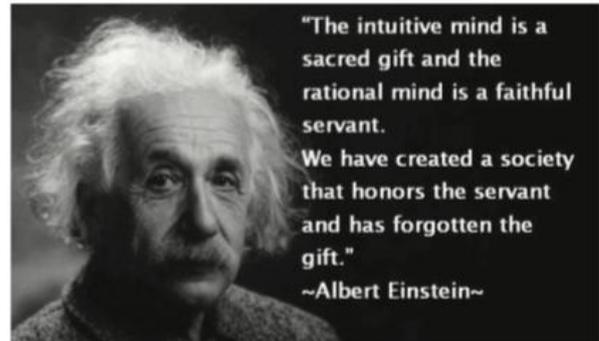
Srinivasa Ramanujan  
1887-1920

Mathematics is regarded as the most logical and methodological of all sciences. Therefore it is especially ironic that one of the greatest mathematicians of all time arrived at his discoveries without either logic or method.

During his brief lifetime, he compiled nearly 3,900 original results, equations and theorems without any formal training in mathematics. But he could provide no proof of how he derived those results. Nearly all of his results have now been proven correct.

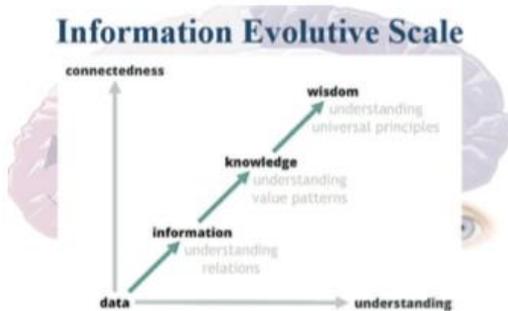
Cambridge professor G. H. Hardy described Ramanujan's method as "a process of mingled argument, intuition, and induction, of which he was entirely unable to give any coherent account."

## INTUITIVE SCIENCE AND THE SCIENCE OF INTUITION



Great scientists confirm that their breakthrough discoveries were the result of non-linear, non-logical processes. Science education focuses only on methods for verification, rather than creative thought processes that generate new discoveries.

## WAYS OF KNOWING



Rodolfo Fiorini

APPLICATION	SIMPLE UNFOLDED LINEAR	COMPLEX FOLDED NESTED
DOMAIN	SIMPLE UNFOLDED LINEAR	DISCIPLINED (TRAINING)
	ANALYTIC	SYNTHETIC
	COMPLEX FOLDED NESTED	INSURMOUNTABLE

Knowledge is an intellectual process. Knowing is an emotional/spiritual process. Knowledge comes from acquiring information.

Knowledge is shared, formal and objective. Knowing is embodied, internalized as values and subjectively assimilated by the personality. **We can know without thinking.**

## ART AND SCIENCE: TWO WAYS OF KNOWING

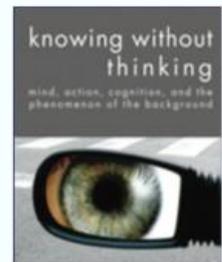


Zdravko Radman

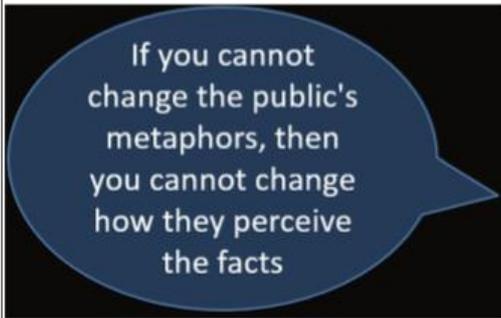
The mind is not the brain. Science accepts facts, formulas and logic. It largely ignores intuition, imagination, emotion and the subjective aspects.

What we see is determined by what we know, expect, feel and believe in. Our perceptions shape reality. Reality by itself is neutral.

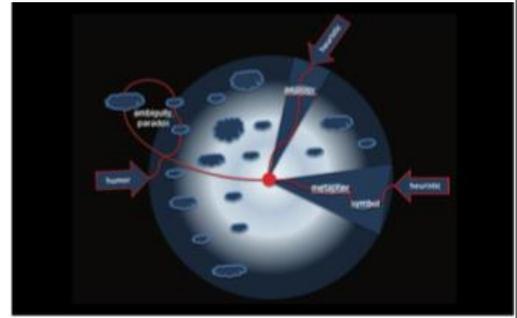
Science and art are but symbolic languages that help us decipher reality. The search for beauty and symmetry does not make science less objective. It makes it more human.



