

The Autopoietic Character of Society

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Hard sciences are successful because they deal with the soft problems; the soft sciences are struggling because they deal with the hard problems.

von Foerster (1971, p. 1)

Introduction

A lot has been written about the concept of *autopoiesis* ever since it was coined by the two Chilean biologists, Maturana and Varela [1]. Being a synthetic word and mirroring the field of systems theory that is the science of synthesis [2], autopoiesis is a blend of two Greek words: a) ‘αυτο’ (meaning self), b) ‘ποίησις’ (which in Greek has the double meaning ‘to make’ and it also means ‘poetry’, in both cases reflecting the idea of *creation*). The combined word, *autopoiesis*, was introduced originally to describe living systems that ‘make themselves’. Think of a cell as an example. Such systems are organised in a way that yields a rather unique phenomenon: their components and processes reproduce themselves continuously (i.e. they produce the same components and processes), until the system dies and surrenders to the trend towards disorder that characterises all systems (entropy). In the example shown below in Figure 1 during the process of mitosis, a cell undergoes a division that results in the creation of two identical cells; in a way, the cell recreates itself by turning within. Under circumstances that do not disrupt such systems completely, either from within or without, autopoietic systems have the ability to (re)-make themselves.

The concept of *autopoiesis* also reflects the distinction that Aristotle made between *praxis* (an actual event that includes its purpose in itself) and *poiesis* (that which produces something external to itself, a creation). With autopoiesis, the phenomenon being expressed turns in on itself, so to speak. This is because we have the creation (i.e. the *poiesis*) of something, but this creation is the self (i.e. the system itself, the *auto*). Thus, the system both exhibits and experiences this unique recursivity, without which it wouldn’t be able to survive. Admittedly, this can be a hard thing to grasp conceptually. The system re-emerges through itself, as another, new version of itself, and one that remains very similar to its (former) self. In many ways, it is a fine balance between a simultaneous genesis and decay.

Ever since the concept of autopoiesis was introduced for the description of living physical systems by Maturana and Varela, several scholars that were inspired by the conceptual implications of autopoiesis have tried to reflect on the following question:

Can society be considered as an autopoietic system, and if so, how?

From the Biological to the Social

Naturally, the transfer of any given concept from one domain to another encounters both problems and some resistance (a semantic protectionism of sorts). However, it is always useful to remember that language itself is a system [4] and that language-use is itself the choice of a system that automatically leaves something unsaid [5]. Being dogmatic about whether a concept like autopoiesis can be moved, used or applied elsewhere ignores the blind spots that have been necessary for the creation of that very concept to begin with (not to mention the variety of different hermeneutic loops that can emerge from it). Thus, the question of society as an autopoietic system can never be precisely anchored onto the domain of biological autopoiesis, but reframed based on the central principle that is represented by autopoiesis: self-creation and the self-referential processes that underpin it. Thus, in probing the autopoietic character of society, we can substitute the question above with another one: *with what mechanism does society re-create itself?* Several scholars have attempted to give an answer to that under the broad umbrella of contributing towards social autopoiesis. In reflecting on the subject matter, Mingers ([6], p. 120) recognises two different strands of responses to those that subscribe to social autopoiesis, with one being a simple application of autopoiesis to the social domain [7], with another being a modification or enlargement of the definition of autopoiesis [8].

In this chapter, we concentrate on the basic tenets of Niklas Luhmann's contribution who launched a very detailed description of society as an autopoietic system. Moving beyond the living physical systems, Luhmann abstracts the idea of 're-creation' into the nonphysical production of events and sees society as being re-created via communication. So when Luhmann "began to use autopoiesis in his work, Luhmann's approach was not crudely to apply autopoiesis to social systems but rather first of all to abstract the concept of autopoiesis away from the biological realm and then to apply this abstracted concept to social systems" ([9], p.197). While Maturana did express his concerns about the transferability of autopoiesis in the social domain, it was actually Maturana himself that introduced Luhmann to autopoiesis, with Luhmann making it his life's work to describe social systems as autopoietic systems. The tension between these two different schools of thought on whether social systems can be rendered through autopoiesis has led to some very lively debates.

