

## COSMOPOLITICS: WORLD AFFAIRS & OUTER SPACE

Since the dawn of the space age in the middle of the Twentieth Century, our planet is increasingly seen as a single fragile system travelling alone in the vastness of space. Whether it is conceived as Goddess Gaia, Spaceship Earth or Global Village, the world has become an interdependent entity, whose various parts share the same ultimate destiny.

This situation came about by radical scientific discoveries and rapid technical developments which gave human societies unprecedented means of transformation, transportation and communication upon and beyond our planet. As a result, humanity is now creating an artificial network of productive, distributive and consumptive centers which dominate their natural periphery.

As this network becomes more intensified and integrated, it tends to accumulate more power in the hands of human beings than ever before. This power is both constructive and destructive; because not only it can blow up the world instantly in a cataclysmic nuclear war, but degrade nature gradually by its carcinogenic industrial growth.

The number of people and their artifacts is rising to such an extent that it presently threatens to overwhelm its own habitat and imbalance the global ecosystem. The global atmospheric pollution and the ozone layer depletion are only two examples of the plethora of planetary problems which multiply along with people.

It is by now apparent that these destructive trends cannot continue indefinitely without endangering life on Earth. Humanity cannot afford to distance itself any farther from its natural origins, neither can it continue to abuse the natural environment with impunity. The laws of nature which have been flaunted so far will eventually re-impose themselves with a vengeance.

In order for mankind to avoid such a tragic fate brought about by its own *hubris*, we have to accept the primacy of nature and the supremacy of its law. Recent scientific advances as well as ancient philosophical verities emphasize that the only way for humanity to survive and evolve in the long run must be within and as part of its natural milieu.

This redirection of our species does not mean a romantic return to nature, nor an apotheosis of the "noble savage." Rather, it emphasizes a renaissance of the classical spirit of *jus naturale* as the basis of social laws and human actions. It is in this spirit that this first chapter is imbued and its thesis is promulgated.

The intention of this essay is to show how natural law comes first and foremost in reality; as a consequence of which human laws must either reflect it eventually or perish ultimately; something that may come sooner than later, given the accelerated change of social progress. Since this possibility is nowhere more apparent than in our extension towards outer space, we converge on this arena where the clash of human and natural laws may prove to be more amenable to political resolution.

In the following sections, we look at the physical foundations of inclusive natural norms and then at the political implications of exclusive social laws. Since the former contains the latter, legal controls of human actions in space as on earth must emanate from the same ultimate source of global legality and legitimacy. Finally, we conclude with the application of these general principles in the particulars of space policies as they are shaping towards the dawn of the Third Millennium.

## 1. PHYSICS

Since nature is posited as the basis and frame of reality, we begin with an overview of the physical environment which supports and sustains us all. Human consciousness can separate itself from its environment and thus distinguish the dichotomy between the egosphere and the ecosphere. The former consists of every individual and is unique to each human being, whereas the latter is common to all existence on our planet.

Behind the plethora of particular natural phenomena which are familiar to every astute observer, the human mind is forever trying to discover a few general patterns which unite and explain these phenomena in a single holistic framework. The drive for this search is at the root of all science and culminates in General Systems Theory, so it is accepted here as the motive for our thesis.

This section, thereby, outlines the general patterns considered as fundamental to the human conception of nature. So much so, that these regularities are labeled as natural laws of eternal and universal validity. The following presentation, then, describes the three primordial laws of physics upon which rest the entire edifice of human science.

### 1.1. CONSERVATION.

The very notion of law implies that there are such phenomena as continuity, constancy and consistency. All around us, nature presents multiple instances of the same thing throughout space and lasting examples of different things throughout time. This comparability of similarities and differences is possible because a sufficient number of things retain their identity in the spatio-temporal context.

This condition of *stasis* was noted by many people from Parmenides to Newton who attributed it to the essential character of nature. Consequently, it has been formulated as the First Law of physics and covers the conservative tendency of all things.

