

# Chaos Theory, Society and Law: A New Paradigm

---

**Sai Venkatesh Balasubramanian**

Sree Sai Vidhya Mandhir, Mallasandra, Bengaluru-560109, Karnataka, India

saivenkateshbalasubramanian@gmail.com

## Abstract:

**The present work presents an insight into how complexity, chaos and nonlinear dynamics play a crucial role in determining the co-evolution of the society-and-law system. The paradigm shift obtained from a reductionist dominant to a holistic dynamical systems approach entails reversing a “reductionist funnel” to ensure better balance and coordination among the freedom, rights and regulations attractors, driving socio-legal principles in the context of human free will. Also, the significance of freedom-right-regulation balance in socio-legal design in the context of various Indian philosophy schools are understood.**

## Introduction:

It is well-known that Chaos theory, as a part of complexity theory, and nonlinear dynamics has deep underpinnings in the understanding of the most fundamental aspects of the universe [1]. It is then but natural to ask, should the rules, laws and regulations by which we live, and would the evolution and co-evolution of such regulations along with man, be somehow influenced, or driven by nonlinear principles?

If the philosophy of relativity theory has taught us something, it is that when systems coexist with each other, talking in absolute terms doesn't make sense anymore. All principles, actions, measurements and descriptions of one of the sub-systems must be made relative to all other sub-systems. Nonlinear principles have further strengthened this concept of “interconnectedness” over space and time, which leads systems to be extremely sensitive to initial conditions.

It is in this perspective that the evolution of laws and regulations in a society are viewed. Law does not lead the society; Society does not dictate laws. Both systems coevolve and are interconnected to each other very intricately. Thus, an understanding and introduction of a new paradigm into the law-society duet based on nonlinear principles helps to move away from “legal reductionism” and better understand the process of framing of rules and their implications. Such an understanding would correspond to an application of qualitative, rather than quantitative nonlinear analysis in law.

## Complexity Theory and the Law-and-Society System:

Perhaps the most extensive work in literature pioneering and detailing this perspective is by Ruhl, and this section heavily borrows, nay, reviews and summarizes the paradigm shifting perspectives put forth therein [2]. Consequently, the terms utilized here such as “Congress” are to be taken as in US legal parlance.

We start with the knowledge that the behavior and trajectory of dynamical systems, when explained using the phase portraits, fall under three main categories of fixed point, limit cycle and attractors, of which the last one alone is complex, chaotic, telling and of interest in this context.

The principle of sensitive dependence on initial conditions holds true even for a law-and-society system. As an example, it is noted regarding the existence of the Environmental Protection Agency (EPA) in the USA that if the Supreme Court had started with a different view of the nondelegation doctrine, limiting Congress's authority to assign legislative decision making power to administrative agencies, EPA would not be what it is today.

A possible analogy for understanding nonlinear behavior in the socio-legal context would map the phase space to the full socio-legal dimension, with laws and morals/ethics acting as rules of motions, and the starting instant of beginning to examine the effect of a new rule of motion on the system forms the initial condition. The analogy is complicated, first by the ability of humans to exercise free will and second, by the law-and-society system's coevolving environment, where death and natural disasters can disrupt a system not able to adapt itself.

The complicating factor of free will is seen as the parameter for defining the system's law attractors. This is understood by detailed examination of a case in environmental law, namely *Lucas v. South Carolina Coastal Council*, 1992. The case resulted in the court explaining the scope of the Fifth Amendment's prohibition against governmental taking of private property without just compensation. The Court's cases evolves toward the doctrine that land use regulation constitutes a taking when it "does not substantially advance legitimate state interests or denies an owner economically viable use of his land."

What happens when regulation denies a property owner all economically viable use of the property? In such a case, as per the Court, the government "may resist compensation only if the logically antecedent inquiry into the nature of the owner's estate shows that the proscribed use interests were not part of his title to begin with."

