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Cultural Complexus and Evolution Conceptual Contributions to a General Theory of Historical Evolution

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Abstract

The development of a general theory of historical evolution requires the development of strong conceptual frameworks. The article proposes a new concept, cultural complexus, applicable to the whole spectrum of communities and macro units of analysis employed in historical studies. The core of the definition stems from general systems theory and complexity. From that perspective, the paper explores the problem of diversity-unity in human societies and the problem of scale, and finds that the concept proposed provides a framework to accommodate all the variants within a coherent description. The article presents a definition of evolution consistent with the conceptual framework introduces three key principles and a model for the change of configuration (evolution) of the complexus. This development implies an answer to the question of determinism, proposes a law of increasing complexity and points to an explanation of the observed acceleration of change.

Keywords: *historical evolution, general theory of history, cultural complexus, complexity, systems theory.*

Introduction

The existence of human societies, their conditions and transformations over time, that is, the matter of social and historical studies, is an indispensable area of scientific inquiry. It is, after all, the framework for the existence of any given individual and community, and therefore their understanding is a necessity rather than a choice.

Approaches to these issues have been shaped by deep epistemological, methodological and ideological debates. Comte (1992) synthesized the early evolution of modern science in a logical-philosophical system oriented to the

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adjustment of the systems of thinking in the midst of the transition to the industrial society. The birth of social sciences largely resulted from the attempt to apply the same perspective as natural sciences to human society. That was also the point of bifurcation between nomothetic sciences like sociology, economics or political sciences, and ideographic sciences, like history, often lumped into the diffuse camp of the humanities (Porter and Ross 2008).

This development culminated in a major problem: the emerging disciplines in the process were separately examining what was, in fact, a common object of study. The importance of this point is hard to overstate, as the specificity of the object of study is one of the distinct features of any given scientific discipline. Even when those objects cannot be fully separated, there is an ontological difference, for example between the objects of study of physics and chemistry. There is no such ontological distinction between sociology, political sciences or history; rather, it is a difference in focus and approach.

In those conditions, the dominance of historicism, driven by a somewhat limited interpretation of positivism and its empiricist component made that many practitioners of the craft, even today, address history as an account of an infinite sequence of particular events.

From the very beginning, however, there have been many attempts to provide historical knowledge with the most necessary explanatory framework, a consistent theoretical body. The fragmentation of social research into multiple disciplinary fields has hampered these efforts, but advances achieved at different points by different authors and schools have opened doors and indicated paths leading to promising results.

Differences are not based on essential features, but on perspectives: the consideration of time as an important dimension or not, focusing on one or other aspect of the object, methodological approaches, these are what distinguish them. Hence, there are sound reasons to accept Braudel's view on the actual relation and necessary integration of history and the *other* social sciences (Braudel 1960).

The question is even more pressing, and the disciplinary fragmentation becomes an even more serious problem, when we consider that human societies exist within changing ecosystems, on a dynamic geological structure, in a changing Universe. Thus, social and natural sciences are but macro disciplines that address different ontological aspects of a common reality. Furthermore, the distinction between nature and human society, although rooted in observable features, cannot and should not be taken as the separation of two independent camps.

The only constant is change. This common place is actually a well-supported fact both for the natural world and for human communities. History as a discipline exists only because human society is a changing object of study.

The real question is the nature of change; more precisely, whether change is exclusively or at least primarily contingent, or whether it occurs according to regularities and therefore can be explained.

From the divergent paths taken by Marxists and Historicists to more recent developments, several authors have approached this problem, albeit partially. Martin Stuart-Fox (1999) and Walter G. Runciman (2009) proposed evolutionary mechanisms: mutation (Stuart-Fox), and cultural and social selection (Runciman). At a large spatial scale and from a different point of view, Giovanni Arrighi (2010) developed a theory of hegemonic transitions in world-systems. At a very large time scale, Peter Turchin and Sergey Nefedov (2009) proposed a theory of secular cycles for historical macro processes. These are just a few examples among many. Beyond their differences, they coincide in one point: human history is the evolution of human societies.

The immediate implication is that the change, observed in literature, material evidence and immaterial evidence, is driven by identifiable mechanisms and can be described through regularities and the laws of history. Yet, at this point, we do not have a general theory of historical evolution but a body of theoretical approaches, each of which addresses a set of types of phenomena, whether broader or narrower.

Hence the need to attempt to advance in the direction of general evolutionary theory of history. To accomplish that goal, it is necessary to expand and refine the theoretical toolkit at our disposal. Many of the components for a broad theoretical formulation already exist or can be easily developed based on existing principles, but they should be interpreted and integrated in a coherent construct.