Without a doubt, Luhmann's theory is elaborate so this chapter must restrict itself to the fundamental context and a few of the cardinal constructs that Luhmann deploys in the context of social autopoiesis. But before doing so, it is worth recognising that Luhmann is considered to be a pioneer in both systems theory and social theory ([10], p.1). Luhmann places central emphasis on the role of *communication* ([10], p.14) and builds his theory on the rich background of systems theory as "language for dealing with phenomena of recursiveness and co-evolution" ([11], p.106) is necessary to describe social autopoiesis.

In seeing his scholarly vision through, Luhmann built on the tradition of systems theory and second-order cybernetics in particular. While he did rest on the basic systems ideas that unite systems thinkers (e.g. the distinction between the system and the environment, the concept of the boundary, etc), Luhmann was heavily influenced by mathematician George-Spencer Brown [12], Heinz von Foerster [13] and of course, Maturana and Varela's description of living systems through autopoiesis. By weaving together the systemic concepts of self-organization, reflexivity, autopoiesis, and communication, Luhmann's response

to our central question above (i.e.: with what mechanism does society re-create itself?) is that society can indeed be considered as an autopoietic system that *re-creates* and *reproduces* itself through *communication*. Thus, communication is considered to be the key to society's autopoiesis; in this regard, social systems are communication systems. But communication in Luhmann's work takes a more radical turn in relation to human beings. Humans cannot communicate, not even their minds can communicate, only "communication can communicate" in the system of society. Thus, Luhmann reserves the term communication for the wider mechanism that involves:: an utterance (Mitteilung), information (Information), and understanding (Verstehen).

Luhmann's central system/environment distinction

For Luhmann, like for the overwhelming majority (if not all) of systems theorists, the common ground for all systems theoretical analysis is the distinction between a *system* and its *environment*, with the environment being fundamental to the constitution of the system and structurally coupled to it. Key to this distinction for Luhmann is that the environment is not simply 'out there'; it is not a residual category. It is absolutely fundamental to the very existence of any given system since no system can exist without an environment. Even when we attempt to define a system without it (e.g. the universe that includes 'everything') it ends up in a paradoxical state: after all, how is it possible for something that includes 'everything' to be expanding into 'nothingness' [14]? System and environment are separated by a boundary which mediates the exchange of positive and negative feedback between them. In order to create a basis for his theory and resting on the primacy of the system/environment distinction, Luhmann makes a radical decision. He places human beings (psychic systems) in the *environment* of the *system of society*.

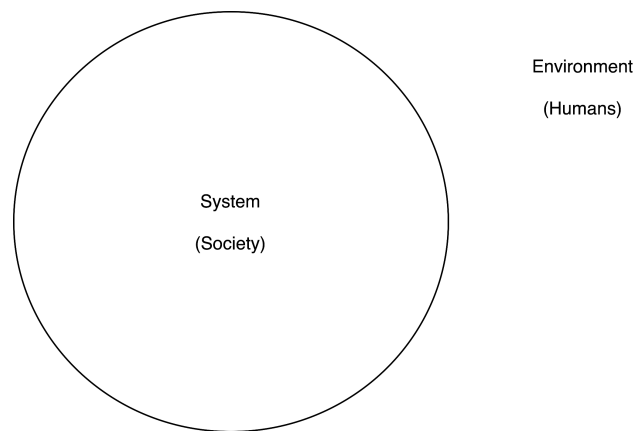


Figure 1. Society as the system & humans as its environment.

This decision has been portrayed by many as an unacceptable and shocking portrayal of society; an extreme anti-humanism; a lack of respect for humans that takes the step (or leap) of conceiving of a *society without humans* altogether. However, this description is truly far away from Luhmann's purely analytical decision, which is in fact a celebration of the multi-dimensionality of human beings, their experiences, and their complexity. Luhmann's system/environment decision here recognises that the plethora of human experiences cannot be captured under the single concept of the 'human being' ([15], p.

ix) and that such a complexity cannot be subsumed as an element into the system of society. In fact, given the significance that Luhmann places on the concept of structural coupling between the system and its environment, we can view all this critique against Luhmann in another light. As Luhmann says:

“The concept of the environment should not be misunderstood as a kind of residual category. Instead, relationship to the environment is *constitutive* in system formation. It does not have merely ‘accidental’ significance, in comparison with the ‘essence’ of the system. Nor is the environment significant only for ‘preserving’ the system, for supplying energy and information. For the theory of self-referential systems, the environment is, rather, a presupposition for the system’s identity, because identity is possible only by difference... Everything that happens belongs to a system (or to many systems) and *always at the same time* to the *environment of other systems*” [8].

