Network Culture

Politics for the Information Age

Tiziana Terranova

give the network consistency beyond the rapidly changing hardware environment of computers, servers, cable and wires. Even though basic Internet protocols have changed over time, the philosophy that has informed their design and hence the architecture of the Internet has been consistent overall and informed by a few key principles which have, up until this moment, survived scalability (such as a universal address space, a layered and modular structure, the distributed movements of data packets and the interoperability of heterogeneous systems). Such principles imply a strong conception of an informational milieu as a dynamic topological formation, characterized by a tendency towards divergence and differentiation, posing the problem of *compatibility* and the production of a *common space* as an active effort involving an unstable or metastable milieu. In other words, beyond being a concrete assemblage of hardware and software, the internetwork is also an abstract technical diagram implying a very specific production of space. As we will see, what characterizes the technical diagram and design principles that have driven the development of the Internet is a tendency to understand space in terms of the biophysical properties of *open systems*. By modelling such open network spatiality the Internet becomes for us more than simply one medium among many, but a kind of general figure for the processes driving the globalization of culture and communication at large.

OF GRIDS AND NETWORKS

The relation between the Internet and the production of space is, by no chance, crucial to all theoretical and analytical engagement with Internet culture. A feature of this engagement has been its insistence on such informational space as being somehow characterized by a dangerous distance from the world of the flesh and of physical spaces. If the early debate on information networks was dominated by the image of a Gibsonian cyberspace in which users would lose consciousness of the real world and lose themselves in a universe of abstract forms and disembodied perspectives, the contemporary debate has shifted onto the terrain of globalization. Where the most common image of cyberspace used to be that of a virtual-reality environment characterized by direct interface and full immersion (data gloves, goggles, embedded microchips and electrodes), now the image is that of a common space of information flows in which the political and cultural stakes of globalization are played out. The

debate on a transcendental cyberspace in opposition to the world of the flesh has developed its counterpart in a political discourse that opposed the homogeneous pull of the global to the heterogeneous world of locality.

For geographers such as Manuel Castells, for example, the network makes explicit the dynamics by which a globally connected elite is coming to dominate and control the lives of those who remain bound to the world of locality, thus reinforcing a 'structural domination of the space of flows over the space of places'.[8] According to this perspective, in network societies the concrete time of places, bound to a specific mode of duration, is increasingly subsumed by the *imperium* of a single, electronic and global space accessible at the click of a mouse: 'the edge of forever or timeless time'. Paul Virilio has argued for the opposite and specular case: information networks are annihilating space in favour of time (thus the Gulf Wars were global, not because they happened in a global space as did World War II, but because they happened in global time, the single time or 'real time' of global television and the Internet). If world history is marked by a constant acceleration (from the age of horses and carriages to that of bullet trains and intercontinental missiles), the emergence of global information networks marks a limit point, as if with global communication we had hit a wall and started a detonation. Thus the simultaneity of actions has taken precedence over the succession of events and the world has been reduced to one unique time and space – 'an accident without precedent'.[9] The time of the network is 'real time': everything happens simultaneously and thus fatalistically with a kind of after-the-event sense of inevitability.

When we relate such allegations to the abstract technical diagrams that make an electronic space such as the Internet possible, we find that they seem to correspond to a specific aspect of its information architecture. To be locatable on the Internet, in fact, a machine/host/ user needs to have an address and this address needs to be unequiv- ocally situated within a common address space. This ecumenical function (the function of creating a single space) is performed by the Internet Protocol (IP) and the Domain Name System (DNS). This Internet Protocol has undergone a number of changes over the years but its main function has not really changed: it is the code that assigns to each machine an individual number. The Domain Name System associates each number with a cell in a table and also gives it a name. The DNS is thus an ideal single spatial map of the Internet,

comprising a system of unique addresses that makes each IP-coded host and server locatable. Whenever we type an email address or a URL into the apposite program, we are to all effects referring to a specific address in this global, electronic map. This feature of the Internet design confirms the image of a distance between a world of information and a world of embodied and bounded locality.