The aim of this article is to explore a set of concepts and principles that can contribute to an explanation for these phenomena and serve as stepping stones along that path. The intent is to produce results that can be integrated into the discussion of historical (social) evolution, which is itself a component of much broader evolutionary processes.

Another problem that arises when addressing these topics is the existence of different levels in the interpretation of the term *society*. One is referred to full sets of human groups and their activities; in other words, the totality within which subjects and their interactions exist. The other identifies a specific type of relations, and the structures and distributions that produce them and that are produced by them, that is, a specific subset of human activities.

There are still other usages. For example, in legal frameworks, society is commonly used as a type of association of individuals or a form of economic entity, which in turn expresses and legalizes organizational practices. Another narrow usage is embedded in the term *civil society*. Society as a concept also applies to other associations in nature, as are the cases of gregarious and colonial animal species, often with distributions of functions amongst individuals

and more or less complex hierarchies. This work tackles the problems associated with the broader versions of the term, viewing human society as totality.

The article is divided in four sections. The first one proposes a concept intended to overcome some of the problems with the term 'society' and to serve as conceptual cornerstone for an evolutionary theory of history. The second addresses two aspects of the concept related to the study of the evolution of human societies. The third section discusses three principles of the evolution of complex systems, and a model for the change of configuration of the society, derived from the central concept. The last section explores some of the main implications of the proposal.

The Concept

The initial step is to determine what we understand by *society* as totality. The first approach is to interpret it as a determined set of interrelated subjects involved in a number of spheres of activity, organized around relatively stable and metastable binding principles. A set of this type is better defined as a system. This is not new: systemic perspectives can be found in a wide variety of disciplines (Luhman 1997; Lotman 1993; Parsons 1991; Easton 1953). However, the potentialities of the systemic approach have not yet been exhausted. The discussion below is based on the general systems theory (Von Bertalanffy 1968), enriched by the ideas that stem from complex thinking and complexity sciences (Morin 2001; Holland 1995).

To refine the definition, one should begin by asking what type of system corresponds to the reality of a human society. Such a totality is categorized as a complex system: a system with a large number of components in which the interaction between them gives rise to non-pre-existent qualities. This means that society is not an aggregate of elements, but a totality with emerging features.

This point is fairly clear. Phenomena such as national identity or the State, to mention just two, do not exist *a priori* in any of the subjects that form the system. To imagine a community, a *sine qua non* condition for the emergence of a nation, according to Benedict Anderson (2006), requires the emergence of a consensus among its members on a set or sets of shared properties, more or less real or mythical. Yet, the nation does not exist in any of the parts outside the relational network. The State results from the development of the political organization of a relatively stable community that controls a territory and creates institutions to manage the power relations that shape them. The entities and the organs that form the State are essential for its existence. However, the State does not exist *a priori* in any of them, it cannot exist without them, but they do not exist, in their full form, without it. Hence, both national identity and the State are emergent qualities, in the form of structure.

Accumulated historical evidence supports the addition or another category to the definition: human systems are also open. It means systems whose boundaries (the frontier) are permeable and continuously exchange matter and energy with the milieu (Von Bertalanffy 1968: 139–154). The exchange between human society and its environment is a constant in all known cases. It is expressed in the flow of persons, resources and information. Furthermore, the milieu also includes the natural environment that creates conditions for the existence of society and, in turn, is transformed by it. The implication here is that the interaction with the milieu is integral part of the operation of the system, as its internal dynamics is directly affected by those exchanges.

Another aspect is that human societies are adaptive systems as they adjust to conditions and produce complexity similar to the models advanced by John Holland (1995). When climatic conditions change or are inherently unfavourable – and thus not conducive to easy subsistence for populations – human communities and groups adapt or perish. Historical cases such as the draining of marshlands and construction of dykes in the Netherlands, the construction of sophisticated irrigation networks in ancient Egypt, or the construction of terraces for farming in the pre-colonial Andean region are just outstanding examples of a vast array of cases. In addition, the generation of public policies to cope with demands stemming from the population, or the constitution of community-based organizations and networks to provide some degree of safety and stability to groups and individuals at local level are all forms of adaptation to changing conditions. Hence, the system is constantly mutating to cope with the needs and pressures stemming from its interactions with the milieu and variations in the character and state of the relations between its own components.

