COMMENTARY | Through COVID-19 – A Systems Perspective: from Square to Circular Systems

Leslie Solomonian, BSc, ND, MPH, Laura Batson, MSc, ND, Cloe Franko and Adrienne Waunch

Abstract: The corona virus that causes COVID-19 jumped from monkeys to humans in the context of deliberately designed systems of economic, environmental, and social organization which are referred to in this piece as “square”. These systems are not compatible with the circular patterns of nature that sustain life. The current pandemic is a symptom of complex mechanisms, and solutions must go beyond reductionist strategies. In order to truly address this crisis, we must critically examine its causes and their relationship to our worldview. Naturopathic philosophy can help orient us to a more holistic and complex way of seeing both how we arrived here, and how we can hope to move forward in a regenerative way.

COVID-19 has been described as a “wicked problem” — a complex issue involving multiple interlinked systems with no single cause and no clear solution. Although the actual infectious agent evolved and jumped to humans within a Chinese context, the origins and impacts of COVID-19 have emerged within deliberately designed systems of economic, environmental, and social organization established by dominant Eurocentric worldviews, which we refer to here as “square”. These systems are not compatible with the circular patterns of nature, the ecological systems that sustain life. The solution to the current pandemic must go beyond reductionist strategies, which are strategies that seek to understand complex systems through understanding their individual parts. In order to truly address this crisis, we must critically examine its causes and their relationship to our worldview. Naturopathic philosophy can help orient us to a more holistic and complex way of seeing both how we arrived here, and how we can hope to move forward in a regenerative way.

Tolle causam — Identify the root (route) cause

Throughout this piece, we are deliberately using both homonyms of root and route to draw attention to both the "where" and the "how" of the underlying causes of COVID-19. The word "root" refers to the roots of a tree that are hidden underground, rooted in place. It represents the "where" of the underlying causes: where the disease originates from. The word route is in reference to the pathways — the means by which the disease is carried out. It represents the "how" of the underlying causes. For example, if we are identifying Eurocentric square systems thinking as a root cause, then systemic racial oppression and environmental devastation to drive wealth concentration are route causes (a means by which Eurocentrism is carried out). We argue that both the origins and consequences of the COVID-19 pandemic are firmly rooted in square systems thinking, which is in direct contrast to circular thinking. We elaborate on these systems throughout the piece; Table 1 provides a brief comparison between these two paradigms.

Square systems

During the European Scientific Revolution in the 16th and 17th centuries, systems of scientific, economic and social organization were invented that broke from the circular patterns of nature. These new systems followed linear principles and displayed linear patterns. They are referred to here as square systems. Capitalism, as a linear economic model, is characterized by unlimited growth, concentration of wealth, and measurement of national health as gross domestic product (GDP). These systems can only function through principles of competition and oppression, as opposed to cooperative cycles of exchange; and linear supply and waste chains (extraction from the earth to make products that end up in waste bins) rather than sustainable, regenerative cycles. Humans invented scientific theories to rationalize these systems: Euclidean geometry and calculus that imposed linear abstractions onto nonlinear systems of nature, and biological theories of survival of the fittest that support capitalism and the systemic oppression on which it depends.

Modern science applies a mechanistic lens that sees the world as a giant watch with linear cause and effect mechanisms; that divides disciplines into siloed subjects that supply a lack of understanding of the complex circular connections between biology, ecology, economy. The consequence is a reductionist worldview that carves bodies into components, the earth into resources we can extract, and people into beasts of labour that can be exploited for capital gain.
TABLE 1: Comparison between dominant paradigms of square vs. circular systems

