

Creativity, Freedom, Love, Politics, Religion, and Science

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Science, Art and Religion (2022): 10.5005/jp-journals-11005-0010

CREATIVITY

Our ancestors developed in Africa: Tanzania, Kenya, and Ethiopia. The oldest fossils of homo are more than 3 million years old. Upright walking hominids were recently found in Ethiopia, likely 3.9–4.2 million years ago. The basic features of homo habilis, homo erectus, and homo ergaster (one who works) is that they traveled and developed some technology. We could argue that they had some beginnings of creativity. First evidence of homo sapiens was found in Morocco dating 300,000 years ago. Their remains were found together with some tools and charcoal indicating that they used fire almost million years ago. They used flint and they could get it only from places 30 km south, proving that they regularly traveled such distances. There is evidence that some of our animal ancestors displayed some sort of creativity and definitely enjoyed playing games. Humans have a singular ability to reason with language and symbols. The sudden emergence of language has been called the “Great Leap Forward.” Humans are not the only species to bury their dead. There is evidence that Chimpanzee, and possibly Elephants do it. It seems that the Neanderthals are the first to bury their dead, e.g., 100,000 years ago in Israel and in Krapina (about 130,000 years ago). According to Calvin,¹ the attributes that make us human are five b’s: blades, beads, burial, bone tools, and beauty. There is evidence for cave paintings more than 50,000 years ago: Gobustan, Altamira, Lascaux, Sulawesi, and Löwenmensch figurine. Cave paintings tell us about pre-homo-sapiens and early homo sapiens. They painted animals. Did they paint stars? Symbols, language, and culture mark the cognitive revolution some 70–100,000 years ago.

Why humans pursued abstract intellectual activities since they did not exist in early hunter-gatherer societies and there is no evidence they provide evolutionary advantages? Possibly these traits emerged as a by-product of the natural selection and we occupy a cognitive niche in evolution. Creativity is the characteristics of human nature that generate change. But nature changes also. “Everything is in a continuous state of change” (Heraclitus) and “Change is what never changes” (Confucius). Pope Francis in his homily on 8th May 2017 said “God always surprises us because he loves us and accompanies us.” Ponder on this deep sentence: unity between God, humans, change, and creativity! Did

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How to cite this article: Šlaus I. Creativity, Freedom, Love, Politics, Religion, and Science. *Sci Arts Relig* 2022;1(1):1–5.

Source of support: Nil

Conflict of interest: None

Michelangelo portray it in his Creation of Adam: God’s finger pointing to Adam? And Adam’s pointing to God. This is creation and permanent change and expression of God’s love.

FREEDOM

Change and creativity are intertwined with freedom: freedom of individual human beings and of nature. This is well described by a famous Einstein-Bohr discussion. Einstein: “I do not think God play dice with us.” Bohr: “He does!” Bohr: “Stop telling God what to do.” It is not a determined world, but a creative world—creative nature—and creative humans. Humankind has been concerned with freedom from the beginning of our thinking: Socrates, Aristotle, Epicureans, Stoics, St. Augustine, St. Thomas Aquinas, John Stuart Mills to A.J. Ayer and us today. How to reconcile our free will with determinism and causality? God allowing for evil in the world—why? Our concept of time rooted in our own experience—limited, chained by three dimensions, by our physical characteristics: size and lifespan. St. Augustine points in the right direction. Time is not a Newtonian absolute time. There is no our time before the creation (or emergence if you prefer) of our universe. This truth is expressed in the Hindu philosophy and possibly in many other thoughts. St. Augustine emphasizes “God is beyond and above time.” In our daily life we are constantly faced with problems of selecting, of acting—are we free? Is our freedom in any way limited? M. Gandhi said: “Freedom is not worth having if it does not include the freedom to make mistakes.” Are we free to hurt, to kill other people? Currently – during the COVID-19 – we are faced with such dilemmas. Are we free to select not to get vaccinated? If freedom allows us to question all God’s law and all those developed by us humans, are we allowed to

possibly kill others by increasing the likelihood that they will be infected? We could equally argue that we are free to refuse examinations when we board the planes. X-rays are definitely hurting our health. Are we free to ignore traffic signals (which we often do)? Isn't such behavior sheer stupidity? It is scientifically proven that possible negative effects due to vaccination are much smaller than benefits. The list goes on: our behavior has a very negative impact on the climate. It also increases pollution and destroys resources we need. We are destroying natural capital, and, of course, human capital. Scientific evidence proves all of these. Of course, science is not a dogma, it changes, science improves. When we believed that we understand our natural world, it turns out that it is just 5% of the entire universe. The rest is dark matter and even more dark energy. Freedom is related to our knowledge, our power and responsibility is larger if we know more and can and do more. These conflicts, questions, uncertainties are overcome if one accepts St. Thomas Aquinas' statement "God is freedom"—God—omniscient, omnipotent, merciful who loves all of us, each of us infinitely.