Thus, a human society is a complex, open and adaptive system. Its existence emerges from a network of relations structured in an implicate order, in which each association is formed by other relations subsumed by the apparent – explicate – order (Bohm 2005). Thus, it is a system in which the organization is a constant process rather than a given configuration. Organization is an emergent of the constant mutation of the components in the midst of their mutual interactions and their interactions with the milieu (Morin 2001: 115–161).

The adaptive nature of the system and the understanding of organization as a process demand the inclusion of another qualifier: dynamic. This means that change is essential to the system. Contingency is thus restricted to shape and orient any given transformation and the circumstances that condition it. The implication is that human societies always change, because they always can change, that is why they have histories and are, in fact, historical realities rather than metaphysical entities.

The systemic approach provides a useful explanatory framework for social phenomena. This is particularly evident in broad studies on core topics like the formation and evolution of capitalism (Beckert 2015; Wallerstein 2011;

Braudel 1981), the evolution of cultures (Lotman 2004); communication (Castells 2009, 2010), discourse (Van Dijk 2008, 2009) or the sign (Eco 1988). All of them are based on the observation and analysis of the systemic nature of their specific objects or the totality in which they are included. The proposal developed here attempts to refine and formalize these traditional views.

On this base, let us now tackle the next and crucial point of the discussion. The concept of society, as used thus far, presents significant difficulties, most of which emanate from the terminological conundrum created by its multiple usages. It requires a pragmatic interpretation aside from a semantic interpretation. For a notion, this is a natural condition. For a concept, this is an issue, as it opens the door to confusion and error. The theory should be built on rigorously defined concepts, as formalized as possible, for which contextual factors are drivers for their operationalization rather than for their definition.

Hence, I propose a new concept: *complexus*. In its initial form, it is defined as a complex, open, dynamic and adaptive system formed by a large set of subjects and their relations, capable of reproducing itself. It is neither distinction without a difference, nor novelty for the sake of novelty. First of all, it addresses the problem of the multiple uses of *society*, as only when used as a totality does it correspond to the complexus. Also the Latin root of the word, meaning knitted together, carries the systemic nature of the object it describes.

Hitherto, the concept of complexus could also be applied to non-human systems: it would only require a more restricted form of subject. Therefore, as intended for human totalities, it needs a differentiating component. This role is played by culture. Hence, the complete proposal is *cultural complexus*. This is critical, as culture is defined as specifically human. It is worth noticing that there is at least one very similar term, cultural complex, used in several fields, for example, it is used in archeology (Marinatos 1960) and socio-historical studies (Martinez Heredia 2001), with different meanings in each case. The proposal presented here includes non-linear perspectives, the existence of implicated relations, and a number of ontological parities advanced by the complex approach that separate it from more traditional usages.

The introduction of culture in the conversation carries its own problems. As a notion, as well as a concept, it encapsulates a polysemy that complicates any immediate application. In large part, the polysemy results from the interaction of political interests, the use of the idea in the construction of the modern State, the evolution of social sciences, the interests of the subjects that appropriated the term for their public discourse and the historical contexts in which definitions and appropriations have occurred.

Some important approaches come from cultural anthropology (Geertz 1973: 10), semiotics of culture (Lotman 2004), and complex thinking (Morin 2010: 103–104). All of these are essentially semiotic in nature. There are two

key aspects here. On the one hand, the semiotic character of the concept implies that the reality it describes is in essence the generation of meaning that articulates intersubjective interactions. On the other, the essence of the culture is not in its visible practical manifestations, but in the mechanisms that produce them.

UNESCO (1982: 1) focuses on concrete expressions of culture that identify human groups and shape the individual in its human condition. Morin's and UNESCO's views have many points of contact with the historical-cultural approach to psychology (Vigotsky 2007, 2008). In both cases, culture is the overdetermining factor in the formation of subjective identities, and subjects, in turn, transform their culture in their interactions.

Other authors address this question from a perspective anchored in Antonio Gramci's concept of hegemony (Gramsci 1992, 1996) and interpret it as an instrument for the reproduction and transformation of hegemony and political consensuses, thus considering it as phenomenological dimension (Linares *et al.* 2008). George Yudice (2002: 16), on the other hand, viewed culture as a resource, conceptually and functionally similar to traditional natural resources.

An important point is that the subjects can be individual and collective, the latter at the level of social macro subjects such as classes or strata. They typically constitute a hierarchy based on an asymmetric distribution of power and thus with unequal influence on the evolution of the complexus. Also, the subjects are neither exclusive nor closed. They can appear as a nested hierarchy of subjects in which larger ones include sequences of smaller ones down to the individual, as they imply different types of identity and function. On the other hand, subjects may overlap partially, thus creating areas of mixed and sometimes conflicting identities.