<table>
<thead>
<tr>
<th>SQUARE</th>
<th>CIRCULAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear principles and patterns of organization</td>
<td>Nonlinear principles and patterns of organization</td>
</tr>
<tr>
<td>People-centric</td>
<td>Land-centric</td>
</tr>
<tr>
<td>Linear</td>
<td>Circular</td>
</tr>
<tr>
<td>Self</td>
<td>Self-in-relationship</td>
</tr>
<tr>
<td>Spirit separate from matter</td>
<td>Spirit-in-matter</td>
</tr>
<tr>
<td>Discrete</td>
<td>Interconnected</td>
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<tr>
<td>Parts</td>
<td>Wholes</td>
</tr>
<tr>
<td>Objects</td>
<td>Relationships</td>
</tr>
<tr>
<td>Quantities</td>
<td>Qualities</td>
</tr>
<tr>
<td>Products</td>
<td>Processes</td>
</tr>
<tr>
<td>Structure</td>
<td>Patterns</td>
</tr>
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</table>

Inequitable consequences associated with the global response to COVID-19

- Mental health crises and increased rates of suicide
- Increased domestic violence
- Educational deficiencies and inequities
- Perpetuation of health inequities
- Inability to physically distance or work from home
- Loss of employment (highly correlated with poor health)
- Harm due to excessive hygiene by some and lack of access to soap and clean water by others
- The environmental impact of increased use of single-use materials

Tale Toton — Consider the Whole

Technological “solutions” are manifestations of square thinking. These have only been needed for survival since the agricultural revolution radically shifted the relationship between the human species and the natural environment. The (temporarily) successful attempt to control nature has for millennia reinforced the faulty worldview that we are capable of doing so. Rachel Carson ardently cautioned of this nearly sixty years ago, yet our efforts and their catastrophic impacts have only accelerated since that time. Technological strategies that preserve human life and support a growing population lead to further imbalance in the biosphere, and thus the need for more technological solutions. A litany of inventions and technologies have aimed to improve quality of life, address hunger or reduce waste, but have ultimately created harm on a systemic scale. For example, the invention of the internal combustion engine has led to anthropogenic climate change, artificial introduction of predator species has led to greater imbalances in ecosystems, and genetic modification of foods has led to loss of food sovereignty. Techno-scientific solutions typically complicate the problem by failing to consider the whole picture.

Square systems have been deliberately designed and perpetuated by those with social, economic and political power for personal gain through the use of oppression, division, and exploitation. Capitalism was the foundation of classical liberalism which went on to become capitalism, creating the socioeconomic conditions for the concentration of power and wealth. This worldview has manifested throughout worldwide imperial/colonial expansion, and destruction of Indigenous and traditional ways of knowing across the planet. Even within “eastern” cultures - such as the one in which the COVID-19 virus emerged - capitalism is the predominant square force driving the global economic system. Capitalism is rationalized throughout by the theory of trickle-down economics. Instead, what it “trickles down” are classism, racism, sexism, xenophobia, and the belief in white superiority. Each of these are clearly manifested in the fallout of COVID-19 and its disproportionate effects on Black, Indigenous, and People of Color (BIPOC), women, and people living in poverty.

Square systems thinking has resulted in neoliberal economics, white supremacy, patriarchy, anthropocentrism, imperial colonialism, genocide, and extractive capitalism (including wealth concentration, privatization of the commons, and waste generation). All of these systems are interlinked and reinforcing each of the other. The consequences are devastating. Systemic oppression, inequity of wealth and health, disparities in access to resources and education; mass extinction, loss of biodiversity, extreme weather events, loss of arable soil, global warming, environmental intoxication, increased acidity of oceans; perpetual conflict and war, mass migration; and the arising of novel infectious disease, leading to pandemics. Linear thinking leads to perceiving solutions that are also linear. These systems consider the complexity of the problem not address its fundamental causes. For example, although public health strategies such as wearing masks, washing hands, physical distancing and a potential vaccine may be essential to mitigate the spread of this COVID, these strategies are proving to be problematic in unintended and inequitably distributed ways due to pre-existing faults in the underlying structures. Moreover, these strategies will fail to prevent future catastrophic consequences of the harmful systems that set the stage for this one.