LOVE

In all major cultures one basic moral law dominates "Though shall love thy neighbor (Lev 19:18, 1000 BC), "What you do not want others to do to you, do not do to others." (Confucius, 500 BC), "Do not do to others what would anger you, if done by others to you." (Socrates, 375 BC), "This is the sum of all true righteousness: deal with others as thou would thyself would be dealt by." (Mahabharata, 150 BC), "What so ever thou wouldst that men should not do to thee, does not do to them. This is the whole Law. The rest is only explanation." (The 31st book of Sabbath, 30 BC). In 1893 John Stuart Mill wrote in his *Utilitarianism*: "To do as one would be done by, and to love one's neighbor as one's self, constitutes the ideal perfection of utilitarian morality." Anarchist, Prince Peter Kropotkin wrote in 1891 "'Do unto others as you would have others do to you in like cases.'" All these statements are known as the Golden Rule. But what love means and who is my neighbor? Charles Darwin wrote in *The Descent of Man* (1871): "As one advance in civilization, and small tribes are united into larger, the simplest reason would tell each individual that he ought to extend his social instincts, and sympathies to all the members of the same nation though personally unknown to him. This point being once reached, there is only an artificial barrier to prevent his sympathies extending to all men of all nations and races." In the global world everybody is our neighbor. In 1973 John Maynard Smith and independently Hamilton, Axelrod, and Rapoport applied game theory—first developed by Johann von Neumann and Oskar Morgenstern in 1953 – to the evolution of animal strategies and introduced the central concept: evolutionary stable strategy. Animals not only compete but cooperate and share resources if that is beneficial to them. R. Trivers developed a theory of reciprocal altruism based on the concept that cooperation would evolve into species clever

enough to distinguish between cooperators and cheaters. It is possible to explain the evolution of this behavior based on the special problem in game theory—the prisoner's dilemma (PD). Robert Axelrod was interested in finding a winning strategy for repeated PD games and conducted a computer tournament with an invitation to submit strategies to play 200 games. The winner was the simplest strategy called "tit-for-tat." *Tit-for-tat* has the following strategy: cooperate and never be the first to defect, retaliate only when your partner has defected, forgive and cooperate after retaliating just once. Through reciprocal altruism natural selection generated various human characteristics: gratitude, generosity, a sense of owing, empathy, and trust. Altruism is an example of the win-win game. An arrow describing our development can be viewed as a series of win-win games starting at least 15,000 years ago. Unfortunately, there is a limit beyond which all win-win games are exhausted and one can play only zero-sum games. This limit is called Pareto limit. Scientific breakthroughs can increase the Pareto limit as they create new win-win games. The Mutually Assured Destruction has some elements of tit-for-tat, but the game involves humankind's existence and certainly is not a game we suggest to play. The tit-for-tat can be considered as the biological expression of the Golden Rule. In a global, interdependent, and rapidly changing world *tit-for-tat* is not sufficient.² Two thousand years ago we were told "Love one another as I love you!" (John 13:34). I am sure similar statements are present in a similar form in all other religions.

POLITICS

On an isolated island humans can and will be creative and free. Even they love themselves and possibly God. However, as soon as Friday comes everything becomes political and Robinson Crusoe gets feelings and needs to make decisions. In the contemporary world our basic values should be common—global, human and humanity-centered. The Eskimos have a saying "The best place to save your food is in your neighbor's belly." Hunting giraffes required that! Kung-San hunter-gatherers form larger tribes since it would be impossible for one person and even a small group to benefit from eating the entire giraffe. Social groups and social interactions play important roles in the evolution of humans. Our curiosity produces questions and necessity to satisfy our needs demands what we now call science and which develops some 10–15,000 years ago. Is the triad: religion, politics, and science compatible? Religions assure salvation. We believe this is achieved through the respect of laws, practices, and rituals. However, what is involved in God's command is not an obedient submission to the will of God revealed in law. Anyone who understands God's commandments legalistically and not in the light of love is constantly faced with a conflict of duties. God's concern is not law, but human beings. Man is not created to serve the law, but the law is created to serve man. Though Aristotle claims that politics is a master science aimed to augment the