The instrumental approach to culture develops in a different way some perspectives included in several semiotic definitions. The character of culture, its identity value, control mechanisms and the relation with groups and potentially with macro subjects, interlock with the hierarchical nature of the societal structure and the asymmetric distribution of power within the complexus. Power – implicitly – is introduced as a key category in the construction, evolution and operation of culture. Following the Gramscian view, culture is also part of political dynamics, ideological constructs, hierarchical organization of subjects, according to the standing power relations.

The definitions mentioned so far are not mutually exclusive. Rather, careful examination shows that they are complementary. This suggests that each one of them addressed a part of a broader reality, something that in turn confirms the complexity of the latter. Thus, it is possible to define culture as a continuous process of production of everything human. This production follows relatively stable patterns that are themselves cultural artefacts, in what amounts to a permanent and recursive process.

These specific patterns are what identify a specific culture and thus a given cultural complexus. Culture cannot be understood as a simple structure in interaction with others, but as generator generated of structures that defines the human condition. It is not something that can experience changes, but something that exists in the change. Culture acts as the current arrange of structures that organize a human society in a given historical context.

The discussion above also leads to the problem of the relation between the whole and its parts. This a major question: it entails more than just the subjects, as it refers to the relations and structures as well. As a complex reality, the components of the system operate in a network of relations of different specific types that can be grouped in distinct categories, each of which identifies a sphere of human activity organized along lines created by relatively stable principles. Thus, relations organize themselves in structures that constitute reticula of the system: economic structure, societal structure, political structure, and symbolic structure. These interact constantly as part of the evolutionary processes of the complexus.

The fundamental structures are interdependent in their operation, origin and nature, as long-term organizational forms of subsystems of relations among subjects. They express concrete forms of those relations with a degree of distinguishable identity, built on multi-layered interactions. Their duration is due to their apparent stability when compared to the typical human life span, which results from the conservation of information in the system. They change at a slow rhythm when compared to the observed pace at junctural and factual (*événementielle*) levels (Braudel 1970; Dominguez Lopez 2020), but still faster than biological or geological time.

Based on the considerations discussed above, the concept of cultural complexus is defined as a complex, open, dynamic and adaptive system, capable of reproducing itself, formed by human subjects – both individual and collective-integrated by multiple relations of diverse types, which are constantly reproduced according to patterns that change over time as part of the evolution of the system, which implies the continuous resignification of the identities of the complexus and its components.

Diversity and Scale

The concept of *cultural complexus* creates a frame for the re-evaluation of topics and categories, in order to develop analytical models. This is particularly evident after returning to the foundations of the general systems theory and complexity that constitute the backbone of this work. To discuss all of them in detail would require much more space than available. Hence, I will address just one particularly relevant dimension that entails some important points: the relation unity-diversity in cultural complexuses.

Accumulated historical evidence shows a high degree of heterogeneity in differentiated realities, identities, social formations, political systems, modes

and models of production occurring during the evolution of human groups. This means that the history of each complexus generates specific systemic features.

Albeit geographical factors have higher or lower levels of impact in one or other period, they are relevant in all contexts, as they provide or restrict capabilities, growth potential and selective pressures. The question of space as a variable in social science is an important one. There are some interesting discussions on the topic, including some that reject its usefulness (Jerram 2013).

A classic application of the special variable is the monumental *La Méditerranée et le Monde Méditerranéen à l´Époque de Philippe II*, by Fernand Braudel (1996). On the other extreme of the theoretical and methodological spectrum in historical studies we find *Il formaggio e i vermi* (*The Cheese and the Worms)* by Carlo Ginzburg (1992). In both works, the geographical space is a fundamental factor in the explanation of the respective objects of study. More recently, Gareth Jones (2017) introduced the spatial variable in a discussion about the dimensions of inequality as global problem, by pointing at the distinct forms and sources of social asymmetries in different scenarios, their specific conditions and relative positions in the global economy and the international system.

Thus, in the academic literature one can find a multiplicity of perspectives in which the spatial variable is relevant. In a second analytical level, it is pertinent to consider that human groups diverge in their origin due to the impact of spatial variables, but cultural distinctions add layers of complexity and more differences, absent some homogenizing force. The result is that each case of study has specific qualities which make it unique to some extent. Concrete conditions for the evolution of each society render useless any attempt to predict the events in their future. This is the plane of the diverse specific histories, including national, regional or local histories.