The academic discipline of “systems science” enfraged in the 20th century, born from European scientists who questioned the limits of reductionism. Albert Einstein’s theories on relativity revolutionized science: they revealed the fundamental nature of reality to not be made up of independent parts, but of inseparable energy-mass systems in constant flux and relative relationship. This fundamental shift in worldview gave rise to systems thinking which aligns more with a circular worldview as we are using the term here.

What we call “parts” are, themselves, coherent sets of relationships. Life is composed of systems embedded within systems, embedded within systems. When we peer deeper into any one part of life, we see more systems of relationships. An organism is made up of a system of organs. An organ is made up of a system of organelles. An organelle is made up of a system of molecules, and so on, down to the atom and its inner system of parts. Living systems, from cellular systems to ecosystems are made of parts in relationship with one another. The whole system is always more than the sum of parts, where the “more” is an emergent property of the relationships within the system. These patterns and principles of organization are not linear, and give rise to systems that are referred to, here, as circular systems.

Circular systems are characterized by reinforcing and balancing loops; a shift in one part of a complex system inherently will result in reverberations throughout the system. This is the crux of chaos theory - commonly appreciated as the butterfly wing effect. It is impossible to attempt to correct one component without considering the entire system. As Sahin et al. attempt to illustrate in figure 1 with respect to the complex factors that resulted in the emergence of COVID-19, “feedback loops illustrate reciprocal relationships between actions and consequences in the system. Reinforcing loops (R) create exponential growth or decay. Balancing loops (B) stabilize a system until equilibrium is achieved. There is an excess of reinforcing loops in the current systems, creating erosion, failure, and near-collapse.” Unless we perceive the complex, messy whole, and approach this pandemic from a circular holistic perspective (rather than a square reductionist one), we will continue to propel the planetary system towards that predicted collapse.

A Circular Systems View

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The Circular Nature of an Indigenous Worldview

The “discoveries” by systems scientists in the 20th century were actually a realization of Indigenous knowledge systems that are and have always been circular. Indigenous worldviews have been described as holistic, circular, land-informed, place-based, relational, perceptive of interconnectedness and constant flux, and integrative of spiritual knowledge. These knowledge systems were oppressed during colonial imperialism when the invasion of dominant Eurocentric worldviews spread across the globe.

Dr. Sandra Styres, author and scholar of North American Indigenous knowledge, writes: “Themes of relationality, circularity, spirituality,
and consciousness of Land provide the unifying contest of shared world views among Indigenous people throughout Turtle Island and indeed across the great waters. The notion of a singular world view is steeped in dominant Eurocentric imperial and colonial ideologies and is framed within discourse based on privilege and power.64

Dr. Gloria Emeagwali, author and scholar of African Indigenous knowledge or AIK, identifies the epistemological foundations of AIK systems as recognizing “the holistic, organic, and multidimensional interconnectedness of body, mind, soul, and spirit, as well as the interface of society, culture, and nature,”... “and a methodological approach to knowledge inquiry that emphasizes principles of interface of society, culture, and nature,”... “and a methodological approach to knowledge inquiry that emphasizes principles of An awareness of the interconnectedness of humans (and the global socioeconomic systems we have created), the environment and wildlife has led to the interdisciplinary approach referred to as One Health. Proponents of this paradigm advocate that global decision-making priorities social and ecological well-being, as opposed to capitalistic trade and wealth concentration in order to mitigate further planetary crises.59 If we see these crises as expressions of the Earth’s cries, we may have an increased capacity to perceive and address the root/route causes.

