Conversations and the Epidemiology of Change

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ABSTRACT

In the network of conversations that constitute the realities called organizations, the focus and unit of work in producing and managing change is conversation. This means that change agents work with, through, and on conversations to generate, sustain, and complete new conversations in order to bring about an altered network of conversations that results in the accomplishment of specific commitments. This chapter proposes that bringing about this alteration is an infective process in which change agents "infect" organizations with new conversations. Drawing on the field of epidemiology, it explores the nature of that infective process and the roles infective agents, susceptible hosts, and environmental factors play in it. These factors are then put into a conversational context and their implications for organizational change explored.

CONVERSATIONS

At the most basic level, conversations are "what is said and listened to" between people. A broader view of conversations as "a complex, information-rich mix of auditory, visual, olfactory and tactile events" (Cappella & Street, 1985), includes not only what is spoken, but the full conversational apparatus of symbols, artifacts, theatrics, etc. that are used in conjunction with or as substitutes for what is spoken (Berger & Luckmann, 1966). In this respect, conversations are the sum total of communicative relations in action in which language, body, and emotion are inextricably linked (Broekstra, 1998). The speaking and listening that goes on between and among people and their many forms of expression in talking, singing, dancing, etc., may all be understood as "conversation". Facial expressions and body movements, with or without the use of instruments or tools, constitute speaking. Similarly, listening is more than hearing, and includes all the ways in which people become aware and conscious of, or present to the world.

Conversations can range from a single speech acts, e.g., "Do it", to an extensive network of speech acts which constitute arguments (Reike & Sillars, 1984), narratives (Fisher, 1987), and other forms of discourse (e.g., Boje, 1991; Thachankary, 1992). Conversations may be monologues or dialogues and may occur in the few seconds it takes to complete an utterance, or may unfold over an extended period of time lasting centuries, e.g., religion. A single conversation may also include different people over time, as is the case with the socialization of new entry people in an organization (Wanous, 1992)

Although conversations are themselves explicit utterances, much of the way in which they support the apparent continuity of a reality is implicit, by virtue of a network

of background conversations similar to Harré's (1980) latent structures and Wittgenstein's form of life (Wittgenstein, 1958). A background conversation is an implicit, unspoken "back drop" within which explicit conversations occur and on which they rely for grounding and understanding. Background conversations are manifest in our everyday dealings as a taken for granted familiarity or obviousness that pervades our situation and is presupposed in our every conversation. A conversation between a female manager and male worker, for example, may occur against a background for gender, manager and worker, oppression or exploitation, human rights, business, organization culture, family relations, or the singles' dating market.

Background conversations are already and always there (Harré, 1980), comprising the intertextual links on which current conversations build and rely. As Bakhtin (1986, p. 86) points our, "our speech is filled with others' words … which we assimilate, rework, and reaccentuate." When we speak, our conversations are populated and constituted to varying degrees by what others have said before us and by our own sayings and ways of saying (Bakhtin, 1986). Through intertextuality (Spivey, 1997), conversations bring both history and future into the present utterance by responding to, reaccentuating, and reworking past conversations while anticipating and shaping subsequent conversations. When we are asked to justify or explain our linguistic characterizations, we respond with other linguistic characterizations which are themselves based in still other linguistic characterizations and so on (Searle, 1969).

It is the accumulated mass of continuity and consistency in the intertextuality of these conversations that maintains and objectifies organizational reality (Berger & Luckmann, 1966; Fairclough, 1992; Watzlawick, 1990). Objects exist for us as independent tangible "things" located in space and time and impose constraints we can

not ignore (e.g., brute force (Searle, 1995)); they are manipulable, and we can do something with and to them (Holzner, 1972; Watzlawick, 1990). When conversations become objectified, we grant them the same permanence as objects by assuming that they exist as some "thing" independent of our speaking them. But this is not the case. Conversations are ephemeral and have no existence or permanence other than when they are being spoken (Berquist, 1993).

Not only are conversations the process through which we construct organizations, they are also the product of that construction: conversations become the organization (Berquist, 1993). What we construct when we construct the reality of organizations are linguistic products, i.e., conversations, that are interconnected with other linguistic products to form an intertextuality or network of conversations. Organizations exist in the words, phrases, and sentences that have been combined to create descriptions, reports, explanations, understandings etc., that in turn create what is described, reported, explained, understood, etc. When we describe, we create what is being described in the description. Whether the characterization is taken for granted or is a basis for argument, we have nevertheless created the objects and their properties in our conversations (Winograd & Flores, 1987).

Conversations, therefore, are not only the process of social transmission, they are also the product of that transmission, i.e., the "what" that is transmitted. Conversations occur in and constitute the order and pattern of discourse that we understand as "the organization". Order of discourse refers to the ordered set of discursive practices between individuals and groups within a particular organization such as informal conversations, one-on-one meetings, formal presentations, etc. (Fairclough, 1992).

ORGANIZATIONS AS NETWORKS OF CONVERSATIONS

Organizations do not simply have conversations, they *are* conversations. More specifically, they are networks of conversations. For example, planning, budgeting, hiring, firing, promoting, managing, rewarding, etc. are all "macro conversations" that are interconnected and constitutive of organizations and which are themselves constituted by different "micro conversations". As networks of conversations, organizations are not discursively monolithic, but pluralistic and polyphonic with many conversations occurring simultaneously, sequentially, and recurrently (Fairclough, 1992; Hazen, 1993) within and as the context of other conversations. These conversations, in turn, establish the context in which people act and thereby set the stage for what will and will not be done (Berquist, 1993; Schrage, 1989).

Organizations, therefore, exist neither as objective entities nor as meanings people carry around in their heads, but in the conversations for, about, and around a limited number of matters in a few physical places with the particular people usually encountered there. Some of these conversations constitute the "social talk" in which people are related and share their lives, wants, likes, dislikes, etc. But other of these conversations engender commitments that are fulfilled through special networks of recurrent conversations in which only certain details of content differentiate one conversation from another (Winograd & Flores, 1987).

Recurrent conversations are interesting because they become embodied in the offices and departments that specialize in fulfilling some part of the engendered commitments and become background conversations for other departments that are not part of the fulfillment, but simply utilize the recurrent conversations (Winograd & Flores, 1987). For example, recurrent requests for travel reimbursements create a relatively

predictable pattern of recurrent conversations called “travel reimbursement” which include all attendant forms and protocols. Although other departments may not be engaged in fulfilling “travel reimbursements”, they nevertheless may refer to, use, or in some other way rely on or refer to these conversations in their own conversations. Recurrent conversations are also embodied in and constitute the orders of discourse (Fairclough, 1989; Fairclough, 1992) that are variously described as formalized, centralized, hierarchical, etc.

Recurrent conversations contribute to structural coupling between organizational participants in which people become habituated to (Berger & Luckmann, 1966) and naturalized in (Fairclough, 1995) the conversations that connect them . Indeed, if we employ Gergen’s (Gergen & Thatchenkery, 1996) concept of a distributed self in which identities rest not so much “in” the individual as “in” the conversations in which they are socially engaged and embedded, recurrent conversations give individuals their identities. This means that people will work to maintain the coupling in the face of environmental perturbation (Maturana & Varela, 1987) so as to maintain their identities. For this reason, structural coupling holds conversations in place and contributes to the persistence of existing conversations and orders of discourse.

What we come to know as an “organization” therefore, is a network of conversations that is the result of who has conversations with whom, about what, when, and where (Broekstra, 1998). Some conversations, because they occur between certain people (e.g., CEO and CFO), about particular subjects (e.g., downsizing), in certain places (e.g., board room), and at specific times (e.g., all day meeting), precipitate a particular set of conversations and lead to something happening, e.g., change. Other conversations, however, even though they may be about the same subject (e.g.,

downsizing) lead nowhere because they are between the "wrong" people, at the "wrong" time, or in the "wrong" place (Hardy, Lawrence, & Phillips, 1998). But all of these conversations constitute the network of conversations we call an "organization" and provide the context in which change occurs.

Given this terminology, we can define the state of an organization at any point by its network of conversations and the actions, behaviors, and practices associated with those conversations. Accordingly, the goal of organizational change is to bring about an alteration in the network of conversations such that there is a correlated alteration in the distribution of actions, behaviors, and practices within the organization. Changing the network of conversations, including orders of discourse, however, implies that some conversations grow and spread while others retract or disappear altogether. In this context, change can be seen as an infective process and epidemiology as a framework for understanding that process.

THE EPIDEMIOLOGICAL TRIANGLE

Epidemiology is the systematic study of the patterns and frequencies of disease or injury within a population and the factors that influence those patterns and frequencies (Ewald, 1994; Mausner & Kramer, 1985). Pattern includes the rate of disease or injury within a population and differences in that rate between groups within the population. At the heart of epidemiology is the assumption that the pattern of disease and injury is not randomly distributed throughout a community, but is the result of systematic differences among subgroups that effect their exposure and susceptibility to infectious or harmful agents. Furthermore, it is assumed that these factors and differences can be identified and the knowledge gained used to establish programs of prevention and control.

Although historically considered in conjunction with the acute spread of infectious disease, epidemiology has been used more recently as a framework for understanding excessive changes in the patterns of other social phenomena. The Center for Disease Control, for example, has studied changes in the frequency and patterns of violence within an epidemiological context (Jason, 1984). Epidemiology has also been used as a basis for understanding such social phenomena as alcohol problems (Weisner & Schmidt, 1995), drug use and abuse (Duncan, 1997), mental health (Turner & Marino, 1994), smoking trends (Guba & McDonald, 1993), stress (Hoyt, O'Donnell, & Mack, 1995), depression (Bromberger & Costello, 1992), political violence (Zwi & Ugalde, 1989), affective disorders (Turns, 1978), teenage and college student suicides (Schwartz, 1990; Shaffer, 1988), marital unhappiness (Singh, Adams, & Jorgenson, 1978), childhood injuries (Rivara & Mueller, 1987), and the alienation of college professors (Sandhu, 1972). By treating the spread of social phenomena in a manner analogous to the way infectious diseases move through populations, it is possible to gain new insights into the dynamics of these phenomena.