benefit of the society, to augment the common good, there are great incompatibilities between science and politics. John Carey wrote “The real antithesis of science is politics. Whereas science is a sphere of knowledge, politics is a sphere of opinion.”³ To many politicians truth does not matter. It is just their own interests to get and to remain in power. Lenin wrote “A lie told often enough becomes truth” and this was elevated to perfection by Göbbels. Donald Michaels wrote an essay “Can leaders tell the truth and remain leaders?” Do people prefer a pleasant lie over an unpleasant truth? People, everybody prefers quick and easy solutions to complex problems. Humankind is faced with a multitude of challenges and they keep changing. These challenges are global and local and everybody is and should be concerned by them. Politics and governance today cannot be reduced to an elite as it was in ancient Greece and even during the foundation of the USA when women and slaves did not actively participate in politics. In old Greek the word idiot—ἰδιώτης described a selfish person, not interested in politics. Today governance and politics have to be participatory.

Politics permeates everything. It has been developing for several millennia, and even the present representative democracy is far from satisfactory. Few aspects are enough to prove it: (i) In most elections the percentage of those that vote is appreciable below 100%. It is often that minority rules. The true democracy is not and should not be the rule of those that win the election, but of checks and balances as emphasized by most founding fathers. (ii) Candidates to be selected are often of very low quality. Actually, below mediocre. (iii) Money and special interest groups grossly distort what citizens actually want. This is why in all countries in all polls about 70% declare that their country is not going in a right direction, and it is not governed as they want. (iv) In a rapidly changing world politics has to be on one hand flexible and on the other it has to be based on solid principles assuring achieving common good. (v) All citizens should be adequately informed and educated, and unfortunately this is not so. Politicians who believe they rule the world prefer ignorant and non-informed people and this is one reason why all of them so frequently tell lies. (vi) Politics is quite complex. Today more than ever! And the world is changing faster and in all aspects. Consequently, politicians are not adequately educated. Yet, most of them display arrogance and over-confidence. Politicians today have to be very humble and clearly admit how little they know. Politicians have to demand constant help of all citizens. (vii) In the contemporary interdependent world we are all responsible—for everything. Politicians have to be aware of their responsibilities. Large inequalities and unemployment destroy our human capital and are inexcusable—we are all to be blamed, but those in power even more.

Politics is interconnected with all other activities, notably with economy. “While economic institutions are critical for determining whether a country is poor or prosperous, it is politics and political institution that determine what economic institutions a country has.”⁴

Currently, relatively many physicists have received Nobel prizes in economy—more precisely econometrics. The first Nobel in economy was given to Jan Tinbergen, a physicist. Actually, physicists got Nobel prizes in chemistry, medicine, and peace. What is their contribution in economy? What can be their contribution in economy? While physics is simple, at most complicated, economy and politics is complex. This prompted me to send on 14th December 2009 an email to several friends in the World Academy of Art and Science (WAAS) asking “Should economy now undergo a paradigmatic change?” This is called “the crazy idea” in the jargon of the WAAS and several conferences and many workshops were organized, numerous papers written, and a new journal “Cadmus” initiated. The quick and unanimous reply by my friends was: Yes—we need paradigmatic changes in economy and politics. Should it be as physics underwent at the turn of the 19th into 20th century? There is a profound difference between physics in the 19th century and economy and politics today. Physics enjoyed great success: unification of electricity and magnetism and as a bonus got optics, understanding concept of energy, entropy, and statistical mechanics. Naturally, Kelvin said: “There are two minor clouds on the bright sky of physics . . . We know and understand everything.” Economy and politics today are in a far more messy position: crisis, hunger, poverty – half a billion people died due to hunger and poverty during the last 100 years—more than by wars, democide, and natural disasters. There are about 200 sovereign nation states, but several thousand different cultures. There are terrorist groups. Some religions were and are behaving as states displaying similar characteristics as sovereign nation states: tendency to dominate. Nine countries possess nuclear weapons, and many more can use chemical, biological, and cyber weapons in a possible war. Paradigmatic change in politics and economy is absolutely demanded if humanity is to survive. Pope Francis in his *Evangelii Gaudium* stresses (2013) “We should say no to this economy of exclusion and inequality . . . This economy kills!” In 26th September 2015, the UN General Assembly unanimously accepted the declaration “*Transforming our World—Sustainable Development Goals – Agenda 2030*.” It emphasizes the urgent need to significantly reduce hunger and poverty and to save our destruction of both natural and human capitals. Pope Francis was inspired by St. Francis to write his encyclical “*Laudato si*—on care of our common home,” 24th May 2015 specifically concerned with protecting and saving our natural capital.