The Law of Conservation manifests itself in many aspects of reality, one of the most important being that of inertia. This phenomenon reflects the tendency of all things to maintain the state in which they exist. This condition of persistence is recognized by the law of conservation of momentum as the reason for the continuation of all material structures.

Another fundamental manifestation of conservation is that of matter and energy. Material existence requires a continuous transformation of these two substances. But throughout these interactions, the total quantity of both is conserved. These three aspects of the conservation law reflect the most significant constant of nature.

Natural constants are necessary for the maintenance of stable relationships which result in structures. Such relations are indispensable in keeping any group of individuals together in discreet systems. Without these conservative tendencies, reality could not amount to anything more than independent and isolated elementary particles.

The explanation for the durability of natural structures is the existence of fields which envelop all matter and bond it together in different ways. Attractive and repulsive charges are responsible for the unity and diversity of material systems as well as the influence exerted between things. It is this influential field that holds all systems together at a constant relationship in a definite place for an indefinite period.

System maintenance is the natural tendency of all things to preserve their structural identity as long as possible. If this tendency was the only rule in nature then reality would be perfectly static. But, as is clearly evident, this is not the case. Although uniformity and continuity reflect part of nature, they do not do so exclusively. There is obviously another tendency in nature that opposes conservation and contradicts its law.

## 1.2. VARIATION

The other side of nature which counteracts conservation is alteration. This presents us with a diametrically different face of the ever changing nature of things. Although, it may be true that there is nothing new under the sun, it is also true that eventually everything changes and nothing remains exactly the same. To the static aspects of nature, we must therefore add the dynamic ones.

Unlike statics, dynamics follow the variations in all systems and search for the causes and patterns of structural change. Although various changes are easy to observe all around us, it is much more difficult to find out the underlying factors which regulate their occurrence. Assuming, of course, that nature is reasonable and things do not just happen haphazardly.

Since the human mind so far cannot fathom all the reasons for the behavior of things, a lot of phenomena are attributed to chance, rather than to cause. Events are thereby divided into deterministic or random, depending on whether we can perceive some order, rather than chaos in their process. Whether nature is ultimately orderly or chaotic must remain a moot question for now, so we shall accept both causality and fortuity as equivalent explanations for changing reality.

In either case, from Heraclitus to Newton and beyond, people have noted the change in things and tried to explain it in various ways. The classical theory of physics does so by postulating a force behind every change of state. According to natural law, everything remains in a condition of rest or motion, unless some force acts upon it to divert its previous course.

In order to overcome the natural inertia of matter, energy must be applied, thereby forcing a change. This famous Second Law of Mechanics states that the force must be proportional to the mass and the acceleration to which it is to be subjected. Thus, the larger the object and the faster it is required to change, the greater the force which has to be exerted upon it.

It is widely accepted that various forces of nature are responsible for the changes that go on around us. But, because every change requires some expenditure of energy, the total energy potential of the universe gradually deteriorates. This natural process whereby usable energy is converted to useless entropy, is recognized by the well-known Second Law of Thermodynamics and underlies the universal devolution towards ultimate cold death.

This pessimistic conclusion of natural change, however, is too nihilistic to be left unchallenged. Our consciousness is very uncomfortable with such inexorable fate, so it tries to find a more palatable end to justify the human condition. This search leads us to a third aspect of reality.

### 1.3. FLUCTUATION.

The two diametrical extremes of conservation and variation interact in nature to produce a mixture containing some elements of both. At different times and places, this mixture ranges at various combinations between the polar opposites. Thus natural systems and events include apparently contradictory aspects which usually resolve themselves one way or another.

Obviously, the process by which opposites first confront each other and then combine certain of their parts is the famous dialectic. This *thesis-antithesis-synthesis* progression was conceptualized by people from Socrates to Marx; spanning both Western philosophy and Eastern theology. Although some people will disagree, it may thus be accepted as a general law of natural interactions.