## LIMITS TO RATIONALITY



Mario Hytten



One of the fundamental findings of cognitive science is that people think in terms of metaphors. When the facts don't fit the frame, the facts get rejected, not the frame.

## MIND, INDIVIDUALITY & CULTURAL DIVERSITY



Marta Nešković

What mind observes as separate or even opposite things, are complementary aspects of a greater reality. Thus the individual and the collective are two complementary aspects of social reality.

*The individual is a catalyst for social evolution.*

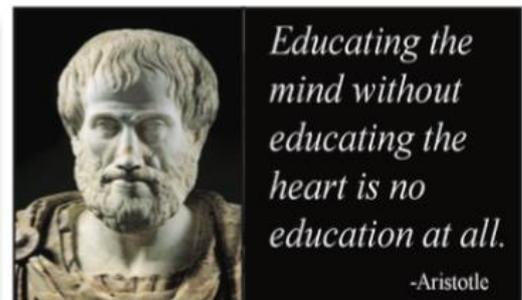
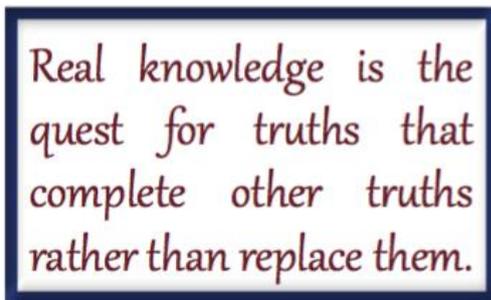
The collective is an infinite reservoir of capacities which the individual draws on for personal development. Society generates the maximum power for accomplishment when the collective fully releases the energy and harnesses the myriad capacities of its individual members. Multiculturalism enriches the diversity of human endowments available for individual and social progress.



## DEEP LEARNING – IMPLICATIONS FOR EDUCATION



Garry Jacobs



True learning is person-centered, not subject-centered. It is made possible by independent thinking, not by acquiring information. It is fostered by the willingness to embrace uncertainty, ambiguity and contradictions and reconcile them as complementary aspects of a wider truth.

Development of the whole mind and whole personality of the individual is the true objective of learning.

## NEW PARADIGM THINKING – REAL-WORLD APPLICATIONS



Tibor Tóth

We are approaching a bifurcation point between two possible futures

- The Subjective view is of a Faith Depression that takes us back to the frustrations, fear and anxiety of the 1930s.
- The Objective view is of an Industrial Revolution that opens up unparalleled opportunities for global social evolution.

The outcome will depend on our capacity to reunite the objective and subjective dimensions to envision a new paradigm by a new way of thinking.

## 2<sup>ND</sup> ROUNDTABLE ON MIND, THINKING & CREATIVITY



Everyone acknowledges the importance of creative thinking skills, but few truly understand the process of creativity. According to the 2016 *Workforce-Skills Preparedness Report* by PayScale Inc., 60% of employers complained that the college graduates they hire are not ready for the workplace, as they lack critical thinking and problem solving skills. Average college graduates show no improvement in critical thinking skills after four years of college. A vital skill that marks the employability of a person is not taught in school, as the concept of creativity remains a mystery to many.

The Dubrovnik roundtables confirmed the self-evident truth that creativity is not merely an act of genius or luck. It is a process, a process that can be learned. The discussions explored many of the mental processes that lead to the discovery of new relationships, unperceived opportunities and untapped potentials. They concluded with a core set of recommendations on how these insights can be applied in classrooms and the findings were presented at the 2<sup>nd</sup> International Conference on Future Education at Rome in Nov 2017.

## POWER OF QUESTIONS



From the time of Socrates, it has been known that asking questions is one of the effective ways to stimulate creativity, original thinking and fresh discovery. It is also true that any question, no matter how silly, unrelated or apparently meaningless it may seem, can lead an open mind to greater insights and discoveries.