Furthermore, this informational and electronic space, as it is constituted within this single map, appears as uncannily reminiscent of a modern dream for a completely homogeneous and controllable space. If we compare the Internet to a global city, with its addresses and neighbourhoods, its overall layout as expressed by the DNS database structure is hypermodernist. Its global electronic address space is structured like a grid of discrete locations – all of which from the point of view of the system have an equal probability of being accessed. In informational terms, that is, the Internet is in principle a highly entropic system (hence tendentially homogeneous) in as much as it can be entered at any point and each movement is in principle as likely as the next. In principle, that is, each Internet browser or file transfer protocol or email programme is structurally free to jump to any street and house number whatsoever (to continue our urban analogy). In order to limit the demands posed on the technical system by such high entropic levels of randomness and indetermination, the DNS protocol divides such single space through a limited number of top-level domains (.com, .org, .net, .edu, and the national domains, such as .uk, .au, etc) enclosing it, so to speak, at the top.[10] Each domain is infinitely divisible: it is divided into a series of subdomains and each subdomain in its turn is potentially composed of an infinite number of smaller addresses, neatly branching out from its umbrella to identify individual users or machines, from servers to personal computers to all kinds of communication devices. (There is a movement to extend the IP protocol to Internet-connectable electric appliances and objects such as toasters, fridges and clothes.)

At the same time, however, this abstract and homogeneous space of cells and grids is not completely devoid of any physical relation to locality. To this abstract space able to contain all possible addresses corresponds a concrete assemblage of technical machines, the DNS servers, which are arranged in a hierarchical structure. Thirteen root servers, ten of which are currently located in the USA, two in Europe and one in Asia, for example, contain information about the next set of DNS machines, that is the authoritative name servers. There are as many authoritative name servers as there are domains and each one

of them contains information about all the machines in that domain; the same is true for subdomains and so on. Thus, if the abstract Internet space is a grid in principle equally accessible from all points, in practice the speed and even, as we shall see, the trajectory by which we can actually get from A to B is determined by the relation and state of traffic between the servers, a relation that crucially includes the differential speeds of bandwidth and the 'weighting' of connections (where some nodes or cell-space assume centrality when compared to others). Finally, to the relatively centralized structure of the naming system corresponds a centralized governing body – a kind of global regulatory board. While the DNS was famously run for years and single-handedly by Internet pioneer Jon Postel, since his death it has been supervized by a non-profit organization, ICANN (Internet Corporation for Assigned Names and Numbers) – a corporation that has typically been the subject of heated controversies about accountability and democratic governance of the Internet.[11]

Another way in which the abstract space of the grid is modified and differentiated is through its relation to the semantic domain of the name (and specifically the semiotic economy of the brand name). The identification of IP addresses with names has introduced into Internet space the symbolic capital of brands – and hence has determined another differentiation at the heart of the universal information space, that of electronic real estate. Following the opening up of the Internet to commercial organizations, for example, the struggles around domain names have witnessed some spectacular lawsuits as corporations, speculators and activists looking for a fight rushed to get their hands on valuable names and addresses.[12] Within the gridded space of the DNS, the brand re-emerges as a star, a centre of gravity, an identifiable name that guides the netsurfer through the anonymous space of the IP number world. The tangled and heterogeneous meshwork that constitutes the Internet is thus not simply reconciled within the hieratic indifference of a universal information space, but also subjected to heated and controversial political debates, expensive litigations and cultural struggles. The Domain Name System then is both single and universal, but also formed and deformed by locality. For Tim Berners-Lee, the legal disputes around names correspond to a *friction* between electronic space and local space, which is where the DNS, overall, can be said to exist.

Trademark law assigns corporate names and trademarks within the scope of the physical location of businesses and the markets

in which they sell. The trademark-law criterion of separation in location and market does not work for domain names, because the Internet crosses all geographic bounds and has no concept of market area, let alone one that matches the existing conventions in trademark laws.[13]

And yet, beyond the distortions introduced in the realm of Internet domains by the injection of symbolic capital, we cannot deny that at least in principle the Internet is organized through the figure of the grid and that this grid constitutes one of the most privileged references in theoretical understanding of electronic space. The grid is a fascinating figure and one with a particularly strong resonance within social and cultural theory, because of its strong association with the space of reason and modernity. The modernist grid, as defined by the intersection of two Cartesian axes, is a triumph of a mind able to extract a homogeneous and ordered space out of the ruggedness and heterogeneity of topological space. There is always something both utopian and dystopian about a grid. Whether it is a city plan, a prison layout or an accountant's spreadsheet, the grid is a principle of division and order, making possible the counting and location of things. If the Internet is ultimately reducible to a modernist form such as the grid, then the main movement that traverses it and organizes it is the vectorial movement of a tele-command.[14] An electronic address does not simply indicate a location within cyberspace (I am @ *anyplace*) but also the possible movement of a direct line traced between two points. (You can find me @ *anytime*. This document is at www.*anyplace*.org; you can find it there *whenever*). Information is divided and allocated a space, each node is assigned a unique number/name, and all information is instantly retrievable by way of a simple command line. Information is uploaded and downloaded as in a kind of electronic warehouse where new content is deposited and disposed of, deleted, updated, or simply left there to rot.