As a result of the dialectic, nature exhibits a marked preference for cyclic, or more accurately spiral, processes. The ups and downs of natural rhythms occur throughout the micro-macro range of the space-time continuum. This means that periods of relative immobility alternate with those of rapid change and progressive creation interfaces with retrogressive destruction.

The explanation for this back and forth motion in the pendulum of nature is to be found in the struggle between life and death. As was mentioned already, the destructive tendency of entropy leads the universe towards ultimate death. Meanwhile, however, the evolution of life counteracts entropy and leads this planet at least for some time to higher energy potentials.

Unlike inorganic matter, living beings fight against entropy and build new structures. This creative process is possible through work by exploiting environmental matter and energy. In this way, life increases islands of order in a sea of entropic chaos.

In order to shape matter and raise energy, life requires information as the indispensable ingredient in forming systems. In this sense, organisms may be said to have informative functions in addition to material structures and energetic processes.

Living beings are purposive systems which try to proliferate through space and propagate through time in spite of increasing entropy. Intentionalism should, therefore, be added to determinism and randomism as the final explanatory factor of behavioral phenomena.

The evolution of life on Earth through the ages has finally produced *homo sapiens* whose mental capacities may be considered its crowning achievement. The self-reflective consciousness of the human mind is thought to be our unique characteristic which developed culture and made us the dominant species of this planet. Complementing natural evolution, cultural development raised humanity to its precarious pedestal from where it is now so easy to fall.

At this point, where nature ends and culture begin, natural laws are supplemented by social laws and the determinism of physics is superseded by the voluntarism of politics. But, although culture very often suppresses nature in many areas, it cannot efface it altogether. Whenever and wherever it tries to do so, there follow catastrophic repercussions for both.

As our thesis emphasizes, the confrontation between humanity and reality must be resolved for our own sake, since reality will reassert itself in the end one way or another. The primacy of natural law imposes upon everything and everybody either the necessary respect or the inevitable conformity.

## 2. POLITICS

Primitive peoples were quite cognizant of natural law and operated entirely within it, as the rest of existence still does. Social development, however, promoted culture at the expense of nature; so our species which began merely as social animals became civilized into political actors. This meant that we acquired a tendency to behave in certain ways that were not predetermined by nature.

As humanity became socialized into particular cultures, it suppressed the instinctive drives common to a single species. Different circumstances produced distinct artificial laws which differentiated societies, thus dividing them into tribes and nations scattered all over the world. This development then replaced the natural patterns which applied to them all with cultural specificities that distinguished each one.

This situation did not disturb significantly the natural scheme of things until the Industrial Revolution came along to propel the Western culture above and beyond anything that was done before. As a result, within barely two hundred years, industrial culture grew and spread to such an extent as to threaten everything else in its path. In return, nature is now striking back to remind us that we have strayed too far afield and should pull back before it is too late.

Humanity has come full circle from the old days when our most crucial problems were the struggle for survival against the forces of nature. For most of human history, this natural struggle was replaced by social, political and economic problems. But now, once again, the nature-culture interface looms large in our agenda.

This section shows how natural laws still underlie social systems, in spite of our cultural patina. The laws of conservation, variation and fluctuation operate in their own way behind the particular laws of every society. Let us look at each one to see how it applies to the social systems we have created.

## 2.1. TRADITION.

As any material system, society has a biomass composed of the population of its humans and their livestock plus their artifacts and possessions. This sociomass has a certain inertia which makes the system continue its acquired momentum. This is to say that all societies tend to maintain their *status quo*, unless some force compels them to change it.

This theorem follows directly from the Conservation Law and applies equally from small communities to the global system. In physical terms, when the mass of a society grows beyond a certain point, it becomes almost impossible to move it. Consequently, nomadic societies are very small and always travel light.

Of course, settled societies always have their internal motion, manifested by the movements of their members. These activities, however, cancel each other out, so the net result is zero. Static systems may contain a lot of routine activity which leads them nowhere.

