How Should Humanity Steer the Future? Randomly.

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A key realization over the last decades is that many systems – physical, biological, social – tend to be organized in small-world networks (see e.g. "Sync", Steven Strogatz, Hyperion 2003). These are networks of connections which exhibit both randomness and order – not networks specifically related to computers but interconnectedness generally and abstractly. An important feature of these is that there is at the same time localized clustering and global long-range connectivity. A peculiarity is that the local components tend to be relatively "unaware" of the global structure. This makes some sense: for local structures to be persistent and meaningful functional units, they must be insensitive enough to externalities so as not to become disorganized due to external variations. Such a state of affairs can be achieved both through limiting interaction with externalities and by achieving a robust local structure.

The particular structure "chosen" will depend on various length and time scales, etc., which are involved in the system. But, as any system evolves, the local evolution will also feed back and change the global environment, gradually altering those externalities which helped define its structure, and so the structure of the system may change, at some point perhaps undergoing a phase transition.

We have seen a number of such transitions during the history of humanity: technological development such as farming and industrialization on the one hand, and natural or manmade disasters on the other.

It has been argued that today we may be on the brink of yet another such transition, and how this transition is navigated will be key. In some ways this is undeniable: the impact of humanity on the planet has become a dominant force, and the technological paradigm is having a deep impact on how many people live their lives. This situation presents a particular problem: how to avoid chaotic behavior, e.g. very sudden, violent phase transitions, exemplified by recent stock market instability and the climate change issue, which may have a global reach.

A common prediction is also that technological innovation will speed up at an exponential rate. Is there a way to safely manage this? This, I argue, points in the direction of looking for a systemic change, rather than particular technological improvements.

We may need to shift perspectives to living in a continual phase transition (perhaps in a critical phase, using the language of statistical mechanics). When we think of avoiding undesirable outcomes it often tends to involve how to control and change a specific outcome. However the downside may be that we lock ourselves in to a very specific set of circumstances and are unable to cope with new ones. We will likely need to think more about preventing unknowns than fixing and avoiding known risks.

To compensate for these problems, a solution could be to introduce a degree of randomness in systems: as interaction/information networks become increasingly ordered, randomization mechanisms can be designed to kick in to preserve the wider network integrity and robustness. There are in fact theoretical hints of signals in general information dynamics that could indicate getting close to a phase transition/disordered state (Barnett et al., PRL 111:177203, 2013). Such signals might be monitored for and used as triggers for action. Furthermore, other recent findings (Krioukov et al., Phys. Rev. E 88:022808, 2013) indicate that there is under some conditions a peculiar duality between equilibrium and growing network models, which could form the basis for developing tools to maintain networks dynamically.

So, my proposition for steering the future of humanity is to harness the creative power of guided randomness.