Anticipating life after the COVID-19 pandemic: Connectivity in past, present and future societies.

The Covid-19 pandemic has dramatically impacted lives across the globe and will likely have lasting effects for years to come. Changes will be most profound in the ways we conduct our day-to-day interactions with other people. How can we as scientists reflect on these changes, and inform our understanding of its implications? As archaeologists and historians, our first inclination is to look at the past for inspiration. Can we learn things from the past in how to act during and after a pandemic? We have several potential points of comparison. The Athenian Plague spreading during the Peloponnesian War in 430 BCE or the Black Death pandemic ravaging large parts of the world in the 14th century BCE are cases in point. More recently, the global repercussions of the Spanish flue in the aftermath of World War 1 can be used as an even more obvious comparison.

But is this necessarily a useful approach? In any historical comparison, it is essential to distinguish similarities and differences, as well as to try and uncover the underlying drivers of these events. One could argue that the current event is so significantly different from any other in the past that comparison will be moot, or at least shallow and uninformative. Still, this does not mean that a historical lens cannot be useful. In this opinion piece, I will not look at specific historical cases, but I will use the theories and methods of the historical sciences to interpret the current situation and provide insights for the future.
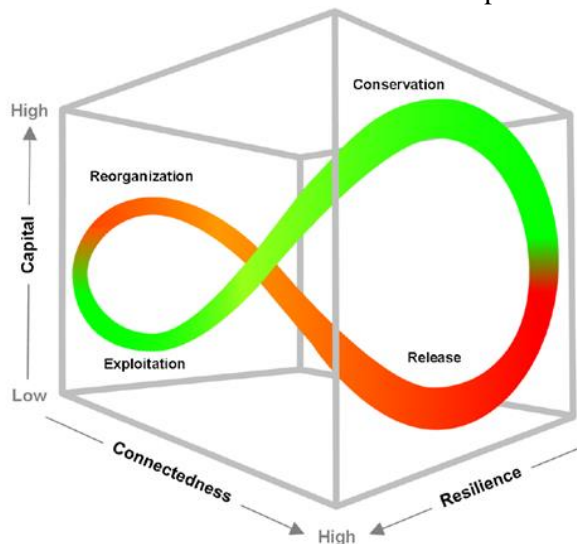

Figure 1: Adaptive cycle (Gunderson and Holling 2002, 41).

In my work, I use the concept of adaptive cycles to study long-term change and stability in socio-ecological systems (Gunderson & Holling. 2002. *Panarchy*). The adaptive cycle (Figure 1) describes system dynamics in three dimensions: (1) potential for change (2) connectivity; and (3) resilience. The system moves along these axes through four phases: exploitation (r), conservation (K), release (Ω), and reorganization (α).

The first two phases – r and K – respectively refer to rapid initial growth and the sustained conservation of the system, whereas the latter two – Ω and α – refer to the disruption of the integrated system and its reorganization into a new cycle. These four phases of the adaptive cycle represent an encompassing perspective on socio-ecological system dynamics. Systems in the r-phase expand into new environmental niches and increase inter-system connectivity. As connectivity grows, the system becomes increasingly rigid, resulting in a decline of resilience and potential for change in the K-phase. At some point, the system becomes unable to deal with stresses and disturbances, causing ongoing cycles to be disrupted in the Ω-phase. Finally, a new cycle emerges which recombines existing elements of the disrupted cycle with innovative components, thus again maximising system resilience and potential for change.

So, how does our situation fit in this framework? I want to particularly focus here on the aspect of connectivity. It is easy to see that, in modern times, connectivity is what makes our society tick. Yet, in the past it was not that much different. In fact, from the very beginning of humankind from Pleistocene times onwards, all human societies have been driven by interactions between individuals and social groups. This is of course a limited perspective, in the sense that it can never hope to cover all dynamics in human societies, nor address the full scope of the problem at hand. But then again, no two-page text can hope to accomplish this. It cannot be ignored, however, that the current pandemic was for a large part made possible because of the over-connectedness of our globalised world.