Thus, we can interpret the above quotation as follows: for Luhmann, human beings, by being in the environment of a system of society, should not be viewed as a residual category, as having accidental significance, or as simply preserving the system. They remain constitutive to the formation of society and its identity, while maintaining their own identity.

Luhmann defends this radical decision in his book, *Die Gesellschaft der Gesellschaft* (the Society of Society) in an elaborate argument that cannot be unravelled here in full. But at its basis, the central assumption that he makes is that: “If we accept the system/environment distinction, the human being as a living and consciously sentient being must be assigned either to the system or to the environment (dividing a human into halves or thirds for distribution between the two sides is empirically impossible)” ([16], p. 9). If we were to put humans in the society itself, this would lead to several conceptual problems that are beyond the scope of this essay, including the psychic/social disconnect in the ‘anthropological’ context, the problematization of human individuality, the inaccessibility of consciousness through societal processes, etc [16]. In fact, as Luhmann argues, “the only option is to regard human beings in their entirety, body and soul, as part of the environment of the societal system” (p.9). Thus, in Luhmann’s theory, the system/environment distinction is operationalised as a society/human distinction.

The functional differentiation of society

From the foundational distinction between system/environment, Luhmann unravels the autopoietic character of society. In that context, while society is not alive in the sense that living organisms are, and while human beings are assigned by Luhmann to the environment of the *system of society*, the reproduction of both living systems and social systems relies *on self-referential, recursive processes that recreate them as systems*. The special feature of the system of society, as an autopoietic system, is characterised “solely by the operation that produces and reproduces society: communication” ([16], p. 35). It is through communication that society re-creates itself. While various types can be attributed to communication (e.g. communication related to the economic subsystem, the scientific subsystem, etc), at a meta-level, communication can be considered to be a form of energy that humans generate at the environment of the system of society. Or else, society consumes communications, and through their information-potential, gives rise to new communications. In this context, society is *communication out of communication*.

Luhmann recognizes three main types of social autopoietic systems:

- a) *interactions* (short-lived face-to-face exchanges that emerge and dissipate quickly between a limited number of people),
- b) *organizations*, which tend to persist much longer and they maintain their autopoietic character as they reproduce themselves recursively through decisions, and,
- c) *function systems*.

These are portrayed in the figure 2, adapted by Moeller [15].

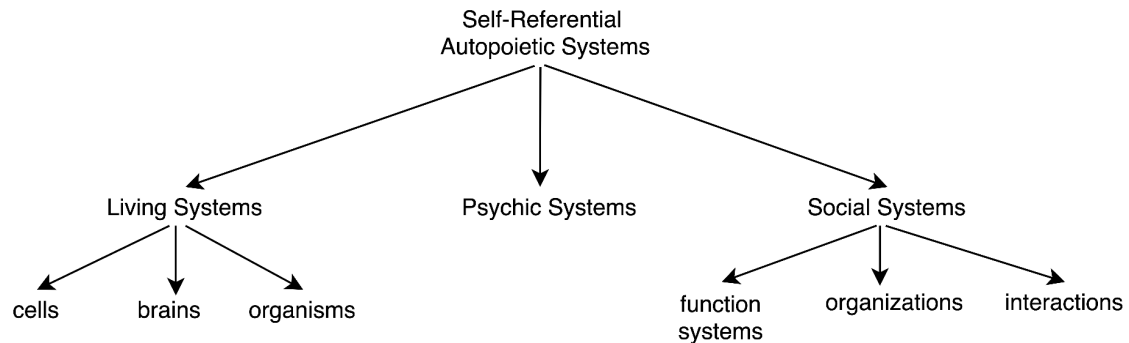


Figure 2. Luhmann's classification of systems.

