



SFI TRANSMISSION

COMPLEXITY SCIENCE FOR COVID-19

STRATEGIC INSIGHT: By using transmission to our advantage, we can eliminate coronavirus through citizen-based medicine.

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Imagine a world where one had the opportunity to prevent cancer. And that this involved no medication and could be developed by every one of us without any special training, entirely from home. And that by preventing the disease for several months we would provide researchers the window of time required to develop a treatment, and doctors, nurses, and hospitals, the relief to effectively deploy it across the global population.

I suspect that we would all stay at home, strive as best as we could to remain productive, and thereby become an active part in one of the greatest prophylactic achievements in the history of public health. The Nobel Prize for medicine would be justly awarded to all the citizens of the world.

This is an impossible scenario for cancer. It is an impossible scenario for effectively all of the top 20 causes of deadly disease in the world. For heart disease, cancer, stroke, and Alzheimer's we have at best a rather patchy understanding of their origins, how they cause illness, and how we might treat them.

Each of these diseases is correlated to different degrees with our genetics, behavioral habits, social systems, economies, and ecosystems. For example, heart disease has a strong genetic component; it is highly dependent on our diets and addictions and our behavior — particularly how active we are. The same factors have an impact on cancer but with a stronger influence from genetics and environmental factors and conditions. And these factors feed back on one another to make isolating a single optimum point of intervention nearly impossible. This is what we describe as Complex Causality. And it makes prevention and treatment of disease very hard.

But the world that we can only dream of for cancer, and for most of the top causes of mortality, is a reality for COVID-19 — we will have a treatment within a couple of years or less and it will work. So why the huge system shock with COVID-19? It has to do with

a rather amplified property of causality that reaches out beyond the disease to touch the complex systems of the world.

Unlike with these other diseases, in the case of COVID-19 there is a rather unique convergence of causes that reestablishes a kind of simple causality, and these causes are transmission networks. The virus is transmitted initially from animal hosts to humans, typically through diet. Humans then transmit the virus to other humans by contact. These contacts are then transmitted through our transport systems and professional and social lives. This is perhaps the principal reason why the markets and society have been so volatile; the shared factor of transmission is so integral to modern life, it is to such a great extent the foundation of the modern world, that it touches nearly every factor of production. Just as monocultures can generate lethal simplicity in agriculture, transmission has generated lethal simplicity across the globe.

But there is a flip side to this entanglement of complex systems: transmission, unlike the complexity of genetics, and social systems, economies, and ecosystems, can be relatively easily understood, and, by extension, controlled. By following the few simple behavioral rules that we all have come to know well — quarantine, maintaining social distance in public, practicing appropriate hygiene, and developing new habits for home-work when possible — every citizen plays a meaningful and significant part in eliminating this scourge.

We use our understanding of the common factor of transmission to our advantage: continue to mobilize the largest information-transmission network the world has ever seen — our technologies of communication — to enable the collective action needed to eliminate the transmission of the virus. Strategic isolation is our anti-viral flash-anti-mob.

And we recognize the extraordinary economic sacrifices that are being made to make citizen-based medicine a reality — position economic relief as fair sharing in the reward for the unprecedented scale of teamwork required to rid the world of a terrible disease. If we can transmit insight at the speed of light, then we should do the same for compassion and support. If the economy is going to rebound anywhere near as fast as it declined, we need to understand the complex nature of transmission, in aligning emotion, reason, science, policy, and economies toward recovery as effectively as these alignments produced collapse.

By using transmission to our advantage, we can control coronavirus through citizen-based medicine.