Tackling modern-day crises: Why understanding multilevel interconnectivity is vital

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Abstract: Complex crises like the coronavirus pandemic are showing us that modern societies are becoming increasingly unable to live in equilibrium with nature. These crises are the result of multiple causes, which interact at different scales and across different domains. Therefore, investigating their proximate causes is not enough to fully understand them. It is also crucial to take into account the structural factors involved. As concerns the global pandemic, I suggest four levels of analysis: (i) the surface or "proximate" level of the crisis; (ii) the human–environment–animal interface, as pointed out by the One Health approach; (iii) the broader socioeconomic context; and (iv) the deeper or worldview level. Furthermore, I argue that there is the need for a mindset shift if we want to properly trace causality. Much more attention must be given to the study of multilevel connecting patterns and nonlinear mechanisms as the producers of emergent global effects.

Keywords: coronavirus pandemic; One Health**;** non-linearity; multilevel causes; complex thinking.

Introduction

Living in equilibrium with the natural environment seems to be an ability that the human race is increasingly "forgetting". Furthermore, in the midst of the present pandemic, some of society's long-standing problems are becoming more evident, including social and cross-country disparities: variable access to healthcare and hygienic living conditions, for example, poignantly reveal our inadequacy to face global crises as a single united world. On the other hand, crises also represent opportunities, as they interrupt the ordinary flow of things. They might induce us to see something (e.g. hidden patterns) that is normally not visible, creating the conditions to envisage alternative, more sustainable, futures.

How causality is traced matters

The Covid-19 outbreak not only represents an epidemiological emergency, but it is also propelling an epistemological challenge. [1] We need to comprehend the conditions that generated the crisis, focusing on both the material (e.g. environmental, socioeconomic, etc.) and epistemic (how we generate knowledge and understanding) grounds, and suggesting proposals to reconfigure them. This requires that the way we trace causality fits with the complexity of the issue at hand.

Understanding the whole set of reasons for the situation depends on our ability to go beyond the "opacity of the immediate", to use the words of the French philosopher Louis Althusser. The pandemic is the result of multiple causes, which interact at different scales and across different domains. It is not enough to focus on contingent and proximate causes, which are easier to grasp and comprehend, as they are closer in space and time; instead, it is essential to investigate its deeper causes, i.e. the structural factors involved.

The "One-World-One Health" approach seems to have partly embraced the challenge and, in response to the pandemic, the proposal to create a COVID-19 One Health Research Coalition has been launched. [2] One Health stresses the importance of anticipation, focusing on the drivers of potential zoonotic diseases. It is imperative not only to work on the contingent eradication of the coronavirus, but also the analysis of the wider circumstances that made its emergence possible, at the human–environment–animal interface. [3] The purpose is, of course, to prevent the future occurrence of spillover events.

Potentially dangerous pathogens may be kept under control by the complex relational webs of natural ecosystems (e.g. tropical forests), but extensive deforestation, rampant urbanization and other invasive human activities disrupt these networks. [4] Besides, as human settlements expand into new areas, an increasing number of people initially come to live in close connection with wildlife. As a result, more opportunities are provided for microbial and disease transmission. Owing to global trade and travel routes, local spillovers might then turn into an epidemic or a pandemic.

The argument that human, animal and environmental health are inextricably interlinked is not new. One Health even highlights the necessity of "symbiotic relationships" between them, and the need to understand that "we are interconnected by default". [2]

At the very least, we can broaden our view and consider how health issues, economic models and social structures are also interwoven. This makes evident the broader context of the problem and links it to its socioeconomic and political determinants. Some studies investigate the relationships between specific spillover events and socioeconomic models that underlie the disruption of wildlife habitat or support intensive livestock farming. [5] Other inquiries go beyond circumscribed analysis, and inspect the wider framework, considering the circumstances under which globalization may contribute to the spread and persistence of diseases. [6]

One thing seems quite certain: despite the many possible particular or localized manifestations, all of them are repercussions of the same global economic model. Such a model is based on the unbridled commodification and exploitation of nature, which is leading us far beyond the Earth's capacity to regenerate and maintain ecological processes that are vital for overall wellbeing. The coronavirus pandemic is only a single, harsh but predictable manifestation of this state of affairs. Just like climate change, it is another epitome of the Anthropocene.

Ultimately, we must question how we conceive the human–nature relationship, which is permeated by a deeply rooted dualism and sense of separation. [7] It is then a matter of a modern worldview and foundational schemes that widely imbue society, and continue to shape our perspective of reality. The crystallization of conceptions already expressed in Descartes' philosophy (e.g. the mind/matter divide) and Newton's mechanics (e.g. atomism) heavily contributed to the creation of such an enduring worldview, which also instigated a utilitarian attitude towards nature, and continues to influence the current understanding of sustainability.