Epidemiologists contend that the pattern, frequency, and severity of disease and injury within a community can not be attributed to the presence of only one factor. Rather, disease and injury is a function of the interaction among three factors: agent, host, and environment (Ewald, 1994; Mausner & Kramer, 1985). Together, these three factors comprise an “epidemiological triangle.” The significance of this triangle is that is implies an alteration in any one of the three components can disturb the equilibrium among all of them such that there is an increase or decrease in the frequency of disease or injury.

Infective Agents

Agents are typically considered to be the biological, chemical, or physical entities that *must* be present for disease or injury to occur. For example, HIV is the biological agent of AIDS, lead is the chemical agent of lead poisoning, and a gun is the physical agent of a shooting. In the spread of infectious diseases, agents are the entities that are transmitted and "infect" their hosts.

Infect comes from the Latin word "in facere" meaning to put in. To infect someone, therefore, means to induce or insert something into their system. This something is an "infective agent" and where its induction is successful and the agent establishes itself within the host, infection results.

Infectivity & Disease

The ability of an agent to successfully enter and establish itself within a host, i.e., to produce an infection, defines the agent's infectivity (see Table 1) (Mausner & Kramer, 1985). The easier it is for an agent to "get in", to overcome host immunity, the more infective the agent. One way to think of infectivity is in terms of the quantity of agent that is required to produce an infection in a host. The smaller the quantity required, the higher the agent's infectivity.

[TABLE 1 ABOUT HERE]

In a conversational context, infectivity is evidenced both by the number of times something has to be said and the amount that has to be said before someone "gets" the conversation. Conversations that are relatively short and only have to be said once (e.g., "fire" in a crowded theater) have high infectivity, whereas, those that are more drawn out or have to be repeated numerous times have low infectivity. High emotion conversations,

for example, are more infective and more contagious than low emotion ones (Hatfield, Cacioppo, & Rapson, 1994).

Just because an agent "gets in", however, does not mean that it will have any effect on its host. Infection and disease (illness) are not the same. Infection refers to the presence of an infective agent in a host. Disease, on the other hand, refers to the effects or symptoms produced by that agent. Fevers, chills, vomiting, headaches, crying, upsets, etc. are all symptoms of an infection that is sufficient to bring about physiological or emotional changes in the host (Ewald, 1994; Hatfield, et al., 1994).

Whether an infective agent produces disease, and the severity of the disease it produces, depends on its pathogenicity and virulence. Pathogenicity is the ability of an agent to produce symptoms once it has entered a host. Nonpathogenic agents have no symptomatic effect on their hosts, whereas pathogenic agents produce some alteration in their host's normal functioning. Within a given population, agent pathogenicity is determined by the number of detectable cases of disease produced within that population. The greater the number of cases, the more pathogenic the agent and the greater the agent's *pathogenic effect*.

Whether pathogenic effects are mild or severe, however, depends on the agent's virulence. Virulence determines the degree of alteration an agent produces in the host with more severe effects being indicative of more virulent infections (Ewald, 1994). Low virulent infections produce little or no alteration in their hosts' performance. Day to day social or small-talk conversations, for example, although highly infectious and pathogenic, are generally non-virulent in terms of the alteration they produce in the actions, behaviors, and practices of participants. Highly virulent infections, on the other hand, produce significant alterations in host performance.

Infectivity, pathogenicity, and virulence determine whether or not an infective agent gets into a host (infectivity), whether the agent is able to produce an effect (pathogenicity), and, if so, the magnitude of the effect produced (virulence). Together, these three factors could explain why some changes seem to "take off" or produce dramatic results (high infectivity, pathogenicity, and virulence) while others never seem to "get off the ground" or produce relatively minor results (low infectivity, pathogenicity, and virulence). Indeed, revolutionary, rapidly moving changes may be the result of inducing infective conversations that are highly pathogenic and virulent, whereas, slower moving, incremental changes are the result of infective conversations with lower pathogenic effects and virulence. If this is the case, then one way change managers can alter both the speed and degree of change is to find ways to increase the infectivity, pathogenicity, and virulence of their conversations while neutralizing the infectivity, pathogenicity, and virulence of alternative conversations.

Stages of Disease

Differences in the magnitude or severity of the effects produced by infectious agents makes it possible to distinguish different levels or stages of disease (Mausner & Kramer, 1985). These stages are shown in Table 1. At the lowest level is the *exposure stage* in which no disease has developed, but the groundwork for it has been laid. Susceptible hosts may or may not have been exposed to the agent, and hosts may even be infected, but the infection has not reached a stage where it is detectable or symptomatic. In other words, there is no detectable evidence of an infection, if in fact one even exists, but there is an opportunity for exposure to an infective agent. From a conversational standpoint, people in organizations are always in the exposure stage since there is always

the opportunity that they will be exposed to some "new" conversation. In this sense, organizations are rich reservoirs of infective conversations.

[TABLE 2 ABOUT HERE]

In the *pre-clinical stage*, there are no manifest reactions or symptoms in the host, but the presence of the infection can be detected through screening tests. With biological diseases, such as AIDS, there are laboratory tests that can be used to determine whether the disease is present before any symptoms are evident. In the case of conversations, the corollary tests are questionnaires that may reveal "private conversations", e.g., what people think, though there is no corresponding public manifestation of that thinking.

The *clinical stage* occurs when there are recognizable and overt symptoms or evidence of disease. Some of these symptoms reflect direct alterations in the appearance (e.g., a rash) and functioning of the organism (e.g., reduced mobility). Other symptoms reflect the interaction of the organism's immune system with the infection. Fever, for example, is indicative of an organism's interaction with an infection. In the case of conversations, the clinical stage is evident in all instances where people publicly resist, endorse, or question what is being introduced.

Within the *clinical stage*, there may be multiple levels of disease progression. For example, in diffusions of innovation, movement from acknowledged awareness to adoption (including rejection) would all be seen as occurring within what is called the clinical stage. Similarly, much of what constitutes the transition period in change (Beckhard & Harris, 1977) occurs within this stage.

Finally, the *disability stage*, refers to any altered or diminished capacity suffered by the host as a result of the disease. This disability may be relatively minor, as in retarded mobility, or severe, as in paralysis or death. Within the context of organizational

change, disability is more appropriately replaced with adoption (as in innovations), habituation, or institutionalization. Given this replacement, organizational change can be seen as a process of moving a conversation through the stages of disease such that it becomes part of the network of conversations that constitute the organization.

Disease, therefore, refers to the outcomes produced by a given infection and the severity of disease refers to the magnitude of those outcomes. As applied to organizational change, disease, at its most general level, refers to the effects, intended and emergent, that result from introducing new conversations into an organization. In this respect, the exposure stage implies that the opportunity for infection occurs the moment someone comes into contact with an infected host or any other carrier of an infectious agent (e.g., email). The preclinical stage suggests that it is possible for someone to be infected with a conversation and to be unaware they are infected. As Weick points out, people may not know what they think until they see what they say (Weick, 1979; Weick, 1995). Because there are no observable symptoms, the pre-clinical stage can give the appearance that nothing has happened and that the change is "not taking" when in fact this is not the case.

At the clinical stage, however, there is manifest evidence that people are engaged with the conversation. This engagement may range from open skepticism, challenges, and complaining to the emergence of new language, actions, and practices consistent with the conversation (Barrett, Thomas, & Hocevar, 1995). At this stage, overt resistance is evidence that the new conversation is engaged and that it is being contested by other conversations. The outcome of this contest will determine whether the disease progresses and thus its severity.

Finally, the disability stage implies that a change has "institutionalized" itself by becoming incorporated into the organization's network of conversations and generating new actions, behaviors, and practices within the organization. The pervasiveness of this disability, however, may be systemic or local. That is, the disability may affect the entire organization, e.g., a new compensation program that covers everyone, or be limited to some subset of the organization, e.g., use of total quality management principles in manufacturing only.

As a disease progresses through the different stages, there is always the possibility that the host will recover. Recovery may be the result of treatments intended to counter the disease (e.g., chemotherapy, surgery), or the host's immunity system overcoming the disease. When recovery occurs, the disease goes away and the host appears to revert to its original healthy state. But this appearance is misleading in those cases where the infection results in increased host immunity, making subsequent infections both less likely and more difficult to produce. When and whether subsequent infection is possible depends on whether the immunity produced from prior infections is local or systemic and whether it is temporary or permanent. Systemic permanent immunity makes subsequent infection impossible whereas local temporary immunity makes subsequent infection both more likely and more frequent.

The ability of infections to produce immunity means that changes, especially those that fail, can increase resistance to subsequent change (Reichers, Wanous, & Austin, 1997). Indeed, people can become cynical about change and dismiss all efforts, regardless of their utility or benefit. As a result, subsequent changes will require higher infectivity, pathogenicity, and virulence if they are to have a chance of succeeding. This cycle offers one explanation for why managers find it increasingly difficult to produce

change: prior changes and change attempts have increased immunity and the level of resistance subsequent changes must transcend if they are to take in an organization.

Memes: Conversational Agents of Infection

In his work on the relationship between genes, culture, and human diversity, Durham (1991) proposes that cultural evolution and change is symmetrical to organic change. That is, culture is a "paragenetic" transmission system whose influence on individuals is symmetrical to that of genes. Among other things, this means that culture is an inheritance system that is transmitted socially through "units of transmission" and that changes in these transmission units can cause changes in the actions, behaviors, and practices, of a given population.

According to Durham (1991, p. 188), any unit of cultural transmission must meet three conditions. It must "(1) consist of information that actually or potentially guides behavior, (2) accommodate highly variable kinds, quantities, and ways of organizing information (that is, with variable amounts of hierarchy and integration), and (3) demarcate bodies of information that are, in fact, differentially transmitted as coherent, functional units." In organic evolution, these units of transmission are genes. In cultural evolution, these units of transmission are memes.