The connection between different locales on the grid is activated by the tele-command – by the click of a link activating the server's call for a response by the corresponding machine. It is in this sense, as some have remarked, that the Internet might not be an immersive virtual reality as the cyberpunks imagined it, but an alternative space existing 'at the edge of forever', as Manuel Castells put it. Cyberspace exists in the omni-equal distance that lies at the end of a mouse click. Regardless of the semantic differentiation of the IP address system, regardless of the geopolitical distribution of servers, within such a

common informational plane a site in South Korea is ultimately within the same vectorial reach as a page in Rio. The whole planet feels as if it were compressed into the same virtual space just the other side of a computer screen, but it is as if such space was ultimately a static one, absorbing and neutralizing all differences on a single plane of communication.

Within this understanding, the Internet is thus nothing more than an extended database, crossed by repeatable sequences of commands enabling the retrieval of documents located at different points in the planet. This chilling picture of a single information space, divided and distributed on a single grid containing all the possible addresses of all possible machines, underlines many of the more damning descriptions of the Internet and its relationship to the world of locality and embodiment. From this perspective, the single information space is an extension of a modern instrumental rationality driving towards the ultimate goal of the disappearance of the irreducible heterogeneous in the homogeneous space of the global network. The Internet thus appears to give form to a space of connections without transformations, where vectors of communication link up different electronic spaces outside of any real possibility for becoming. But does the database structure really exhaust all aspects of network communication? Or does an over-reliance on the database model blind us to the more dynamic aspects of the Internet diagram and its relation to network culture as such?

THE PARADOX OF MOVEMENT

The debate about space and time in the age of communication is not necessarily limited to the Internet as such but is a variation on the larger theme of cultural globalization. A communication technology such as the Internet participates in the emergence of a globalized culture, following and expressing the fractal folds of a spatiality that twists and knots together different scales of interaction – the local and the global, but also the regional and the national. In as much as the Internet is an informational diagram, form here should not be understood in the sense of a mould, imprinting its stamp on a world of locality already weakened by decades of global popular culture. The Internet informs a globalized planet by reproducing some of its most individuated and stable forms as well as its potential to diverge, to pass over into new formations through the combined power of the fluctuation and the mutation.

Physicists such as Duncan J. Watts and Albert László Barabási, for example, have mapped 'the small worlds' of networks in terms of a relation between 'structure' and 'dynamics'.[15] Within the same field, Steve Lawrence and Lee Giles at the NEC Research Institute in Princeton have produced a model of the Web, based on the data brought back by a meta-search engine or robot about its size and topology. In this way, they have reconstructed the virtual geography of the World Wide Web by mapping the number of links that connect different web sites to each other. Replicating an action that search engines carry out all the time, algorithms have been let loose on the network to come back with a picture not only of how many pages and sites are actually out there on the Web, but also of the overall movement of information flows within the network. This approach downplays the links to locality (mapping the global distribution of Internet access) for an internal snapshot of the web world. The researchers thus looked not only for the number of pages and their location in the DNS grid (as a search engine bot would do), but also for the overall map drawn by the active movement of the link.

The result is a kind of parallel global map of an informational planet, produced on the basis of outgoing and incoming links, mapping the directed movement linking sites to sites. One such map pictured the informational space of the web-planet through the topology of continents, archipelagos and islands.[16] It mapped the gravitational pulls of portals and brands (at the heart of the core continents lie all the major websites – the likes of Yahoo, MSN, Google, the CNN and BBC – which collected the largest number of incoming links) and also the existence of peripheral information land masses, tied to a central core, but also independent from it. Beyond these massive continents signalling a centralization of Internet traffic, they pictured a sprinkling of small archipelagos made up of web sites that connect only to each other, and large info-islands which corresponded to Gibson's Black Ice – the firewalls hiding the high-security intranetworks of military and financial institutions. At the same time, the researchers admit that it was hard to claim that their map of web space is exhaustive – in as much as a great number of web sites appear to be off the radar. If the portals act as centripetal forces of attraction in an unstable and disorienting network space, producing the effect of an informational land mass, this does not exclude the existence of other movements of divergence and disconnection, which characterize, for example, the choice of some groups to communicate only with each other within a closed network of sites shielded from outside access by

obscure addresses or corporate firewalls. In this sense, the global appears as a site of *accumulation* of resources that manifests itself as a *mass*, which distorts the homogeneous informational milieu by exercising a kind of gravitational pull that *draws in* other spatial scales (such as national or regional) to itself. Any interface with the medium, therefore, implies some kind of relation to such centripetal movement.