This is problematic, as an extreme version would lead to reject any possibility of generalization on the base of irreducible particularity. Historiography as a field includes the most frequent appearances of this type of views. This is a consequence of the supposedly ideographic nature of historical sciences, because generalization is the key methodological procedure in the identification of regularities in the behaviour of any system and thus the production of scientific explanations – theories.

Each of these approaches entails an interpretation of the relation between the cultural complexus and nature. Some of them interpret the latter as context, that is, boundary conditions that are ontologically different from the complexus itself, however important they may be. Thus, there cannot be regularities, as there are not common mechanisms to connect them. Others go further, with the natural environment acting as a referential framework rather than an active factor.

The conceptual proposal introduced in this text implies a different perspective. The cultural complexus exists in a milieu, that is formed by other cultural

complexuses and all natural systems. At a sufficiently large scale, all cultural and natural systems are subsystems of a comprehensive system. This last one would be the cosmos, as the current advances in physics indicate that the Universe as observed is a local presentation of that cosmos.

Hence, culture, as critical part of the reality described by the concept, includes all the interactions with the milieu, and therefore with nature. Those interactions are transformative of the components of the complexus, its structures and the milieu to scale in which they are significant: ecosystems, climate and to some extent the geology of the planet. Beyond the planetary scale, these effects are minimal so far. For the complexus, and therefore for human history, natural history is one of the drivers of its specific evolution.

A second dimension of the same problem is addressed by some paradigms, like world-systems analysis. In all its versions, this approach argues that, in modern times, the nation-State or – more broadly– political, territorial and cultural units commonly used as sufficient totalities – units of analysis in their language are in fact insufficient to explain their own evolution. Instead, they propose to use world-systems as unit of analysis, understood as a system of socio-political entities that develop as parts of that totality, in the midst of interactions that are fundamental for them and for the entire set.

In other terms, the world-system is a totality that integrates sets of specific societies, in which formative and evolutionary processes unfold interdependently, albeit in asymmetric concentrations and with distinctions between central processes (structuring process for the whole system) and secondary or peripheral processes. This distribution of processes translates into a hierarchy of States and regions, placed in distinct relative positions as centres, semi-peripheries and peripheries (Arrighi 2010; Chase-Dunn 1998; Hall 2018; Wallerstein 2011).

These works along with many others have compiled abundant and compelling evidence of the validity and soundness of world systems analysis to explain processes at macro level, and specific ones as well, within a common framework. Other schools and projects, like global history (Beckert 2015; Edgerton 2008; Sachsenmaier 2011) or cliodynamics (Grinin *et al.* 2016; Grinin and Korotayev 2015; Modelski *et al.* 2008), to mention just two of the more recent ones, coincide in the fundamental points, with differences in perspective and scale.

Is it possible then to study all cases that support these lines of inquiry and theoretical approaches by applying models based on the concept of cultural complexus? The answer is a definitive Yes: it is possible to articulate a paradigm capable of explaining the observed dimensions and variants.

Divergences in those cases are directly related to the spatial variables and the role they play, as well as to the specific evolutionary paths taken by particu-

lar systems. The first line of support for the validity and usefulness of the concept comes from the fact that it recognizes the diversity of cases as it is not attached to any singular formation or set of formations. The variability of the conditions, both initial conditions and boundary conditions, will produce distinct results in terms of the configuration of the complexus in any given historical context. This in turn translates into what can be labelled societal, political, economic or ideological configurations, typically addressed by broad disciplines like sociology, anthropology, political sciences, economics, psychology, semiotics, history; or much narrower ones, like Etruscology, Hittitology, transitology, and so on. The organization of each system is dependent on spatial and temporal variables, thus the concept is applicable to all those cases.

However, one of the most salient differences between the approaches mentioned above, and others that are not explicitly included for the sake of space is scale. To address this aspect of the problem of unity-diversity, it is necessary to determine if the concept can be adapted to different scales, and if those scales represent qualitatively different systems. To do so, there are two implications of the definition that should be considered. The openness of the cultural complexus allows for inter-systemic interactions capable of producing common emergents. Simultaneously, a paradigm based on this concept accommodates without issue the possibility of convergent evolution of separated cultural complexuses when conditions are similar. These two points are not exclusive, and can combine in several ways.

This entails another version of the same question: the possible integration of multiple complexuses into a larger one, a macrosystem. Here the paradigm draws on one of the principles of complexity, the hologrammatic principle (Morin 2005: 100–101). The qualities that form the system as a whole are also present in its components, as long as these are subsystems, reticula of the larger one, and the larger one is also open. Such principle operates in both directions, micro to macro, and macro to micro. Due to their nature, there will be several levels of overlapping and interconnection, with boundaries determined by the specific conditions, as well as by multiple factors of identity.

