

distance' and 'flat world' theses and points to the need for more conceptual and theoretical work on the subject of distance. Second, it reviews models and metaphors of distance and outlines their strengths and weaknesses. Third, it proposes a new definition of distance, namely as connective gaps. Defining distance as connective gaps may help us better understand distance in mobile and distributed work contexts. Implications for contemporary and future organizations are discussed.

## 2. A BRIEF HISTORY OF DISTANCE OR MANAGING DISTANCE TO DEATH

Physical exchange across geographical distance including tourism, immigration, and trade of goods and services has long existed as both means and ends of connecting humans to other humans (Berdayes, 2000). Physically travelling from one's own camp to a neighbour's camp was followed by exchanges of text in various formats, from runners to noise (drums) and visual exchanges (smoke signals) to codified written messages and documents, each able to convey messages with increasingly complex meanings. The story of techno-physical connectivity throughout history is one of incremental advances, interrupted with significant spikes of advancement (i.e., the printing press, steam generation, telegraph, combustion engine). With each new technology came advances in human connectivity, but not without some (often significant) delays, errors, inconsistencies, misinterpretation and misunderstanding between parties.

Reviews of the management of organizational empires include King and Frost's (2002) portrayal of how civilizations have managed and worked across distance for several thousand years. These authors describe the importance of balancing 'ambiguation' and 'dis-ambiguation' in the Catholic Church and America's Constitutional government model. Similarly, O'Leary et al (2002) describe how the Hudson Bay Company managed its sprawling Canadian empire from headquarters in London for more than a century by keeping tight controls over some aspects of the business and fairly loose autonomy in other aspects of managerial practice. New Zealand historian James Belich convincingly illustrates how for nearly 100 years (1880-1973) a "protein bridge" (2001: 66) was formed between New Zealand and Britain, whereby New Zealand was effectively as close to London as any provincial English town. In exchange, London served as New Zealand's cultural capital (as it largely continues to be to this day). Australia's Blainey portrays a different story, where the hardships of exchanging people and goods between Australia and the world were notoriously coined as 'the tyranny of distance' (1966, 2001), an expression still in use. Blainey's accounts of incredible hardships notwithstanding, all these examples suggest that organizations and whole industries have been managing across distance for hundreds, if not thousands of years. The point here is that technologies such as sailing and steam ships, telegraphs, and railways linked people and societies together long before contemporary information and communication technologies (ICTs) came on the scene (J. R. Short, 2001). And that, like other technologies, information technologies are often viewed with eutopic euphoria, only to have the reality turn out differently (Marx, 1999).

Other scholars, including economists, sociologists and geographers, have long addressed the concept of distance. Theories of industry location date back to the early 1900s (e.g., Weber, 1909) and studies of the concentration of economic activity appeared not long after that (Christaller, 1933). One can find extensive and growing literatures on topics such as attributes of new communication media (e.g., Daft & Lengel, 1986; Epley & Kruger, 2005; Kiesler, Seigel, & McGuire, 1984; Taylor, Groleau, Heaton, & van Every, 2001), the information revolution (e.g., Calcutt, 1999; Carr, 2003) and virtual environments (for example, Rheingold, 1994; Turkle, 1995; Woolgar, 2002). The 'shrinking' world around organizations is the focus of discussions of networks (Castells, 1996, 2000; Hiltz & Turoff, 1993; Sproull & Kiesler, 1991; Watts, 2003), global culture (Nisbett, 2003; Thomas & Inkson, 2004; Tomlinson, 1999) and globalization (Chomsky, 2003; Osland, 2003; Stiglitz, 2002). But, until recently, little specific attention has been paid to definitions of distance.

Calls for more conceptual clarity, however, have been made (Leonardi, Jackson, & Marsh, forthcoming; M. B. O'Leary & Cummings, forthcoming). King and Frost remind us that distance is not only important, but it requires our conscious attention in order to manage it.

New technologies are changing important aspects of how we live and work and, among them, the ways we manage distance. However, the management of distance has always required far more than technical artefacts. It has required as well techniques, social conventions and norms, folkways and mores, organizational structures, and institutions (2002: 4).