Five years later, again inspired by St. Francis Pope wrote “*Fratelli tutti*—on fraternity and social friendship,” October 2020. Its first chapter opens with “Dark clouds over the closed world” and in Chapter V Pope explicitly calls for “A better kind of politics”: “154. Development of a global community of fraternity . . . calls for a better kind of politics, truly at the service of common goods.” This is exactly what Aristotle means when he writes “politics is a master science aimed for social good. 162. The biggest issue is employment. 168.

The marketplace by itself cannot resolve every problem. It is necessary to reform the UN and our economic institutions. 172. Some form of world authority regulated by law to provide for the common good, the elimination of hunger and poverty . . . 182. Each one of us is fully a person when we are part of the people, at the same time there are no people without respect for each person. 191. A love capable of welcoming differences . . . Disagreement may give rise to conflicts, but uniformity proves stifling and leads to cultural decay. 194. Politics must make room for a tender love of others." Chapter VII stresses that religions should be at the service of fraternity in the world . . . Never again war! . . . No one is useless and no one is expendable . . . We are made for love.

This last sentence links our creativity, desire to know, our freedom, and our expression of love and need to be loved.

SCIENCE AND FAITH

The questions our curiosity produced and attempts to satisfy our needs developed science. Science is present everywhere. Aristotle considered political science to be the master science. Humans are not only curious but also social, compassionate, empathic, and free, requiring spirituality and politics. Meaningful politics is possible then and only then where there is trust: trust among people and trust in the institutions they have developed. Without trust politics deteriorates into a dangerous activity.

Are science, religion, and politics compatible? Science is divided into basic, applied, and developmental. Inventions, innovations, and technology are linked to science. Spirituality is linked with faith, religion, and church, and politics with governance, policy- and decision-making. Science answers more and more of our questions, but it will never answer all of them. Many are outside the scientific domain. Science progressed when from asking general questions focused on addressing specific questions (Weisskopf).

Barbour defined four categories⁵ of the relationship between science and religion: conflict, independence, dialogue, and integration. Both Gould⁶ and Popper⁷ reject the first option and almost completely agree in their analyses: science and religion are not in conflict. Science and faith are independent and Gould coined the acronym NOMA (non-overlapping magisteria). Conflicts occur only when there is trespassing. An example of trespassing was the speech of Pope Pius XII addressing the Pontifical Academy of Science on 22nd November 1951 and stating that recent scientific results (Big Bang and the expansion of the Universe) prove the existence of God. George Lemaitre, a Belgian priest, later president of the Pontifical, and cosmologist who was among the first to claim that Einstein's theory leads to an expansion rather than to a static Universe, promptly requested a personal meeting with Pius XII. There is no record of what they spoke, but later, addressing an audience of astronomers in Castel Gandolfo on 27th September 1952 Pope Pius XII did not repeat such a statement but emphasized that creative

human spirit may solve all mysteries of nature. Science cannot prove the existence or non-existence of God. This question is outside of science.

Another trespassing was an attempt by Max Born to formulate an equivalent of the uncertainty principle involving freedom and regulation, but could not find an analogue to Planck's constant.⁸ In his Nobel Prize acceptance speech in 1962 Born said:

"I believe that ideas such as absolute certitude, absolute exactness, final truth, etc. are figments of the imagination which should not be admissible in any field of science. On the other hand, any assertion of probability is either right or wrong from the standpoint of the theory on which it is based.

In a letter to M. Fierz, now in CERN Archives, Pauli wrote "Science and religion have to be connected."

Critique of NOMA is described in several books. Pope John Paul II argues that faith and reason are integrated and in his encyclical "Fides et Ratio" (1998) he wrote: "Faith and reason are like two wings on which the human spirit rises to the contemplation of truth." Five years earlier on 8th May 1993 while visiting "The Ettore Majorana Research Center" on the steep cliff on the Western tip of Sicily (it used to be a Phoenician temple to the goddess of love and later on a Franciscan monastery), the Pope John Paul II unveiled the monument with the inscription "Science and Faith Are Both Gifts of God."

