7.7 Networks

Karen Stephenson

The term network has three meanings in social life. The verb to network refers to the activities of social discourse or socializing; hence, the endless jabberwocky about networking in popular psychology, business press, and tabloids. In organizational behavior, network analysis refers to an analytical tool desperately seeking a theory. This comes as no surprise to veterans who know all too well that practice precedes theory by way of methodology. In management science, things are more mercurial: the noun network exists at the level of metaphor with minimal regard for rigorous empiricism. It is network as a noun that is in need of explanation and the objective of this précis.

We find networks on either side of the atomic divide: from the macromolecular in chemistry to the subatomic in physics. From Feynman and physics, the source and course of subatomic travel can be traced via networks as in Fig. 7.11. From organisms and organic chemistry, rates of reaction are differentially distributed along a macromolecular chain of benzene building blocks as in Fig. 7.12. Can we look at extinct and extant human organizations in the same way? Can we “trace” the ancient trade networks and deduce the dynamics of dynastic expansion? Instead of tracking family lineages, can we track “financial and organizational lineages” and follow the money to unravel contemporary management and moral mazes? What if these ideas are not metaphorical conveniences or artifacts of the past but rather, scientific organizing principles?

Elementary Structures

Valuable insights stem from the desire to unearth buried structure. For example, look at the anthropologist Levi-Strauss’s own failure to find a real “atom” of kinship in families [Levi-Strauss, 1969]. His suggestion that we should be less concerned with the theoretical consequences of a 10% increase in the population in a country having 50 million inhabitants than with the changes in structure occurring when a “two-person household” becomes a “three-person household” [Levi-Strauss, 1955] is a calculated statement about the relative importance of structure over scale. It is true that scale, i.e., going from 1 million to 10 million to 50 million, can and does make a difference. Just ask Donald Trump. However, what if there was an iterative pattern to the structuring of the five deals that produced Trump’s 50 million? What if management mazes on the ground form recognizable patterns when viewed from afar? In other words, what if there was a structural principle at work in work? For Levi-Strauss, the original idea of an elementary structure or atom

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![Figure 7.11](image1.png) **Figure 7.11** Feynman diagram: scatter/transformation map of subatomic fission/collision.

![Figure 7.12](image2.png) **Figure 7.12** Benzene ring: six-carbon building block of organic compounds.
of kinship was more provocative than practical. It turned out there was no reliably repeating structure in the biological or fictive family. However, what if there was an atom of organization, a recurring structure of how people organize? Is there a network at work in work and, if so, can it be measured?

If one closely examines patterns in ancient trade networks and early settlements, we don’t find a carbon copy of benzene (Fig. 7.12), but we do find a constellation of three prototypical patterns. These patterns emerge from the remnants of past civilizations to tell us why certain people traded with certain partners and avoided others. From the remains of daily routines, these same patterns unfold to tell us how people organize at work. To share identical patterns with our ancestors is a hint that humans are responding to scientific principles of organization.

Let’s examine this notion more closely by reviewing the patterns. The first repeating pattern is to be central [Freeman, 1979], like the hub in a “hub and spoke” system on a bicycle wheel. This pattern represents an optimal distribution system for trading, settling in the flat lands and for centralizing work processes. The second pattern is the gatekeeper on the critical pathway between hubs and thereby connecting hubs to each other. These gatekeepers serve as important links or bridges along waterways, connecting one part of a society to another, or one part of an organization to another. The third pattern is the pulsetaker, someone who is maximally connected to everyone via the shortest routes. Pulsetakers have their finger on the pulse of the organization and know what everyone is thinking and feeling. Machiavelli was a pulsetaker, someone behind the scenes and arguably all seeing if not all knowing. These three culture carriers are pivotal and operate as change agents in a general sense, that is, they can resist change if they want or, by the same token, can rapidly catalyze change if they choose. Once identified, culture carriers can be used to retard or speed the rate of a restructuring or an acquisition or divestiture of another company. The speed of light pales in comparison to the speed and synchronicity of messages coursing through human networks.

A simplified example of tactically leveraging a communication network would go something like this: if a message needs to be sent to 500 employees, enlist the help of the hubs to broadcast the message effectively and efficiently. While the hubs are so deployed, do due diligence with the gatekeepers. Be sure they are working with you, not against you. Once 3 months or so have elapsed from the time the first message was sent, check with the pulsetakers regarding the veracity of the message. If “apples” represent the original message and the pulsetakers report back to you “apples”, then the message was accurately and uniformly received among the 500 employees. You don’t need to ask all 500 employees, just the pulsetakers — if they know, rest assured everybody else knows. If the message reported back to you was not “apples”, but “oranges”, then you know you have a problem and that problem is most likely located with the gatekeepers. Damage control consists of resending the message through them.

If one adds these three structures together, a “benzene ring” of network structure is approximated and is illustrated in Fig. 7.13. It may not be the atom of kinship Levi-Strauss envisioned, but it is a highly charged molecule or network of social interaction. This molecule of interaction appears in both extinct and extant records and is a highly structured form of social capital.