This article is an attempt to present existing models and metaphors of distance and to add new thinking around the

Similar and extended models (e.g., Tinbergen, 1962) predict the volume of trade between places diminishing the farther apart they are. Essentially, regions and countries' trade levels are almost universally highest with their nearest neighbors, decreasing correspondingly in proportion to the distance between countries or regions. Though other models have emerged and robust theoretical explanations for its success are still lacking, the gravity model is still empirically valid (e.g., such patterns of trade widely persist) and is still discussed in contemporary economic geography textbooks (for instance, Brakman, Garretsen, & Marrewijk, 2001). One might imagine that new communication technologies and the Internet effectively 'defy gravity,' making distance irrelevant in a highly connected world. Returning to our previous example, under 'old' economic and technological conditions, the farther we are from London or LA, the less trade activity we would expect with those cities. By contrast, in the so-called 'new economy,' we might expect new patterns of trade on the frictionless World Wide Web. But foreign investment patterns are still influenced by distance (Ghemawat, 2001; Nachum & Zaheer, 2005) and the fact of the matter is that the geography of the Internet largely mimics or mirrors pre-existing trade patterns (Leamer & Storper, 2001). So, to a greater or lesser extent, the Internet notwithstanding, the gravity model lives on.

### 3.4 Center-Periphery Model

Borrowed from sociology, a center-periphery model of distance is less predictive, but somewhat more explanatory than the gravity model. How distant one is vis-à-vis a given 'center' or 'periphery' is relative to one's relationship with that 'center'. For example, staying with our previous example, one might construct London or Los Angeles as the cultural center of the world and thereby any distance away from it is always great. Taken to its extreme, anyone who is not located at the 'Center' is by definition 'playing at the periphery.' Art and culture might be replaced by power and wealth and we have the 'all roads lead to Rome' syndrome, whereby certain 'global cities' predominate in global infrastructure, cultural production and social influence (Sassen, 2002; Townsend, 2001). In organizations, the head office may be seen as quite separate or remote from the rest of the organization or vice versa, regardless of the physical or temporal distance involved. 'Centers,' of course, may change over time and depend on what criteria one applies. They may also be the thing from which we 'distance' our local selves (Giddens, 1991; Thomlinson, 1999). Consider, for example, the resurgence of local and regional pride that flourishes alongside global hegemony. In summary, the center-periphery model of distance locates an entity (individual, group, people, nation) more or less proximal to 'centers' of social activity, commerce, culture, power and other influences. The logic is that we are more or less distant or close depending on our relationship with those who matter to us and/or have influence over us. Minority or marginalized sub-cultures often experience distance from centers of power and global decision-making. Within an organizational setting, this might be one's perceived distance from Head Office. The key issue here is that, while the center-periphery model of distance is subjective, it nonetheless can strongly affect relationships. And, those at the periphery are often more aware of and/or sensitive to their location vis-à-vis the center than those in the center, who may be oblivious to the power and powerlessness constructed around locations.

### 3.5 Distance in Networks

Disentangling the notion of distance within networks is a conceptual challenge. Networks are characterized by an almost infinite number of established and potential linkages (relationships) between nodes or actors (Castells, 1996, 2000; Hiltz & Turoff, 1993; Watts, 2003; Wellman, 1999). Distance exists in networks, but this fact is downplayed if we apply simple definitions, wherein being in or out of the network is the primary attribute of being 'networked.' We should not underestimate the importance of the relative position of nodes/actors, i.e., where they are located relative to other nodes/actors in the network. Empirical network analysis does, of course, attempt to statistically describe actors' relationships on a variety of dimensions, including being more or less proximal or distal to one another (Ahuja & Carley, 1999), including the effects of being more or less 'central' in virtual environments (Ahuja, Galletta, & Carley, 2003). The logic of networks is that the addition of nodes exponentially increases the connective possibilities of each member/node and thereby the reach of the network fills in the connective spaces between actor/nodes. For example, assuming that every member of a network has an email connection, then the time (as proxy for distance) it takes to make contact with everyone on the network is 'only an email away,' that is to say the few seconds it takes to click on a group list and send a message. Such bundled communications afforded by networks greatly multiply the span (distributed distance) a message or service can travel, i.e., it travels to multiple places in the same amount of time as required for a single message to go to a single place. Because many members can be contacted in (essentially) the same time as it takes to reach a single member, the 'network effect' compounds time-space compression effects with synchronicity effects, thereby rendering perceived distance within a network to be further reduced than distance in place-to-place, actor-to-actor models. Metaphorically, if we can deliver 1000 pieces of mail with the same energy

#### 4. Defining Distance as Connective Gaps

The term connectivity, which began as a description of the relationship between electronic devices, is becoming commonly applied to social relationships. Some authors use the term connectivity per se (Cartwright, 2002; Cross, Nohria, & Parker, 2002; Davis & Meyer, 1998; Tomlinson, 1999; Wellman, 2001), or extensions thereof, i.e., “superconnectivity” (Hiltz & Turoff, 1993: 455), or “global connectivity” (Kanter, 1999: 8). Others use related terms, such as “connections” (Rheingold, 1994; Sproull & Kiesler, 1991), “connectedness” (Laumann, Galaskiewicz, & Marsden, 1978; Raghuram, Garud, Wiesenfeld, & Gupta, 2001) or “connexity” (Mulgan, 1997). Connectivity suggests a state of having techno-physical and/or social contact with others. An implicit characteristic of technical connectivity is that once links are established, they are continuous, i.e., the wires to your landline telephone or modem are always there.