But, this raises an even more important question: what uses did the property owner have available to it as part of the title prior to introduction of the regulation in issue, so that the effect of the regulation can be measured? According to the court, "A law or decree with such an effect must, in other words, do no more than duplicate the result that could have been achieved in the courts-by adjacent landowners (or other uniquely affected persons) under the State's law of private nuisance, or by the State under its complementary power to abate nuisances that affect the public generally, or otherwise."

Lucas is an example for defining the three attractors among which laws travel with respect to the free will in the context of private land use decisions:

- a. Freedoms, represented by the property owner's Fifth Amendment protections against social interference in individual land use choices;
- b. Rights, represented by the rights of nuisance recovery that adjacent property owners or the state may have against some uses of land;
- c. Regulations, represented by the direct governmental restriction of land uses.

The description of the court ruling is complicated and impossible to reduce to a rule of general application for the present or future.

Considering the possible values that law could have taken to balance the three factors, the freedoms to use property as one wishes are limited by the rights others have to recover in nuisance and the ability of the government to duplicate the effect of those rights through direct regulations.

The case of Lucas denotes a point in the law-and-society system's phase space where regulatory takings law has moved. All the cases prior are points along a trajectory bending and twisting around the freedoms, rights, and regulations leading to Lucas. Two centuries ago, the notion of land use regulation did not exist and freedom was the dominant attractor.

Subsequently, Nuisance law grew as a land use control, particularly in environmental pollution control, and during this period, the trajectory moved away from the freedom attractor toward the rights attractor.

The Court's tacit restriction of the takings clause to physical invasions opened the door to regulatory approaches to land use control, and nuisance law no longer was perceived as able to address pollution, with direct regulation then filling the gap.

However, during Lucas, the system began curving away from the regulations attractor. In recent times, Property rights bills, are passing in state legislatures, seeking land use freedom- a curving back towards the freedoms attractor. Evidence of curving away from regulations attractors is everywhere in environmental law. Environmental justice proponents seek rights-based outcomes, rather than regulations as the solution.

Similar to the discussion above, any example of law-and-society involving free will can be seen as a point on a trajectory that meanders among the attractors of freedoms, rights, and regulations.

Freedom here is the ability to act without restriction in accord with subjective free will. Right is the society enabled ability, of one person to constrain another's freedom in the absence of direct governmental intervention. A regulation is society's direct intervention with respect to exercise of a freedom, regardless of any individual's rights. Some legal approaches however resemble a hybrid between two or more of the three attractors, such as citizen suit provisions of environmental laws allowing private suit to challenge regulatory violations.

The next challenge is predicting where the trajectory curved away from regulations is headed in terms of the balance between freedoms, rights, and regulations. In typical chaotic systems, because of an incomplete understanding of the initial conditions, we might never achieve complete predictability. This is a very real challenge for the physical and social sciences.

It is imperative to examine the experience of chaos in the law-and-society system model, to appreciate their value to legal theory and to assist in framing the goals of the system.

As an example of chaos induced drastic shifts in law, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), represented a catastrophe shift, compared to the incremental additions of regulatory pollution control statutes prior to this law. The perception that this trajectory was not adequate to the problem of abandoned waste sites led Congress to adopt CERCLA, introducing strict, retroactive, unforgiving liability across a vast universe of regulated entities.

Chaos also manifests in environmental law in many examples in which simple rules for exercising administrative authorities results in highly complicated, random-looking results. As an example, when Congress defined 'solid waste' in the Resource Conservation and Recovery Act as "discarded material", the EPA has taken two pages of the Code of Federal Regulations, scores of pages of the Federal Register, and hundreds of pages of internal agency guidances to define the term.

The dynamics of the law-and-society system plays truant with the narrowly targeted environmental regulation efforts. There exist scores of federal environmental laws to obey and a host of agencies addressing discrete issues in conflicting manners. Is a law-and-society system that requires adding one statutory component after another, ad infinitum, to combat one emergent behavior pattern after another, desirable?

The best one can hope is to gain some control over how frequently and intensively these behaviors occur, and to harness their positive effects on a system-wide basis.