Research and development (R&D) are social activities and therefore, however significant their contributions may be, they are limited and of little use without the concomitant socio-economic inputs and appropriate political actions.⁹ Science differs from all other activities in that its practice has no immediate economic value, but may bring more wealth than all other activities combined (J.D. Bernal). For instance: if the vaccine for polio had not been invented, the annual cost in the USA would be 30 billion dollars, lithium treatment of manic depression saves yearly 6 billion dollars, tooth decay rates dropped 60% when fluoride was added to the water supply, and 10 billion dollars a year in dental care was saved in the 1980s.

It is said that governments never allocated so much for R&D. R&D, particularly the centers of excellence with their outstanding researchers and equipments are an expression of the spirit of our time just as cathedrals and Stonehenge expressed the spirits of 8 and 35 centuries ago. Did not the cathedrals and megalithic structure require a much larger fraction of their GDP, than R&D requires today (in a conversation with Erich Vogt, director of TRIUMF)?

The Ancient Chinese philosopher Chuang-Tzu said "How useful is useless?" and Socrates said to Glaucon: "How funny is it that you are afraid to propose useless research?" There are many examples which show the subtle relationship between fundamental research and its application. First, it is impossible to predict if, when, and how this connection will materialize. For instance, Faraday's discovery of electromagnetic induction was immediately recognized by his peers as the essential scientific breakthrough, but neither Faraday nor

his peers foresaw its application for many years. When Prime Minister Goldstone visited Faraday and asked him whether his research could have any application, Faraday replied: "I do not know, but if it does I am sure that either you or your successors will impose taxes on it." Similarly, the discovery of X-rays came from basic, curiosity driven research and today X-rays are essential in several scientific fields and in most medical diagnoses.

A lot of very important scientific results are serendipitous. A good example is the work of Penzias and Wilson who were concerned with making an antenna with noise as low as possible and in the process of working on that found the signal from 380,000 years after the Big Bang: the cosmic background radiation. So, a technical task led to one of the most important fundamental scientific results.

Thomas Jefferson wrote: "Wherever the people are well informed, they can be trusted with their own government." Today's politicians prefer uninformed citizens. Most citizens, including political leaders, are incapable of discerning fact from opinion. Several books were written explaining the war against science. "While the forces of anti-science come from diverse social groups they share a common political end. By undercutting science's legitimacy, anti-scientists cripple peoples' natural capacity to challenge authoritarianism... The founding fathers insisted on making scientific ideals the DNA of our democracy."¹⁰ Scientists are today being attacked by fake news, alternative facts, climate change denial, fossil fuel industries, shrinking government funding, postmodernism, and religion. Peters encourages theologians and religious leaders to ally themselves with scientists in defense of evidence-based judgments in policy-making.¹¹ A Pew Research Center study has shown that public confidence in science and medicine is high and has been high for decades,¹² typically around 40%, while confidence in most other institutions and activities is low, e.g., the press is constantly between 10 and 20%, and it is about 20% in elected officials 22%. Trust in religions is typically high.

In spite of all anti-intellectualism, fake news, appointment of the wrong people to the wrong positions, in spite of aggressive ideology against science, successfully contributing to the achievement of sustainable development goals requires scientific research, creativity, and out-of-the-box thinking and action. Science is the best way to develop our own culture and in addition—since science is universal, international, cumulative, and objective—it links it with

all other cultures and nations. "Science is a self-correcting system. Science is cooperative and at the same time encourages originality, independence, and dissent. It stresses the need for an open mind; time and again the scientists must reverse direction, and they normally do.... This helps the scientists tolerate ambiguity, strive for improvement, and allow for self-correction ... L. Christoferou (to be published).

Knowledge is the dominant political power.¹³ It includes R&D, technology, and spiritual understanding. It is inexhaustible. Knowledge is the most democratic source of power. And science-technology breakthroughs act as equalizers, creating a chance for resetting to zero economic and political advantages accumulated in some centers.¹⁴ Science, politics, and religion are intertwined and have to be compatible. Science and religion, as expressed so well by St. John Paul II are fully compatible. Politics has to be modified: we need a better kind of politics (Pope Francis).

Newton was a devoted believer. He was president of the Royal Society, member of the Parliament and minister of finance and he kept emphasizing that his work in theology is more significant than in physics. Einstein claimed to believe in Spinoza's God. Darwin claimed to be a believer. In the book published by his daughter Hawking claims there is no need for God to explain nature's law. Newton, Darwin, and Hawking are buried in the Westminster Abbey.

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