Network vs. Hierarchy as Organizing Principles: Information, Power, Benefits in Business as in the Brain

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Abstract

The Conspiracy of Symptoms: Mental Illness as a Network – Metaphor or Reality?

Network methodology and concepts are recently being applied to mental health disorders (psychopathology): symptoms are treated as nodes, causally interconnected via biological, psychological, and societal mechanisms. Symptoms can become self-sustaining and self-reinforcing as they get integrated in robust feedback loops. The entire network than becomes chaotic (disordered). Stable states of networked symptoms amount to discreet mental health diagnoses. This re-conception of mental illness as a network of directly and dynamically interacting symptoms is a reversal of the medical, static common cause and latent variable model where symptoms are brought on by a single mental health syndrome or disorder.

In these nascent models, the emphasis is on internal psychodynamic etiology. They neglect social and interpersonal interactions as major drivers of mental dysfunction. Indeed, incorporating other people in such diagrammatic will serve the flesh out the network, materialize it, put on a human face on it, and connect the internal to the external, as is the case in real life. Interactions with significant others or strangers, intimate partners, or colleagues, family, and friends are as symptom-inducing as any neurotransmitter. Indeed, they are often the direct cause for such secretions and for most crucial and relevant network effects and cascades in the first place.

As usual, evolution borrowed the best of all possible worlds, models, structural engineering approaches, and action principles. In living organisms and even moreso in human psychology, hierarchies combine with networks seamlessly to yield optimal favorable outcomes. Thus, the brain is a delicate balancing act between these two models with interspersed and interacting stable and stochastic structures. Exactly like in the twin cases of cancer and viruses - lethal mutative pathologies which are also evolutionary agents – mental illness may be a way to experiment with variations on the themes of mental health in order to yield or discover higher, more efficient organizational structures, principles, and processes.

Review Note

Networks are not a new concept. As Douglas Hofstadter noted in "Godel, Escher, Bach", Indra's bejewelled Net is 3000 years old. The most modern incarnations of this organizational principle have to do with computing and business. National economies and the global arena are set up as networks of producers, suppliers, and consumers or users. Indeed, the network is one of two organizing principles in business, the other being hierarchy. Business units process flows of information, power, and economic benefits and distribute them among the various stakeholders

(management, shareholders, workers, consumers, government, communities, etc.) Similarly, neural networks are used to process information (both endogenous and exogenous), convey instructions and programming, allocate energy, and monitor and distribute outcomes among its corporeal clients. They bring together producers of signaling and catalyzing molecules and their consumers and end-users: various tissues and body systems [1,2].

In mental health networks, it is possible that symptoms act like thermodynamic sinks, draining data generated from within and from without and filtered via psychological constructs, defense mechanisms, memories, core identity, socialized roles, inhibitions, and internal and external objects. Within networks, timing determines priority and privileged access. First movers (pioneers, early adopters, or processes which immediately follow stimuli such as triggers) benefit the most from network effects. In hierarchies, positioning is spatial, not temporal: one's slot in the pyramid determines one's outcomes. But this picture is completely reversed when we consider interactions with the environment: The spatial scope and structure of the network (e.g., the number of nodes, the geographic coverage) determine its success while the storied history of the hierarchy (its longevity, in other words: its temporal aspect) is the best predictor of its reputational capital and its capacity for wealth or signal generation [3].

Counter intuitively, access to information and the power it affords are not strongly correlated with accrued benefits. In networks, information and power flow horizontally: everyone (or everything, every node) is equipotent and isomorphic. Like a fractal or a crystal, every segment of the network is identical to the other both structurally and functionally (isomorphism). But benefits accrue vertically to the initiators of the network and are heavily dependent on tenure and mass: the number of nodes "under" the actor. Thus, the earlier participants or members enjoy an exponentially larger share of the benefits than latecomers (MLM commissions, ad revenues in business – or access to mental resources and processing power in psychology). In hierarchies, benefit accrual is also closely correlated with one's position in the organization and, less often, with one's tenure. Power, information, and benefits are skewed and flow vertically and asymmetrically: the hierarchical organization is based on diminishing potency and heteromorphic (no functional cross-section of the structure resembles another). Members of the hierarchy experience an external locus of control and often develop alloplastic defenses (they blame the world for their failures and errors) and passive-aggressive reactive patterns [4].

Consider this apex and culmination of creation: the brain. Neural activity in the brain is subject to thresholds of activation and excitation which accrue in multiple populations or units. This structure is midway between a network and a hierarchy and resembles the stock exchange with its trading curbs or circuit breakers (where every equidistant participant is equipotent, at least ideally). Networks evolve from informal, diffuse structures to increasingly formal ones. Hierarchies go the other way: from formal to informal. The formal hierarchy ends up playing host to numerous informal networks (e.g. in the boardroom or in the neuroplastic brain as it re-wires its pathways). In business, over time and as size increases, informal networks tend to introduce terms of service, regulations, and etiquette that render them less nimble and more focused. In the brain, they generate proteins that code for memories and are stable structures within otherwise plastic neural pathways. Finally, hierarchies tend to concentrate their concerted efforts on problem-solving and on fending off challenges. They seek equilibrium and homeostasis and avoid creative destruction, disruptive technologies, and paradigm-altering innovation [5].