Hence, the integration of several systems in a network of relations will form a broader complexus. The paradigm points to the existence of cultural complexuses of different magnitude and level of complexity, connected to diverse communities, polities and other self-reproducing entities: States, groups of States, nations, world-systems. Each one of them can act simultaneously as a totality and component of a larger totality, and each one is a complex, open, dynamic and adaptive system, a cultural complexus. Each of them is also integrated by subsystems, that can be complexuses themselves. The identity of each complexus derives from the emergents in each plane of interaction. This paradigm fits both singularity and generality, and their distinction results from the analytical level and methodological decision, rather than from ontological differences.

Evolution: Three Principles and a Model

At this point we can look into the evolution of human societies through clearer lenses. Within the conceptual framework proposed above, we can define historical evolution, that is, the evolution of a human society, as the change of the configuration of the cultural complexus over time.

A way to describe the dynamic nature of the complexus stems from the thesis that human societies are the systems that exist away from equilibrium, as in the model described by Ilya Prigogine (1997). In such systems, every equilibrium is temporary and unstable, and relations and structures have to adjust constantly. Cultural complexuses are not eternal, as demands and pressures can surpass their adaptive capabilities, in which case they would disintegrate.

Stuart-Fox (1999) explored the occurrence of mutations that change the systems of signifying and therefore preferences and forms of satisfaction of individual subjects. His explanation of this mechanism utilizes the mentmemes, postulated units of signification that code and decode information and shape behavioural expressions. Runciman (2009) complements this with social selection and cultural selection, two mechanisms that determine what particular configuration of formal and informal institutions will control the operation of the complexus. These are but two out of a complex system of mechanisms that require further study. A key difference between historical and biological evolution, for example, is that in human systems, the subjects have agency in the process.

The perdurability of the changes as new structural emergents in the evolution of a cultural complexus is related to the key concept of adaptation. The whole process is guided by the degree of effectiveness of the neoformations to cope with the demands dominating the cultural complexus. Therefore, mutations and other primary changes are random, but the general process is shaped by regularities, first and foremost the degree to which the neoformations fit the conditions for the survival and reproduction of the complexus. Their study in an array of complexuses will allow for the identification and verification of evolutionary mechanisms.

Each configuration of the complexus will be structured, then, by a nucleus formed by the current institutions, which control the process of culture, that is, the production and reproduction of the system and its conditions of existence. However, the complex and multilayered nature of the system implies that there will be also alternative sources, that is, sets of institutions or proto institutions that operate in marginal and clustered spaces, as specific local conditions may differ from the overarching ones. Importantly, this refers not only to physical conditions, but also to specific *mores* sustained by communities integrated into a larger complexus (Dominguez López 2020).

The ontological integration of cultural complexuses within larger natural systems permits the immediate application of the principles of *cosmic evolution*

(Chaisson 2001; Smolin 1997; Rosen 1991; Alvarez de Lorenzana 1990; Alvarez de Loranzana and Ward 1987). Alvarez de Lorenzana (2012) synthetized this body of work in a triad of principles that drive the evolution complex systems with developed hierarchies. Cultural complexuses are complex hierarchical systems, whose distinctiveness is generated by the agency of the components that adds an extra layer of complexity. The principles are non-dependent on this factor; thus, they are applicable.

The first principle is *combinatory expansion*, which states that a system is built by the interaction between its components and between them and the milieu that form the different levels, from the lowest scale to the highest, based on coupling constants, that is, the formal expression of the organizational principles. The expansion constantly generates new combinations of relations that modify the hierarchies and the intensity of connections between components. Expansion should be interpreted in multifaceted way: physical expansion of the system, both in terms of space and number of component subjects; but also expansion via the incorporation of new behaviors and forms of relation.

The second principle is *generative condensation*. It states that when a system reaches its highest development level in a given state, it generates clusters of deeply intertwined components in intense interaction with the milieu and comparatively weaker connection to the rest of the system. This situation produces tension and centrifugal forces, thus creating the conditions for the transition to a new state or, in a limit case, a new system, with the clusters acting as alternative sources and potential new nucleuses.

The third principle, *conservation of information*, states that functional information accumulated by the system in disaggregation and change of state is transferred to the new state as a structural component integrated into the emerging configuration. This is a condition considered critical for the survival of the system in its environment.

In my view, the conservation of information can be part of the generation of a new nucleus and/or the formation of alternative sources; therefore, the latter can pass from one configuration to the next or be formed in the process. Hence, in any given state the alternative sources can exist before the system reaches its limit in a given state.

