Everybody Knows: Complexity, Causality, and the Most Trivial Reason to Do Foresight

Veli Virmajoki

Open a foresight report, a project proposal or the strategy document of almost any organisation, and chances are that the first page tells you that the world is complex. The second page then tells you that this is why foresight is needed. The world is interconnected, nonlinear, emergent, adaptive, full of feedback loops, and so on – therefore we need scenarios, horizon scanning, a Delphi panel, or at least a workshop. The list of features is by now standard and, to be fair, it comes from serious work on complex systems (Holland, 1992; Cilliers, 1998; M. Mitchell, 2009). It is recited, almost word by word, in ecology, management, health care (Plsek & Greenhalgh, 2001), education and information systems. It also comes packed in acronyms: *VUCA* – volatile, uncertain, complex, ambiguous, a term borrowed from the US military (see Bennett & Lemoine, 2014) – and *TUNA* – turbulent, uncertain, novel, ambiguous (Ramírez & Wilkinson, 2016). The acronyms change in every few years. The message does not.

All this is true. But it is trivial. Everybody knows that the world is complex; nobody in a ministry, in a board room or in a research council has ever believed that the world is simple and waited foresight researchers to come and tell otherwise. Telling a decision-maker that the world is complex is a bit like telling a fisher that the sea is wet. (I have done it myself, in more than one funding proposal, so I do not write this with clean hands.) Moreover, a reason that justifies everything justifies nothing in particular. Complexity of the world is equally good reason to do foresight, to do statistics, to hire consultants, to read horoscopes, or to do nothing and wait. It does not tell which method to use, which question to ask, or what would count as a failure. In this sense, the "complexity-argument" is not even an argument for foresight. It is an opening line, so to say, and opening lines are not meant to be examined.

Worse, the complexity-argument comes with a silent promise: that foresight has tools to handle what complexity makes difficult. It does not have such tools. Scenarios, Delphi, horizon scanning, system maps or causal layered analysis (which, despite the name, does not come with any account of what makes something a cause) are ways of organising thinking – good ways, at that, and I teach them every year to doctoral students – but none of them is a complexity-solver. Consider the Cynefin framework, one of the most used pictures of

complexity in management (Snowden & Boone, 2007). It sorts the situations a decision-maker faces into simple, complicated, complex and chaotic ones (plus disorder, when one does not know which of the four is the case) – and, notice, the contexts are defined by the nature of the relationship between cause and effect. In the complex context, we are told, why things happen can be understood only in retrospect, and therefore one should probe, sense and respond. Notice what is said here. It is not said that there are no causes and effects in complex situations. It is said that there are, but we see them only later. That is a causal claim, and rather strong one. So the complexity-talk presupposes causation and, in the same breath, moves it out of sight. And what is out of sight is not analysed; it is merely assumed.

Why is this a problem? Because causality – even without any complexity – is, to be blunt, a hideous issue. Hume gave, in one sentence, two definitions of cause: an object followed by another, where all objects similar to the first are followed by objects similar to the second, "or in other words" where, if the first object had not been, the second never had existed (Hume, 1748/2007, Section VII, Part II). The first is regularity; the second is counterfactual dependence. They are not other words at all – Lewis (1973) opens his classic paper by noticing exactly this – and philosophers have been arguing about how the two relate to each other for almost three centuries. (Hume, by the way, was far less of a sceptic than the textbook reading suggests – but that is another essay.)

Take the counterfactual side, which became the most discussed one after Lewis (1973). In its simplest form, C causes E if E would not have occurred, had C not occurred. Simple enough. Then consider the toy example that has haunted the literature since: Suzy and Billy both throw rocks at a bottle; Suzy's rock arrives first and shatters it; Billy's rock would have shattered it a moment later (Hall, 2004). Did Suzy's throw cause the shattering? Of course it did. However, the bottle would have shattered anyway, so the shattering does not depend counterfactually on Suzy's throw. Two children, two rocks, one bottle – and there is a whole book, *Causation: A User's Guide* (Paul & Hall, 2013), that maps how the theories handle, and fail to handle, cases like this one. Consensus is not in sight. This is how a simple causal system looks like when philosophers take it seriously.