But, what happens when ties or links are severed or interrupted? Communication theories have long recognised the importance of gaps (e.g., Dervin, 1983). In the organizational literature, Masnevski and Chudoba’s (2000) observations of global virtual teams led them to suggest that it was the broken, interrupted streams of communication (for example, time gaps between face-to-face meetings) that had a major impact on team performance. Watson-Manheim and colleagues (2002) have applied the term ‘discontinuity’ to describe the common characteristic across diverse types of distributed work environments suggesting it (discontinuity) to be the central ‘thread’ within the literature’s diverse definitions of ‘virtual’ work. Their empirical findings suggest that spatial and temporal discontinuities or “gaps” are the main challenges associated with virtual teams and that interrupted connections are a key characteristic across many forms of distributed work. Others have identified other types of ‘gaps’ in distributed work environments. For example, it has been concluded that leaders must not let too many gaps exist communication flows of teams (Cascio, 2000; J. N. Cummings, forthcoming; Majchrzak, Malhotra, Stamps, & Lipnack, 2004; Weisband, 2002). Taken further, gaps may be seen as the basis for a new definition of distance<sup>38</sup>.

I propose that distance can be defined as the length or endurance of the gaps in social and technical connective links, rather than the length of the link itself. The crux of the matter and the base logic of this definition is that links or connections between Point A and Point B or Actor A and Actor B are seldom fully continuous, but rather they are typified by connective gaps. Applying the notion of connective gaps to our earlier example of the distance between London and Los Angeles, the distance, expressed in time (i.e., 12 hours to fly from London to LA), only applies if one is sitting in a plane on the runway as the plane is taking off (waiting for take-off is a temporal gap). So, even if the time required to physically or technically connect Point A to Point B is negligible and shrinking, the total connective distance may remain the same or become greater, if we take into account the social, political, bureaucratic and logistical gaps between actor/nodes. In an ICT context, the experience of distance is determined by the number and length of connective gaps in the system, not from the length of wires between computers. Logged in to a high-speed connection can make distance seem irrelevant. But gaps almost always appear. For instance, the server may go down, or there may be a time lag getting to a network terminal (personal computer), or one may have to wait for the terminal to be available. One might argue that ubiquitous wireless mobile applications will address these technical issues and make connectivity seamless, but technical systems are never 100% robust. Similarly, social connections are fleeting and tentative at best, always requiring connection and re-connections (Luhman, 1995; Morner, 2003).

Connective gaps are defined here as the combination of all connective absences (i.e., not available, affordable), interruptions, and disconnects between one social actor and another, including spatial distance (down the hall, or around the world), temporal (slow transfer times, different time zones), techno-physical/media problems (slow boats, missed flights, no Internet connection, etc.), security checks (spam filters, airport security lines), plus social connective gaps, including interpersonal differences (personality conflicts, different values, intentions, agendas, etc.), group issues (lack of trust, leadership and effective communication, etc.), organizational setting (lack of flexibility, structural impediments, inadequate resources, power struggles, etc.), as well as organizational context (suppliers, customers, competitors, etc.), economic barriers (local, regional and national policy, trade blocs, trade barriers, etc.) cultural differences (world-views, values, belief systems, etc.), political conflict (wars, instability, uncertainty, etc.) and exclusionary philosophical perspectives (individualism, isolationism, exceptionalism, fundamentalism, etc.). Taken together, all the gaps in all of these connective dimensions—spatial, temporal, media, social, emotional and security—constitute the total socio-technical distance between any two actors.

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<sup>38</sup> The term “discontinuity” is found in the organizational change literature (Leanna & Barry, 2000; Srivastva & Fry, 1992) and therefore, to avoid confusion, I use the term ‘gap’ rather than ‘discontinuity’ to describe any break or lack of social or technical connection between actor/nodes.

### Lesson 3: Gaps Can Be Repaired

If both social and technological dimensions of connectivity are vulnerable to connective gaps (distance), what else might managers do to ensure continuity when confronted with connective gaps? They seek alternative links, as stated above, or they restored the connection by repairing or bridging gaps. Watson-Manheim and colleagues (2002: 200) suggest that, “Discontinuities introduced into organizational processes are accompanied by continuities, i.e., factors that are in place or emerge to bridge the discontinuities. Continuities play a significant role in bridging the potential differences introduced with discontinuities.” In one recent case study, the manager of a multinational, multi-cultural product development team applied processes within her virtual team to make sure the functional and cultural bridges were built and maintained so that the necessary information was available and that everyone remained involved and up-to-speed with everyone else. When a team member metaphorically went missing, she found them and made the (mostly telephone) connections necessary to keep the team on track (Majchrzak et al., 2004). In virtual and distributed work teams, leaders and managers can not take participation for granted. Nods of approval must be sought and silence must be investigated. Otherwise, small gaps can become enormous gulfs between team members.