It is critical to notice that the existence of condensations and the alternative sources they can form does not imply necessarily a separated physical location within the system. Rather, it refers to alternative or marginal situations in the structural sense, which are outside the dominant nucleus and manage some specific types of demand. The relation between the nucleus and the alternative sources is dialogic. This means that their interaction introduces changes in all of them, and eventually the marginal patterns or combinations of some of them can become dominant, either by displacing the nucleus or integrating into it, after experiencing transformations in the process.

Each one of these sources represents the organization of relations between subjects in a specific scenario to respond to the imperatives of the system and its ecology generated by their specificity. The interests of intervening subjects, weighed by their relative power, specific space-time coordinates and impacts from the milieu, produce those imperatives.

When a configuration breaks down, it is largely the result of increasing demands beyond the ability of the prevailing models to meet them. The accumulation of smaller changes and the influence of the milieu create an aggregated alternative demand that exceeds the threshold of what is manageable by the nucleus, because they connect growing numbers of subjects that surpass those whose interests are satisfied in the specific current conditions. That is, the configuration loses legitimacy in the broadest sense of the concept.

In a limit case, the action of the milieu can be destructive and powerful enough to destroy the nucleus and either impose a new organization or annihilate the system. The absorption by force of territories and peoples via conquest and colonization is the prime example of this type of cases. There is also evidence of cultures and entire civilizations that disappeared or were extremely weakened, probably by uncontrolled natural forces.

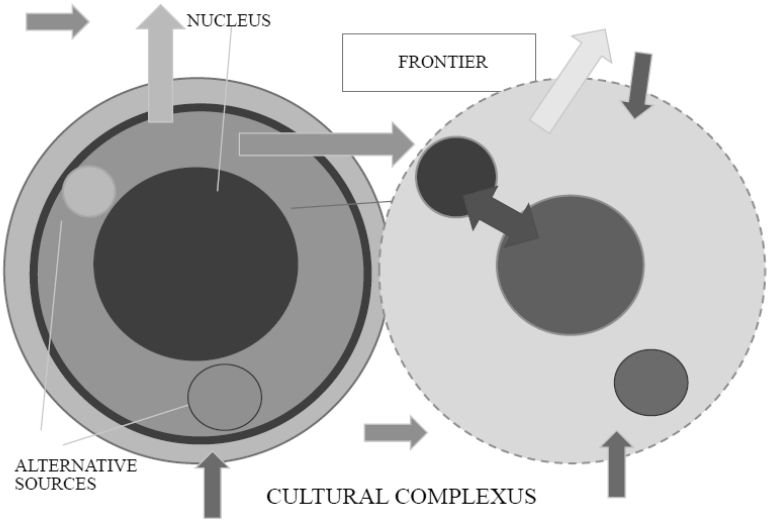

Fig. Diagram of the change of state in a cultural complexus

This figure presents a diagram of the change of state, with the transformation of an alternative source into nucleus, with some modifications in the process, and the transit of the former nucleus to a marginal position, thus becoming an alternative source. This leads to the complete reconfiguration of the

system, in its internal dynamics and its relation with the milieu. It is also visible that the relation with the milieu is bidirectional, thus it can be influenced and transformed by the action of the complexus. The frontier, in this model, acts as an interface that translates forces and information going in and out of the complexus.

Implications

The conceptual proposal discussed in this article and its theoretical ramifications have a series of implications that can contribute to the development of the general theory of historical (social) evolution, and the interpretation of existing and future empirical data. In this final section I will address some relevant ones.

First, it tackles the problem of determinism. The latter typically assumes one of two general forms: causal determinism, or conditional determinism. The former has also two variants. First, strong causal determinism (or strong causality), which implies the sufficiency and necessity of a phenomenon A for the occurrence of a phenomenon B, thus allowing for an exact and precise prediction. In this formulation, the causal relation is general and acts in any possible context.

The second variant of causal determinism is weak causal determinism (or weak causality). It implies local causal relations that operate in specific conditions. Thus, in other arrays of conditions, a pair of phenomena of the same type may not occur. This means that phenomenon A is necessary but not sufficient for phenomenon B, except for in certain conditions. Any law based on weak determinism is context-dependent and as such it has more or less defined frameworks of applicability.

Conditional determinism has many similarities with weak causal determinism. The basic idea is that a set of phenomena A is necessary for the occurrence of phenomenon B, without A implying necessarily B in any circumstances. The difference between conditional and weak causal determinism is that B may or may not manifest in presence of A within the same context. Hence, it refers to stochastic behaviour and accurate prediction is not possible.

