

Linearity, Complexity and Well-being

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When you think about factors that affect your well-being and professional satisfaction, “linear causal thinking” is probably not the first the first thing that leaps to mind. But I would contend that excessive and inappropriate use of this heuristic – this practical strategy for simplifying perception and decision making – contributes to an enormous amount of anxiety and suffering for healthcare professionals. Linear thinking frames our understanding of the world we inhabit, our expectations, our ways of acting upon our intentions, and our criteria for assessing our own (and each other’s) competence and worth. Yet for all its vital importance, we are scarcely aware of this style of thinking or its implications. We take it for granted; we simply go about our lives without noticing how we are thinking or considering what alternatives are available. So as you read this article, I would invite you to think with me about your thinking. We’ll make this subliminal process more visible by comparing and contrasting linear causal thinking with non-linear or complexity-based thinking. And when we’re done, you can begin to evaluate what these styles of thinking mean for your well-being.

Linear causal thinking is epitomized by classical physics, and is founded on statements describing a sequential and unidirectional relationship: "A causes B." Rhinoviruses cause colds. Diabetes causes renal failure. Childhood sexual abuse causes Somatization Disorder. Long work hours cause medical residents to make errors. Linear causal thinking is reductionistic by design, seeking to explain complicated phenomena on

the basis of simpler elements. Its goal is predictability (if you know A you can predict B) or, even better, control (if you can control A you can control B). Risk factor analysis is a case in point: epidemiologists identify risk factors to predict people who will develop a particular target condition, and clinician-researchers then study interventions to modify risk factors in the hope of preventing the target condition from developing.

Another important characteristic of linear causality is that it presumes consistency and steady state equilibrium conditions. Given the same general prevailing conditions, A will always have the same effect, namely B. After some change in A, B will settle into a new equilibrium state and will remain there until A is disturbed again.

Linear causal thinking has a number of important consequences. It offers the tantalizing promise that we can achieve any desired outcome provided that our analysis, planning and execution are good enough. It narrows down the focus of our attention to our desired image of the future and a few selected causal factors in the present. And most important, it reinforces a set of values that places highest value on being in control. (1)

Medical research guided by linear causal models has brought us a vast and powerful technology that can alter the course of many diseases and diminish threats to public health. There is little question that this has been a boon to most people, but linear causality brings with it some problems as well. It is an incomplete model; like a map that omits many features of local geography, it blinds us to patterns of complex interdependence and other phenomena. Its false promise of control leads to unrealistic expectations, and when those are not met, to feelings of anger, failure, blame and shame. For example, healthcare professionals commonly assume responsibility for outcomes beyond their ability to control, putting their sense of competence and self-esteem at

considerable risk. When they don't realize their desired outcomes, they may become angry with their patients (think of the vexation physicians experience with "non-compliant" patients) or with other members of the healthcare team, or they try even harder, resulting in excessive treatment or personal exhaustion and burnout (think of the idealistic practitioner trying to "save the world"). Both the professionals and their patients suffer.

It's all but inevitable that we should think in terms of linear causality. We come of age professionally saturated with the culture of linear thinking and control – countless tests with multiple choice questions having one right answer, quantitative research based on linear statistical models, clinical algorithms with branching linear logic, case presentations that reinforce linear causal relationships (we don't recognize the editing – frequently unconscious – that it takes to make them look that way.) Everyone is busy trying to look like they are in control and we successfully psych each other out – when we look around us, we see everyone else looking like they're in control when we know that we're not. And so we all sweat it out behind our masks, each of us thinking we're the only one, that everyone else has it all together and something is wrong with us.

Let's now consider an alternative perspective – a non-linear or complexity-based approach – to see how it might focus our attention differently and create a different set of expectations. A complexity perspective recognizes the bi-directional influence that is present in most relationships: A influences B and at the same time B influences A. Causality is bi-directional rather than unidirectional, and this changes everything. Over

multiple cycles of these back and forth feedback interactions, the relationship between A and B takes on a number of important new properties.