Memes. Drawing on the work of Dawkins (1989), Durham, among others (Dennett, 1991; Dennett, 1995; Lynch, 1996), proposes that the unit of cultural transmission that is symmetrical to the gene is a "meme" (rhymes with gene). Dawkins (1989, p. 192) provides the following explanation for the derivation of this term:

> "We need a name …, a noun that conveys the idea of a unit of cultural transmission, or a unit of *imitation*. 'Mimeme' comes from a suitable Greek root, but I want a monosyllable that sounds a bit like 'gene'. I hope my classicist friends will forgive me if I abbreviate mimeme to *meme*."

According to Dennett (1991, p. 201), memes are, roughly speaking, ideas. "Not the 'simple ideas' of Locke or Hume (the idea of red, or the idea of round or hot or cold), but the sort of complex ideas that form themselves into distinct memorable units." Examples of memes are clichés, tunes, catch-phrases, clothes fashions, ways of making pots or of building arches, right triangle, wheel, chess, evolution by natural selection, and so on (Dawkins, 1989; Dennett, 1991).

Memes are the smallest functional units of cultural transmission. They are also variable units of transmission in that they can vary in size, form, and internal organization (Durham, 1991). The opening five notes of Beethoven's 5th symphony, for example, constitutes a meme just as "symphony" itself is a meme. Yet, the two memes differ significantly in their size, form and organization. What is critical to memes, therefore, is not size, form, or organization, but coherence and the ability to replicate with reliability and fecundity (Dawkins, 1989).

Longevity, fecundity, and accuracy of replication influence the propagation of memes (Dawkins, 1989). If meme "C" exists longer than meme "D", all other things being the same, there will be more of meme "C" in a given population than meme "D". But longevity, by itself, is of little value in the absence of replication because the meme could be located in only one vehicle. A meme published in one book that sits on the shelf in someone's library and is never read may exist a long time, but it will not propagate itself in the population. On the other hand, a meme that is published in a best seller has the opportunity to propagate widely throughout the population. The existence of a meme, therefore, depends on its ability to propagate through a continuous chain of vehicles that are able to persist (Dennett, 1991; 1995).

Fecundity refers to how prolific memes are in reproducing themselves. If meme "A" makes copies on the average of once a week, while meme "B" makes copies on the average of once an hour, "B" will outnumber "A" even if "A" has greater longevity. Fecundity means that the "success of a meme depends critically on how much time people spend in actively transmitting it to other people" (Dawkins, 1989, 198). Quite simply, a meme will spread only if people are engaged in transmitting it through any available meme vehicle. Even speaking against a meme helps its spread. Why? Because in order to speak against something, you must bring that something into the conversation, thereby spreading it. For example, one can not speak against sexism without mentioning sexism in some way and thereby replicating the "sexism" meme.

Accuracy of replication has to do with the amount of variation produced in a meme (these variations constitute allomemes). If "X" makes a mistake every 10^{th} time and "Y" makes a mistake every 100^{th}, there will be more Y than X (Dawkins, 1989). But accuracy in this case does not mean an exact replication of the meme. As Dawkins points out, there need not be an exact copy of each meme, written in some memetic code in each person's brain. Memes are susceptible to variation and mutation during replication. This susceptibility is known to everyone who has ever played the "telephone" game in which one person repeats what they are told to the next person and so on in a sequential pattern. At the end of the sequence, there is often considerable difference between what the first person said and the last person heard.

During replication there are errors which are themselves replicated. In the preceding example, "X" is the source of more variants than "Y", each of which replicates with a particular accuracy, fecundity, and longevity. If any of these variants are more vivid and gripping than the original, they will eventually out propagate it (Lynch, 1996).

This phenomenon of being "out propagated" occurs during organizational change when there are several understandings (i.e., misunderstandings and rumors) about why a change is being made and what its consequences might be. Some of these variants will be favorable toward the change and others will not. If, for example, one of the unfavorable variants propagates faster than the original, change agents can end up explaining themselves or addressing variant issues which are different from the original change.

Allomenes: Variations of a Meme. A meme is like a template for which there are many possible variations. For example, there are many different forms of the "handshake" meme. Consistent with this idea of variation, Durham (1991, p. 189) subdivides memes into two categories: holomemes and allomemes. Holomemes are the more inclusive of the two categories and "represent the entire cultural repertory of variation for a given meme, including any latent or unexpressed forms." A holomeme, therefore, is the set of all existing and possible variations of a particular meme. For example, the holomeme of the meme "number" includes all the existing forms and variations of numbers, e.g., whole, rational, imaginary, as well as those forms and variations that have not yet been invented but which will be classified as numbers. Likewise, the holomeme for the meme "management" includes all the various forms and expressions of management such as strategic management, human resource management, financial management, etc. Holomemes, therefore, are the set of all existent and possible allomemes (variants) of a meme.

An allomeme is one particular form or variant (i.e., a specific element) of a meme that is actually used by some members of a population in some circumstances (Durham, 1991). If a meme is like a theme, then an allomeme is a variation of that theme. Examples of allomemes include alternative corporate strategies, different forms and

programs of compensation, alternative styles of leadership and motivation, different conceptions about "resistance to change", and alternative definitions of words such as change.

Instructive Effects. What is particularly significant for us about memes and allomemes is that they have "instructive effects". What this means is that memes influence the overt and latent properties of their carriers (Durham, 1991). Instructive effect implies a correlation between the distribution of allomemes and the distribution of properties within a given population such that an alteration in the distribution of allomemes within a population results in an alteration in the distribution of corresponding properties within that population. Some of these alterations may be relatively small, incremental, and virtually undetectable, whereas, others may be quantum like and readily observable (Durham, 1991; Tushman & Romanelli, 1985).

The idea that allomemes have instructive effect is highly significant when considered in the context of organizations as networks of conversations because it implies that a change in the distribution of those conversations can produce corresponding alterations in organizational properties. For example, if an organization can alter the distribution of conversations in its network such that the conversation "complain to someone who can do something about it" occurs more frequently and in more places, there will be an alteration (increase) in the number of complaints resolved. This implies that the properties of organizations, such as their structures, operating practices, orders of discourse, etc. are all a function of the content and distribution of conversations (allomemes) that constitute the organization's network of conversations and that alterations in these conversations will have correlative instructive effects. Under these conditions, organizational change becomes a function of the differential transmission and

selection of conversations in which the frequency of a conversation or set of conversations changes through time.

Viral Sentences. If memes, as root conversations, are the foundational agents of transmission in organizations, how are they able to propagate? Hofstadter (1985) provides some insight into answering this question in his discussion of "viral sentences". Viral sentences are self-replicating conversations that operate in a manner similar to viruses. Viruses are small "objects" that enslave larger and more self-sufficient hosts (e.g., cells), getting them by hook or crook to carry out a complex sequence of replicating operations that bring new copies into being, which are then free to go off and infect other hosts (Hofstadter, 1985).

For example, consider Sentence A: "It is your duty [job, obligation, calling, mission, etc.] to convince [inform, tell, persuade, etc.] others that 'this' is true [false, real, etc.]". Whenever you are in Sentence A, you execute it and engage in convincing others that "this" is true [real]. And, if others have the same sentence, they will do the same, and so on. In other words, Sentence A gets you to engage in transmission, i.e., it is self-replicating.

Not all conversations, however, are self-replicating. So how do they spread? Hofstadter proposes that they spread by combining with self-replicating sentences in a symbiotic relationship in which each plays a complementary and mutually supportive role in the survival of the sentence system they together comprise. In other words, conversations that are not self-replicating must combine with or drag along self-replicating conversations to ensure their own replication. Since conversations can be fragmented, combined, and recombined, it is possible for any sentence to become viral.

How infective, pathogenic, and virulent the resulting sentence is, however, will be a function of the infectivity, pathogenicity, and virulence of the combining elements.

For example, let us assume that the entire system of sentences (e.g., a body of theory, research, and beliefs) which comprise "resistance to change" is not self-replicating. This means that this system of sentences, by itself, will not get you to engage in transmission, i.e., it will not reproduce itself. But consider what happens when the word "this" in Sentence A (which is a self-replicating sentence) is replaced with the phrase "resistance to change", giving us "It is your duty to convince others that resistance to change is real". The result of this combination is a new self-replicating sentence in which people transmit to others that "resistance to change" is real.

In the preceding example, Sentence A and "resistance to change" form a symbiotic relationship in which each plays a complementary role in the survival of the new system they together constitute. In such cases, sentences like Sentence A are *hooks* and the sentence or system of sentences with which they combine (e.g., "resistance to change") are the *bait* (Hofstadter, 1985). Once the bait is taken, the recipient is "hooked" and will engage in the transmission of the new sentence combination.

Another, more general version of this "bait-and-hook" combination is found when sentences such as "The *villain* is *wronging* the *victim*." (Hofstadter, 1985) combine with Sentence A giving us the sentence "It is your duty to inform others that the *villain* is *wronging* the *victim*". In this example, villain, wronging, and victim are themselves placemarkers (like "this" in Sentence A) that can be replaced with other sentences or sentence systems. For example, "The President is lying to the people", "Management is cheating the union", and "The Dean is not leading the faculty", are all variations (i.e., allomemes) of this sentence.

Hofstadter's work implies that in order for conversations to replicate, they must either be self-replicating or combine with ones that are. In other words, conversations that are not self-replicating (i.e., "bait") must combine with or drag along self-replicating conversations in order to ensure their own replication. Although Hofstadter never explicitly addresses the characteristics of "hooks", other than their self-replicatability, his examples suggest that normative conversations, such as "should", "ought", "must", and "have to", are central.

According to Dennett [, 1991; 1995], normative conversations are among the most entrenched in our culture and among the conversations that constitute us, they play a central role. If we accept Hofstadter's viral sentences meme, the central role of normative conversation is one of propagation not only of themselves, but of all the conversations with which they combine. Thus for example, in the combination "The whales are in danger of extinction and we should save the whales", the phase "we should save" is the normative part that has us engage in getting others to help save the whales. Notice that when the normative part is removed, "The whales are in danger of extinction" is just an assertion and does not "hook" one as easily.