Social statics are best exemplified by the customs and institutions which dominate all societies. Institutional structures and their customary practices always attain an inertia proportional to their mass and duration; so that the bigger and older they are, the more difficult it becomes to change them. As is well known, traditions live long and die hard.

The reason for this phenomenon is that all structures form energy fields which bond their members together and prevent them from flying apart. Institutional bonds are strong and lasting relations within systems, as a result of which societies attain their cohesiveness and resist change. Such conservative tendencies are inherent in all societies and ensure their survival.

The strongest institution of society is the family, which from the nuclear to the extended form functions as its basic producing, reproducing and consuming unit. Developed societies, of course, have built many more institutions with complex intra and inter-connections. The strength of these connections is reflected in the traditions which give every society its ethnic homogeneity, geographical identity and historical continuity.

Based on biological determinants, sociological traditions emphasize law and order, power and security, autonomy and prosperity as indispensable values for the maintenance of any community. Social systems try to attain and accumulate such values and myths in order to maximize their chances for survival. Since social values are scarce and relative, they cannot be maximized all at once; so a collective optimization is the best that may be expected in any case.

Historically, part of this optimization has been due to the threat or use of physical violence; so the existence of some armed force is traditional in all societies. So

much so, that the state itself is defined as being the only social institution with a monopoly of the means of legitimate violence. Consequently, trying to change these traditions would require either large amounts of directed energy and/or long periods of evolving time.

The Technological Revolution which we are undergoing now, however, may provide the necessary trigger for rapid and radical social change. The air and space age, which dawned in this century adding a third dimension to human movement, is such a radical break from the past and requires a great readjustment of traditional cultures. This means the generation and application of much human ingenuity and social power.

## 2.2. REVOLUTION.

The current Technological Revolution has been called the third wave in human macro-history. The first one -Agricultural- transformed primitive nomads to civilized settlers and created empires out of tribes ten thousand years ago. The second one - Industrial- only happened two hundred years ago and created the single modern world out of the many traditional ones.

All these revolutions were triggered by changing circumstances and the various human responses towards them. The advancement of knowledge and the application of science created new expectations and demands which spread to society at large. The effect of these innovations in arts and crafts generated sufficient pressure to overcome the traditional inertia of social systems and force a dramatic change in their culture.

The rapid rate of this change was due to the increased capability of humanity to harness, convert and use large amounts of matter energy and information for its own purposes. This growing capacity to manipulate and utilize natural resources accumulated great potential for work, thus putting more power at the disposal of humanity than ever before.

Whereas the first revolution took millions of years, the second took only thousands and the third merely hundreds. This logarithmic progression shows the acceleration of history resulting from the activation of society beyond anything experienced before. Of course, in addition to these momentous upheavals, there have been many lesser economic, political and cultural revolutions; thus replacing the slow advance of natural evolution by the fast progress of artificial development.

Such development raised the potential of social systems at the expense of their physical environment by increasing the rate of ecological entropy. The pollution of our planet and depletion of its resources was the inevitable result of heavy industrialization whose excessive productivity could only be bought at the high price of natural degradation. Accordingly, the capacity of humanity to destroy as well as to create was increased by several magnitudes.

Even faster than this centennial economic development was the decennial explosive growth in military weapons of mass destruction. By the time the Atomic Age combined with the Space Age in the middle of this century, our destructive potential reached its ultimate level of suicidal genocide, thus threatening the very existence of the human species.

This critical situation has come about by the differential rates of technological and sociological change. Since the former is much faster than the latter, there is a dangerous gap between what man can and may do. The increase of human science and power has outpaced the evolution of social wisdom and morality to the extent that it has now taken a life and momentum of its own, almost beyond our understanding and control.

The revolutionary dynamic of modern history may be explained by the alternating cycles and epicycles produced by the laws of conservation and variation. Long periods of static tradition are broken periodically by short periods of dynamic upheaval. These succeeding waves of calm and storm, like those of war and peace, have repeated each other in increasing frequency and amplitude, thus threatening to explode in a final orgy of violence and death.