Key factors enabling systems to survive and sustain the transformations and catastrophes brought about by chaos are Stability, Adaptability and Simplicity. According to Dynamical systems perspective, it is important first, to focus on system mechanisms serving as "release valves." Second, it is necessary to look at simplifying system dynamics, rather than just the system rules. Finally, we turn our focus on promoting adaptability targeting lower-level system dynamics. In essence, legal reform directed at increasing adaptability must focus on working with the complete law-and-society system as a whole.

It is a known fact that the closer a dynamical system gets toward the chaotic state without "falling in," the more adaptable it is to surprises produced by chaos.

While strange attractors, possessing memory, are necessary for system adaptation, fixed point and limit cycle attractors, enable system-wide stability and simplicity. When the coupling, among system components is sufficient to allow these three types of attractors to blend, optimal system adaptability is achieved. Too many limit cycle or fixed point attractors drag the system into stasis. Too many strange attractors drag the system into chaos. The paradox of dynamical systems is that "equilibrium" in the sense of stasis and linearity is not sustainable in dynamical systems. Thus, a sustainable dynamical system, because of inherent chaos, is unpredictable.

Classical legal theory and institutions are based on the reductionist tenet that through finer decompositions of the system we can discover the system's governing principles. Reductionism historically had been a very powerful tool in science. But how much can we learn about snow, avalanches or snowflake structures by studying an individual snowflake?

The fixation of legal theorists on predictable static outcomes has led to a way of thinking resembling classical scientific reductionism. A common thread of reductionism is seen in the four major American legal theory movements-legal formalism, legal realism, law and economics, and Critical Legal Studies.

In contrast, the autopoietic law theory is based on two premises: First, Changes in the body of law are manifestations of reflexive, self-generative evolution taking place within a closed legal organism, a subset of the open social system. Second, Such a closed legal system interacts dynamically with other closed social subset systems within the open social system. Thus, "law (and only law) defines what is and what is not law, and every law must participate in defining what is and is not law."

The convergence of autopoietic law theory and complexity theory raises the issue of what the "whole" organism means. Autopoietic law theory is in a way focused on separating law from society. Nonlinear thinking alone too is not enough for the way out of the mess- "Legal theory must abandon the reductionist premise if it is to comprehend the dynamical qualities of the law-and-society system."

An appreciation of the dynamical system model entails knowing that the system can be changed, but whether for better or worse is not directly apparent. The lesson of dynamical systems for law reform, is that the system matters as much as the rules, and we cannot effectively change only one variable of that equation, i.e. *Ceteris paribus* doesn't exist.

Drastic changes to the system, for instance replacing an appointed federal judiciary with an elected judiciary, carry high unpredictability.

The "Reductionist Funnel" operates on the basis that administrative regulations are used as our first resort means for dealing with socio-legal issues, and that Congress or court will not target administrative outcomes frequently, and that common law operates on the fringes where regulation has not reached.

Ruhl's suggestion of reversing this hierarchy requires several shifts in emphasis, and the Consequence would be a redirection away from the regulations attractor toward a balance between freedoms, rights, and regulations. This plan has three components. First, common-law and rights-based solutions are to be the first resort means for managing freedoms. Second, if regulations are essential, require that Congress provide as much substantive decision making and information as possible. Third, wherever discretion is required to allow administrative agencies to act in limited capacity, minimize the amount of required judicial and legislative deference to the agency outcomes.

Common law "mirrors the variety of human experience; it offers an honest reflection of the complexities and perplexities of life itself." In essence, the rights-based attractor of our law-and-society system is adaptive, and the best approach to keeping us there is common law. The common law changes slowly and incrementally and is thus less prone to catastrophe. Also, it is structurally more coupled than administrative state, since it takes issues wholly as they come, and decides in context. Moreover, common law operates at the component interaction level. Hence, a system that relies on common law as a preferred approach returns some proportionality to the balance between freedoms, rights, and regulations.