Environmental Exposure to Agents

Infective agents produce no contagion in the absence of exposure to susceptible hosts. Environmental factors, such as population density, availability of transmission vehicles, etc., are the biological, social, and physical conditions in which hosts reside (Mausner & Kramer, 1985) and determine the opportunities a host has for exposure to infective agents. One environmental factor that influences exposure is prevalence.

Prevalence.

Prevalence is the number of existing cases of a specific infection in a population at a given point in time (Mausner & Kramer, 1985). Within a given population, N, there are people who are infected, I, people who are susceptible, S, and people who are immune or have recovered and can not be reinfected, R (Cavalli-Sforza & Feldman, 1981) such that N = S + I + R. Prevalence, therefore, is the ratio I/N at a given point in time and changes in this ratio over time determine whether an infection is spreading. For any host population, there is a prevalence that is considered normal, or endemic, for that population.

The higher the prevalence, the higher the likelihood a susceptible host (S) will come into contact with an infected host (I). And, the higher the infectivity of the agent, the higher the likelihood of infection resulting from that exposure. Research on emotional contagion, for example, shows that the likelihood of being infected with the moods of others is a function of the number of people around you in that mood and the severity of the mood (Hatfield, et al., 1994). Prevalence, therefore, tells us the extent to which a particular conversation or set of conversations exists within a population and whether those conversations are spreading, remaining the same, or diminishing.

[TABLE 3 ABOUT HERE]

Prevalence depends on incidence rates and duration of infection. An incidence rate establishes the probability a susceptible person will become infected and is defined as the number of new infections that occur within a given period of time. In general, the higher the incidence rate, the higher the rate at which susceptible people are becoming infected, and the greater the prevalence.

Two factors that influence incidence rates are agent infectivity and contact rates. Infectivity refers to the ability of an agent to invade and multiply in a host and is a

function of agent-host interaction. In general, where there is high (low) infectivity, there will be high (low) incidence. But levels of infectivity can be offset or amplified by changes in the contact rate. The contact rate, which is a function of social dynamics, refers to the average number of people someone comes in contact with in a given period of time. For a given level of infectivity, increases (decreases) in contact rates will produce higher (lower) incidence rates as infected hosts increasingly come into contact with susceptible hosts.

The level of prevalence is also influenced by duration or how long the disease lasts before the infected host recovers. Where the disease is chronic, such as diabetes, duration can be for the life of the host. For other diseases, such as the 24-hour flu, duration is very short. In general, the longer the duration the higher the prevalence. Once someone has recovered, they are either susceptible (e.g., common colds), and can become reinfected, or they are immune and are removed from the susceptible host pool.

Since conversations are ephemeral, they will be of short duration unless ways are found to increase their existence. Indeed, part of the job of infecting an organization with a new conversation is finding ways to keep the conversation in existence. In this respect, we are all familiar with occasions where great ideas were generated and agreements made only to be forgotten shortly thereafter. They were forgotten not because people didn't care, were malicious, or any number of other reasons, but because the conversations had no existence independent of when they were spoken. As will be discussed below, one way to increase existence is through the use of different meme vehicles, e.g., media, which increase the duration of the conversation.

Where organizations are networks of conversations, there is a prevalence for each and every conversation. Indeed, it is this prevalence that determines the distribution of

conversations within the organization. Accordingly, alterations in prevalence reflect an alteration in the distribution of conversations and, to the extent these conversations have instructive effects, the actions, behaviors, and practices within the organization. Prevalence, therefore, offers one way to determine the extent to which a new conversation has been successfully introduced into an organization. By increasing a conversation's infectivity (e.g., its attractiveness), the frequency of contact between infected and susceptible hosts, and the duration of the infection, change managers can increase prevalence.

Epidemics. Shifts in prevalence are the basis for declaring whether or not an epidemic exists, with the pattern of prevalence determining the type of epidemic. In a common or point source epidemic, incidence and prevalence increase from the exposure of susceptible hosts to a common source of infective agents. For example, an epidemic of food poisoning is the result of people being exposed to a common food source containing the infective agent. This exposure may involve a single, one time occurrence, several occurrences over time, or be continuous. Common source epidemics are characterized by an explosive onset of infection (very high incident rate) that is limited and localized in time, place, or persons and then diminishes (see Figure 1a).

Propagated or progressive epidemics are caused by the transmission of an infectious agent from infected host to susceptible host on a one-to-one basis. In propagated epidemics, there are many sources of the infection and the number of sources increases until the infection runs out of a sufficient number of susceptible hosts, the sources are contained or eliminated, or immunity sets in. Propagated epidemics are characterized by a slower increase in prevalence up to some limit and then they decline (see Figure 1b).

[FIGURE 1 ABOUT HERE]

The difference between point source and propagated epidemics provides a framework for how one goes about introducing a new conversation. If a change agent is interested in a "rapid start", then broadcasting from an infected host to many susceptible hosts is appropriate. Indeed, this particular strategy is used in organizational change when there is an interest in getting the message out as quickly as possible. Alternatively, if the change agent is interested in a slower start that builds momentum, then a progressive or propagated epidemic is appropriate. In this case, the change agent relies on numerous emissaries to spread the word and for those they infect to do the same. One of the nice things about organizational change is that both strategies can be used so that it is possible to infect a large number of people quickly and then have them propagate the infection throughout the organization.

It is worth pointing out that there is a self-correcting character to epidemics in that the rising risk of infection can prompt susceptible hosts to take self-protective measures (Philipson, 1996). These measures tend to reduce their exposure (e.g., lower the contact rate) or increase their immunity (e.g., lower infectivity). As a result, an epidemic will moderate as the number of susceptible hosts effectively decreases relative to infected hosts. In the case of organizational change, this tendency could be evidenced by people avoiding meetings, failing to read email or other information, and hanging out with other noninfected susceptibles so as to "protect" themselves from what is happening.

Transmission.

For an infection to propagate through a population, there must be mechanisms for transmitting the infective agent from its source (e.g., infected host) to susceptible hosts. Although speaking and listening, reading and writing are the underlying technologies of

cultural transmission (Dennett, 1995), there are many variations in how and in what forms, these are used. Indeed, the proliferation in transmission vehicles (e.g., the internet) means that conversations are virtually unquarantineable as they leap from vehicle to vehicle, medium to medium. Epidemiologists distinguish between direct and indirect forms for the transmission of infective agents.

Direct. Direct transmission refers to an essentially immediate transfer of an infective agent from its source (e.g., an infected host) to a susceptible host through direct contact (e.g., touching). In the case of conversations, direct transmission refers only to those forms of direct personal contact that are available in face-to-face interactions. This does not mean, however, that direct transmission requires verbal communication. Research on emotional contagion, for example, shows that emotional states (e.g., upset, anger, irritation, etc.) propagate from individual to individual even in the absence of verbal communication (Hatfield, et al., 1994).

Direct transmission can occur whenever there are mobile infectious agents or mobile susceptible hosts. Mobility increases the opportunity for the host and agent to come in contact with each other, thereby increasing the contact rate, incidence, and prevalence. Where the agent is mobile, infections occur when the agent moves into a population of susceptible hosts. For example, someone who is in a bad mood can infect an entire group of people who were otherwise feeling fine. It is this ability to dampen other's mood that gives rise to the attribution that someone is a "wet blanket".

Alternatively, infectious agents may be located in stationary sources. Under these conditions, the infectious agent must "sit-and-wait" for susceptible hosts to come to it (Ewald, 1994). Pathogenic E.coli bacteria, for example, require that the susceptible host eat something contaminated with the bacteria. In this method of direct transmission,

infection occurs when susceptible hosts come into contact with the source and prevalence is a function of the how many hosts come into contact with source.

With direct transmission, mobility determines whether it is the infectious agent or the susceptible host that is responsible for exposure. Determining which is mobile is of significance because it dictates both what is needed to propagate an infection (e.g., increase mobility) and how to stop its propagation (e.g., decrease mobility through quarantine).

Indirect. Indirect transmission refers to the transmission of an infective agent from a source to a susceptible host through some form of intermediary vehicle. In the case of conversations, these vehicles include all the artifacts and expressions of human culture including books, pictures, music, papers, sayings, machines, charts, dance, etc. (Dennett, 1991). For example, this chapter and the book it is in are a form of indirect transmission, as are training videos and journal articles. With indirect transmission, the likelihood of infection increases with the number and form of vehicles and with the number of susceptible hosts who come into contact with those vehicles. This means that as long as an infective conversation is embodied in any vehicle, and there are susceptible hosts, there is a potential for infection. Only when all the vehicles in which a conversation is embodied are destroyed is the potential for infection eradicated.

An advantage of indirect transmission is that it expands the reach of infectious agents by eliminating the need for source or host mobility. By propagating the number and variety of vehicles, infective agents effectively increase their contact rate, thereby increasing incidence and prevalence. As a result, indirect transmission can substantially increase the speed and distance with which an infection can spread.

Direct transmission means that the opportunity for infection exists only as long as the source of that infection survives in the host's environment and its infectivity is preserved. Once the source or its infectivity is removed, there is no opportunity for infection. Hence, removal of the source eliminates the threat of infection while persistence of the source continues the threat.

With indirect transmission, propagation depends on the availability and persistence of different vehicles, and can continue even if the original source no longer exists. The works of Plato, for example, continue to propagate even though Plato is no longer alive. Because conversations are ephemeral, they depend on their embodiment in humans or other vehicles for their continued existence. If all such embodiments disappear or are destroyed, infectious agent's have no way to move from source to host. For this reason, the fate of any conversation depends on the variety of forces that act on the many vehicles that embody them (Dennett, 1991). The elimination of all vehicles will bring about extinction of the conversation much in the same way the extinction of a species eliminates its genes.

The environment, therefore, determines the opportunity that exists for an infectious agent to come into contact with a susceptible host. The more prevalent a disease within a population, the greater the opportunity for exposure and infection. The relative ease with which both sources of infectious agents and susceptible hosts can move through a population also increases the opportunity for exposure and infection. This is one reason why isolation and quarantine is an effective way for fighting the spread of disease. Finally, the availability of alternative transmission vehicles also increases the opportunity for exposure and infection.

