Contextualising Virtuality: Polychronicity and Multipresence

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Abstract

Virtuality implies fundamental transformations of temporal and spatial aspects of interaction and work. In this paper, we suggest that we can better conceptualise the notion of virtuality through examining it in terms of polychronicity and multipresence. These allow us to examine the underlying nature of what it means to be virtual, in a variety of contexts. One of these contexts - mobility - is examined in detail using fieldwork to illustrate this. Our data showed how the use of technology (in particular, the mobile telephone) supported the virtuality of mobile individuals by augmenting their abilities 1) to manage the polychronicity of their ongoing work and 2) to maintain an appropriate level of multipresence across different physical locations.

1. On the nature of virtuality

Innovations in information and communication technologies have enabled new ways of interaction, new working patterns and new organisational forms. Although there are several adjectives which describe these new trends such as agile, flexible, virtual, tele-, distributed, and so on, the term 'virtual' has become established as representing all of them, as seen in the coining of expressions such as virtual work, virtual office, virtual teams, virtual organisations, virtual community, to name a few.

On perusing through a number of dictionary definitions, there appear to be three meanings for the term, virtual: a) capturing the essence of something, whilst not being actually so; b) something that exists purely mentally, not in the world; c) (specifically from *computer science*) something that is generated, simulated, and maintained by a computer, but which has no physical counterpart. These meanings are all obviously closely related, and capture a similar meaning – namely, that of an interpretation of reality maintained externally from physical (atom based) reality. This is not to neglect its reality – to its *users* this may be meaningful, or real, and in another sense, it may be said to really exist at the level of electrons and neurochemical activity.

The understanding of virtuality or virtual reality as a simulation of reality has been the dominant theme of writings, both from within the field of computing and popular science (Rheingold, 1991, 1994) as well as its commentary within social science (Schroeder, 1996). Rheingold (1991) describes the first uses of the term "virtuality" within computer science (by Theodore Nelson) which is used in the context of interactive computer systems. Over time, we have moved from the simple notion of virtual reality as simulation to a more complex understanding of virtuality as being to do with our presence in a multidimensional space, through which we have the capability of presenting ourselves in multiple ways. Baudrillard's writings echo this: "The unreal is no longer that of dream or of fantasy, of a beyond or a within, it is that of a hallucinatory resemblance of the real with itself" (Baudrillard, 1983: 142).

We are presented with a world of hyperreality, where the real and unreal become seamlessly blurred together.

When the term virtual is used in relation to work which is our scope of interests, virtual workers work across space, time and organisational boundaries (Lipnack and Stamps, 1997). In virtual work, people also become *disembodied*. "They can act as if they are completely connected while remaining far apart. They can have an instantaneous global presence. They can transcend barriers of time and space, continually creating and re-creating themselves through changing networks of interconnection based on 'real time' communication" (Morgan, 1993: 5. quoted from Jackson, 1999). Virtual work environments are where sets of people from different places, temporal locations (e.g. time zones) and sometimes different organisations work together, primarily by interacting electronically (Lee and Liebenau, forthcoming). In whichever way it is defined or understood, we note that there are two commonalities, which have led us to work on this conceptualisation of virtuality. First, virtuality implies, by nature and by definition, fundamental transformations of temporal and spatial aspects of interaction, work and organisation, or the overcoming of temporal and spatial constraints. In this paper, we therefore attempt conceptualise 'virtuality' in terms of both time and space. Second, most of the definitions available are not much helpful in understanding our everyday life practices, particularly at work, which are experienced and conducted by using information and communication technologies such as mobile phones. They are more or less at an abstract level. In this paper, we attempt to contextualise virtuality in a way that is useful to understanding users' everyday behaviour and designing, for example, mobile devices.

We suggest that virtuality can be defined in terms of polychronicity and multipresence. In the following section, we present what polychronicity and multipresence are and how they are realised (or even materialise) in virtuality. Although they are closely related practically and conceptually, we discuss them separately for an analytical purpose. Then we give examples from our empirical study on the use of mobile devices.

2. Polychronicity and multipresence

Polychronicity

Information technologies have the power to alter the ways in which time is structured in work. One of the aspects of structuring time is the distinction between monochronicity and polychronicity (Hall, 1983). They are two different ways or cultures in which people organize time and process tasks, particularly at work. In the former, people do one thing at a time while in the latter, several things are done at once. It is implied that individuals working polychronically place less value on temporal order, accept events as they arise and engage in multiple activities simultaneously, whereas people working monochronically seek to structure activities and plan for events by allocating specific slots of time to each event's occurrence (Barley, 1988: 158).

