Initial Thoughts on 'A Different Kind of Space':
Mediating architectures and discourse coherence

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Abstract

This paper presents some of the authors' initial thoughts on how an understanding of the relationship between the spatial aspects of cyberspaces and the social interactions they contain, can be used to guide the design of collaborative virtual environments. The paper does this in three steps: 1) by examining the parallels between notions of physical spaces and cyberspace; 2) by recognizing the link between online spaces' interaction architectures and coherent discourse; and 3) by examining some of the *social requirements* for the design of collaborative virtual environments.

1. Physical Space and Cyberspace

The structure of the physical environment around us moulds and guides our social interactions. Our lives are rooted in and given context by the places within which we live and the locations in which we conduct our work and leisure activities. In turn, through social activity we alter and give meaning to the places we interact within (Harrison and Dourish 1996, Relph 1976). Space is central to our lives, and this is so whether the space is virtual or physical. This paper considers how the architectures of cyberspaces, affects social interaction.

It has been suggested that the advent of cyberspace has essentially removed the constraining or bounding nature of space on human action. For example, Gillepsie and Williams (1988: 1317) argue that the "essence of advanced telecommunications, […] is not to reduce the friction of distance but to render it entirely meaningless." A similar position is taken by Hauben (1995) who does not consider geography and time to still be true boundaries. Cairncross (1997) declared the "death of distance" because the instantaneous communications of the internet has led to what he considers a collapse in spatial and temporal boundaries, leading to radical space-time compression which frees social and capital relations from modernist spatial logic. However, we suggest that the advent of cyberspace, while transcending the limits of physical space, highlights the need for a different conception of space – one that recognizes the boundaries to computer mediated actions. While virtual space is a different kind of space from physical space, it is still a space, and the nature of its architecture impacts on human actions and interactions.

The term cyberspace is derived by the science fiction author William Gibson (1984) from the Greek work kyber (to navigate). He used it to describe a highly structured non-physical fantasy space called the 'matrix' that could substitute for reality. A common property of both cyberspace and geographic space is that they are navigable – people move through them, and as they move the environment changes. Curry (1995, 1998) argues that space is generally viewed in one of four ways: 1) Aristotelian, whereby space is 'static, hierarchical and concrete'; 2) Newtonian, whereby space is ' kind of absolute grid, with which objects are located and events occur'; 3) Leibnizian, whereby space is 'fundametally relational and defined entirely in terms of those relationships'; and 4) Kantian, whereby space is conceptualized as 'a form imposed on the world by humans'. If navigation is a fundamental requirement of space, then this accords with a view of space in Leibnizian / Kantian terms as relational – the environment is given meaning by the action of humans within it. This is in line with Lefebvre (1991) who denotes geographic space as relational both in terms of it being constituted and given meaning through human activity. Hence cyberspace is not a neutral or passive established geometry, but rather is continuously given meaning by social-spatial relations. The relationship between space and human behavior is not contingent simply on the laws of the space, but is the product of both space and human activity. Quantum theory experiments have over the last fifty years established the same principle for physical space – observer interaction is a necessary element in our understanding of space and time (Davies and Brown 1986). Space seems to be created whenever there is the action of movement, in that to move there must implicitly be a space within which one moves.

Physical space locates us – its three dimensional nature means any position can be designated by three numbers or xyz coordinates. Cyberspace can also be said to locate us in the sense that each position is unique– whether this uniqueness is defined by URL, IP number, or other identifier. However while physical location further implies distance – the difference between the coordinate values of two points – all points in cyberspace to the causal observer seem equally distant. However, in cyberspace one "moves" through space by interacting with technology, typically key strokes or mouse clicks, so different points have a distance. While in theory every position in cyberspace could be one click away from every other, in practice this is not so. This is highlighted by research into the diameter of the World Wide Web, which was an average of 19 links between two randomly selected points in 1998 (Albert, Jeong, and Barabasi 1999).

Cyberspace is *creatable*, in that one can easily create more space, for example simply by adding a new home page on the Web. Physical space, as first suggested by Einstein's general relativity theory is thought to have the same property (Davies and Brown 1986). However, while the creation of physical space requires unimaginable energies (a la Dr Who's Tardis), cyberspace is to a greater extent under our control.