Addressing the root (route) cause

Human beings have created a complex of intertwined systems that are responsible for COVID-19, the climate catastrophe, and structural oppression. An argument could be made for lecturing nature to take its course – allowing the virus to express itself until homeostasis is re-attained. However, we believe this approach is deeply unjust and unethical. We know that we are not “all in this together.”59 Myriad evidence shows the inequitable distribution of the impacts of COVID-19 and our collective response to it due to differences in access to healthcare, the ability to work from home, the space to self-isolate, and the absence of pre-existing risk factors.60,61 BIPOC people and communities have suffered the most from this pandemic, just as they do from all global crises.62 The recent uprisings against police brutality and systemic racism are an attempt to resist the inequitable outcomes of structural privilege that were present before and will be present after COVID-19. The square systems that brought us here and are currently being used to get us out favour the elite-white, global north, wealthy, etc.—whom they were designed by and for.63,64 Letting nature take its course would further reinforce existing inequity and injustice and is therefore not a viable option.65-67

Rather than allowing square responses to this pandemic to further entrench social inequities, we can view COVID-19 as a stark reminder that planetary healing is dependent on a deliberate return to circular, regenerative systems. A key principle of most Indigenous traditions is honouring all sentient beings and the Earth for their worth beyond their economic value to humans. The values of taking only what we need, of leaving enough for others both now and in the future, and of not leaving a mess behind are the essence of the Dish with One Spoon Wampum Belt Covenant into which European settlers were invited in the Great Lakes Region (the territory on which the Canadian College of Naturopathic Medicine sits). These values also reflect the Seventh Generation Principle common to many Indigenous traditions (considering those who are not yet born, but will inherit the world),... and are an explicit component of the concept of Sweetgrass path. Acknowledging the position of the human species within the complex, interdependent web of the biosphere rather than superior to it requires humility.67 Yet, entering into a reciprocal relationship with the planet and other beings (human and otherwise) that share it, rather than trying to dominate it/them, is the most promising path toward healing.59 It would be easier to accept that the COVID-19 pandemic (or global climate degradation, or systemic poverty) could be reduced to a simple problem of contagion with a simple solution. However,
Restlessness is often described as the capacity to bounce back from adversity. This approach, however, reinforces the increasingly untenable status quo and does little to address the root causes that make the planet vulnerable to increasingly frequent and severe disruptions. We cannot strive to “go back to normal”. The socio-economic systems that created both the COVID-19 pandemic and are guiding the global response to it must be critically examined, deconstructed and collaboratively redesigned if we have any hope of mitigating the worst of the avalanche of crises that will inevitably follow. We must seek ways of bouncing forward which not only address immediate shock events, but leverage disruptions to support a radical transition to a more sustainable and just future. This will require active hope, loving compassion, participatory democracy - and embracing circular thinking.

**Bouncing Forward**

Resilience has often been described as the capacity to bounce back from adversity. However, this approach, while providing temporary relief, may not address the root causes that make the planet vulnerable to increasingly frequent and severe disruptions. We cannot strive to “go back to normal”. The socio-economic systems that created both the COVID-19 pandemic and are guiding the global response to it must be critically examined, deconstructed and collaboratively redesigned if we have any hope of mitigating the worst of the avalanche of crises that will inevitably follow. We must seek ways of bouncing forward which not only address immediate shock events, but leverage disruptions to support a radical transition to a more sustainable and just future. This will require active hope, loving compassion, participatory democracy - and embracing circular thinking.

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**Prime non nocere - Do no harm**

Any radical action must begin with examining our values. To which worldview do we ascribe? How do we view our own position in relation to the Earth and the other beings with whom we share our home? Nora Bateson demonstrates in her warm data labs that a deeply human response to complexity is possible when we tend to relationships that build fertile and resilient bodies, our species initially evolved and thrived? Are we able to work was shared, and relationships were prioritized? Are we able to cultivate communities that recreate the environment within which our species initially evolved and thrived? The catastrophically harmful systems our planet is resisting must be deconstructed and redesigned; this can only occur at a global level. Individuals and organizations must demand change. At the very least, we need to vote--and critique the design of our electoral and governance systems. COVID-19 has seen an increase in calls for not just temporary economic relief to individuals and families impacted by the economic consequences of the pandemic response, but for a full redesign of the global economic system. 