In general management practices, it is implied that monochronic procedures are superior to polychronic ones in terms of productivity in organisational work (Lee, 1999: 17). Schein (1992), for example, considers monochronic time to be easier to control and co-ordinate. Monochronicity is seen to be well suited to the management of large systems. As such, most organisations take it for granted as the only way to get things done efficiently – take as an example the idea of a 'business process' in which work is seen as sequential and temporally ordered. On the other hand, polychronic time

is considered to be more effective in building relationships and when solving complex problems. It is therefore regarded as more suitable in the developmental stages of an organisation, for smaller systems and for organisations where one gifted person is the central point of co-ordination.

When information technologies are involved in work processes, however, the superiority of the monochromic over the polychronic may be reversed. Information and communication technologies are frequently introduced for the purpose of disrupting temporal order by shifting the ways in which people structure their work patterns. They are changing the way of working, especially in terms of temporality. For example, mobile computing technologies enable people to involve themselves simultaneously in several tasks which are located at different places. Increasingly we see that information technologies are enhancing the polychronic dimension through, for example, different screen windows allowing multitasking. Developing this line of thought further, even before we reap the supposed benefits of third generation mobile (3G) communication devices, we often mix work and personal life while being engaged in the other by using mobile devices. This happens as we use our mobile telephones on the train or check e-mails at airport public internet terminals. Increasingly we see that information technologies are enhancing the polychronicity of our life and work in many areas. Jauréguiberry (2000) describes this idea as 'simultaneity', through which activities are superimposed on top of each other, allowing multiple activities to be performed at the same time. His argument is not that technology makes tasks or work more efficient, but that it is inherently *radical*: "One is not substituting one activity for another, or dealing with a task more quickly" (Jauréguiberry, 2000: 257). This layering of work on top of other work which may be intertwined with that work can be seen in the example of driving to a meeting and simultaneously arranging its location. This is not a property of information technology in and of itself, but IT does provide increased opportunities for disrupting the temporal ordering of work, and indeed leisure as well.

Furthermore, we suggest that we distinguish between two separate, though closely connected, domains to which discussions about monochronic and polychronic times can be meaningfully applied (Lee, 1999). The first domain relates to the way in which tasks and events occur in a temporal sense. We call this the 'temporal behaviour of events and tasks'. While some events take place in an unexpected temporal way, i.e. irregularly, sporadically, unevenly and not following a fixed schedule, others come in an organised temporal way, i.e. regularly, following the predetermined, or at least predictable, sequence. The former is polychronic, the latter monochronic. The second domain relates to how workers organise their time to deal with tasks and events. This is concerned with ways of working, or the 'temporal behaviour of workers'. Sometimes, people may deal with tasks and events spontaneously as they arise and may perform several things in any order during a given period of time whether they occur regularly or not. This is a polychronic approach. At other times, they may deal with events regularly at specified times and conduct one thing at a time, designating some slots of time for specific tasks. This is monochronic. Figure 1 shows these modes of temporal behaviour.

		Temporal behaviour of events and tasks	
		Monochronic	*Polychronic*
Temporal behaviour of workers	*Monochronic*	conventional postal systems	
	Polychronic		virtual work environments

Figure 1. Modes of temporal behaviour

In the upper-left area, events take place in a monochronic way, that is, regularly, in sequence and at specific times. Workers in charge also operate in a monochronic way; they tend to pre-allocate a time slot for one task, that is, they make a schedule. For example, when communications in workplaces only rely on traditional postal systems (internal or external) that make regular deliveries of letters and memos twice per day, people can set a time for communication, both sending and receiving.

In the lower-right area, events take place in a polychronic way and workers operate in the same way. They can deal with tasks spontaneously as they arise and perform several tasks at a time. In this case, tasks are expected to be completed in a timely manner without a separate co-ordinating arrangement unless there is too much work loaded on each worker. Mobile communication devices support this mode of interaction. People can connect with others on as and when they are able top do so. In some communities, it is considered even a nuisance if a person is not immediately available through email or a mobile phone (Sorensen, 2001). This mode describes the temporal profile of virtual work environments where tasks tend to increasingly take place in polychronic ways and workers are increasingly expected to work polychronically to deal with the tasks occurring in this way.

Multipresence

Information and communication technologies transform not only temporal aspects of interaction and work, but also spatial ones. In theory, and increasingly in practice, mobile devices allow people to interact wherever they are, which is augmenting mobility. Mobility is generally understood only “in terms of humans’ independency from geographical constraints” (Kakihara and Sorensen, forthcoming). They argue that ‘being mobile’ is not just a matter of people travelling but related to the *interaction* they perform - the way in which they interact with each other in their social lives. Information and communication technologies afford various dimensions of human interactivity with others in their social lives. By relating mobility to interaction, they expand and/or break down the concept to include spatial, temporal and contextual mobility. In discussing temporal mobility, they focus on increased polychronicity by the use of information and communication technologies. From our

point of view, this temporal mobility clearly illustrates the inter-relatedness of temporal and spatial dimensions of virtuality.