However, common law does not provide complete answers to all socio-legal agenda. The current model thus proposes more energetic enforcement of the nondelegation doctrine as a means of reversing the trend. The point is not to make Congress run the entire government, but to have Congress make the decisions necessary so that day-to-day functions of government can be run by Congress's delegates. The Congress is an elected body, and thus reflects the evolving social agenda the same way the common law mirrors social phenomena. However, agencies are supertanker bureaucracies that can plow far off course before society can steer back. Thus, Congress is more dynamically in tune with the law-and-society system than any modern agency.

To expect Congress to make all the regulatory decisions necessary, too would be impractical. Where necessary to expand administrative functions, it is indeed unwise to elevate agency's decision beyond the courts and Congress. To reverse this, it is necessary to first modify the Standards of Review, adopting a less deferential standard of judicial review than the "substantial evidence" and "arbitrary and capricious" standards. Convincingly articulating the factors on which decisions are based would keep agencies in tune with the broad socio-legal agenda. Second, the Chevron doctrine of judicially self-imposed deference to administrative interpretations for "ambiguous" legislative directions should be reversed. Third, the proposal necessitates reversing the Chadha doctrine's prohibition of the legislative veto mechanism, allowing Congress to police agency action more directly.

In summary, the above discussion gives an insight into how complexity, chaos and nonlinear dynamics play a crucial role in determining the co-evolution of the society-and-law system. The paradigm shift obtained from a reductionist dominant to a holistic dynamical systems approach entails reversing the reductionist funnel to ensure better balance and coordination among the freedom, rights and regulations attractors, driving socio-legal principles in the context of human free will.

A logical next step is then to formulate methods and in some capacity, measures to understand, preferably quantitatively, where the trajectory of socio-legal system is headed, given the context of a law or moral value in a certain case.

However, the chaos and complexity offering sustainability, brings with it, a certain degree of unpredictability, and this is the inevitable law of nature. While on the one hand, responsibility lies on the lawmakers to formulate laws keeping these factors and the freedom-rights-regulations balance in mind, onus is on various elements of society to periodically check and give slight nudges to the trajectory of the socio-legal system towards the balance between these three attractors.

### **Discussion and Conclusion:**

The above discussions also herald a transformation of socio-legal system – a maturity of sorts, for law. It is thus useful to look at some of the older civilizations in the world, and how they have dealt with society-law evolution. In this context, we turn towards the Indian Philosophical system, where law, as Nyaaya is seen as one of the six Darshanas.

The implications of such an investigation will be in understanding how ancient India was a haven for all religions and faiths and an epitome of peace contrary to today's world dominated by terrorism, which atleast in some part is motivated by the attention seeking need to show off one's might and power, and intolerance of other faiths and beliefs manifesting as fanaticism.

Schools of Philosophies, called Darshanas are broadly divided into Astika and Nastika schools, where the former, containing Nyaaya among other types, accepts the authority of the Vedas, while the latter reject it. What this means is that Vedas, which are accumulation of spiritual experiences of higher levels of consciousness, are revered by Astika, which understands and acknowledges that levels higher than our physical existence do exist, and respects the views of forefathers who have been there. Thus Astika corresponds to Poornatva – a picture of completeness, including all levels of consciousness, while Nastika advocates Shoonyatva – a picture of emptiness, going so far as to say even the current physical experience is but a mirage, fueled by desire.

The following briefly describes the 6 Astika schools, in the context of society-law evolution and philosophy, in the order conventionally listed.

1. Sankhya: Branded as dualist and at times atheist, the primary focus here is on consciousness, as distinct from matter, and is a rationalist exposition on “groups” of entities such as Tattvas, and on dualities such as Purusha-Prakriti. Thus, Sankhya is at best, a wonderful classification system useful in science for constructing periodic tables, elemental groupings and so on.
2. Yoga: Apart from the “physical fitness program” as the modern Western world sees it, Yoga, while centering on dualism, focuses on spiritual practice as well, with the primary goal of aligning physical, mental, emotional and spiritual aspects of the self. This is achieved in one of four ways: Action (Karma Yoga), Knowledge and Wisdom (Jnana Yoga), Devotion to the Absolute (Bhakti Yoga) and Energy-level perspectives and activities (Kriya Yoga). Epistemically, Yoga derives from perception, inference and testimony, similar to Sankhya.