*The answers you get depend upon the questions you ask.*

**– Thomas Kuhn**

## CREATIVITY IS A SOCIAL ACT



G. Jacobs

Conventional wisdom attributes great mental discoveries to acts of insight or genius by unique individuals. But creativity is never the act of a single individual. All human endowments and capacities are the cumulative product of the long evolution of humanity over millennia. It is impossible to think a thought or use a word without borrowing from the treasure chest of humanity's past discoveries. Moreover, it is the interaction and confrontation with other points of view that serve as the creative catalyst to help us escape from the limitations of our implicit assumptions, subconscious prejudices and cultural biases.

'The growth of knowledge depends entirely upon disagreement,' said **Karl Popper**. The capacity to embrace opposite and even contradictory points of view is a powerful source of individual and social creativity. Taking the other person's point of view opens up new vistas of discovery, even when that viewpoint appears obviously flawed.

## IMITATING NATURE

### Why did it take human beings 190,000 years to invent agriculture?



S. Inbarajan

Agriculture is arguably the greatest human invention of all time. Nothing else has so radically transformed life on earth. It is the foundation on which civilization and social evolution are built. Nature's method is transparent and observable, yet it remained a mystery for countless millennia. Deciphering the process required human beings to make millions of observations about what grows when, where and how under what conditions. The relationship between the tree and seed, seed and soil type, sprouting and sunshine, temperature and season, rainfall

and plant growth is self-evident to every child today, but none of them is obvious or easily discernible to anyone who has not been the beneficiary of thousands of years of collective knowledge. Acute observation needed to be coupled with the capacity to relate and correlate each condition and factor of production with countless others to identify critical determinants and weed out those that were irrelevant or purely circumstantial. Correlating the color, smell, texture, consistency and moisture of soil to the growth of different crops was the work of centuries of investigation.

Rediscovering agriculture through acts of imagination is itself a great act of creativity that reveals profound insights into the creative processes to new discoveries today.



## CONSCIOUS CREATIVITY ABRIDGES TIME

Creativity is not confined to discovering new knowledge. It also expresses in the application of mind to consciously conceive, plan, organize and perform new types of activity. Between 1966 and 1975 India doubled its foodgrain production by consciously and creatively applying the knowledge about agriculture which humanity had acquired by trial and error during thousands of years of discovery. This creative conscious application of knowledge known as Green Revolution was soon applied by countries around the world to eliminate famine from large areas of the world. **Conscious creativity radically abridges time.**



S. Sreejith

## UNRAVELING COMPLEXITY



R. Pachauri

There was a time when geography textbooks taught about the unchanging characteristics of climate in each particular region of the world, because they did not understand the relationship between climate and the growth of forests, agriculture, sunspots, human settlements, industrial activity, energy production, consumption and pollution. Today we know that climate is changing as a result of all these factors. The evolution of science to tackle the challenge of climate change represents an unprecedented collective act of creativity by the global scientific community involving tens of thousands of researchers.

The capacity to relate distinct, apparently unrelated phenomena and fields of knowledge is one of the hallmarks of mental creativity.



## ORGANIZATIONAL CREATIVITY



M. Nešković

What do language, agriculture, manufacturing, markets, money, cities, science and internet have in common?

They are all examples of the creative capacity of the human mind to fashion new types of social organizations out of thin air. Social advancement has been the result of this remarkable capacity of human beings to invent social organizations that enhance and multiply cooperative relationships among people. Social organizations are pure acts of creativity. The discovery of agriculture led to the development of trade, money, market, rural towns and urban centers of civilized life. Banking, governments, standing armies, police, law, courts, artisan crafts, education and entertainment are some of the creative products of organizational invention. Creation of new organizations requires higher faculties of mind to divide, classify, categorize, plan, communicate, coordinate and systematize activities for greater speed, quality and efficiency.

## WHO DONE IT?

The story of a stolen race horse and his murdered trainer offers rich insights into mind, thinking



and creativity. Arthur Conan Doyle's Sherlock Holmes tale "Silver Blaze" reveals the typical pitfalls of linear rational thinking tainted with egoistic ambition. Intuition is born of an integral perspective. Profound knowledge can be gained by pursuing comprehensive creative solutions that account for even the smallest particle of information. A dish of mutton curry trashed Scotland Yard's simplistic theory that the gambler did it. Sometimes the most important facts are those that did not occur. They also overlooked the simple fact that the dog did not bark. As Holmes reminds, never come to conclusions until all the evidence is before you and when all plausible explanations have been exhausted, look to the implausible for the answer.