In discussing the spatial aspect of virtuality, we suggest the use of *multipresence* instead of mobility. While mobility is a generic term which describes the ability to move freely or with less friction, multipresence specifically refers to the ability to exist in multiple places simultaneously or to effectively function as if the person under question were present regardless of his or her real/physical location. As mobility should mean not only people travelling geographically, but also the interaction, "the way in which they interact with each other in their social lives" (Kakihar and Sorensen, 2001), we believe that multi-presence is perhaps a more suitable concept than mobility to describe the enhanced interaction facilitated by information and communication technologies.

We define multipresence as the ability to act, and to make others aware of your *presence*, in and from multiple locations; notably the term "spirit" or "apparition" is commonly referred to in dictionary definitions of presence. This is not dissimilar to religious notions of the term: "The multipresence of Christ's body" (from Websters' dictionary) in which there is freedom of/from the corporeal body, allows Christ to be 'everywhere' simultaneously. Whilst we would certainly not argue that technology turns us into gods, it does allow its users the freedom to act in ways that allow them to appear to be in many places (albeit with significant limitations). This is not to argue for the rather clichéd notion of being anytime, anywhere (see also Perry et al., forthcoming), but rather to suggest that the essence of the users is made virtual within the limitations of the technology that they have available, and they can make their presence felt from beyond the bounds of their physical location. The concept of multipresence allows us to separate actor from action. This is particularly useful when considering mobile work and mobility.

This 'being able to be multipresent' enables us to overcome some of fundamental constraints of human conditions identified by time-geographers (Hagerstrand, 1975; Carlstein, 1982) such as capability and coupling constraints. Humans are indivisible so that a person cannot be in two places or more at the same time, which is one example of capability constraints. Since all individuals are located in space and moreover interaction is time consuming, coupling constraints among individuals appear. Coupling constraints are set by the limited ability of the human being to come together in particular places to interact with one another. These constraints are by no means independent, but closed linked to each other. Information and communication technologies, particularly, mobile computing and communication devices help overcome these capability and coupling constraints.

3. Virtuality in context – data and work practice

As we have noted, virtuality implies fundamental transformations of temporal and spatial aspects of interaction, work and organisation, and the overcoming of temporal and spatial constraints. In previous sections, we suggested contextualising virtuality into polychronicity and multipresence. In this section, we use field data to demonstrate that this is the case in actualité, and how it is made possible. In the following sections, we concentrate on the two component parts of virtuality in turn,

the spatial (multipresence) [1] and the temporal (polychronicity). However, as the two aspects are not independent at all, but closely linked, readers are advised to see implications for both even when only one of them is explicitly described. Much of this data is derived from studies already documented (Perry et al., forthcoming), but are not examined using these dimensions.

One of the key findings of our data supports the idea of users making themselves 'virtual' and 'multipresent' across *space*. Mobile technology allows the ability to monitor activity remotely, which is frequently used by mobile workers in this capacity. Of course, different technologies allow, or *afford*, different modalities of remote presence and levels of immersion. Thus, the mobile telephone acts as a mechanism through which travelling workers could keep in contact with their offices, calling them through their mobile telephone at convenient times in the day, to find out what is going on in the office, both to keep an eye on background activity, and to see if any information has come into the office that might be important to their travelling work:

> *We've always had a habit keeping ourselves, keeping one another up to date as the day goes on…if he's down in London I would say you know OK we've had a brilliant day or we've had a bad day you know we've just got a habit of doing that.… He rang me a couple of times just to say yes that order he had expected to come off had happened or it hasn't.* (extract from Perry et al., forthcoming; quote from a 'mobile professional' using their mobile telephone).

We would argue that the phone is not being used to bring the two places closer, but to allow the user to become multipresent, both travelling and 'at the office' simultaneously. We have seen the same kinds of activity conducted using other forms of technology/media to do the same kind of thing – email and instant messaging being commonly used for the same reasons, but with rather different affordances and effectiveness in maintaining this sense of multipresence. Again, rather than being criticised for failing to create a good representation of presence, these technologies often were artfully used by their users in maintaining an appropriate level of presence, as it allowed them to control their intrusiveness and the form of information that they could access.