Host Susceptibility

At first glance, it would seem that the introduction of an infectious agent into a community where there is a high likelihood of exposure to that agent would be sufficient to produce disease. But this is not the case since host susceptibility influences the likelihood of infection. Susceptibility refers to the responsiveness of a host to a *specific* infective agent. In a sense, susceptibility is like a "readiness for" or "receptiveness to" infection. Highly susceptible hosts are very responsive and easily infected by a particular agent, whereas, immune hosts are unresponsive to that agent.

What is significant about susceptibility is that it is always specific. That is, susceptibility is always with respect to specific infective agents. Someone who is susceptible to the measles, for example, is not necessarily susceptible to cholera. This means that when we talk about susceptibility, we must do it relative to a particular agent, not as a general condition.

That susceptibility is specific suggests that "readiness for change" should be treated as a specific condition that can only be established in relation to the induction of a particular change. An organization that is ready for reengineering, for example, is not necessarily ready for cultural transformation even though both may be "ready for change". For this reason, it may be inappropriate to talk about readiness for change as if it is a generalizable condition independent of the specific change being considered.

Immunity

Immunity refers to a host's capacity to counteract the effects of an infective agent and results from natural endowment, immunization, or prior infections with the same or related agents. Some immunities last a lifetime, whereas other immunities can be lost through continued exposure to infective agents or due to other infections. AIDS, for

example, reduces immunity to forms of infectious diseases to which a host was previously immune.

Durham's (1991) work suggests that host susceptibility to conversations is in part the result of preference based on secondary (i.e., learned) values (e.g., "rules of thumb, wise proverbs, social conventions, moral or ethical principles'). Secondary values are conversations from prior infections and immunizations that serve as the very criteria for the evaluation of other cultural phenomena (i.e., other conversations), thereby creating susceptibility differentials that would otherwise not obtain. For example, we all have conversations of the form "Ignore everything that appears in or is said by X".

Existing conversations, therefore, become the filters for subsequent conversations, making it hard for new conversations to invade. If new conversations "pass" the evaluation, they get in. These filters, which are themselves simply other conversations, constitute a type of immunological barrier that responds to the introduction of new challenges. The success of these barriers determines whether or not a host is susceptible and the nature of that susceptibility.

An example of this filter process can be seen in scientific processes (Durham, 1991), such as that found in the academic research. The conversations of science – theories, hypotheses, research methods for example – are transmitted differentially depending on their consequences in explaining phenomena. In this respect, empirical research that explains a significant amount of variance is viewed more favorably and transmitted more widely than research that does not. Indeed, science has even created an entire set of conversations for establishing and communicating if what is discovered is "statistically significant". Conversations that meet or exceed these standards for significance are transmitted with far greater success than those that do not. In fact, it is a

rare piece of empirical research that is published without meeting these standards. But "statistical significance" is itself a conversation that is used as the basis for selecting other conversations, i.e., statistical significance is a secondary value. And, as a secondary value, statistical significance becomes a limit on what can be published.

Another example of this filtering is found in a study of the influence of mismatches in corporate cultures on the interorganizational relations between two organizations (Wilkof, Brown, & Selsky, 1995). The two organizations were unable to resolve problems, though technical and structural solutions existed, because they did not realize that their perceptions and understandings of the other were filtered through their cultural lenses. When they talked about critical incidents, personnel from the two organizations observed that "not only did the stories not match most of the time, it did not even sound like people were talking about the same incident or the same companies" (p. 377). Managers in both organizations were unable to acknowledge and understand each other's culture and continued to misinterpret each other and to blame each other for the problems. They were, quire simply, unable to see the other's point of view. Failures were attributed to the other's "way of doing things" consistent with their own culture. It was not until the consultants were able to get the managers to consider alternative interpretations (engage in different conversations) that things began to improve.

The preceding examples suggest that the dynamic between infective agent and susceptible host is similar to the active-attractive dynamics found in trialectics. Trialectics proposes that the movement from one state (e.g., uninfected) to another state (e.g., infected) involves two interdependent components: attractives and actives (Ford & Ford, 1994). Attractives are like magnets in that they attract, draw, or pull things toward

them. We have all had the experience of being drawn or attracted to something or someone, e.g., food, another person, a vision, etc. They were attractive.

But attractives are only attractive to things that are "active", i.e., that are looking for, listening for, or open to what is being offered, made available, or given off by the attractive. An entity is considered active in that it "acts on", is receptive to, or is susceptible to the attractive entity. Food is not attractive to someone who has just eaten, but it is to someone who is hungry; hunger is active, food is attractive. Things are attractive to us because we are "active" with respect to them; there is no attractive without an active.

Host susceptibility and agent infectivity, therefore, can be seen as an active attractive dynamic in which an agent is infective (active) because a host is susceptible (attractive). For example, if someone is “cynically active”, cynical comments will be attractive and they will notice cynicism more than someone who is “empowerment active”. In this sense, the relationship between agent and host is like velcro in which the agent has one piece and the host has another piece, and without the complementary piece, nothing sticks.

Herd Immunity.

One consequence of individual host immunity is a condition referred to as herd immunity. Herd immunity is the resistance of an entire group to the propagation of an infectious agent based on the immunity of a proportion of individual members within the group. The higher the proportion of immune hosts, the higher the “herd immunity” and the lower the likelihood of a contagion within the group. Herd immunity decreases the probability a group or community will experience an epidemic after the introduction of an infectious agent even though group members may be susceptible.

Herd immunity is of particular significance with infections spread through direct transmission because once the infection encounters an immune host, it stops spreading. Because of herd immunity, it is not necessary to achieve 100 percent immunity in a population in order to halt the spread of directly transmitted infections. Indeed, several well placed, immune hosts can effectively stop the spread of an infection even in a large population of susceptible hosts. Herd immunity explains why some groups never seem to get infected with particular ideas and why it is that only a few people can apparently "shut down" a change. Herd immunity is less effective where infections propagate through indirect transmissions because there are more opportunities for agents to come into contact with susceptible hosts.

DISCUSSION AND IMPLICATIONS

Where organizations are considered networks of conversations, change managers are engaged in altering the network of conversations that constitute the organization through the introduction of new conversations and patterns of discourse. For an alteration in the distribution of conversations to have a sufficient instructive effect in the organization, the change per unit of time in the distribution of conversations must either be large or cumulative (Durham, 1991). This means that change managers must be able to successfully introduce and sustain conversations that spread quickly, as with point source epidemics, or that spread cumulatively, as with propagated epidemics. In this regard, organizational change can be understood as an infective process in which the work of change managers is to purposively infect an organization with new conversations that spread and become part of the organization's network of conversations.

Managing the Triangle

According to the epidemiological triangle, the spread of any infectious disease is a function of agent, host, and environment factors. Increasing agent infectivity, opportunities for exposure, and host susceptibility increases the likelihood of infection and disease. For change managers, increasing the likelihood of infection means finding ways to make the conversations more infective, increasing opportunities for susceptible hosts to come into contact with infectious agents through direct and indirect transmission, and increasing host susceptibility (reducing immunity).

Increasing Agent Infectivity.

Ford and Ford (1995) propose change managers can increase conversational infectivity by being more selective in the type of conversations they use and when they use them. Conversations for understanding, for example, are appropriate and useful when understanding is wanted, but not when action is called for. Where change managers are interested in action, they will find conversations for performance to be far more effective. The difference in these conversations implies that conversations for performance are more infective in the domain of action, whereas, conversations for understanding are more infective in the domain of understanding. Furthermore, with conversations for performance, unreasonable requests and promises appear to be more pathogenic and virulent than ordinary requests (Goss, 1996).

Clearly there are likely to be other factors that contribute to the infectivity of particular conversations and additional research is needed to discover what these factors might be. For example, conversations that are high in emotional content, particularly of an unsettling nature, are highly infective and spread rapidly as people attempt to cope with their reaction (Kubey & Peluso, 1990). This, along with other research on emotion

contagion (Hatfield, et al., 1994), suggests that change managers can alter the infectivity of their conversations by the amount and type of emotion they display. Excitement and enthusiasm, for example, are more likely to support a change than are despair and hopelessness. However, if the use of emotion is seen as inauthentic, it could reduce credibility, making the conversation less infective while contributing to distrust and cynicism (Kouzes & Posner, 1993; Reichers, et al., 1997).

Increasing Host Exposure.

In addition to making conversations more infective, change managers can also find ways to increase the exposure of susceptible hosts to sources of infective agents. Prevalence implies that change managers can spread change by "surrounding" susceptible hosts with infected hosts and other indirect conveyance methods that contain infectious agents. If this is the case, then change managers would do well to keep infected hosts (e.g., advocates and supporters) mobile so as to increase prevalence within different areas of an organization. Any new conversation introduced into an organization has, by definition, little or no prevalence in that organization. Although this means that the infected host has a large pool of susceptible hosts, it also means that the host risks being reinfected with the more prevalent conversations of the organization, i.e., a relapse. If a relapse occurs, the more prevalent conversations will persist, giving the appearance of inertia or resistance, when if fact what has happened is that the host has been re-infected with the prevalent conversations.

Increasing exposure also raises issues of existence. Conversations are ephemeral and have no existence independent of the vehicles that embody them. Based on the principles of transmission, existence is a function of the number of infected hosts and the number, variety and longevity of the vehicles in which infective agents are embodied. If

there are few infected hosts and few, if any vehicles, a conversation will have less existence than where there are many hosts and vehicles. Low levels of existence are evident in people "forgetting" or "not knowing". As existence increases, people become "habituated" to the conversation and it becomes part of the network of conversations.

Recognizing that prevalence is a function of existence means that change managers do not have to attribute low incidence rates to personal characteristics or attributes, e.g., personality. Rather, change managers can look for ways to add existence to conversations by increasing the number of vehicles that embody the conversation and the frequency with which the conversation is spoken. For example, change managers can increase the contact rate and the duration of each contact, thereby increasing exposure.