We cannot regulate our interaction with any aspect of reality that our model of reality does not include—whether as to its theoretical range or as to its observational facilities and resolution—because we cannot by definition be conscious of it.

– Stafford Beer

## SUPERSTITION, REASON & LOGIC AS CREATIVE ASSOCIATION

Thinking comes from relating two or more observations, ideas or sensations. When early man observed that the appearance of lightning in the sky was invariably followed by a clap of thunder, his mind linked the two phenomena in thought and tried to discover their causal relationship. But observation and association can also lead to erroneous conclusions, which form the basis for superstitions.



I. Slaus

**Identifying the real relationship between causes and effects is a creative act of human mentality that gave birth to rational thought.** The effort to formulate a set of rules to test the validity of mental conclusions gave birth to logic—another great act of mental creativity. Thousands of years ago, science discovered that the rules of logic valid for observable physical phenomena are not always true. Quantum physicists have discovered that something can be both a wave and a particle, that an electron can be in more than one place at the same time, and that objects can influence other objects instantaneously over infinite distances. Mothers often tell their children that they cannot have their cake and eat it too. But this truism does not apply for knowledge, as **Harlan Cleveland** observed: “Knowledge grows the more you share it. It grows by giving”. These examples show that the rules of logic are themselves creative.



Carlos Blanco

Intuition creates, rationality validates. Intuition is the gateway to creativity that connects elements which have previously been unconnected. Rationality is a structured way of thinking and organizing information by human mind, with a minimal number of presuppositions. Logic is the formalization of thinking based on rules and premises, so that its elements are constructed in a consistent way. Reason and logic formalize that which intuition discovers and converts into propositions that can be effectively communicated. Intuition and logic are essential instruments in the creative quest for knowledge.

## CHANCE & CAUSALITY



Janani Harish

Creativity arises from the capacity to look beyond the confines of existing concepts and premises, to think outside the proverbial box. Our creativity is severely constrained by the fact that we accept as given and incontrovertible many things that may ultimately prove to be erroneous or only partially true. The concept of the geocentric universe prevailed for 15 centuries or more simply because it was supported by the visual evidence of our senses that the sun rises and sets and the notion that the earth and human beings lie at the center of the universe.

Our notions of chance and causality are based on the premises of materialism developed by modern science which have proven of great value in explaining a great many purely physical

phenomena such as the motion of objects described by Newton. Much of what passes for chance in science is simply phenomena of which we do not know the causal factors or do not have the capacity to measure their impact. These same conceptions are grossly inadequate to explain historical, biographical, literary and personal experiences which are extremely improbable yet remarkably common. Take the example of Jacqueline Novogratz of Virginia who gifted her blue sweater to charity at age 15 and then met a boy wearing the very same sweater with her name on it 10 years later while visiting Africa. Or Maxwell Morrison, the high school student in Chicago, who saved the life of a Thai student who swore to repay the debt. Maxwell was mistakenly accused and arrested for drug smuggling 20 years later while visiting Thailand only to be saved by the very same Thai boy who had grown up and become the judge trying his case.

## CREATIVE MODELLING



R. Hoffman

The act of model making is mental creativity, and we strive to create models that are closer to reflecting the world as it is.

Computers create dynamic models through simulations that portray and test conflicting theories. The process of creating a model leads to rigorous thought, and exposes fallacies in mental models.

## ART OF CREATIVE COMMUNICATION



R. Fiorini

Communication is a creative process. All forms of communication including written or verbal expression, conceptualization, symbol-making, abstraction, and analogy involve the condensation and transformation of personal insights and experience in a form that can be passed on to other people. Each stage in the process involves a loss of information, a further generalization and abstraction of reality. This loss is inevitable. The problem comes when we mistake communication for the reality it seeks to represent. The capacity to evoke the original experience in another person is the point at which communication becomes a creative form of art.