The telephone was also used when mobile in another way that lends itself to thinking about multipresence over space, and this was realised in the ways that they made use of remote technology; we have called this 'device proxying' (Perry et al., forthcoming). Again, here the telephone was used in order to extend the range of spaces within and though which action could take place; the flexibility of the telephone is the key to its use in this respect. In the example below, the mobile telephone is used to dictate letters and to access email from a remote location:

> *… I could ring up the office normally and speak to my secretary, she does shorthand and she can type it as quick as I can say over my mobile 'phone, you know, letter to so and so, really urgent, must go out, dear Mr so and so reference our conversation, I have pleasure in quoting you for this blah, blah, blah, that's the price Linda, you know, and she'll end and whatever it, and I'll say nip in my*

[1] As an aside, we note of course that disembodiment and multipresence, whilst metaphorically distinct, are functionally equivalent in this sense; a disembodied voice (perhaps over a telephone) is similar in experience to a multipresent entity that is limited to the medium of voice.

drawer and get the technical information, get it in the post this afternoon, he's really chasing it. You know, that sort of thing happens but I can do that on the 'phone. I can do most things verbally. (extract from Perry et al., forthcoming)

At the risk of sounding pretentious, this can be seen as a twist of the notion of multipresence, as one person remotely becomes multipresent, acting on the world through the body of another. Again, referring back to the religious context of multipresence, this would appear to be a familiar means of a deity making themselves apparent to believers.

Whilst it is apparent that multipresence can be used as a good way of examining the spatial aspects of some forms of activity, we have also made claims about its value in looking at temporal embodiment. The following discussion attempts to make this more explicit. During the field studies into the use of mobile communications devices – particularly the mobile telephone – we have been struck by the role that they play in the ordering and re-ordering of time, in integrating multiple, concurrent activities, and in merging work and leisure time. Taking these points in turn, mobile communication and information technologies allow contingent scheduling of activities around local circumstances (see also "micro co-ordination" in Ling and Yttri, 1999); this is interesting in that it supports both monochronic (sequential ordering) and polychronic (attention to multiple information sources) action.

Mobile technologies also have the capacity to blur work and leisure time. There appears to be a heavy spill-over in both directions. For example, one of our participants used his (work) mobile phone to call family and friends from his car during working hours. This was acceptable to him because the time was perceived as otherwise 'dead time' (Perry et al., forthcoming) and because he would be working late into the evening that night. In a similar example of this, a recent television advertisement in the UK also emphasises the mobile devices as tools to engage simultaneously in work and leisure relationships despite distance and location by showing a mother working in a European city tells her son a bedtime story by use of her mobile (Green, forthcoming). Time – most noticeably work time – is itself made mobile (i.e. it is freed from the constraints of location and resources), and this is supported and made possible by new (mobile) technology. However, it is important to recognise that understanding this technology alone is not enough to explain action, which is conducted through social norms and adapting work practices around the technology.

The always-availability, in our terms, multipresence and polychronicity, facilitated by mobile devices, affects the sequencing of life tasks, deadlines organised around work and home activities, the cycles of work, leisure and family life, and the rhythms of diurnal, lunar, seasonal and calendar change – all of which have social implications (Green, forthcoming).

4. Conclusion

Innovations in information and communication technologies have enabled new ways of interaction, new working patterns and new organisational forms. This is characterised by the popular notion of 'being virtual'. However, on examination, this notion is limited in its explanative power in making clear what it is about these technologies that allows these changes to working practices (or indeed, wider social changes as a result of this). Virtuality implies fundamental transformations of temporal and spatial aspects of interaction and work. We suggested that we can better

conceptualise and contextualise virtuality by focusing on its temporal and spatial aspects: polychronicity and multipresence. Our fieldwork data showed how the use of mobile phones augmented polychronicity and multipresence of mobile workers both at work and leisure.

This paper has several limitations. Among others, it is limited in its coverage of mobile technology. Mobile phones are virtually omnipresent, and therefore the most important mobile device. Nowadays, however, other devices such as 'smartphones' and personal data assistants (PDA) are increasingly being used by mobile workers. In addition, advances in mobile and ubiquitous computing and infrastructures (e.g. Bluetooth, IEEE 802.11b WLANs, Hewlett-Packard's JetSend, Sun Microsystems' Java and Jini) mean that computing is becoming more embedded in our everyday objects, each of which is networked and able to communicate with other network enabled devices. In addition, web-based applications such as web calendars (e.g. O'Hara *et al*., in submission), which are easily accessible at work, at home, at the airport and even on the street, are also adding another dimension of virtuality, especially when individuals are widely (even globally) distributed and highly mobile. Further research will include these new devices, focusing on how they enhance and transform the virtuality, as understood in terms of polychronicity and multipresence. Despite the limitations, we believe, this paper does open a new possibility to study virtuality by pulling it down from the abstract to the practical.

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