Function systems carry a rather special status as they *emerge* in a bottom-to-top manner from inventions in society that end up being indispensable to society itself. For example, the invention of money has progressively led to the differentiation of the economic system, an indispensable function system for the broader (meta)-system of society. In a similar manner, the invention of the concentration of power in political offices, has led to the differentiation of the political system [15]. Luhmann considers such function systems to be very few as they create productive differentiations in society that become so significant that the rest of society has no option but to adapt to their emergence. That's why this is a rather short list: law, politics, economy, religion, science, mass media (with Luhmann however keeping open the possibility of more function systems to be added). Rendering the existence of function systems through the concept of *emergence*, implies that "emergence is not simply an accumulation of complexity, but rather an interruption and new beginning in the constitution of complexity" ([8], p. 24).

The autopoiesis of society is thereby reconstituted by the autopoiesis of its parts (interactions, organisations, function systems), much like the autopoiesis of organisms rests on the autopoiesis of the brain and its cells. As observers, we may differentiate logically between such systems as what is a system is contingent in what an observer wants it to be; however, we can think of autopoiesis as the common field

that connects living, psychic and social systems, albeit with different manifestations of recursiveness in each case, and with different layers of abstraction.

In the context of social systems theory, function systems can be represented by a few characteristics: their *code*, their *programme*, and their *medium*, while their *efficacy* can be considered as well.

The *code* is the heart of a function system and is always represented as a binary distinction (e.g. true/false). The code is also the basis on which communication is conducted within that system [17]. In many ways, because the code is the basis of a function system's communication, and also, because it is the foundational distinction deployed throughout the function system, the *code* can be thought of as the system's identity. For example, the legal system operates on the basis of the distinction between *legal/illegal* and therefore all communications within the legal system are based on this distinction (e.g. between lawyers and judges) [18]. Thus, we have different autopoietic systems (law, science, etc) that *code* communication in different ways [8]. However, "what is specifically legal or illegal is a matter of dispute" and for this reason, "function systems develop *programs* on the basis of their code that supply it with flesh and bone, so to speak. In the case of the legal system, such programs are the concrete laws, constitutions, norms, and so on" ([15], p. 25). Furthermore, the *medium* of different function systems is a highly specialized symbolic mechanism through which the success of communication is safeguarded.

System of society (and its function)	Code	Programme	Medium
Science (production of knowledge)	True/false	Theories, methods	Truth
Religion (elimination of contingency)	Immanence/transcendence	Holy scriptures, dogmas	Faith
Law (standardization of norms)	Legal/illegal	Laws, constitutions	Jurisdiction
Economy (reduction of shortages)	Payment/non-payment	Budgets	Money
Politics (production of collectively binding decisions)	Government/opposition	Programs of political parties, ideologies	Power

Table 1. A few of the core autopoietic subsystems of society.

For example, in the case of the function system of the economy, money contributes to the system by increasing the likelihood of continuous, and successful communication. While each of the function systems can be considered as autopoietic in its own accord, each remains distinct and at the environment of each other [19]. In this regard, the medium of each system can become more or less successful in a Darwinian sense as it supports its function system. In a sense, the more significant a medium becomes, the more likely it is for its corresponding system to gain an evolutionary advantage and further differentiate its medium (e.g. money is further differentiated in stocks, bonds, virtual currencies, derivatives, etc). But overall, the high degree upon which society is differentiated, implies that none of these systems can strictly steer the others. Luhmann's autopoietic social systems theory demands a vision of a de-centred society.

Applications

In the context of more theoretical applications, Luhmann himself has delivered detailed theoretical accounts for law [18], mass media [20], politics, risk [21], religion [22], art [23], ecological communication [24]. By applying the theoretical principles he developed, Luhmann deconstructs these systems in more detail and provides theoretical reflections on their function, programmes, binary codes, and the different systemic characteristics that he delineates. In the context of organisations, while autopoiesis is a “fundamental concept which eludes empirical testing, what can be empirically observed, however, is how different organisations are able to sustain their decision-making processes, i.e. how they ensure that subsequent decisions do in fact follow” ([25], p. 23). In a more general context of social autopoiesis that rests beyond the locale of a single organisation, thinking systemically through Luhmann demands either the application of basic concepts through which a given domain is observed, or the exploration of how some organisational problems can be steered through a clear expression of the autopoietic character of Luhmann's function systems. Of course, thinking systemically through Luhmann allows us to reflect on much wider socio-political and economic phenomena that transcend organisations.