Philosophically, Yoga entails contemplation, meditation and liberation, as activities or exercises essential to achieve Yuktam, or Union. Thus, Yoga essentially builds upon the various classifications exposed by Sankhya and achieves their alignment and Union.

3. Nyaaya: Shifting from dualism, Nyaaya, almost always given as the Sanskrit equivalent of “Law”, centres on realism, logic and is thus a system of analytical philosophy. Based on four Pramanas - perception, inference, analogy and testimony, Nyaaya contends that human suffering results from defects produced by activity under wrong knowledge, which must be corrected to achieve liberation, or Moksha. Correct knowledge is discovering and overcoming one's delusions, and understanding true nature of soul, self and reality. Thus, Nyaaya, in contrast with erstwhile reductionist law practices, asserts only a quarter fraction importance to testimony of past or reliable experts. It thus makes itself foolproof to chances of human error, and thus the catastrophes induced by small variations in initial conditions, by paying crucial attention to perception and inferences of the situation at hand. Also, since it pays attention to correctness of knowledge, Nyaaya necessitates sessions of open debates and discussions to settle differences of opinion. Such a perspective of knowledge is absolutely necessary to remove unwanted ‘evils’ such as intolerance and fanaticism. The “reverse funnel” discussion earlier, by giving equal importance to freedom and rights as to regulations, thus corresponds to this perspective.
4. Vaiseshika: While Nyaaya focuses on correctness of knowledge, Vaiseshika understands that there is a certain limit to human capabilities of investigation and that theoretical reasonings and conclusions are not complete without verifications and validations. Thus, Vaiseshika takes the principle of realism to a new level by centring on empiricism. In such context, the system accepts only two reliable means to knowledge - perception and inference. This is because, analogy might not work in areas of focus in Vaiseshika, which mainly concerns with atomism - the indivisibly small, and how such units build up to form bigger one. Also, since atomism is an area where due to frontiers of human capability, numerous theories exist without definite validations, the concept of testimony does not find relevance. Knowledge and liberation is achievable by complete understanding of the world of experience, according to Vaiseshika.
5. Mimamsa: While the earlier disciplines started with science and moved slowly towards knowledge in general, Mimamsa concerns with the social aspects, such as orthopraxy – ethics, also concerning with exegesis – criticism and philology. The school is known for its theories on the nature of Dharma, based on Vedic hermeneutics. Epistemically, knowledge is gained by perception, inference, analogy, postulation, testimony and negative/cognitive proof. Mimamsa holds that the soul is an eternal and active spiritual essence, and focusses on the metaphysics of dharma, as in rituals and social duties. It considers the purpose and power of language as to clearly prescribe the proper, correct and the right.
6. Vedanta: Translated literally as the “end of knowledge”, over time Vedanta became the most prominent of the Astika schools. The Vedanta relies for its source, three canonical texts – Upanishads, Brahma Sutras and the Bhagavad Gita, the last one known for its syncretism of Samkhya, Yoga, and Upanishadic thought. Traditional Vedanta considers scriptural evidence, as the most authentic means of knowledge, while perception and inference are considered to be subordinate. Vedanta rejects ritual in favor of renunciation, which makes Vedanta irreconcilable with Mimamsa. In Vedanta, Actions are subordinate to knowledge or devotion and are useful only for preparing the mind for knowledge or devotion.

From the above listing, it is easy to see where Law, as a branch of knowledge falls, in the context of philosophy, and how it is related to other lines of thoughts both in view of epistemology and basic

premises for acceptance and processing of information. Also, the significance of freedom-right-regulation balance in socio-legal design in the context of these philosophy schools are understood.

**References:**

[1] Scott, Alwyn C. The nonlinear universe: chaos, emergence, life. Springer Science & Business Media, 2007.

[2] Ruhl, John B. "Complexity theory as a paradigm for the dynamical law-and-society system: A wake-up call for legal reductionism and the modern administrative state." *Duke Law Journal* (1996): 849-928.