In summary, a network is a structured pattern of relationships typified by reciprocal patterns of communication and exchange. A seamless and often invisible web of differential and deferential reciprocity achieved largely through face-to-face and/or frequent interactions holds these trust-based relationships in place [Mauss, 1990]. Trust, typically conceived as a “warm and fuzzy” form of social capital, can be highly coercive and used to groom and maintain network contacts for monopolizing resources.

A network is the structure of culture: HGP (an acronym for the pattern of Hubs — Gatekeepers — Pulsetakers) is the structure of a network just as DNA is the structure of biological identity. Networks are the reason why culture is difficult to change and why rearranging the hierarchical or organizational chart is an impotent attempt at change. How do networks work? Trust is the glue that holds human networks together and is not unlike (1) the shared electrons that bind benzene or (2) field theory that prevails upon protons to produce subnuclear cohesion. Cursory calculations reveal that “matter” matters little: rather it is the field of energy that makes brick walls, steel plates, and diamonds impenetrable. If networks are the structure of culture, then the hardness of culture gives lie to the notion that organizational science is a “soft science”.
Of Myth, Metaphor, and Mystification

Assume a hierarchy. It was long thought that business organizations are islands of planned coordination in a sea of market relations. This hubbub over hierarchy eclipses the network or shadow organization and instead evokes images of a pristine paradise inhabited by vertically integrated tribes of happy and naive natives. However, the myth of the noble savage in primitive society was debunked by a generation of anthropologists who produced map after map of kinship diagrams charting the intricate webs of relationships among tribal society; theories about the elementary structures of kinship resulted.

In like fashion, postmodern explorers debunked the myth of the firm by discovering tangles of communication channels as intricate as kinship. General theories, such as the ABCs of kinship [Rivers, 1900] or the XYZs of organizational theory resulted [McGregor, 1957; Ouchi, 1981]. Map after map of hidden networks underlie notions of an organization in much the same way that generation after generation of biological or fictive kin define tribal or clanlike behavior. Networks bolster the hierarchy when needed or unravel it when it becomes burdensome. They nimbly collide and collude to produce asynchronous and asymmetric exchanges and thereby elude the visible hand of direct control [Chandler, 1977] and even the invisible hand of the market [Smith, 1978]. Bureaucracies live in infamy because of the capability to leverage networks against its own hierarchy; they are nothing more than knots of networks hanging on hierarchies of convenience.

The Deep Structure of Organizations

There is more truth than fiction to the phrase, "In the beginning there was a network...and from networks, all organizational life derives." The network is the embryonic beginning of culture and the initial stage of structure. It absorbs a certain amount of information or energy until it reaches a threshold and then subdivides into layers of networks. This incremental layering of networks is the birth of hierarchy. After continuous replication, hierarchical growth will slow to a glacial pace and ossify. Networks will then reemerge to nimbly dance like a whirling dervish around tradition, tradition being no more or less than fossilized hierarchy. The network contains the seeds of innovation, made visible against the backdrop of hierarchical tradition, and so it goes, organizations learn, grow, and perpetuate themselves through the networks producing hierarchies and hierarchies producing networks in a chain of leapfrog. Together, networks and hierarchies are pressed into organizational service and form a natural tension in the dance to discovery. Let's examine how this happens.
TABLE 7.7 Comparison Chart of Features of Hierarchies and Networks

<table>
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<tr>
<th>Features</th>
<th>Hierarchy</th>
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<tr>
<td>Organizing principles</td>
<td>Depth, breadth, inverse relationship</td>
<td>Centrality: hub, gatekeeper, and pulsetaker</td>
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<td>Visibility</td>
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<td>Knowledge stored in</td>
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<tr>
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<td>Power</td>
<td>Direct: command and control</td>
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</tr>
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<td>Resource investment</td>
<td>Money: financial capital</td>
<td>Time: social capital</td>
</tr>
</tbody>
</table>

Networks and Hierarchies: The Yin and Yang of Organizational Structure

When viewed from afar, organizational structure is not one structure but a set of distinct subsets of structure, that of hierarchies and that of networks that exist in a symbiotic relationship with one another, each having its own inherent set of organizing principles summarized in Table 7.7. Many of the features have already been discussed or alluded to in the text. A few additional features are explained below.

Organizing metaphor: Charting the formal and mapping the nonformal networks produces two kinds of representations. To give an apt analogy, there are maps of a city’s highways system and separate maps of the complex web of surface streets. Each kind of map has its own rules that produce different sets of travel itineraries. However, most organizational journeys require both kinds of maps. More importantly, the behavior of the transportation system depends fundamentally on the interaction of traffic on the freeways and the surface streets. Not only does one system feed the other but the overload or failure of one system spills over into the other as drivers innovate to solve unexpected congestion problems.