Secondly cyberspace does not seem to be *continuous*, which causes problems for traditional geographic analysis. For example, Benford et. al. (1998) note that when designing virtual environments, there is no need to mimic geographic space in terms of geometric form, but there is a need for them to be navigable. When we say continuity we seem to mean that to move from one location to another, it is necessary to pass through certain intervening points. In this sense cyberspace is not entirely discontinuous, in that sometimes to pass from one point to another it is necessary to arrive via an intermediate point. For example to get to some web pages, it is necessary to first navigate through a database interface. In this case one may talk about the *route* from location A to B as being how one moves from A to B.

In summary space, be it virtual or physical, has the following characteristics:

1. *Location.* Locates objects relationally, and by doing so is navigable;
2. *Distance.* Requires effort to move between locations;
3. *Creation.* Can be expanded, designed, and manipulated; and
4. *Routes.* Contains constraints on movement between points.

2. Interactional Architectures, Social Places and Coherence

Interactional Architectures

We now address the issue of how space serves as the basis for social interaction. The term interaction architecture refers to the way that a technology environment enables and constrains mediated social interactions (Jones and Rafaeli 2000a). We take here discourse architecture to be a subset of interaction architecture. The concept of what is meant by "discourse" is still developing. If it means simply the exchange of message content, then there is evidence that human interaction involves more than this (Whitworth, Gallupe, & McQueen 2000). Interactions also convey information about sender states, often in the form of back-channels such as tone of voice, which is processed quite apart from the message content (Bales 1950). For example to say in an angry voice "I AM NOT ANGRY!" illustrates that message content and sender state information can be different. Also, by exchanging position information, including intellectual positions, information can be exchanged about the group, allowing normative influence which seems to be critical to group formation. This means a third type of meaning exchange - information about the actions of "us", the group to which the receiver belongs. This meaning exists neither in the message content, nor the sender context, but in *the pattern of group action.* Voting is an example, where the combination of votes has a meaning beyond individual actions. Using this method in its simplest form social insects create colonies without language. Research reveals that the communication that unifies an ant colony: "… is not in the contact, or in the chemical information exchanged in the contact. It is in the pattern of contact." (Gordon 2000, p64). This same process can be applied to declarative information, as when the people of a country vote to elect a President. While it is difficult to call such social interaction “discourse”, it remains a fundamental process of human social groups and the agreement necessary for them to operate (Whitworth, Gallupe, & McQueen 2001). The term interaction architecture therefore seems more appropriate in many cases.

The idea that the environment within which people interact affects that interaction is not new. Lessig (2000) gives many examples, including the layout of towns in New England so the relationship of the buildings to each other, and to the town square, would positively affect behavior within the town. Other examples were Bentham’s design of a prison so that all cells would be viewable from one central position, so that prisoners could always be watched without their knowledge, and Napoleon III rebuilding Paris so the boulevards would be broad, making it hard for revolutionaries to blockade the city. Lessig goes on to make the point that not only physical “architecture” has been used to regulate and affect people’s behavior. In fact he explicitly argues that in cyberspace that same regulating role of “architecture” is achieved through code — “the rules imposed through the software and hardware that makes cyberspace as it is”. While a general understanding of how the design of cyberspace connects to online social interaction has not been developed, it has been suggested that assessments of social requirements should precede the construction of online virtual environments (Whitworth & de Moor 2002).