### Lesson 4: It All Matters

Seeing distance as connective gaps does not supplant or supersede other forms or dimensions of distance. On the contrary, it allows us to account for multiple forms of distance between ourselves and others. Work teams, for example, might list all the forms of distance they might encounter that might affect their ability to collaborate effectively and efficiently. Typically, this involves discussions of how to deal with time zone differences. In other scenarios, a team might include members from different branches or divisions that are each exactly the same spatial distance from the corporate Head Office. Due to historic effects, such as a merger or acquisition, or the nature of the site’s contribution (say, R&D vs. manufacturing), members from one branch may feel much more ‘distant’ from HQ than their counterparts. This could be described as a socio-cultural variance to the centre-periphery problem, and while not an easy ‘gap’ to address, it might nonetheless be an important form of distance to recognise and address, if necessary. Understanding various ways to define or think about distance should help managers ‘see’ the whole problem rather than evoking the platitudes found in the beginning of this article, such as ‘distance doesn’t matter.’ Not only does it matter, but many forms of distance matter in a global economy.

### Lesson 5: Keeping Our Distance May Be a Good Thing

Not only is distance a complex phenomenon, but it is more enduring than some suggest. And that may be a good thing. In order to function, social systems seem to, at least from what we see in their present forms, require some space between members. Defining and estimating that space leads us to turn our attention to the notion of distance. For every technical advance in connectivity, there seems to be at least some social ambivalence about becoming too close, too connected for comfort. Even if 24/7 ubiquitous networks become reality, social actors are likely to insist on some ‘distance’ within or outside of those networks. Security, health and resilience are but a few reasons to switch off. For many of us, creativity and reflection require periods of isolation, even if it is merely a few moments in our busy daily schedule or a few weeks off holiday each year. Managers and leaders may increasingly be able to bridge and overcome distance, only to realise that some distance is necessary and beneficial within productive systems. With that in mind, perhaps we should continue to manage across distance, but hope it never dies completely.

## 6. IMPLICATIONS FOR RESEARCH

The intent of this article is not to replace other models or definitions of distance, but rather to introduce a new definition of distance for an increasingly inter-connected age. A connective gap model of distance sits alongside other models of distance, but has several advantages. First, seeing distance as gaps accounts for the tentative, fluid and dynamic aspect of distanced relationships, where our experience of distance fluctuates as gaps come and go. Technical connections are seldom continuous and even a strong cultural connection within a virtual team can be expected to encounter gaps in understanding, values and norms from time to time. Second, the concept of connective distance lends itself to new areas of empirical research. For example, gap analysis could be applied to one’s ‘expected’ vs. ‘experienced’ distance from others. This factor alone might account for greater or lesser member satisfaction in distributed team situations. One might also compare ‘social’ vs. ‘technical’ connectivity within organizations and/or expand each of these dimensions using broader multidimensional analyses. Third, whereas models of distance based on physical locality apply less and less as workers become more and more mobile, defining distance as connective

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Table 1 – Models of Distance

Model	Logic	Measure	Addresses	Limitations
Spatial	Distance = Physical space between fixed points	Physical distance (miles, kilometers)	Territory, Space, Local/Global, Face-to-Face as 'gold standard' of communication	Relevant for physical exchange, but less so for virtual or mobile applications
Temporal	Less time = Less distance	Transfer times; time zones	Time compression, Asynchronicity (time zone differences)	Transfer speed can not fully erase effects of distance
Gravity	Closer = Less effort	Influence (pull) of one entity on another	Historic trade patterns, least effort	Lacks explanatory power for 'why' other than history and 'least effort'
Center-Periphery	Distance or periphery relative to 'center'	Tension (2-way pull)	Power, Resource (inter)dependency; Why centrality still rules (almost); Rise of localism	Largely tacit; Difficult to articulate, quantify relationships in meaningful way
Networks	Higher Density = Increased spread = Less distance	Ties (type, quantity, quality) multiply one another's connections	Multiplied spheres of influence	What if a tie 'breaks'?; Does not help us see where ties should be, i.e., how and why to build a network
Dichotomous	Out of sight, out of mind	Collocated vs. dispersed	Comparisons with face-to-face	Too simple; maintains face-to-face as gold standard
Connective	Links reduce distance; Gaps = Distance	Gaps, length of disconnections	Requisite connectivity; Creating reliable connections while keeping our 'space'	Difficult to quantify; a dynamic condition, i.e., gaps appear, disappear, appear again