Whether this happens or not will depend on various deterministic and random factors beyond our control. If history repeats itself, nuclear wars are bound to happen by design or accident, sooner or later; especially when the combative arena is extended towards the outer space theater of Star Wars. It is only the conscious intervention of the third factor involving human will that may deflect the momentum of history from its destructive course.

### 2.3. RESOLUTION.

Since the duality of reality reflected in natural statics and dynamics has its equivalence in social traditions and revolutions; the interplay of the opposing sides of this dichotomy alternates eternal and ephemeral phenomena, thus combining constancy and variety in both nature and culture. The combination of these polarities, however, is not simply linear. Rather, it follows the complex process of dialectics by which contradictions are resolved through a combination of their components. Natural selection here spills over into human affairs, so that social history flows in parallel with physical evolution.

The process of an eclectic dialectic in society is performed by human volition, as well as by natural evolution and random chaos. The development of the self-reflective mind supplemented the impersonality of nature with the intentionality of mankind. This unique human factor adds consciousness to the dialectic and hence attributes it with motive and purpose.

The distinct identity and consciousness of every person creates different opinions and interests among them. These differences mean that to each position there is an opposition whose contact produces friction and conflict. To resolve their interpersonal contradictions, people use various methods, the most significant of which are either physical violence or political acumen.

The difference between physics and politics is similar to that between nature and culture. In this context, politics may be defined as a social activity of dialectic resolution. The pure political act then involves a dialogue to accommodate conflicts of interest or differences of opinion.

This diplomatic consensus-building process is based on the principle of morality according to which ethical conduct is characterized by due consideration of others. Moral decision-making takes into account through consultation those who could be affected by its consequences. In this sense, unilateral policies or activities are unethical and should be avoided.

This principle is valid both in individual and collective interactions, so either in persons or nations, morality consists in communicating intentions and compromising interests so as to accommodate the views of all concerned. This in effect is the goal of ethics and politics alike, making the two activities the essence of social dialectics.

In the world stage, where morality and polity are most tenuous, interstate affairs are still conducted on the basis of national interest, assigning the common good of mankind a rather low priority. But as global interdependence increases, so do its common interests; thus raising the planetary society up to the level of a panhuman community.

This uplifting progress has to resolve the contradictions between natural and national laws by the dialectical synthesis of their common human denominator. Since mankind is both a natural and social animal, it partakes in the laws of both physics and politics: a duality that reflects our basic dilemma, as well as our major advantage. What we propose next is that by developing the latter we could solve the former.

### 3. CYBERNETICS

As the science of government and control, cybernetics has made great advances in recent times. These advances, however, are rather theoretical and can only be imperfectly applied in practice. It seems that both physical and political reality incorporate a chaotic element which makes them only partly knowable or controllable.

Heisenberg's Principle and Godel's Theorem reflect this innate characteristic of systemic resistance to absolute comprehension and determination. Empirical uncertainty and intellectual finality thus impose unsurpassable limits to manipulating and understanding both internal and external reality.

Nevertheless, since it is not known where these limits are, we do not know if we have reached them; so we must keep on trying to increase knowledge and improve control, even incrementally. In this endeavor, what we do know is that the world is becoming a closely interrelated and interacting social system whose extensive exploitation of the natural environment has brought us to such an untenable position that something must be done presently to reverse its direction and correct the situation.

This section discusses the crucial areas of human concern as they pertain to the legal aspects of outer space affairs. Based on our theory Sociophysics, we envisage the convergence of natural and social laws as the best, if not the only, way to emerge from our deepening predicament. Accordingly, we consider problems of regulation; distribution and protection as they could be integrated in the social policies of global scale.