Increasing Host Susceptibility.

Host susceptibility to a specific conversation is a function of prior experiences with that or related conversations. Where those experiences have been favorable, susceptibility is likely to be higher than where experiences have been unfavorable. In this respect, research has shown that unfavorable experiences result not only in cynicism toward change, but those who initiate it (Reichers, et al., 1997). From a procedural fairness standpoint, employees are likely to expect an explanation for a change decision regardless of whether outcomes are positive or negative. And, if they are not given an explanation, they are likely to feel the procedures for making the decision are unfair, leading to resentment against the decision as well as the decision makers [Daly, 1995 #471.

The impact of prior experiences on susceptibility implies that change managers may be able to increase host susceptibility (reduce immunity) by bringing closure to prior experiences (Albert, 1983; Ford & Ford, 1995). It also implies that how managers

conduct changes now can and will have implications for how people react to future changes. Accordingly, managers who are interested in creating organizations susceptible to future changes will want to learn how the changes they are currently introducing and managing are raising or lowering host susceptibility. Research on cynicism toward change, for example, proposes that managers can reduce the likelihood of cynicism if they openly and completely communicate the results of changes, no matter what they are (Reichers, et al., 1997). Similarly, research on leadership suggests that host susceptibility to change will increase along with the change manager's credibility which is a function of authentic and straight communication (Kouzes & Posner, 1993).

The realization that host susceptibility is a function of prior conversations suggests the possibility that hosts can intentionally alter their own susceptibility by altering the conversations to which they are exposed. Individuals, for example, can expose themselves to new cultures, thereby increasing their likelihood of infection to the conversations of those cultures. Alternatively, individuals may alter their susceptibility through ontological change processes in which they reveal the background conversations that operate as filters (Marzano, Zaffron, Zraik, Robbins, & Yoon, 1995). Indeed, such processes seem to underlie some forms of therapy (Watzlawick, 1978; Watzlawick, Bavelas, & Jackson, 1967).

Incubation Periods.

One factor that influences the dynamics of infectious disease is the incubation period. The incubation period is the time interval between infection and the onset of disease (Mausner & Kramer, 1985) and is a function of host-agent interaction. The longer the incubation period, the longer the time between exposure to an infectious agent and evidence of illness.

What is significant about the incubation period is that each infection has a different incubation period and change managers can misread the absence of symptoms as “nothing happening”. There may be no symptoms not because there is no infection, but because the infection has not progressed to the point where symptoms are detectable or manifest. Where incubation periods are particularly long, managers run the risk of giving up on good ideas not because people have rejected the idea, but because it has not worked its way through the incubation period.

Differences in incubation periods could explain why some changes appear to happen suddenly, in a revolutionary, quantum like, or punctuated fashion (Gersick, 1991; Romanelli & Tushman, 1994). For example, assume an infection has an incubation period of six months and that a change manager immediately infects, through direct and indirect conveyance, 50% of the organization. During these six months, nothing much would appear to be happening. And then, in the sixth month, there would be an explosive onset of new actions, behaviors, and practices resulting from the new conversation.

The incubation period also has implications for managers who assume that once something is introduced that it will (or should) stick. Such an assumption is based on the premise that all introductions have an immediate incubation period. Where this is not the case, managers could become frustrated and attribute the absence of symptoms to resistance. Although host immunity does contribute to the incubation period, the incubation period is not resistance. It is simply the time it takes for the infection to progress to a level where symptoms are detectable. If managers are concerned with successfully infecting susceptible hosts, they should use multiple and frequent conveyance methods over an extended period of time so as to allow for any cumulative effects to overcome host immunity.

Given the importance of incubation periods, research is needed to identify the conversational factors that influence incubation periods. Since incubation is in part a function of host immunity and agent infectivity, altering either of these two factors would be important to altering the incubation periods. Giving managers access to altering this period could bring about a substantial increase in the speed of change without any loss in the outcomes produced by the change.

Research is also needed to help change managers differentiate incubation periods from the absence of infection. Where change managers introduce conversations with low infectivity, there will be no infection and no incubation period. However, if managers confuse the absence of infection with an incubation period, they may take the wrong next steps. For example, if there is no infection, an appropriate next step is to increase exposure of susceptible hosts to the agent with the intent of producing an infection. However, if an infection exists, an appropriate next step is to hasten the incubation period. Given the inability to differentiate these two states, change managers should probably assume low infectivity and continue to expose susceptible hosts through multiple conveyance vehicles.

Disease Stages.

Where organizational change is seen as an infective process, change managers will want to recognize and use progression through the stages of disease as a guide for where things are. Barrett et al. (Barrett, et al., 1995) provide an excellent example of how change moves through stages of disease in their study of the introduction of Total Quality Leadership into a Navy Command. As Barrett et al. point out, the introduction of any change involves the introduction of new language (conversations) and that this new language is introduced through existing orders of discourse. Exposure occurs when the

new language is first spoken into the organization. Although everyone in the organization was exposed to the same new language of TQL, their responses to it were different. Initially some people questioned the new language, pointing out inconsistencies, questioning the authenticity of those proposing it, and complaining. As both the number of people speaking the new language and the degree to which the new language was spoken increased, however, people began to add new language (what Barrett et al. call "nascent scripts"). The increase in TQL related vocabulary provided a new background set of conversations that provided a basis both for sensemaking and for taking new, novel forms of action. As the new vocabulary expanded, it replaced and transformed the "older" vocabulary, made new actions that were previously unimaginable possible and altered underlying assumptions and beliefs.

What is significant about the Barrett et al, study is that it clearly shows the progression of a conversational infection within an organization consistent with the stages of disease. Immediately after exposure, there is a contest between the new language and the existing language, much as there is a contest between a host's immune system and an infectious agent. This contest is evidenced in the challenges to and complaining about the new language and whether or it will take or if it will be something that passes. This is like the incubation period in which the infection is working to establish itself in the host. Once the TQL language begins to spread and events are now interpreted using the new vocabulary, it is clear that the infection has gone beyond the incubation period and into the preclinical and clinical stages. In the clinical stage, the issue becomes one of how severe (extensive) the disease will be. In Barrett et al's, example, the infection can be seen as increasing in severity as "nascent scripts" are added (the TQL allomemes are combining and recombining with other allomemes), creating

new actions that were previously unimaginable. The disability stage is reached as the new conversations of TQL begin to replace and alter the background assumptions and beliefs of the organization. At this point, the new vocabulary has successfully established itself within the network of conversations.

Countering Unwanted Infections. Understanding the stages of disease not only allows the change manager to see what is needed to accelerate the spread of an infectious conversation, it also provides information for how to counter the spread of unwanted infections. For example, at the exposure stage the prevention strategy is to reduce the susceptibility of the host or reduce host exposure to infective agents and their vehicles. This reduction is accomplished through education and immunization of the host (e.g., giving susceptible hosts conversations which counter the infective conversation) or through the eradication or confinement of the infective agent. Once an infection has moved to the preclinical and clinical stages, the change manager can work to slow the progression of the disease by limiting communicability (e.g., contact rates and access to vehicles) or treating the disease through the use of countering conversations with the intent to cure the disease or limit its severity.

Nonlinear Dynamics

The epidemiological triangle implies that the ability to successfully infect an organization depends in part on understanding that epidemics are a nonlinear function of the dynamics among agent, host, and environmental factors. Linearity assumes that an X% increase in one factor will produce a corresponding increase or decrease in another factor. But in epidemics, a small (large) variation in the conditions of one factor, such as the contact rate, can result in a disproportionate change in the prevalence of disease. This non-linearity is similar to that observed in complexity theory and stems from the

interconnectivity that constitutes all networks, including an organization's network of conversations (Waldrop, 1992).

Indeed, what is significant about epidemics is that there is a threshold point that they must pass to start (or end) and that until this point is passed, the triangle remains stable at the endemic level of disease. In fact, this threshold point is established by the ratio of the removal rate (effectively the rate at which hosts become immune) to the incidence rate. If this ratio increases, people are being removed from the susceptible host pool at a faster rate than they are entering the infected pool. This means that the number of people who can become infected is getting smaller at a faster rate than people who are becoming infected. But if this ratio goes down, people are being infected at a faster rate than they are being removed, and prevalence increases. The ratio of the removal rate to the incidence rate, therefore, is responsible for setting a threshold to the number of susceptible hosts and prevalence (Cavalli-Sforza & Feldman, 1981).

Consider, for example, a situation in which a thousand residents in a city are infected with an untreatable strain of 24-hour flu (Gladwell, 1996). The virus has a 2% incidence rate, which means that 1 out of every 50 people who come in contact with it become infected. Furthermore, assume that city residents have an average contact rate of 50 people per day. Under these conditions, the thousand infected residents will infect another thousand residents who in turn will infect another thousand residents and so on. But, because the duration of the disease is only 24 hours, a thousand people will recover each day. As a result, the prevalence of flu will remain endemic at one thousand cases per day.

But consider what happens if for some reason the contact rate were to rise from 50 people per day to 55 people per day. Although this does not sound like much of a

change, the net effect is that prevalence would rise. In fact, within one week, the prevalence would increase to nearly two thousand cases and the city would have a progressive epidemic on its hands.

This particular example illustrates that the equilibrium among agent, host, and environmental factors can be highly sensitive to fluctuations in those factors. For example, the flu epidemic could have been worse with the introduction of a more pathogenic and virulent virus with an incidence rate of 5% and duration of 48 hours. Alternatively, the prevalence level could be significantly reduced if the contact rate were to drop or host susceptibility improved and the incidence rate decreased to 1%. For example, if the contact rate went from 50 to 45 per day, prevalence would fall to approximately five hundred cases within a week (Gladwell, 1996).