The ontology of the complexus and the complexity and implication of the relations that form it, the interdependence of the parts, condition the answer to the question of the possible existence of determinism. In this topic, a principle of complexity becomes particularly relevant: the ontological parity between the structures – subsystems of the complexus – in state of permanent interaction (Morin 2001, 2005). In certain conditions, one of them can take precedence, as we derive from historical evidence, but this does not warrant the assumption of a stable precedence, as the outstanding structure has changed along with the formation of new modes of production.

Another principle of complexity, recursivity, is equally relevant. Expressed in a brief synthesis, the principle establishes that in complex systems, cause-effect relations interchange constantly (*Idem.* 2005). It means that a phenomenon A, in favourable conditions, produce a phenomenon B, but in turn the occurrence of B favours the occurrence of A. In other words, the system operates through an arrange of feedback loops, also known as recursive cycles, in which the effect becomes cause of its own cause.

Exploring in some depth the implications of this principle leads to the conclusion that it breaks immediately with strong causal determinism, while reinterpreting weak causal determinism and conditional determinism as fluctuating states. Also, the temporality of the processes is reassessed, as the rigid sequences of cause-effect relations in strong causally deterministic systems is not viable. Hence the fertile ground found by multiple approaches to the problem of time and temporality by authors like Braudel (1970), Heidegger (1996) and Uspenski (1993), has its natural place in this paradigm.

Hence, strong causal determinism, particularly of the unidimensional subcategory, is not possible, as no part is independent. The methodological exercise of controlling for variables is valid as an approximation, but it does not reflect the ontology of the system. Hence, any explanation based on one independent variable is insufficient. Other forms, particularly conditional determination, are compatible. Evidence accumulated from different fields indicates that any process is part of a finite set of possibilities, delimited by specific conditions in a given moment. Weak causal determination may be possible, but with a high degree of variability in terms of the subsystem that harbours each given cause.

The nature of the process, as described, suggests that several outcomes are possible, and that the transformations unfold largely as results of the competition between the alternatives, generated by the specific condensations and their interactions with the components of the system, and each of them generates a bifurcation. Each of those bifurcations opens a new set of potential paths for the evolution of the system with significant probabilities. The effective concretion of one of them is determined by the capacity of the neoformations to reproduce the system in the given conditions. The laws of the evolutionary process, rather than determining a specific path *a priori*, define the limits of the spectrum of possibilities for new potential configurations, that subsequently undergo the processes of social and cultural selection, the two components of a broader historical selection.

The principles of evolution and the model that describe the evolutionary change in a cultural complexus, combined with the nature of the latter, lead to an immediate conclusion: the evolutions of cultural complexuses tends to a continuous increase of the complexity of the system. The conservation of information in the form of structure, combined with the generation of neoformations, new types of relations, new organizational forms, implies the con-

stant production of additional layers of implicated relations, permitted by the flow of information, resources, persons and factors of growth across the frontier of the complexus. This can be postulated as a law of evolution, and it is supported by accumulated empirical evidence, and is consistent with observed behavior of other complex open systems, for example the Earth's biosphere.

This connects directly with an interesting theoretical problem. Empirical evidence shows that the rhythm of change has increased over time, and has done so in exponential fashion, as is particularly apparent in the technological society (Grinin *et al.* 2020; Korotayev 2020). This observation generates many interesting theoretical questions.

The explanation of this phenomenon stems from the increasing complexity of the systems. The expansion and imbrication of relations generates more possibilities for mutation and adaptive behaviour, as more numerous components interact in the operation of the system and with its milieu, in conditions of constant inflow of energy.

Applied to the cultural complexus and historical evolution, increasing complexity also implies increasing contradictions between subjects with agency, in an asymmetric distribution of power. Contradictions are inefficiencies in the operation of the system, and force eventual modifications to accommodate shifting demands, seeking to secure the reproduction of the complexus. In these conditions, more complexity leads to faster change.

Technological development includes two fundamental components: innovation and social assimilation. Increased complexity generates a push for innovation in the form of identifiable demands and rewards, and conditions for assimilation in the drive to keep adjusting the configuration of technological societies. The result is an accelerated change that points to overtake the generation of any potential relative stability of a given configuration. What will be the outcome of this development and what are its possible consequences – these are the main questions of human evolution. These are some of the most important implications of the conceptual and theoretical proposal presented in this article, but are far from being the only ones. Their development as part of a general theory of history and of a broader theoretical framework is a path to explore, as the fundamental ideas must be further explored and tested.

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