## INTEGRATION AND UNIFICATION



D. Raković

The greatest scientific discoveries have led to the unification of apparently unconnected phenomena. Newton's laws unified motion and inertia. Maxwell discovered that by unifying magnetism and electricity both could be explained according to the principles of electromagnetism. Einstein unified space and time, gravity and acceleration, matter and energy. Knowledge involves connecting, unifying, and integrating that which appears different or unrelated within a wider conceptual framework.



We explored ways to promote integrated forms of thinking that will foster original thinking, creativity and intuitive ways of knowing.

– Drenka Dobrosavljević

## INTER-DISCIPLINARY CREATIVITY IN RENAISSANCE ITALY AND CONTEMPORARY SILICON VALLEY



Florence was a triumph of both art and engineering combining technology, design, chemistry and commerce. This mixing of ideas from different disciplines became the norm as people of diverse talents intermingled, as Walter Isaacson describes in his book on Leonardo da Vinci. Creativity arises

from the ability to combine ideas from disparate disciplines.

The same quality is at the root of the astonishing functional creativity that characterizes Silicon Valley today where technology, design, materials and neuroscience, science, and commerce are integrated with human needs and aspirations to an extent unimagined in the past



## LAW AS EVOLUTIONARY CREATIVITY

Law is commonly regarded as the most staid and uncreative of fields encumbered by centuries of accumulated principles, precedents, rules and procedures. In reality, the creation of law has been the driving force for the transformation of human relations from the battlefield to the conference table, marketplace and the courtroom; from rule of might to rule of rights, contracts, treaties and higher expressions of civilization.

The foundations of law are continuously evolving. Though jurists strive to emphasize continuity with the past as the mark of legitimacy, in fact the evolution of law has progressed through

markedly different stages—from the rights of the most powerful leaders and countries to seize whatever they can—be it property or entire countries—to the divine right of kings, the feudal privileges of aristocracy and the sovereignty of nations to finally establish a foundation on universal human rights. In fact all these levels of law persist and co-exist and their relative contribution is constantly evolving.

Moreover, every act of interpreting and applying law to



*H. Gordilho*

*W. Nagan*

*S. Bahia*

specific situations by the legal system constitutes a creative act involving the conversion of a general principle into a specific judgement based on the unique peculiarities of each case.

## CREATIVE LEADERSHIP



*E. Valencia*

Creativity proves the adage that the invisible and intangible are more powerful than the visible and tangible. Great leadership involves acts of social creativity. Mahatma Gandhi transformed the act of producing salt on the seashore into a national symbol of defiance by the Indian people against colonial rule. His famous Salt March in 1930 shook the foundations of British rule in India.



Twenty years after Apple was founded and it launched the first commercially viable personal computer in 1976, Steve Jobs returned for a second time as its CEO at a time when most people regarded the PC as a commodity product that could only compete on the basis of the best quality for lowest price. In spite of predictions that both he and Apple were doomed to oblivion, Jobs soon transformed Apple into the most valuable company in the history of the world.

He accomplished this tremendous feat of creative leadership by looking at the PC business from a fresh perspective to discover people's unmet needs and aspirations. He quickly transformed Apple from a commodity PC maker into a music company with the launch of the iPod, and then into the world's most profitable maker of smartphones and tablet PCs. Jobs' success arose because he creatively conceived of Apple as a company that utilizes technology to empower individuals to better meet their needs.



*M.S.R. Dev*

## CREATIVITY IN SCIENCE

New facts, collected in old ways under the guidance of old theories, rarely lead to any substantial revision of thought. Facts do not “speak for themselves”; they are read in the light of theory. Creative thought, in science as much as in the arts, is the motor of changing opinion.

**-Stephen J. Gould**

## MAN AND MACHINE



**M. Hytten**

Machines are a wonderful product of human creativity in Matter. The debate still rages as to whether the marvelous machines human beings create can themselves be truly creative and perhaps even excel the creativity of their own creator. Can algorithms create new algorithms that transcend the assumptions, premises and boundaries of reality on which they themselves are founded? Regardless of the answer, it is evident that the capacity to think outside the box, to question and transcend the boundaries of an existing conceptual system is a hallmark of human creativity.

Artificial Intelligence can mimic certain mental capacities like memory, recreate the mechanistic aspects of human mind and excel at high volume tasks. Human intelligence is unique by the understanding of fundamental processes of conscious awareness and knowing, self-consciousness, insight and creativity.