The threshold point at which any subsequent variation in one or more of the factors precipitates a shift, up or down, in the prevalence of some occurrence is referred to as its "tipping point" (Gladwell, 1996). The tipping point is that point at which ordinary and stable phenomenon become unstable. In the case of epidemics, the tipping point is that point beyond which an alteration in factors influencing the incident rate (e.g., contact rate), duration (e.g., a new strain of infective agent), or removal results in a sudden "outbreak" or "rash" of cases, i.e., an increase in prevalence. As long as the relation among these factors remain at or below the tipping point, nothing changes. However, once the tipping point is exceeded, there is a sudden "outbreak" or "rash" of events beyond what is normal or endemic for the population. Every epidemic has its tipping point.

One of the things that makes tipping points interesting is that nothing appears to happen until they are crossed and then there is a dramatic and sudden change in

incidence. This phenomena is illustrated by the "broken window theory" (Wilson & Kelling, 1982). The essence of this theory is found in the metaphor that if a window in a building is broken and left unrepaired, other windows will soon be broken. This is true in "good" as well as "bad" neighborhoods. Window-breaking does not occur because there is a group of window breakers within the community, but rather because the broken window is a single or invitation to others that it is "OK" to break windows. In other words, a broken window exceeds the tipping point and there is a sudden increase in the number of broken windows.

A classic example of the broken window theory is found in Zimbardo's research in which he put an abandoned car without license plates on a street in the Bronx and a comparable car on a street in Palo Alto (as reported in (Gladwell, 1996; Wilson & Kelling, 1982)). Within twenty-four hours after a family of three removed the radiator and battery, virtually everything of value had been removed from the car. The windows were smashed, upholstery ripped, and parts torn off. Most of the "vandals" were well-dressed, apparently clean-cut whites. The car in Palo Alto sat untouched for a week until Zimbardo smashed part of it with a sledgehammer. Within a few hours, the car had been destroyed. The "vandals" again appeared to be clean cut whites.

Tipping points have also been found for neighborhood transitions in which attainment of a certain minority percentage leads to an accelerated increase in the rate at which white residents leave (Steinnes, 1977). A study by Crane (Crane, 1991) found that there was no effect on teenage pregnancy rates as long as the percentage of high status people (e.g., professionals) in the neighborhood was between 5% and 40%. However, once this percentage fell below 5%, teenage pregnancy increased like an epidemic. And other studies have found that once the number of homicides reached between 50 and 70,

gang-related drive-by shootings became epidemic (Hutson, Anglin, Kyriacou, Hart, & Spears, 1995).

A second thing that is interesting about tipping points is that a series of small steps in one area can produce extraordinary results in apparently non-related areas. For example, stopping more suspicious cars, confiscating more guns, chasing away more loiters, and shutting down more drug markets may result in a dramatic drop in major crime (Economist, 1998). Rudy Giuliani, mayor of New York, has used the principle of tipping points as the basis for crime prevention in New York with considerable success (Economist, 1998). By cleaning up environmental factors such as graffiti, and similar allomemes of misconduct (e.g., turnstile jumping in subways), law enforcement officials substantially lowered the incident of major crime in New York. Although there may be other explanations for the drop in major crimes, the drop is consistent with the "broken window" theory and tipping points (Economist, 1998; Gladwell, 1996).

Tipping points offer one explanation for why, even after considerable investment, some change efforts produce no significant alterations in actions, behaviors or practices while other change efforts, with considerably less investment, produce dramatic shifts. If the tipping point is highly sensitive to variation, then very slight alterations in agent, host, or environmental factors can precipitate dramatic changes. Alternatively, if the tipping point is very insensitive, change managers can invest considerably and still realize no real benefits. Until the tipping point is crossed, nothing happens. But once it is crossed, there is a sudden shift in incidence.

The broken window theory and the principle of tipping points suggests that there may be no such thing as an insignificant or inconsequential conversations during a change effort. Indeed, since it is not possible to know what conversations will lead to

what results, every conversation counts and it may be a mistake for a change manager to "step over" or "ignore" some conversations with the justification "it really doesn't matter". For example, the absence of trust is considered to be one of the factors that contribute to resistance during organizational changes . Trust, as well as credibility, have both been found to be a function of the extent to which leaders keep agreements or authentically clean them up when they are broken (Kouzes & Posner, 1993; Lewicki & Bunker, 1995). Tipping points and the broken window theory propose that there is a finite number of agreements that can be broken and not authentically cleaned up before there will be an epidemic of broken agreements and a widespread loss of trust. This means that if change managers "step over" a broken agreement, no matter how small or insignificant, they run of the risk of an epidemic of distrust and subsequent resistance to change.

Rethinking "Change"

The adoption of change as an infectious process within a network of conversations calls for an alteration in our understanding of what constitutes "change" in general and "a change" in particular. Traditional, structural-functionalist perspectives talk about "change" as if it were a clearly definable and identifiable object or thing that is put in place, e.g., a computer system. Even if it is acknowledged that there are many parts, stages, or components, the "change" is nevertheless represented as if it has object-like properties and clearly defined parameters that exist independent of the conversations in which they are embedded. At best, conversations are simply a tool that are used to put the change in place (Ford & Ford, 1995). Within the context considered here, however, such a monolithic view of change is problematic.

Change, like the organizations in which it occurs, is not monolithic discursively. Rather, it is more appropriately seen as a polyphonic phenomenon (Hazen, 1993) within which many conversations are introduced, maintained, and deleted (Barrett, et al., 1995; Czarniawska, 1997). This perspective is evident in Czarniawska's (1997) study of Swedish government agencies in which particular "changes" were comprised of a series of conversational episodes organized around particular themes (e.g., "decentralization" or "computerization"). It is also evident in Barrett et al.'s (Barrett, et al., 1995) study and Elden's (Elden, 1994) observation that the transformation of Magma Copper occurred in a "myriad of many, mostly small, local activities" initiated on a local level within a common commitment to a possible future. According to Elden, the key to Magma's transformation was the introduction of a metalanguage that allowed for creating possibilities for action that were outside of what would be predicted based on historical and current operating practices. This new language helped people to breakthrough their habitual ways of thinking, envision futures not possible inside these ways of thinking, and enact that future.

Within an infectious conversation perspective, there is no **the** change, like a single conversation, that is being produced. Rather, change is an unfolding of many conversations within a general theme (Czarniawska, 1997), new vocabulary (Barrett, et al., 1995), or metalanguage (Elden, 1994), most of which can not be anticipated and must be generated "in the moment". Indeed, every time change managers introduce a conversation to a susceptible host, they will need to engage in a variety of conversations depending on agent, host, and environmental factors. In this sense, change as an infectious process is like experimental theatre or improvisational jazz where the script (music) is being written while it is being performed (Boje, 1995; Czarniawska, 1997).

Although there is a theme or context to the change, the specific conversations that are needed, with whom, and when have to be generated on a moment to moment basis. Indeed, as Barrett et al. (Barrett, et al., 1995) have found, entirely new language, the specifics of which can not be anticipated, is generated as a change grows and spreads within an organization.

Because the conversations required for spreading a change can not be anticipated, the production of any change involves the generation and unfolding of many conversations, the specifics of which are unforeseeable at the time. The failure to recognize change as this unfolding (spreading) of micro conversations within a macro conversation robs change agents of their power in conversations. Indeed, it is the very inconspicuousness of individual transmission events that generate and sustain epidemics, as well as all other conversations endemic to organizations, that makes their actual relevance little noticed and underestimated (Lynch, 1996). Yet, can be seen with epidemics, transmission need not proceed conspicuously to amass an enormous host population or produce dramatic conversational shifts.

Conversational Shifts.

Change, as an infectious process, produces a language shift in organizations (Holmes, 1992). When Holmes (1992) refers to a language shift, she is talking about a gradual process whereby the language of a wider community displaces the language of a smaller community. For example, immigrants to a country shift from their native tongue to the language spoken by the wider community. As people speak in one language, the vocabulary in another language diminishes and there is a loss of fluency and competence by its speakers. There is a gradual erosion of the prior language and the minority language retreats in terms of the places in which it is used, who uses it, when, and for

what purposes. In the terminology of this chapter, the minority becomes infected with the more prevalent conversations of the majority.

But in the case of organizational change, we are actually proposing something akin to a "reverse" language shift in which a nascent conversation infects and becomes part of the network of conversations that constitute the organization. That is, we are talking about bringing forth new conversations into an existing community and having those conversations prosper such that they become naturalized and habituated within the network of conversations that constitute an organization.

During language shifts, both the majority and minority languages are present in the organization, though the extent of their usage is altering. In particular, if the new conversations are infectious and spreading, the minority language will be growing and expanding within the organization, whereas the majority language will be contracting. Since it is not possible to keep the two languages separate, people within the organization will have to be bilingual (or even multilingual) and there can be a period of "reduced competence" in which people are unlearning the old, but have not yet mastered the new (Gilmore, Shea, & Useem, 1997). Although such bilingualism could be considered a potential source of friction and frustration for some (Barrett, et al., 1995), it need not be a limitation. Czarniawska (1997), for example, found that a government agency continued using both the new and old accounting system and ways of acting to the appreciation of all. In a sense, people were bilingual and were able to distinguish which language to use, when, and with who.

Change as conversational shifts can also be seen in Rappaport's (1993) finding that the power of mutual help organizations in supporting individual transformation stems from their ability to provide shared narratives that are incorporated by the individual into

their life narratives. Mutual help organizations "tell stories" which become reflected in the autobiographical stories people tell. Moreover, the stories told tend to have a different focus and flavor than those told by people under professional care, suggesting that different organizations impart different stories. Since identity formation and change takes place within a social context of community narratives (e.g.,Gergen & Thatchenkery, 1996), joining a community has consequences for identity development and change. Mutual help organizations provide narratives that interpenetrate with personal narratives bringing about changes in the autobiographical stories people tell.

Rappaport's work suggests that conversational shifts are also found in the interpenetration of organizational stories with individual autobiographical stories. If organizational change can not occur without individual change (Gergen & Thatchenkery, 1996; Hazen, 1994), then we would expect to see the narratives of organizational change to manifest themselves in the personal stories people tell. More specifically, we would expect to see the autobiographical stories individuals tell about themselves in organizations to be interpenetrated with organizational stories. In fact, interpenetration of organizational and personal stories might be one way to determine the pathogenicity and virulence of an infectious conversation. Extrapolation of Rappaport's suggests that organization change can be seen as the interpenetration of a new conversation (or network of conversations) with the existing network of conversations such that the new conversation is modified and expanded as it becomes part of the organization's autobiography. Such an extrapolation is consistent with the findings of Barrett et al. (Barrett, et al., 1995).