More practical applications that come closer to the spirit of systems thinking and operationalise Luhmann in order to deconstruct a specific problem remain sparse. The table below summarises some selected works: Following the table below, a sample case is presented in more detail.

Application domain/area	The context: thinking it through systemically via Luhmann's ideas	Reference
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Environmental Governance of the Danube Delta	The authors think through the governance of the Danube Delta by demonstrating how specific path-dependencies have shaped both the present situation and its reform options. They combine social systems theory with path dependence theory and resting on a rich body of empirical evidence, they rethink the governance of the Danube Delta by rendering its problems onto the different function systems delineated by Luhmann.	[26]
Public management of pay scales in Denmark	The author examines a very interesting case of the Danish pay reform where new principles for pay formation have shifted the conduct of management across different organisations of the public sector (the reform led to pay decisions being conducted along local contexts). By taking a multiple-case study approach and covering several public sectors, the author deconstructs the diversity of arguments in relation to the different Luhmannian function system. The author reflects on how communication about pay is formed by four different systems (legal, economic, educational, intimate) and unravels the ambiguities of pay as the result of interference between codes that condition how we communicate about pay.	[27]
Public governance	While this work is purely theoretical, the model being developed by the author on the public governance of autopoietic organisations based on Luhmann's ideas, invites practical implementation, further exploration, and empirical research. The model escapes individual organisations and provides a meta-framework that affects and includes different function systems (in this regard, directly pondering social autopoiesis through governance). By pondering the question of 'how is it possible to govern operationally closed entities?', given that Luhmann himself was a 'steering-pessimist', the author manages to consolidate both first and second-order cybernetic thinking and brings together: steering learning, difference, signals, and effects. Policy makers, nation-states, the United Nations as Steering Subjects are seen as creators of <i>differences</i> that are used by steering administrators (they use steering <i>media</i> like money, knowledge). The steering administrators create steering signals that affect the steering addresses (e.g. Universities, Schools, Hospitals, NGOs, etc). Steering effects are then observed variably by different steering observers (e.g. analysts, mass-media, etc) and the outcome of their observations is steering the learning of the steering subjects.	[28]
Disaster and emergency response	The authors look at the challenges faced by emergency and disaster response organisations in the context of a large German city. After problems in interagency collaboration during several incidents in the old town of Düsseldorf, a new plan was created. The authors draw on Luhmann's concepts (more specifically the concept of conditional programming) and analyse the relationship between stability and flexibility in emergency response. They follow Luhmann's planning perspective (deciding on the premises for future decisions) on the basis of	[29]

	communication channels, personnel recruitment and placement, and focus on <i>programmes</i> .	
Financial market representation in the mass media	By using a TV commercial as a case-example, the author explores how the stock market is made visible to a broader audience and draws from Niklas Luhmann's systems theory to deconstruct how the financial economy, the most abstract of economic realms, describes itself recursively. The author uses Luhmann's ideas to think through the domain of application in the representation of the system/environment distinction and the representation of the financial market through different forms, showing what tensions are thematised (e.g. the portrayal of the financial economy as an attractive and popular place, the tension between the expert knowledge of the traders vs the popular knowledge of the excluded).	[30]
Technology and Financial Instability	By following a systems theoretical approach that includes basics from Luhmann's theory, the author draws from the Flash Crash of 2:45 of the Dow Jones Industrial Average crisis where \$1trillion was lost in market value and explores how 'technology out of control' in the context of algorithmic trading creates instabilities. The author extracts a number of systems theoretical principles and shows how technology affects the function system of the economy and highlights issues related to algorithmic decisions, algorithmic 'understanding', the automated decisions that shape the code of payment/non-payment and the emergent phenomena that propel the financial instabilities.	[31]

Table 2. Sample cases using elements from Luhmann's social systems theory.

This following case is based on: [26]

Case: The environmental governance of the Danube Delta

The context and the problem(s): The Danube Delta is a famous wetland area that has significant ecological value, a rich history, but also a number of vulnerabilities. The potential for the area (located on both sides of the Ukrainian/Romanian border) is also significant for attracting various forms of tourism. While the Delta is protected, the authors note a number of problems: a poor and problematic governance situation, privatized common pool resources, criminal activities (e.g. smuggling), lack of citizen participation or participation fatigue, entrenched interests, obstacles towards establishing participatory biodiversity conservations, non-inclusion of citizens in the context of decision-making, lack of clear management plans, etc. Even after the Danube Delta's recognition by Unesco as a Natural World Heritage Site in 1991 (and some 15 years later), international actors were gravely concerned about the lack of local participation. Seeking to understand why and put forward proposals and a way forward, the authors conducted both observations and expert interviews with stakeholders involved in policy formation/implementation.