### 3.1. REGULATION.

Since the natural law of conservation applies to society by the inertia of its traditions and the strength of its institutions, the structures and functions of all systems exhibit distinctly conservative tendencies in the constancy of their relations and the continuity of their processes. These systemic parameters give nature and culture the indispensable permanence and stability which characterize them.

Such open and dynamic systems, however, cannot maintain long-range stability by petrified structures and rigid routines. Even the static aspects of these systems must be flexible enough to allow for adjustments in their performance in order to respond to environmental disturbances. This means that an elastic equilibrium, rather than a frozen immobility, is the absolute requirement for the survival of any living system.

The social homeostasis described here can either be left to the random behavior of economic forces or attempted by the cybernetic control of political institutions. In simple or primitive communities, the first option may be good enough; but in complex societies, such as the contemporary world, some intentional intervention by central governing mechanisms is both necessary and desirable, as well as unavoidable.

Of course, this does not mean that the above alternatives are mutually exclusive. Most likely, any real situation is a mixture of both in various degrees. The human hubris of omnipotence and omniscience must therefore be avoided by admitting the impossibility of absolute or totalitarian control of complex systems. Social cybernetics should never fall into the delusion of political power, but only aspire to a conscious and cautious regulation of society.

This conclusion is unavoidable, given the increasing problems which the global system is facing at the end of the Twentieth Century. The impact of thoughtless social activities upon the environment have produced extensive land, water and air pollution as well as depletion that threaten critical climatic changes which will adversely affect the health and welfare of human beings everywhere. Even in space: the pristine environment of the past, material pollution and ozone depletion are now reaching such dangerous levels that only consistent and concerted global action can reverse the situation.

If the international regions of the planet (polar lands, high seas, outer space) are to avoid the fateful "tragedy of the commons," a new balance must be established between natural cycles and social actions. This would require that humanity draw a "natural contract" with Gaia that will encode the sustainable rules of our global game. In other words, a nomosphere must be added to the sociosphere and ecosphere to bring human activities into line with the exigencies of natural laws.

Human rights can only be enforced along with equivalent human duties towards the natural order of things. Obviously, our demands upon nature cannot exceed its absorptive capacity. Global conservation measures must therefore be devised to protect our habitat and prolong its existence.

These measures would have to combine public and private initiatives on a world scale, because local state sovereignty is no longer adequate to guarantee an effective

global environmental policy. The territoriality of inter-national governments overlaps and cross-cuts the functionality of trans-national corporations, thus necessitating the cooperation and coordination of both public and private bodies in this difficult task.

More particularly, a new earth-space order -NESO- has to be worked out between governments and corporations under the aegis of the United Nations to regulate the exploration and exploitation of the spatial environment in conjunction with the earthly one. In this way, public and private international law can be developed in parallel to promote a more harmonious and continuous coexistence between nature and culture.

### 3.2. DISTRIBUTION.

Man's symbiotic relationship with nature is a crucial one for the survival of the species, so it must be improved as soon and as long as possible. The environmental problems caused by humanity, however, critical as they may be, are not as immediate and impassioned as the social suffering caused by man's inhumanity to man. Human relations still provide the most controversial and contradictory issues in the world, so they must be dealt with in tandem.

Foremost among public issues is the problem of equitable distribution of natural resources and social wealth. This perennial problem of distributive justice has haunted the best minds of humanity since the beginning of history and still eludes us. As the widening gap between the rich and poor countries testifies, the global system is more divided than ever on how to share its scarce values.

Of course, inequality is a fact of life and is reflected in the natural law of variation whose dynamics keep upsetting the efforts of entropy to equalize everything at their lowest common denominator. As we have seen, it is only the unequal distribution of matter, energy and information that allows evolution to counter the entropic tendencies of nature. So, trying to increase equality beyond a certain point would be equivalent to hastening our inevitable death.

Equality, however, must not be equated to equity. On the contrary, forced equality invariably results in inequity. Natural justice admits of functional inequalities and so must social justice accept economic discrepancies, so long as they are within the operational limits of systemic dynamics. Present dysfunctions throughout the world are warnings that we have overshot these limits.