On the other hand, however, this centripetal and homogenizing pull of the global mass is not the only movement active within the Internet as an informational milieu. In this sense, we can draw a useful parallel with the debate on globalization. If a structural domination of the space of flows (the global) over that of places (the local) exists, together with attendant forms of cultural imperialism, it is one that does not deny the *fluidity of places as such*, their constitution as local reservoirs endowed with a productive capacity for difference. The study of global popular culture in the 1990s has gone some way towards mapping some of the features of this 'virtual global'. When seen spatially, a global culture has often appeared as split between the opposing pulls of homogenizing (global) and heterogenizing (local) forces. The relationship between the opposing poles of the global and the local has been shown to produce all kinds of mutant cultural forms – ranging from familiar patterns of pseudo-individuation (the French McDonald's as distinct from the American McDonald's, as depicted in the memorable dialogue between John Travolta and Samuel Jackson in *Pulp Fiction*), to more complex nonlinear dynamics of mutual feedback (as in the relationship between the cinemas of Hong Kong and Hollywood).[17]

If the local, in fact, were nothing but a reservoir of frozen differences; if the global were only the homogenizing pull of the likes of McDonald's, Microsoft and Coca-Cola; if the Internet were nothing but an electronic grid or database where all locations lie flat and movement is mainly that of vectors of fixed length but variable position linking distant locations to a few centres – where would the potential for struggle and change, becoming and transformation come from? In the case of the Internet, for example, where would its dynamism come from? How can we reconcile the grid-like structure of electronic space with the *dynamic* features of the Internet, with the *movements* of information? How do we explain chain mails and list serves, web logs and web rings, peer-to-peer networks and denial-of-service attacks? What about the rising clutter of information, the scams and the spam, the

endless petitions, the instantaneous diffusion of noise and gossip, the network as permanent instability? It is possible, that is, that by thinking of the Internet in terms of the grid we might have fallen into a classic metaphysical trap: that of reducing duration to movement, that is, of confusing time with space.[18]

The notion that cyberspace is nothing more than the intersection of the grid and the vector reminds us of some classic paradoxes of movement – paradoxes that Henri Bergson referred to repeatedly in his dissection of Western metaphysics' relation to duration. The Zeno paradox, for example, marked a high point of confrontation between the pre-Socratic philosophy of qualitative change and the Euclidean geometry of position. The challenge of the former to the latter was thrown on the basis of the geometrical argument that between a point A and a point B lie an infinite number of points ($A…$ $B…$ $C…$ $D…$). Zeno's paradox was that of applying the geometrical method to motion: If an arrow has to pass through an infinity of points, how will it ever reach its target? How could Achilles catch up with a tortoise if in order to do so he will have to go through an infinity of points (which, in Euclidean geometry, compose a line)? Won't he be caught up in the infinite passage from point A to point B to point C and so on? Bergson's reading of Zeno's paradoxes is that they showed how the specificity of duration is unaccountable on the basis of the notion of an infinitely divisible space, a notion that deprives space of its qualitative dimension. Movement does not so much imply a simple passage between points, but involves duration, that is a qualitative becoming that affects both the arrow, the target, the archer and the overall context. Space is subdivided into discrete points only because the pragmatic orientation of our bodies in the world privileges space as a homogeneous container of objects and underestimates the fact that extension and duration are related within the process of becoming.

Bergson suggested that Western metaphysics (and hence also the popular metaphysics that gives rise to what we think of as 'common sense') is particularly troubled by the notion of an *intensive space,* a space that endures. Indeed Western metaphysics for Bergson has persistently misunderstood duration, almost as if it constituted a kind of unthinkable other. When we think about movement, Bergson argued, we make the common mistake of thinking of it as always the movement of an object through a space. We tend to think of something that moves as something that crosses a space that can be neatly assigned a position between a point of departure (*A*) and