Social Places

Harrison and Dourish (1996) argue that places, not spaces, frame behavior, stating that “space is the opportunity; place is the understood reality” and “we are *located* in “space”, but we *act* in “place””. When people interact in the physical world they meet in a place (to which they must go). Cyberspace provides places for social interaction, just as physical space does. Again just as in physical places, not only can the place affect the people, but the people may change the place. The process by which people in social groups change their environment to fit social needs has been called “structural adaptation” (Poole & De Sanctis 1990). The degree to which the environment fits those social requirements is its ‘social affordance’ - the relationship between the properties of an object and the social characteristics of a group that enable particular kinds of interaction among members of that group (Bradner et. al 1999). This notion of affordance was originally proposed by J.J. Gibson (1979). He defined it as the relationship between an object’s physical properties and characteristics of an agent that enable particular interactions between agent and object. The most commonly cited example is the ‘door knob’ which typically affords grasping and turning. Later Norman (1988) and Gaver (1991) appropriated the term as a conceptual tool for discussing the design of interactive computer systems. Both Lessig’s view of the environment acting to regulate and control social interaction, and the view that the environment should fit or be fitted to pre-existing social requirements, illustrate two sides of the dynamic inter-relationship between people and their social environment. This issue resolves to two inter-related questions: - First, s*pace functionality*. What properties of spaces affect social interaction between people? and Second, *place legitimacy*. How *should* those properties be defined?

The issue of legitimacy is essentially the question of how the environment grants rights to people to do various actions upon or with various objects, including the right to view (Whitworth & de Moor 2002). For example if architectural boundaries constrain who sees what, and those boundaries are changeable (via the system code), if one controls the code environment one can see anything, including for example other people’s email. Whether this is functionally possible is distinct from whether it is legitimate. The “mailbox fallacy” is the view that whoever owns a space necessarily has all rights to all objects within it, and so the owner of a virtual “post-office”, namely the ISPs and the code that transmits email messages, have the right to view and screen those messages. By contrast, ownership of physical spaces such as offices, apartments, and public areas, and ownership of physical communication spaces such as the Post Office, does not imply ownership or any rights to objects within them. For example “tampering” with mail is a federal offense in the United States.

For any social requirement to be met depends on a certain functionality being provided by the system. For example to send mail through a Post Office system without it being viewed along the way requires the functionality of an opaque envelope to enclose the message. The equivalent for a message in cyber-space could be considered to be encryption. The requirement for message privacy in transmission is a social one, and it is such social requirements that are likely to define the implementation of space functionalities, such as encryption. Hence the functionality of social spaces must be considered in terms of the nature of social interaction.

Coherence and cyberspace

Coherence is generally understood to relate to the transfer of intelligible meaning (Herring 1999). Social interaction involves the exchange of meaning. Discourse architecture for coherent computer-mediated interactions implies the planned construction of cyberspaces to enhance the ability of users to engage in intelligible discourse if desired. One class of cyberspace of particular interest to us in regards to the conduct of coherent discourse is virtual publics. Virtual publics are symbolically delineated computer mediated spaces such as email lists, newsgroup, IRC channels etc., whose existence is relatively transparent and open, that allow groups of individuals to attend and contribute to a similar set of computer-mediated interpersonal interactions (Jones and Rafaeli 2000x). The transfer of meaning regarding virtual public discourse can be understood to occur on four levels in relation to space:

1) Meaning ascribed by users to the symbolically delineated computer mediated space where messages are posted. This relates to the notion of virtual publics as places;
2) Meaning ascribed to the message frame. By this we mean meaning ascribed to message labeling such subject line or poster. For example, although messages from the same alias, person, email address, may have little or no topic connection, they are typically understood as being connected, as coming from the same person. Although logically disconnected, messages from the same person may build up a picture of what that person is like.
3) Meaning ascribed to the inter-relatedness of messages (a la Herring's 1999 notion of interactional coherence, and Whitworth et al. (2000) notion of group position); and
4) Understandings gained from message content.

Of course such meaning exchanges in relation to space occur in many other types of cyberspaces than virtual publics. However we believe that modifications to the above may be required to generalize the above approach beyond open systems. For example, how does one apply the above logic to dyadic back-channel exchanges and highly transitory cyberspaces? Despite the complexities a space based perspective on coherence allows for what are to date atypical approaches to the analysis of online interactions. For example, Jones et. al. analyzed the discourse dynamics of Usenet newsgroups based on a spatially bounded view of cybersociety (Jones, Ravid and Rafaeli 2002).