This is a simplified view of organizations. Two kinds of organizational structures exist side by side and interact in important and predictable ways to determine the behavior of the firm. The analog of the highway system is the corporate hierarchy; it is apparent and obvious and changes design infrequently, tightly controlling behavior. The analog of the flow of traffic on the surface streets is the network. It is apparent, but not obvious; the network is not the system of surface streets but rather their pattern of use. The network changes organically and frequently as drivers constantly explore new routes, changing overall traffic patterns daily in ways that are beyond the direct control of traffic engineers. The network imposes a different set of constraints on behavior; if maneuvering becomes difficult, people will drive through parking lots, across lawns, around corners, and even over pedestrians!

Organizing principles: The three organizing principles of networks have been previously discussed. Three principles of hierarchical organization are: depth, breadth, and the inverse relationship between the two. Depth or layers of hierarchical levels are found in every organization and range from 2 in entrepreneurial organizations (the president and everybody else) up to and over 200 in government. Most organizational or management literature deals with the dark side of depth, that is, the multiple hierarchical layers that serve as filtering mechanisms — making information disappear all together or adding the patina of personal bias to information as it is handed off to those above. With so many hierarchical levels handling information flow, it can be difficult to track where and when information may get off track. Thus, deep hierarchies are often perceived as a black hole into which accountability is drawn and disappears.
Breadth (or span of control) is the number of people directly reporting to the person above them. Span of control is a way of segmenting or compartmentalizing information into buckets that can be sorted. These direct reports in turn have multiple direct reports to them and so on, as this self-replicating pattern cascades down the hierarchy.

A critical but subtle connection is the inverse relationship between these two organizing principles of depth and breadth, that is, a change in one (e.g., depth) will have the inverse or opposite effect in the other (e.g., breadth). For example, when one decreases the depth (flattens the organization), the breadth or span of control will increase. If one increases the depth (adds more hierarchical levels), the breadth will automatically decrease, that is, different departments representing the elements of span of control will merge or be eliminated. This relationship consistently holds if one does not substantially change the population of the organization through a divestiture or acquisition. The organizing principles of hierarchies have inherent constraints, allowing organizations to change only incrementally. Thus, hierarchies are beautifully designed structures for slow and incremental change. Networks, on the other hand, are exquisitely designed structures for rapid and radical change. For significant and substantive change, we must alter the networks.

Diversity: Networks are based on trust and trust takes time. Because trust is determined through face-to-face interactions, one needs to appreciate the profound truth that the face of culture is still a human face. What's coded in a face: gender and race for starters. After that, dress, height, accent, and a host of other personal attributes, which when aggregated with network formation reveal the stark truth about networks: you don't look like me, you don't dress like me, you don't think like me, therefore, I don't want to know or understand you. Such an opposition to diversity comes from a fetish for the familiar and is fundamentally tribal and resistant to the more-heterogeneous qualities of a hierarchy. Therefore, the last and perhaps the most important point to make about networks is that, contrary to popular opinion, networks have a dark side: they form exclusionary groups based on like seeking like and mask a fundamental fear of differences [Stephenson and Lewin, 1996].

A network is the most natural (and most ancient) form of grouping; its cultural complement to be found in hierarchical organization. That is why it is so important that the two organizational forms of hierarchy and network are forever yoked together to assure balance and accountability.

Defining Terms

Central (centrality): A mathematical (combinatorial or statistical) measure to indicate maximum connection as algorithmically defined.

Culture carriers: A collective term including hubs, pulsetakers, and gatekeepers as key to controlling the rate and substance of cultural change.

Network: Pattern of reciprocal communications or exchanges in a human group.

Hub: To be central in a "hub and spoke" pattern.

Pulsetaker: To be central by being maximally connected to everyone in a network over all possible paths.

Gatekeeper: To be central by being a bridge between highly connected groups or individuals.


References


## Further Information


## 7.8 Power in Organizations

**Donald Palmer**

Power is the capacity to attain one's goals over the resistance of others. Thus power is a social relationship — between more-powerful people and less-powerful ones. Power, as the term is used here, should be distinguished from [formal authority]. Formal authority is rooted in an organization's chain of command. Those at the top of the hierarchy possess authority over those below them insofar as the latter recognize their legitimacy. Legitimacy is based partly on evidence of a superior's ability to successfully fulfill the obligations of his/her office and partly on his/her ability to meter organizationally sanctioned rewards and punishments to subordinates conditional on their conformity to organizational rules and directives. Power, as we will discuss in greater detail below, is rooted in the control of resources. Power is analytically separable from the formal authority structure. Subordinates can possess power over their superiors just as surely as superiors can possess power over their subordinates. However, insofar as power may improve a superior's record of success, it can help boost his/her authority over subordinates.

Power, as the term is used here, should also be distinguished from influence. While power is a "capacity" to attain one's goals against the resistance of others, influence is "action". Influence may be related to power, as when it translates power into action. However, it may also be unrelated to power, as when it entails the altering of others' perceptions of what they want. Importantly, powerful people can obtain the compliance of others without exerting perceptible influence. The powerless sometimes comply with the inferred interests of the powerful because they perceive the costs of resistance to be high and the