In the business world, networks thrive on challenges and novelty. They benefit from disequilibrium and disruption. They foster technological instability as well as other forms of chaotic interaction such as creative disruption and creative destruction. Consequently, they tend to attract mavericks and entrepreneurs, not managers and academics, for instance. Again, the brain is a delicate balancing act between these two models with interspersed and interacting stable and stochastic structures. Exactly like in the twin cases of cancer and viruses - lethal mutative pathologies which serve also as evolutionary agents – mental illness may be a way to experiment with variations on the themes of mental health in order to yield or discover higher, more efficient organizational structures, principles, and processes.

Both hierarchies and networks are homophilic (attract same-minded people, and similar stimuli, information, constituents, or elements) and, therefore, acts as "sinks". Both are threatened by confirmation bias and by the emergence of in-house monocultures which are susceptible to external shocks ("silos"). But networks are far better suited to leverage synergies: they are less rigid than hierarchies and, as a result, have the upper hand as far as coordinated emergent response times and dissemination of new information go. Networks are also far better suited to optimize their social or peer capital (same tissue biological cells or neurones are such "peers") because they emphasize social, peer-to-peer interactions over top-down flows. Networks go through a life cycle which can be divided to three phases:
a. Memetic Phase
b. Network Effects Phase
c. Collapse Phase

The Memetic Phase is autonomous and based on the

distributed replication of memes. It is characterized by fecundity (replication) but not by fidelity (authenticity of replicated memes), or longevity. We use emotions and cognitions to fixate memories and contextualize them precisely for this reason. In many mental health conditions, this process is interrupted by various forms of dissociation, by infantile and regressive defense mechanisms, by cognitive deficits and biases, or via emotional deregulations. The transition to the phase of network effects (network externality) is based on a bandwagon effect: a positive feedback loop enhances the value of the network for its members and users the greater their number is. The more insulated the network is, the more of a self-sufficient and self-sustaining ecosystem it is, the greater its value to its members. But a degree of openness to the environment is critical to ensure proper regulation, validation, calibration, and verification within a regime of non-impaired, functional testing of reality.

Various psychotherapies emphasize the former self-reinforcing aspects of networks (CBT) – or the latter, homeostatic functions (mindfulness). The orthodox prevailing wisdom is that as some critical mass or threshold are transcended, the network goes viral. But this is not necessarily good news. In nature, viral pandemics self-limit and peter out. Ageing-related mental health disorders can be thought of the unfortunate by-products of the inexorable process of winding down of an organism once "herd immunity" had been established in its natural, now immune, hosts. Similarly, all networks decline, decay and collapse if they fail to activate their members: monopolize or consume their time, monetize their eyeballs, reward them for time spent within the network, or otherwise create value added intrinsically or extrinsically. Similarly, incipient networks decay in the brain if they fail to excite or activate a neural pathway or if they lack feedback from the body [6].

Various reinforcement techniques leverage this principle to inculcate in the target some pathology or to eradicate it (healing) by flooding the mind (brain) with the relevant, behavior-triggering, signals and messages – or by starving the unhealthy mind of the cues that provoke the illness. Social media make abundant use of these psychological insights and revelations to foster operant conditioning and long-term addiction in their unfortunate users. Also, if the network is totally sealed off and homophilic – is biased as far as information and membership flows are concerned, is subject to solipsistic confirmation bias – it is doomed to collapse. Following the collapse, the network can survive as a remnant, as a residual network ("neutron star network"), or as an archive ("memory" or "identity" which is a set of memories organized into reframed narratives).

Certain mental health conditions, such as psychotic disorders,

mimic such solipsism by confusing and conflating internal objects with external ones. Consequently, no information is granted a privileged position, no data are deemed "objective". This hyperflexive confusion makes it impossible for the patient to generate self-efficacious feedback loops based on proper reality testing. All told, networks thrive when two conditions are met rigorously:

A. When they generate meaning intrinsically, no matter how outlandish it is (consider religions, scientology, and inane or eccentric cults such as flat Earthers, birthers, or believers in reptilian aliens as the true rulers of humanity). Such self-generated meaning bonds the members and affords them a feeling of "home", of affiliated exclusivity, of belonging to a brotherhood. It also provides them with a narcissistic boost due to their access to arcane or occult knowledge. Networks decay when meaning is exclusively imported (extrinsic) or even when it arises only as a result of the network's interactions with other exegetic, nomological, or hermeneutic systems. Mental illness may be exactly this: an exclusively internal generation of meaning which is not subjected to unimpaired or rigorous friction with reality.

B. Networks thrive when they generate value endogenously, by empowering and gratifying their members as they leverage the total resources of the network. Political parties, social media, institutional religions, and the Freemasons are examples of such networks. Networks decay when they depend on the outside for value creation (exogenous value proposition). Even hybrid networks – such as MLMs (Multi-Level Marketing) - are doomed to fail ultimately owing to this dependence.

Again, mental illness is largely solipsistic (for example, in the cases of delusions or hallucinations). It serves to restore both ego-syntony and self-efficacy. It is therefore of critical value to the mentally ill patient. This might explain why curing mental illness and healing are so difficult to accomplish: mental disorders, in most cases, are positive adaptations which allow for the optimization of scarce resources under the constraints of the individual's idiosyncratic personality and chaotic life circumstances. Thus, the more insulated, self-contained, and self-sufficient the network and its memeplex are as far as generating meaning (goals) and value (benefits, both emotional and economic) – the longer it survives and the more it prospers. Facebook and Apple are prime examples of such insular, closed, exclusive ecosystems. Mental illness is another such instance.

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