The link between coherence and space highlights the issue of proxemics (the study of spatial interrelationships in human populations). How large groups of people can interact online is both a problem and an opportunity. The larger the group, the less sensible and likely it is for proportionally large numbers of individuals to make significant message contributions (Jones et. al. 2002). For example if each of a hundred people contributed, there would be too much for any individual to read, as well as a lot of duplication of information. Hence in larger groups the number of "lurkers" increases (Nonnecke and Preece 2000). In cyber systems these lurkers are often "invisible" – and contribute nothing. This occurs because while in physical places people are objects, but what is said is not, in cyber-places the reverse is often true – people are invisible but what they say is shown as an object. But in physical social spaces presence is a contribution – as when a crowd assembles to watch a show or sports match. Being watched has powerful effects such as social facilitation (Zajonc 1965). An architecture to support this social requirement would offer what has been called social translucence, essentially that people are visible, not just the remains of their actions (Erickson & Kellog 2000).

Large groups seem to manage the problem of their numbers by acting in ways that can be combined, for example by clapping as a group, rather than by making individual statements. But while the physical environment merges the outputs of say 100 people clapping, to create a single powerful sound heard by all, cyber-environments do not typically have such functionality. Merging 100 emails supporting the same view does not create a powerful email. This ability to merge member contributions may be the basis of representation. When the people of a democratic country vote to choose a president or prime minister one can talk about the will of the people being combined to express the will of the group. But the architecture of cyberspaces has some way to go before it can support the functionality of combining individual choices to give group choices.

3. Social Requirements for the Design of Collaborative Virtual Environments

We can now consider some design issues related to virtual space functionality, virtual place legitimacy, and the exchange on meaning by users.

The above discussion suggests that the interaction architecture of a social cyber-place, whether it be a chat room, bulletin board, MUD or MOO, email or any sort or groupware or social interaction computer system, always involves certain fundamental aspects.

The first can be considered to be aspects that arise from being a part of some navigable space. The place must have a *location* or series of locations. Entry to a place may or may not be *restricted* by a symbolic boundary or informational boundary. To be social, a space must allow *people to interact* within it by the *exchange of information*. Whether restricted or not, a space could still be *transparent*, allowing one to see some or all of the people or information within it without entering it, just as a physical shop may have a transparent window. Conversely it could be *opaque*, and only allow visibility once one is inside. Internally it could be *limited* in the number of people and/or objects that can enter or be created, or *unlimited* in that any number is allowed.

The second set of considerations relate to the formal declarative content of the information exchanged. The place could be for example *dedicated* to the exchange of a certain type of information content, such as a discussion group for a certain subject matter. It can *organize* its information content, for example into groups which are effectively sub-spaces, each of which may have different space properties (restricted, transparent, or limited). The same effect can be achieved by the linking of common topics into threads. It could provide *connections* to other information (inside or outside the space), for example using hypertext links. It could offer *search* functions to enable participants to find desired information easily.

The third set of considerations relate to allowing people to interact. For people to relate to each other the architecture must support *addressability*.

Fourthly, what may be the most complex and as yet most undefined requirements are those related to the exchange of information about the actions of others, and the formation of groups with common norms and rules of action, especially those which govern group action. For example the people present in a space can be *visible* or not. If their actions are visible the space can be described as socially *translucent.* If the architecture allows the *authentication* of people as group members, the evolution of group norms, sanctions and social responsibility becomes possible. If the action rights of individuals can be defined by the group in a way that is beneficial to group prosperity, and people behave in socially accepted ways, the space may be considered *legitimate.* Finally if the group is able to act as a group, and the choices of the group reflect the sum of the choices of its members, then it can support *representativeness,* allowing its members a voice in collectively defining the nature of the social space. This final context – a community context – allows common socially beneficial ideas of free speech, of not offending others, of being responsible for ones actions, etc, to be implemented. Indeed one reason people may enjoy and stay in an interaction space may be because of a sense of not only belonging to a group who share ones own views, but also being able to participate in the way the group defines its own social interaction.

4. Conclusion

In conclusion, although a great deal of the architecture of social interaction cyberspaces is unknown and undefined, the general requirements of space and social interaction, provides a useful overview. The importance of computer-mediated social interaction is hard to over-state, whether for the advancement of knowledge, business, personal lives or even the governance of our communities. That their interaction architectures are in so many ways a matter of choice makes these questions even more pressing.

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Appendix

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