## CREATIVE HEALTHCARE SOLUTIONS

The power of mind over matter is dramatically illustrated by what is known as the placebo effect. A placebo is something that is not a real medicine, but it has the effect of a real medicine. Placebo effect is the authority of ignorance. Right information provides the authority of knowledge. Information is still a kind of conditioning. A mind that is not closed is not superstitious. It is more powerful than a closed and superstitious mind. A mind that is not conditioned even by knowledge, is an open mind.

Research on the placebo effect has focused on relationship between mind and body. Even the relationship between patient and doctor, and the faith that the patient places on the doctor improve the outcome of treatment.

Professor Ted Kaptchuk, director of the Harvard-wide Program in Placebo Studies, says, “The placebo effect is more than positive thinking—believing a treatment or procedure will work. It is about creating a stronger connection between the mind and body and how they work together.”

How placebos work is still not fully understood. If the role of the functioning of mind is carefully studied and fully understood, creative healthcare solutions can be developed, and dependence on real medicines can be reduced.



**Chandra Sekaran**



Improvement of living conditions and human welfare is not limited by boundaries or rules. Remarkable upsurge is carried out by individuals with firm vision and inner belief.

**– Davor Bernardić**



It was a great occasion to exchange ideas and to make contacts with colleagues who are passionately engaged in researching questions I am also passionate about.

**– Francis Brassard**

## RECOMMENDATIONS ON EDUCATION FOR CREATIVITY

The findings of the Roundtable were presented and discussed at the 2<sup>nd</sup> International Conference on Future Education in Rome on Nov 16-18, 2017.

### Active, student-centered learning:



V. Senthil

Creativity of mind occurs in an atmosphere of freedom, engagement and interaction. Activities in the classroom should be structured around the students, rather than subjects, giving them freedom to raise questions,

voice their ideas and interact with one another in pursuit of knowledge. This will develop students capacity to see beyond what exists and open their minds to new ideas. An interactive classroom fosters active, experiential learning, whereas the current system of education in India encourages rote memorization and regurgitation of facts. Teaching strategies should develop and exercise the students' mental faculties for conceptualization, judgment, analysis, discrimination, organization, problem-solving, value-based decision-making, integration of knowledge and imagination. The focus should be on learning how to learn by learning about the validity of different ways of thinking and viewing reality.

### Understanding complexity, reconciling and integrating differences:

It is difficult for mind to perceive relations of cause and effect when the causes are complex. Creativity is needed to integrate knowledge of complex phenomena and to evolve effective solutions that embrace all contributing factors, avenues and opportunities. From early childhood, the emphasis should be to develop in the child an understanding of the complex interrelationships and interconnections that govern the way the world works and to look for underlying principles and factors that relate and unite things that appear unconnected, opposite or even contradictory.

### Seeing the whole picture in context:

The key to comprehending complexity is to view phenomena in context rather than merely understand them in abstraction. Specialization divides, focuses, narrows and limits understanding to its individual component parts, fragmenting knowledge in the process and separating it from the contextual reality to which it applies. Discovering how to derive abstract generalizations from myriad diverse facts should be balanced by the capacity to apply abstract principles appropriately to fit the complexity of the real world, rather than reducing action to simplistic formulas. Transdisciplinary education helps us become aware of the limitations and traps of compartmentalized knowledge.

### Independent thinking:

Real creativity requires the capacity to question established beliefs, prevailing theories and conventional wisdom. Learning is a social activity which is too often constrained by the authority of those who teach and the social acceptance of that which has already been discovered. At its heart science is a process of endless discovery of greater knowledge, rather than a set of orthodox truths to be passed on and accepted religiously. Students should be encouraged to question, explore, challenge, debate and rediscover for themselves rather than to memorize, accept, repeat and regurgitate what they are taught. Students must develop the capacity to acquire skills that can be applied to many fields and be flexible. The ultimate aim of education is not transfer of knowledge but rather development of an independent mind and individual personality capable of making conscious value-judgments and acting on deeper convictions. Rather than merely a means to a job, education is the process of learning how to live successfully, happily and harmoniously as an individual and a responsible contributor to the progress of society