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Taking loving action is one of the most optimistic and radical things any of us can do, and is a powerful antidote to fear and guilt. The diffusion of innovation theory describes that only a few innovative thinkers will initially take on leadership, with a group of early adopters following closely behind. Naturopathic doctors are inherently innovative. We are used to thinking in systems, challenging the status quo, and recognizing the importance of effective social healthcare by typically conservative political leaders. Given a temporary break from the plague of humanity, natural environments have provided a taste of what a healthy future can look like if we fundamentally shift our relationship with the planet. Previous pandemics have dramatically shaped the course of social progression, COVID-19 too presents a global opportunity to evolve.

Action can occur at many levels (often described as a micromacro framework, see figure 3 for more ideas and examples). The most intimate is at the level of interpersonal relationships and individual choices. This could range from seeking to understand what determines the values of your patients’ health have been exposed by this pandemic, to seeking to understand the systems that have resulted in this wicked situation. It could include choosing to challenge the systems through personal decisions around food, waste production, and financial investment. We can seek opportunities to contribute to our immediate communities; during COVID, groups with the mandate of mobilizing grassroots community support for individuals in need have blossomed.

Social and ecological determinants of health have the greatest influence on wellbeing; unfortunately, very few can be changed in the clinic room or with individual action. How can we use our privilege to influence the communities and institutions of which we are a part? At our worldview shifts and as the bigger picture comes into focus, we can begin by sharing that perspective with others. It is deeply impactful to have hard conversations about values and worldviews with those in our circles; we must embrace productive, compassionate conflict in order to mobilize change. We can advocate for changes that address flawed and unjust systems. Professional groups such as Naturopathic Doctors for Environmental and Social Trust (NEST) was created to further opportunities for the naturopathic profession to engage in this work.

Ultimately, systems do what they are designed to do. Can we “leap forward into the past” when children were raised by communities, work was shared, and relationships were prioritized? Are we able to cultivate communities that recreate the environment within which our species initially evolved and thrived? The catastrophically harmful systems our planet is resisting must be deconstructed and redesigned; this can only occur at a global level. Individuals and organizations must demand change. At the very least, we need to vote--and critique the design of our electoral and governance systems. COVID-19 has seen an increase in calls for not just temporary economic relief to individuals and families impacted by the economic consequences of the pandemic response, but for a full redesign of the global economic system. 

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**Vital Link**

We can advocate for changes that address flawed and unjust systems. Professional groups such as Naturopathic Doctors for Environmental and Social Trust (NEST) was created to further opportunities for the naturopathic profession to engage in this work.

Practicing safe social distancing, as we have been doing, does little to address the root causes that make the planet vulnerable to increasingly frequent and severe disruptions. We cannot strive to “go back to normal”. The socio-economic systems that created both the COVID-19 pandemic and are guiding the global response to it must be critically examined, deconstructed and collaboratively redesigned if we have any hope of mitigating the worst of the avalanche of crises that will inevitably follow. We must seek ways of bouncing forward which not only address immediate shock events, but leverage disruptions to support a radical transition to a more sustainable and just future. This will require active hope, loving compassion, participatory democracy - and embracing circular thinking.

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**Figure 3: Non-exhaustive ideas for advocacy**

- **Macro**
  - Build community relationships
  - Promote and design sustainable cities for individuals
  - Incorporate circular thinking and design into conferences/scientific and business
  - Support food sovereignty (e.g. community gardens)

- **Meso**
  - Build community relationships
  - Promote and design sustainable cities for individuals
  - Incorporate circular thinking and design into conferences/scientific and business
  - Support food sovereignty (e.g. community gardens)

- **Micro**
  - Take individual responsibility to reduce environmental impact, practice self-sustainability
  - Practice self-practice isolation personal capacity
  - Participate in local politics
  - Support local businesses
  - Call to have well-urbanized square systems
  - Reduce or even avoid interventional white supremacy and minority

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**Commentary**

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About the Authors

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