First, given the simultaneous presence of some degree of freedom and some degree of fixed constraints (i.e., order *and* disorder together), very elaborate patterns can emerge spontaneously – a property called “self-organization.” Two examples of this are the spontaneous formation of micelles by fatty acids when they are mixed with water in the right concentration and the emergence of unanticipated but coherent themes in conversations.(2)

Second, minutely small differences or disturbances have the potential to propagate and become amplified rapidly through self-reinforcing feedback loops, culminating in transformational changes to the entire system. This property is called “amplification of small differences” and is popularly referred to as the “Butterfly Effect” (referring to the propagation of air currents from the beating of a butterfly’s wings into a major weather system halfway around the world). An illustration of this phenomenon is the spread of a very localized electrical disturbance in the brain to involve the entire cortex, resulting in a grand mal seizure. Whether you are studying patterns at the level of the cosmos, populations, individual living beings, cells, or molecules, you cannot find a large pattern anywhere that did not begin as a focal small disturbance. However, that is not to say that every small disturbance leads to major change – clearly that is not the case. This leads us to a third property of non-linear processes - unpredictability.

In any given moment, it is impossible to predict which disturbances will propagate and which will be damped out. Immeasurably small differences can affect the outcome of large processes (a property called “critical sensitivity to initial conditions”).

For any given disturbance, the chances of a major transformative change are much smaller than those of a small effect or none at all. This is referred to as the “Inverse Power Law” or the “Sand Pile Effect” (named for the unpredictable potential of any given grain of sand dropped from above onto a sand pile to cause an avalanche; there is an inverse relationship between the size of a potential avalanche and the likelihood of its occurrence).

A complexity perspective gives us a very different view of the world we inhabit and our place in it. Every moment holds the potential for both stability (the continuation of existing patterns) and transformation (the emergence of new ones). The future is unpredictable. At every level of observation, patterns can arise or shift without intentional design. We ourselves are comprised of and subject to these patterns – never outside them – so when we act with a particular intention, the result may or may not be what we had expected. Actions and events can cause unexpected ripples (popularly known as the “Law of Unintended Consequences”); there are always surprises, there are always new patterns of influence and interaction to discover.

In a world such as this, expectations of control as the norm or the ideal state are very problematic. Linear causality is a special case – the exception rather than the rule – but we take it to be the general case. A complexity perspective focuses our attention not on the desired future but rather on what’s happening in the present – what is the nature of the connections between events, how are people interacting, what patterns seem to be emerging? We focus more on process than outcome, and more on relation than control. The parallels between these implications of complexity theory and the core principles of Relationship Centered Care are striking.

A non-linear mindset helps us embrace paradox and recognize that uncertainty and lack of control are normal. Unpredictability no longer has the connotation of personal failure that it takes on with a linear causality perspective, so it does not make us as anxious. We don't give up all intentionality, but we hold our intentions more lightly. As we let go of rigid control, we don't have to live in such a tight existential space; there's room for more spontaneity, curious observation, discovery and delight. And as we are more present and less fearful, we stop trying to control other people for the sake of our own anxiety reduction. We improve the interpersonal environment for our patients, colleagues and family members, and therefore for ourselves as well.

In summary, we've compared the core elements of linear and non-linear approaches to causality and noted how they differ. The former is characterized by unidirectional relationships, steady state/equilibrium dynamics, and expectations of predictability and control. The latter is characterized by interdependence, self-organization of both stable and transformative patterns in the presence of order and disorder, and the unpredictable propagation of minutely small differences and influences. We have seen how attention is focused differently in the two approaches: towards future outcomes as compared to here-and-now interactional process. Linear causality culminates in a quest for control that is associated with and driven by anxiety. Complexity culminates in a quest for relation, reminding us to pay attention to our surroundings and our relationships. It also helps us set realistic expectations for ourselves, reducing shame and fear. And that, to me, seems like a major contribution to improving well-being.

References

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