A mindset shift is needed

From another angle, what we also need is a subtle but substantial mindset shift. Conceptually, we should learn to pay much more attention to connecting patterns and structures, thus complementing (not replacing) the dominant scientific approach that still favours division and reduction. Improving our ability to see connectivity leads us to recognize that there are no separate matters: each element or domain is part of a broader setting, it is simultaneously produced by other items, and together they are assembled to form the overall structure. In this structure, damage anywhere could harm other parts of the assemblage. It also fosters thinking that goes beyond a linear and simplistic idea of causality and takes into consideration nonlinear mechanisms, multiple causal factors, and domino effects [8] -- features that are crucial for understanding how an (initially localized) virus can trigger a chain reaction that engulfs the whole world. [9] This is not merely a philosophical or conceptual endeavour, since the factors we consider or ignore in framing the situation, and the data or viewpoints that we include or exclude, make a big difference: our analysis produces different outcomes, which in turn lead to different reactions and strategies.

What would really be helpful for better coping with complex situations like the pandemic is refining our way of *reading* the world. In order to better understand a complex (natural and social) reality we should make our thinking "complex" too. Our dominant cognitive approach is still accustomed to work in a short term and linear fashion, being mostly familiar with processes and changes that are linear or in

small incremental steps. Thinking in complex terms is not about embracing a naïve or vague holism. It would instead require people to be able to grasp much longer causal chains and their multiscale and circular patterns. Such an ability is essential to fully understand the implications of feedback loops and cause-effect non-proportionality (i.e., a hallmark of nonlinear behavior), as well as the risk of cascading effects: maybe at first visible changes happen slowly, but then, once a critical threshold is crossed, they suddenly go very fast, risking imminent disaster or the reaching a tipping point after which there is no going back. Not only are these are the key features involved in the dynamics of the coronavirus pandemic (e.g. during an exponential growth phase) or climate change, but very likely they will also typify many other future planetary crises. [9]

Fostering a multilevel and multiple perspectives approach

The quality of our responses to momentous events like the above-mentioned crisis will depend on the extent to which the features of such a way of reasoning -- which are already endorsed by established fields of contemporary science (e.g. systems biology and complexity science) -- are incorporated into institutional mechanisms. This would allow us to track and understand complex phenomena in a more formal way, thus creating the conditions for timely and effective actions.

Besides, we need not only coordination of global health and research; we also need to embrace a systemic approach that puts health (or any other field) in a broader context, not separating the many aspects involved, but considering their interplay and interdependence. Healthcare, for example, should be integrated with social care, as well as with actions for creating sustainable food systems and measures for biodiversity and habitat preservation. [10] No single institution or standpoint is able to properly address situations of such a complexity, and very often conflicting particular interests are at stake. There is, hence, the need to embrace a truly participative model that is able to successfully bring together multiple actors, such as administrations, scientific experts, local communities and productive enterprises. This is not an easy task, which would require the creation of a “polycentric” space, where the coexistence of different (even conflicting) voices is allowed and all parties participate in framing the situation and finding solutions, not pretending to ignore the fact that there is an unequal distribution of power as well.

In this framework, the combination of multiple types of disciplinary expertise is also required. As already discussed, mechanisms which trigger a complex crisis are located at different levels, some visible and directly linked with the outbreak dynamics, others more hidden because “distant”, both materially and conceptually. All the different levels playing a causal role should be properly investigated and addressed, together with their multiple relationships. This would create a broader understanding of the situation and the basis for planning wide-ranging changes in society and their implementation.

Figure 1 illustrates, in a schematic and simplified way, four levels of analysis regarding the global pandemic: (i) the surface or “proximate” level, which is already familiar to us and hotly discussed across the media; (ii) the human–environment–animal interface, as suggested by One Health; (iii) the broader socioeconomic context, where the previous features are framed; (iv) the deeper or worldview level, which consists of grounding assumptions providing the lenses through which we perceive the world.