The case I want to argue here is that the Covid-19 pandemic was caused by hyper-connectivity on multiple levels and that, if we want to deal with it, we must find a fundamental solution in a new cycle

that deals with the trade-offs between the advantages and downsides of connectivity. On a micro level, all viruses work by hijacking transmission mechanisms between organisms. As connectivity between organisms increases, so does the transmission rate. Ergo, more people in densely packed spaces result in higher infection rates. In this case, however, it is not only micro-level biological transmission that is affected, but macro-level social transmission as well. Clearly, global connectivity in modern-day society has turned this disease into a global pandemic. Over the last few decades, humans have expanded throughout ever more parts of the world, destroying or usurping existing environmental niches, a process typically associated with the r-phase. One of the current hypotheses states that SARS-CoV-2 was transmitted from bats to humans, caused by our co-existence in the same niche, paving the way for the virus to transmit from animal to human. As human and natural worlds have grown more closely related – as the system moves from r to K – potential danger has grown accordingly.

How should we respond to this? And how do these responses play out on different scales? One response might be to break up connections so that the virus is given no chances to be transmitted. Individuals might self-isolate, societies might go in lockdown, or countries might close their borders. But is this a viable long-term solution? In the face of this crisis, the time has come to fundamentally rethink our societal structures and ways of interaction for years to come. But how do we do that? When predicting the future, two opposite trends of prediction can occur. On the one hand, predictions of collective futures are 'futuristic', seeing society as markedly different from today, be it in a utopian or dystopian way. On the other hand, when predicting personal futures, people tend to predict a future self which is remarkably similar to their current self, a phenomenon termed projection bias (Loewenstein et al. 2003. Projection Bias in Predicting Future Utility). The result is an uneasy straddle between an unchanging self in an increasingly different world. Yet, we will need a radical overhaul of both individual and societal structures to get to grips with this situation which we so often see being denoted as the "new normal" over the last few weeks and months.

We can hypothesise that the current pandemic will act as a disturbance event inducing the start of a new cycle of socio-ecological dynamics in future societies In other words, we are currently experiencing an Ω-phase in which existing system components are broken up and certain dynamics break down. This can be extremely taxing for individual and social well-being, as has been evidently exemplified in the increasing difficulties experienced as societal lockdowns dragged on. Yet, it also means that a new dawn might be right around the corner and we are given the opportunity to reorganise the system into a new cycle. Typically, during this α-phase of reorganisation, more potential for change is available to make the system more resilient. This new cycle will necessarily be built on reduced connectivity among system components. Yet, the question remains whether this is possible while still maintaining the dynamics of a globalised world. Going forward, new network structures will have to revolve around 'thinned' connectivity, focusing on a few, well connected hubs for certain services and flows of goods, while having less overall connectivity. How this will impact daily lives remains to be seen, but major overhauls cannot be avoided. The importance of scientific studies on social networks and complex social systems, employing long-term temporal perspectives, to sketch potential scenario's and develop policies to deal with this new reality cannot be overstated.

How could such change come about? In the technology-based society of today, people tend to look for technological innovation as the main driver of change. For example, contact-tracing apps are developed to map interactions and contain the spread of the virus. However, as noted by the historian Arnold Toynbee, it are ideas, not technology, that typically drive the biggest historical changes (Toynbee 1934 *A Study of History*). Successful adaptation will therefore require massive behavioural overhauls as well. Some of these changes are starting to be seen as facial masks are becoming ubiquitous and handshakes increasingly less common. Do we know for certain where we are going next? Probably not. But one thing is certain, if we are to find the proper ways to steer society towards a sustainable future built on long-term perspectives, scholars able to contextualise the present in our past will need to sit at the table. Luckily, we are eagerly awaiting to be invited to the conversation.