Unlike equality, equity is not a quantitative concept, but the feeling of a proper balance between contributions and distributions to the public wealth. This common sense of fairness balks at abject poverty in the midst of plenty and punishment of the innocent for the sins of the guilty. For that reason, the present maldistribution of material wealth is globally admitted to be unjust because its extremities threaten the natural equilibrium of the planet.

Part of this problem is determined by the maldistribution of natural resources which different social systems inherited from their environments. Another part stems from random factors which arose from the conjuncture of events favoring some and

disadvantaging others. Only the third reason: i.e. policy, falls within human responsibility and accountability.

Since natural equity favors the optimal balance, not only for the preservation but also for the evolution of a species within its habitat; social morality behooves us to control the excessive growth of some, so that others get a chance to develop as well. On that basis of enlightened egoism, human ethics must take into consideration all those who will be affected by one's policies or actions.

These general principles can more easily be applied to the international areas of the planet which are accepted as the "common heritage of mankind." As in the case of the Law of the Sea, the natural resources of space (positional, potential, informational) do not belong to any particular group that happened to get there first, but are merely held in trust for the benefit of all and particularly of the most needy. Only in this way can the requisite variety of the world system be assured and with it the optimization of its development

What is required to effect such redistribution of the commonwealth is a global social contract to complement the renewed natural contract mentioned above. Supplementing the equilibrium between humanity and nature should be the equivalent balance of producing and consuming among human beings. Since the exploitation of these resources demands the investment of long time and great effort, larger cooperation is unavoidable; thus making the incentive for better distribution easier to implement.

### 3.3. PROTECTION.

The major obstacle against world-wide cooperation is the excessive attachment of people to their parochial institutions and historical traditions. The strength of this attachment is due to the innate insecurity of all living beings facing a hostile environment and banding together to protect themselves against various perceived threats.

By doing so, however, individuals have to curtail their freedom of unilateral action and submit to a collective will. In any case, individual freedom is akin to random behavior, so it is incompatible with systemic order. Social law, thus requires some curtailment of personal freedom in exchange for peace and security.

This exchange, however, is often lopsided and the price paid for it quite high, so groups are always bargaining for the right terms of trade under particular circumstances. More frequently, circumstances beyond our control dictate the terms which most people have to live with and chaotic events fluctuate among various dominant values at different times and places.

In order to avoid the vagaries of nature and the whims of culture, nations and states create military establishments and build armed forces for self-protection. But since to every action there is a reaction, one group's security is another group's threat and what one side considers as legitimate defense, the opposite side perceives as unacceptable offense. As a result, there arise the vicious cycles of arms races and military dictatorships which often escalate into domestic oppression and foreign war.

The paradox of this situation is that the efforts for absolute security result in greater insecurity, as the obsessive search for liberty begets slavery. This fundamental contradiction of social life is a reflection of the natural impossibility of maximizing all human values at the same time. Going against this principle not only results in diminishing returns but also in reaping a whirlwind of reactions.

The relativity of values, including the means of attaining them through power, makes for a zero-sum game, where the gains of one can only be paid by the losses of another. Given these constraints, a global balance of power seems to be the best strategy for the world in the long run. Only such balance can promote the optimal mixture of all value ingredients among all the players in the world's stage.

The application of these principles in international affairs means that states, like individuals, must see themselves as others see them; thereby curtailing their behavioral independence for the sake of collective security, at the same time as they learn to live with some insecurity and uncertainty. This situation applies on earth as it does in space where searching for the Holy Grail of foolproof defense mechanisms may unleash dreaded star wars.

It should be realized by now that national defense cannot be guaranteed by arms alone. The broader concepts of social security and human liberty require an optimal combination of civilian and military means, minimizing threats and maximizing rewards as an incentive to peace. The space environment should therefore be further demilitarized and privatized, while at the same time remaining under an overall control of the collective organs of humanity: i.e. the UN System.