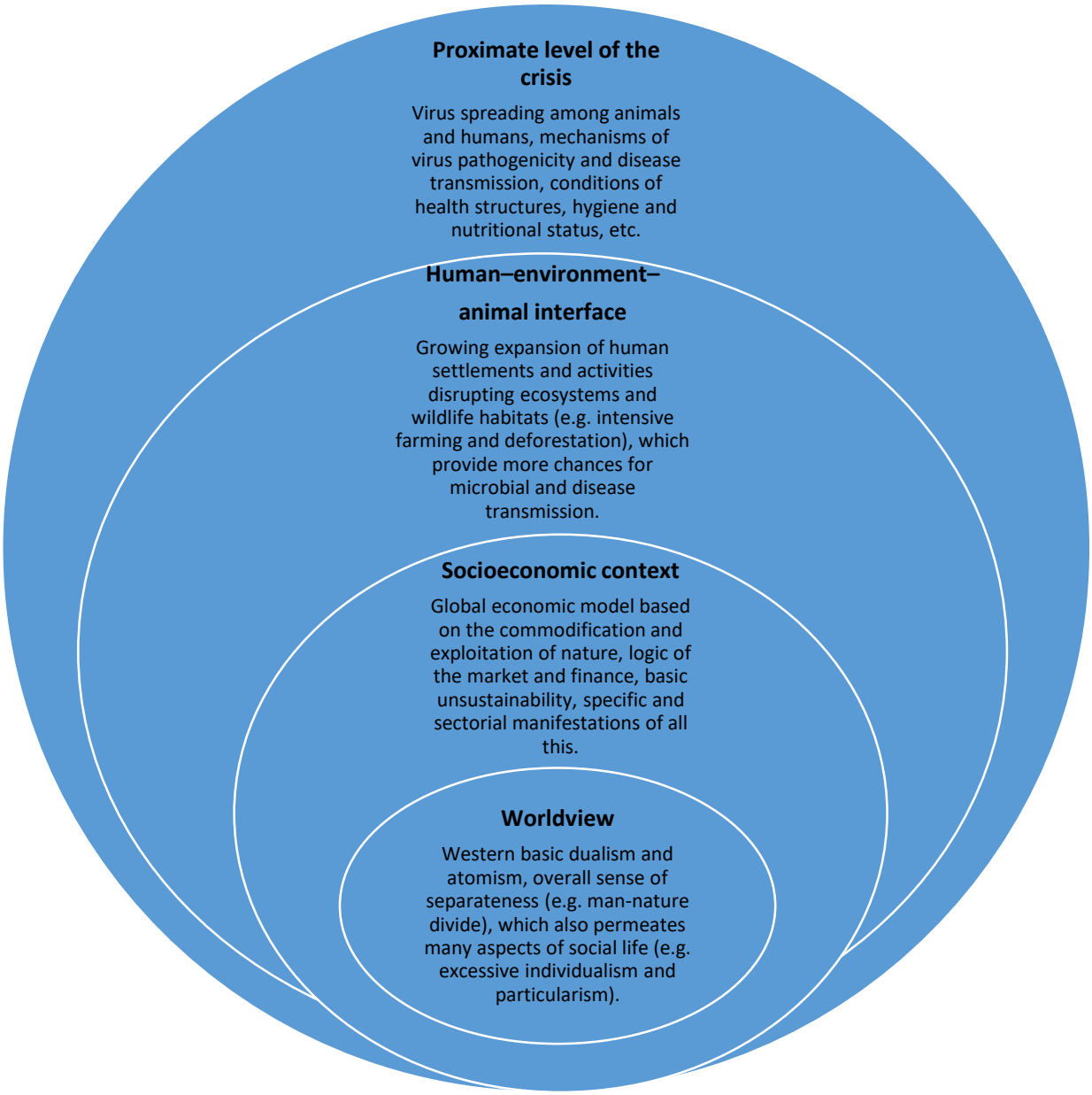

Figure 1: The multiple levels involved in the coronavirus crisis (the first three could be juxtaposed with the pyramid used for representing the idea of *Structural* One Health). [6] The deeper the level, the less visible it is, but the more powerful its influence. All these levels are linked through mutual causal relationships between them.

As for the corona pandemic, knowledge and methodologies of virology, epidemiology, pulmonology, genetics (just to name a few) are required, together with the establishment of common best practices in the procedures of preventive and emergency medicine. However, analyzing the human–environment–animal interface requires additional expertise, including agriculture, land management, ecological conservation and urbanism. And if we consider the broader socioeconomic context and then the worldview level, it is clear that an extensive scholarly engagement is essential. Natural sciences, even if combined, are not able to encompass all the aspects of the question. They should be complemented

with the perspectives of economists, sociologists, historians, philosophers, etc. All these partial contributions should be integrated, through multidisciplinary and interdisciplinary engagement, in a comprehensive and multifaceted overview. In so doing, we would not limit ourselves simply to dealing with emergencies in reactive mode, but we would rather work to create a very different future in proactive mode.

Concluding thoughts

Highly complex problems require a response equal to their scale. At times, incremental modifications or acts of progress, which maintain the same frame of reference, are not sufficient for tackling them. What might be needed is a transformation of this very scheme. No particular individual is responsible for the present health or environmental crises. But it is also true that we are all embedded in the same overall fabric of the "system" that generates them by default. Thus, the "enemy" is not only outside (e.g. the virus). Unless structural changes are undertaken, the same overall conditions will continue to prevail, likely causing analogous crises in the future. These changes should concern all the layers of causality involved, starting from the deepest ones.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Conflict of interest

The author declares no conflicts of interest.

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