The interventionist turn made things better. It did not make them easy. In Pearl's (2009) structural causal models and in Woodward's (2003) interventionism, X causes Y if an intervention on X – roughly, a surgical change that sets X to some value while leaving the rest of the system as it is – would change Y. Pearl and Mackenzie (2018) put this as a ladder

with three rungs: seeing (association), doing (intervention) and imagining (counterfactuals). I take Woodward's account to be *the* theory of causation that is actually used, whether explicitly or not, across the sciences. But notice what it requires. One needs to specify the variables. One needs to specify the possible interventions. And one needs modularity: intervening on one causal relationship should leave the other relationships intact. The new mechanists add their own demands on top. A mechanism consists of entities and activities organised so that they produce regular changes (Machamer et al., 2000) – or, in a looser version that drops the demand of regularity, of parts whose organised activities and interactions are responsible for a phenomenon (Glennan, 2017). Either way, finding one means decomposing a system into parts and localising functions in them – the strategies that Bechtel and Richardson (1993/2010) described in a book called, notice, *Discovering Complexity*. These are heavy requirements even for a garden sprinkler.

Now, here comes the point. In philosophical terms, *complexity* is not a mood of the times. It names, rather precisely, the places where these requirements start to fail. Simon (1962) argued that the complex systems we can understand are, luckily for us, nearly decomposable: interactions inside subsystems are stronger than interactions between them. Decomposition and localisation work as long as near-decomposability holds; when the behaviour of a system depends on its organisation more than on its parts, they run into trouble (Bechtel & Richardson, 1993/2010). Modularity can fail. Cartwright (2002) pressed this point against Hausman and Woodward (1999) early: in a designed system causal laws may come in the same package, so that one cannot change one of them without changing the others. Feedback is one obvious way the same failure appears in complex systems, since intervening on one relationship may change others. Redundancy creates a different trap: knock out a gene and nothing happens, even if the gene matters, because another pathway takes over the job (S. D. Mitchell, 2009). (Yes, two Mitchells, both in 2009 – Melanie on complexity science and Sandra on complexity in philosophy of science. Complexity is everywhere, even in reference lists.)

So, if causality is difficult in a system of two rocks and one bottle, complexity is causality where even our best theories strain – causality squared, as it were. And this turns the standard argument upside down. "The world is complex, therefore we need foresight" means, when spelled out, "the causal structure of the world is very hard to know, therefore let us do something that does not, as such, study causal structure". Put it on Pearl's ladder. Trends,

megatrends and weak signals live on the first rung: they are about association, about what goes together with what. Scenarios, however, speak the language of the second and the third rung – what would happen if we did this, what could be otherwise. Without causal assumptions the climb is not made, it is only pretended. A foresight exercise that never states its causal assumptions does first-rung work in third-rung clothes.

Then again, this is not a reason to fall into despair. Nor is it a call to reduce foresight into causal modelling; people act on their images of the future, and that is a different matter that causal models do not exhaust. Consider the most famous case where foresight met complexity head-on. *The Limits to Growth* (Meadows et al., 1972) wrote its causal assumptions down: the feedback loops of the World3 model were there for anyone to see. And critics did see them. A group at Sussex worked from the model itself and attacked exactly those assumptions – the data, the aggregation, the treatment of technical change, and so on (Cole et al., 1973) – and the *Limits* team answered in the very same volume. One may side with either party; that is not my point here. My point is that the debate was possible in the first place because the causal structure was explicit. The model could be wrong, and it could be shown where. "The world is complex" cannot be wrong, and that is the very reason why it is so cheap. Popper (1963) would have recognised this at once.

Even The Clash managed to put the problem of acting under uncertainty in a few lines. The question is not whether the situation is complex; it is whether one should stay or go, and on what grounds (The Clash, 1982):

> *This indecision's bugging me (Esta indecisión me molesta)*
> *If you don't want me, set me free (Si no me quieres, líbrame)*
> *Exactly whom I'm supposed to be (Dígame qué tengo ser)*
> *Don't you know which clothes even fit me? (¿Sabes qué ropa me queda?)*
> *Come on and let me know (Ahora me tienes que decir)*
> *Should I cool it, or should I blow? (¿Me debo ir o quedarme?)*

What follows, then? First, drop complexity as the opening reason, or at least stop pretending that it does any work. Second, state, even roughly, which causal assumptions an exercise carries: which variables are taken to matter, which interventions are considered, and what is held fixed while we imagine. In Woodward's terms, what-if-things-had-been-different questions are always asked about something; they are not asked about everything at once.

Third, say where modularity likely fails – where pushing one thing will move the relationships we rely on – and say it in the scenarios themselves, not in the disclaimer at the end. None of this solves complexity. Nothing does. But behind the trivial reason for foresight there is a non-trivial one. We have to act, that is, to intervene in the plain sense of the word, with partial causal knowledge and in a world where interventions may change the very relationships we rely on. That is why foresight is worth of doing. Decisions do not wait for philosophers to settle the debates of causation – and philosophers, to be fair, have never been in hurry.

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