Since space is the latest arena of human activity, it has not yet acquired as much inertia of vested interests as the other worldly environments of land and sea. For that reason alone, it is more amenable to global radical initiatives. In this as in other respects, natural law favors the "golden mean" between conflict and harmony, so social legislation can also aim to avoid extremes of mass violence and sclerotic security as of peaceful stagnation and licentious anomy.

In this task of dialectical compromise, no way offers fewer risks and greater prospects than politics. It is through political diplomacy that conflict resolution can best be attained by the eclectic synthesis of the various opposing interests or clashing opinions in the world. Using both cooperative and competitive means, politics aims at consensus with equanimity: which is something that, given human imperfection, cannot be surpassed.

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In this essay, we have now completed a grand *tour d'horizon*, encompassing both the natural and social highlights of spatial and terrestrial jurisprudence. The brevity of the presentation did not allow the elaboration of these general principles in the particular case of space affairs; but this will have to be done in other interdisciplinary studies.

What is emphasized here is that these principles are based on the classical dogmas of natural law as well as the recent discoveries of natural science, which are now converging into a single cosmology. A comparison of the theories of Relativity, Quantum and Chaos indicates a close proximity for the general patterns of the natural and social sciences from which scholars of all disciplines could benefit.

With the integration of space in world affairs at the turn of the millennium, the expansion of the planetary frontier has been completed and the Earth is fast becoming a global village. It is about time then that the fragmentation of knowledge is reversed and the various scientific fields are reintegrated within the same corpus of human epistemology.

Began as a creature of nature, humanity has strayed from its common origins to create its own distinct cultures, which often opposed and violated their natural roots. As a result we acquired a split personality whose two sides contradicted and conflicted with each other. After accumulating for a long time, these discrepancies have now come to the fore with a vengeance and threaten to destroy our civilization.

In order to resolve the complex problems, sociophysics emphasizes a dialectical synthesis of the natural thesis and the cultural antithesis which dominated human societies at different times and places. By utilizing a system unification model, sociophysics combines the fundamental principles of the natural and social sciences into general rules of human action.

This article was a brief outline of the salient points of this theory as they could be applied in space affairs. We conclude by summarizing the main argument by presenting it as a triangular relationship among physics, politics and cybernetics. These aspects of our discourse correspond to the concentric spheres mentioned at the beginning, so they model the same reality from a different perspective. From it, we can see the connections between the major *foci* of natural and social concerns, as well as the *loci* of their communication channels which form continuous cyclic loops.

Depending on where one chooses to begin this journey, influence flows along the arrows which connect natural facts with human acts and *vice versa*. The fundamental laws of physics: conservation, variation and fluctuation are reflected in the social patterns of tradition, revolution and resolution, both of which converge in the legal controls of regulation, distribution and protection.

Accordingly, the conservative tendencies of natural and social systems maintain a balance of forces that ensure the stability of a situation. In order to overcome the inertia of a given *status quo*, some superior force must upset its balance of power. However, if the system is not to be destroyed altogether, another equilibrium will have to be re-established at a different level.

As long as some people are willing and able to apply the required force, social change will continue in human history. For such change to succeed in complex systems, however, great care must be taken to control the process and not allow it to slide into extreme positions where chaotic events are more likely to create unexpected and unwanted byproducts.

Of course, the bounds of human creativity are unimaginable, so we cannot know how far it is possible or desirable to go. But, since the survival of our fragile world is at stake, one cannot morally attempt social experiments of high risk, no matter how laudable the goal. In this case, political legitimacy is the most prudent method of bringing about social change on a global scale in the long run.

It is the conclusion of this study that the ultimate criteria for such change can only stem from and be bounded by natural laws. Upon them should be based human legislation which tries to maintain the natural equilibrium while promoting social equity and equanimity. In this respect, law-making on space issues can lead the way in rediscovering the principles of natural law in the third millennium.

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