How Luhmann's social systems theory is being used: The authors reflect on the concept of path-dependency through Luhmann's social systems and the evolutionary character of systems. Using the functional differentiation of society and the major subsystems of society that we discuss above, the authors describe the current governance of the Romanian Delta and depict the most important organization for the Delta, known as the DDBRA (i.e. the Danube Delta Biosphere Reserve Authority) as embedded in different function systems. The authors describe how decision-making is shifting from one function system to another in higher-level meetings. They use the concept of autopoiesis to describe how the DDBRA would re-create itself on the basis of feedback from its environment, leading it to specific path-dependencies (e.g. towards education). However, they argue that without the existence of specialized nature organizations, anchored in function systems, the environmental issues of the Danube Delta would not be addressed. For instance, a political function system that would broker the collectively binding decisions was necessary and creating clarity on that was significant. As an example, the authors describe the struggle over the political function system in the case of the Delta. More specifically, they show how the functions of the DDBRA overlapped with local government (i.e. it had some authority to create collectively binding distinctions) but as the DDBRA did not replace local government altogether, it had to continue dealing with municipal and county organizations. This led to mutual distrust and unclear delineation of responsibilities. With the inclusion of such systems and their functions as described by Luhmann, it became easier to find ways through which these complex problems could be addressed.

After many initiatives and funding (e.g. from the EBRD), the problems persisted. The DDBRA was perceived as a 'political prize', where a political appointment had a very high status (just below a minister). Participatory planning was never realized, local municipalities were not well informed about the DDBRA and didn't realise the consequences for local planning. Trust levels remained low and responsibilities were not clearly demarcated.

Thinking systemically through Luhmann, the authors dissect the problems of the case and reflect on the different circumstances that have led to their development, while they also reflect on their potential amelioration. Their description of the problems through the insights drawn from applying Luhmann gives a rich description for a way forward.

Future Possible Developments

Even though Luhmann rests on many of the key principles that systems theorists rely on, for example, the system/environment distinction, or indeed, the emphasis on the observer that follows through from the tradition of second order cybernetics, his vision of society as a social system that is operationally closed by communication and his decision to place human beings at the environment of that system, sets the scene for interesting possible future developments and creates interesting potential. Luhmann's approach to differentiate society based on interactions, organisations, and function systems is very useful analytically for thinking through problems; also, considering communication to be the common fabric within all society can allow us to consider how such communication is brokered between different observers, or indeed, how technology restructures communication.

Future developments could see the emergence of methodologies that operationalise these elements and that explore how arguments, conflicts, challenges, and new phenomena in socio-technical, political, or economic systems, can be perceived as communication in-between interactions, organisations and function systems. Furthermore, Luhmann's reliance on self-reference can allow us to reframe the recursive processes through which different systems operate and place second-order observing at the core of our problematization. In a similar manner, future developments can explore the binary codes of function systems (e.g. true/false, legal/illegal, payment/non-payment) and tackle multidisciplinary problems that affect all of society by seeing how such binary codes re-express themselves in different subsystems of society. While function systems are few based on Luhmann's social systems theory, the door remains open for considering a few more fundamental ones that have restructured society foundationally. For example, technology can be thought of as a function system of society [31] that reconstructs other function systems through algorithmic decision making and recursive processes.

Conclusion

While Luhmann's theory of social autopoiesis is dense and its applications are still few, operationalizing Luhmann has a lot of potential. Such applications do not have to be overly complicated; instead, as illustrated in the examples above, they can rest on a handful of concepts and principles, and they can be attached to one or more subsystems of society (Luhmann's function systems).

Where next? The interested reader is prompted to explore these examples in more detail and reflect on how a selection of concepts can apply to his/her own domain of interest. Such an application can yield substantial systemic insights that escape the confines of the domain itself; in turn, these can allow us to reflect on much broader societal transitions and their implications.

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