Decentering the Individual

The possibility that organizational change can be understood as an infectious process in conversations moves conversations from a background, support role into a foreground, main character role. Rather than simply a tool in the process of change, conversations are the medium, message, target, and product of change. Indeed, organizations are themselves seen as constituted in and by conversations such that alterations in these conversations provide opportunities for new actions that were previously unimaginable. Moving conversations onto center stage makes it possible to decenter our attention on the characteristics and attributes of individuals in the change process (Barrett, et al., 1995). Thus, rather than look at individual factors as key to the change process (Dirks, Cummings, & Pierce, 1996; Neumann, 1989), we begin to look at conversational dynamics. From a conversational perspective, it is the conversations that are being spoken and listened that are of interest, not the characteristics of those who speak and listen.

This shift in the centrality of individuals and conversations implies a shift in the theoretical questions one might ask. For example, where individuals are central and conversations are secondary, we might ask, "What are the individual characteristics that determine why someone would select (resist) that conversation?" However, where conversations are primary, the question is more like "What are the conversations that allow for the inclusion or exclusion of other conversations?" In a sense, the question shifts from one of "Why do people select the conversations they do?" to "Why do conversations select the people they do?" (Lynch, 1996).

Decentering begins to make sense if we accept Durham's (1991) proposition that current conversations become the filters through which all subsequent conversations must

pass. Under this proposition, people are not monolithic identities with relatively fixed characteristics that consciously choose which conversations "get in" or "stay out". Rather, individuals are networks of conversations (memes) that have accumulated over time (and which continue to accumulate) and that establish the barriers which subsequent memes must pass if they are to enter the network. As Dennett points out " (1991, 207-8), "It cannot be "memes vs. us", because earlier infestations of memes have already played a major role in determining who or what we are. The "independent" mind struggling to protect itself from alien and dangerous memes is a myth. Our existence as us, as what we as thinkers are – not as what we as organisms are – is not independent of these memes".

Infection by memes, therefore, may not be a conscious choice any more than infection by any virus is a conscious choice. Research into emotional contagion, for example, shows that being infected by another's emotional state occurs unconsciously (Hatfield, et al., 1994). Indeed, one important point about infective agents in general and infective conversations in particular is that their capacity to propagate within a population has little to do with their epistemological virtue. As Dennett (1991, p. 203) points out, "The first rule of memes is that replication is not necessarily for the good of anything: replicators flourish that are good at … replicating! – for whatever reason". Conversation "X" might spread in spite of its perniciousness and conversation "Y" might go extinct in spite of its virtue. There is no necessary condition between a conversation's replicative power, its "fitness" from its point of view, and its contribution (positive or negative) to its host's fitness (Dennett, 1991).

Tipping points and the nonlinear dynamics of the epidemiological triangle also make it clear that the spread of a particular conversation is a population phenomenon, not

an individual one. Although host susceptibility is one of the factors that influence whether a particular host is infected, it does not determine the dynamics of the population as whole. Thus, rather than arguing that broken windows are the result of people who are "window breakers", the nonlinear dynamics of epidemics implies that "window breakers" occur as a function of the interplay among host, agent, and environment. Such dynamics allow for the possibility that those who are "resistant" with one change will be "receptive" to other changes based not only on their personal susceptibility, but on the dynamics of contact, infectivity of conversations, etc.

The Power of Conversing

Memes propagate themselves in the "meme pool" by leaping from one vehicle to another vehicle of the same or different form through replication (Dawkins, 1989). If a scientist hears, or reads about an idea, theory, or research finding, and passes it on to colleagues and friends, writes about it in articles, or talks about it in lectures, the idea can be said to propagate or replicate itself. Memes, therefore, are not limited to person to person replication. Rather, memes can propagate from person to person, person to book, book to person, paper to person, person to computer, etc. (Dawkins, 1996). But, in all forms of meme replication, human agency is involved. A meme located in a book for example, can not, without human intervention, move to a computer on its own. It is because of their reliance on human intervention that memes are dependent on human conservators for their continued existence.

The realization that memes rely on human conservators for their existence implies that although infection by a particular conversation is not necessarily a conscious choice, exposure to particular conversations may be. We can, for example, decide not to put ourselves in situations in which we will be exposed to conversations that are unattractive

to us. By the same token, we can be aware of the conversations to which we expose others. Bohm (1996), for example, proposes that we can be aware of the conversations that constitute us and choose whether or not we will speak them. Indeed, the idea behind both Bohm's concept of dialogue (Bohm, 1996) and ontological approaches to change (Marzano, et al., 1995) is that hosts can discover the conversations that constitute them and then choose whether to persist or alter those conversations.

If we are aware that each time we speak (in all its forms of direct and indirect transmission) we expose the listener to a potentially infectious conversation, then we can look to see if we want to infect them with what we are about to say. For example, if we elect to speak complaints, and complaining spreads, then we should not be surprised when we find ourselves in an organization of complainers. In this respect, Bohm (1996) talks about the pervasive nowness of pollution in which we are ongoingly pouring pollution into the stream of conversations. The source of this pollution is not in time – not back in ancient time, when it may have started – but rather the source is always *now*. Each time we speak, we have a choice about what we say. We can say something that is "pollution", or we can say something else. The choice is always ours.

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Table 1: Infectivity and Disease

Infectivity	Ability of agent to successfully enter a host.
Pathogenicity	Ability of agent to produce an effect (e.g., disease) in host.
Virulence	Severity or magnitude of effect produced by agent in host.
Infection	Presence of infective agent in host.
Disease	Reactions in host produced by infection.

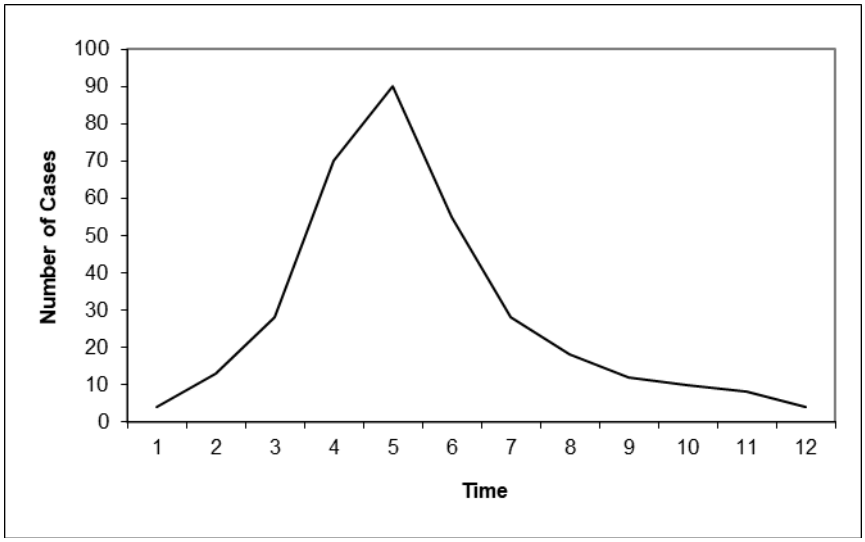
Table 2: Stages of Disease

Stage	Characteristics
Exposure	Host is being or has been exposed to agent; conditions are such that exposure is likely; may be infection, but it is not yet detectable
Preclinical	Host is infected and infection has progressed to the point that it can be detected through some form of screening test. There are no overt signs of infection.
Clinical	Infection has progressed to the point that the host has manifest symptoms.
Disability	Infection has run its course and host is left permanently with the consequences of the infection.

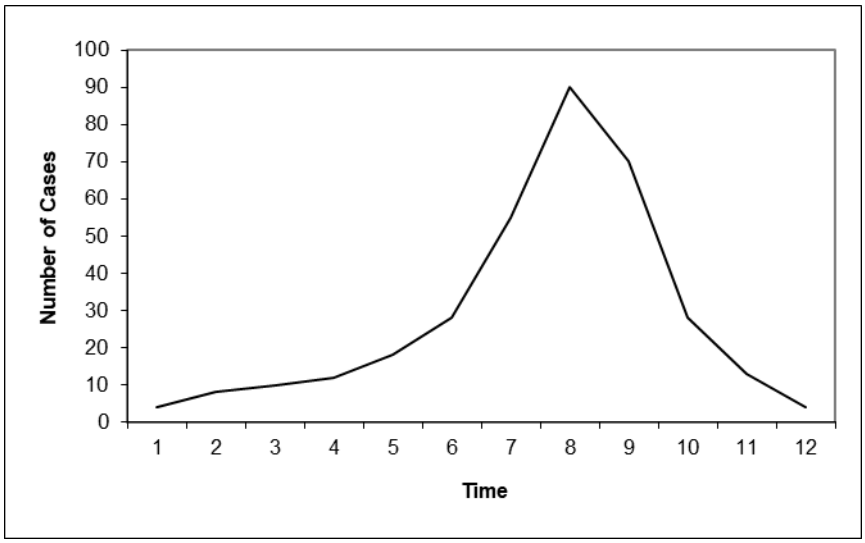
Table 3: Prevalence and Determinants

Prevalence	The total number of infected people in a given population.
Incidence	The number of new infections within a population.
Contact rate	The average number of people someone comes in contact with in a given period of time.

Figure 1: Types of Epidemics



A. Common Source



B: Propagated

Bio Sketch

Jeffrey Ford is Associate Professor of Management in the Max M. Fisher College of Business at The Ohio State University. Prior to joining Ohio State, Jeff was on the faculty at Indiana University and Rutgers University. His current research focuses on management in general, and the management of change in particular, as phenomena in and of language. He has also been working with his wife Laurie in the development of an original approach to the design and management of organizations called "link management", which will be forthcoming in a book to be published later this year by Executive Excellence Publishers.