COMPUTATIONAL MEDIA AND THE ISSUE OF SPATIALITY

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ABSTRACT:
Based on phenomenological literature and recent interest of Human Computer Interaction (HCI) in embodied paradigm, this paper discusses spatiality through a set of operative principles adapted from literature around phenomenology that theorise engagement in media.
As computational media and interactive systems become integral parts of architectural spatiality including automated double-skin facades, large display screens, interactive installations, to increasing proliferation of context-aware and ubiquitous devices in built-spaces, it is important to understand how they address the issue of space; and how would this in turn inform understanding of media in spatial settings. What can we learn from the behavioural praxis of networked communities, Computer Supported Collaborative Work (CSCW), user practices on web-based communication, and indulgence in videogames for how they pertain to the issue of space and our engagement in them that remains predominantly spatial. Relevance of pragmatics and phenomenology to HCI and computer science is a relatively new field that exposes the limits of empiricist traditions on which technologies have continued to grow. It sets out new departures for computer science and interaction design based on phenomenological guidelines.
We explore five clusters of themes, namely *Intentionality, Affordance & Coupling, Augmentation & Esctasis, Ontology & Metaphor, Repetition & Ritual* to understand embodied paradigm. Through applying these themes to specific aspects of Tangible computing, CSCW, Context-Aware systems, Ubiquitous computing and Videogames, we demonstrate how these themes encapsulate the essence of embodiment, through which, the notion of space and meaning in a given domain can be read and addressed.

Keywords: Computational Media, Embodiment, Spatiality

1 INTRODUCTION:
Computational media are not only analogous to the organisation of the physical world but they also refer to spatiality as a ground - a primary organising principle. Notion of spatiality in media borrows significantly from the Cartesian program where coordinates and optical principles of perspective dictate not only the way representation is handled in conventional computing but also how contexts are described and handled in emergent Ubiquitous and Context-Aware computing. Objectivist notion of space talks of space as a real entity whose behaviour and characteristics can be abstracted, calculated, stored and represented in a disembodied manner. Hermeneutic notion of space negates this reductive approach and talks of space and its signification from a much deeper perspective of engagement and praxis. Phenomenological treatment of space and the real puts the Cartesian program in question without presuming the immutable subject-object divide otherwise prevalent in objectivism. Phenomenology emphasises on the engagement in the routine world as explained through the concept of *Deisen* or being-in-the-world (*in-der-Welt-sein*) [Heidegger 1962]. In Being and Time, Heidegger [1962] makes a distinction between "*as*" statements that are assertions, and the primordial hermeneutical "*as*." The "*as*" of an assertion corresponds to the common usage of metaphor, as in asserting "space as container," "interface as space," or "document as document." The hermeneutical "*as*" is that characteristic of *Dasein* that already understands circumspectively, that is, unreflectively. In the same way that Heidegger distinguishes between space and spatiality, time and temporality, the in of containment and the in of engagement, he distinguishes between the *as* of assertion and the primordial *as* - a distinction between metaphor and metaphoricity. While metaphor is a feature of the assertion, with

metaphoricity we hear *as*, see *as*, feel *as*, prior to any metaphorical assertion - We hear the sound as a piercing car horn, we see the picture as a beautiful portrait, we feel the tool as a hammer that is too heavy and that the concepts such as the space, body and time, are indeed understood by the notion of spatiality and embodiment being prior to their corresponding words. [Coyne 1999, pp.164] Separating the notion of space as some kind of enveloping entity from the notion of the enveloped "being" are problematic to Coyne for how this forbids the unitary theme essential to spatiality. For Heidegger, also, the "*in*" of "being-in-the-world" is not of containment but of involvement. He invokes various other etymological arguments to demonstrate the primordiality of the noncontainment kind of *in*, where involvement precedes containment. Space hence appropriates exclusively to praxical engagement. According to phenomenological paradigm, such embodiedness precedes spatial containment.

2 ENGAGEMENT AND SPATIALITY IN MEDIA

Spatiality and vision are closely linked to the notions of truth, reality and reason. According to various commentators, such as Dewey, McLuhan, and Ong, the visual is the favoured sense of the culture of print and the Enlightenment. To be able to understand and reason out is to be able to see that which exists and which exists in space. Following Ramis, and the early Enlightenment encyclopaedists, reality is that which can be represented (i.e. in photograph or in equation), that which is true by virtue of its verifiable existence in space. Space is also apprehended visually. The visual sense appherehends the world at a glance as objects laid out in various relationships to one another – the relative space. [Coyne 1999] In this light it is apparent that the major channel of our comprehension of the computational world is visual, both in terms of interaction with computers and the reductivist, disembodied and verifiable notion of the real acting as a prime referent in structuring computational ontologies. Spatiality is hence an inseparable aspect of computational media. How does than phenomenological concept of spatiality-through-engagement account for media environments? To address this issue we will examine Virtual Reality (VR), Graphical User Interface (GUI) and Multi-user domains (MUDs), and show how space is not a virtue of representation. Here we consider VR as an extreme case of spatial metaphor - space represented literally and explicitly, GUI as an example of representational space that largely relies on spatial metaphors, and MUDs, blogs and other online systems which exist without much explicit spatiality associated with them – largely textual.

2.1 The Myth of Space Replication

Domain of virtuality and cyberspace are closely linked with replicating a notion of space as it is found materially; with objects, people and places *in* it – an *ontic* notion of space that draws significantly from the idea of Cartesian space as some enclosing entity, that which is visually perceived in three dimensions and that which's existence we recognise solely through perspectival vision, or that *in* which things are contained and acted upon. Number of developments in computer hardware and HCI, including desktop metaphors, VR, development of the web and gaming, attempt to perfect this vision under a populated belief that higher resolution, photorealistic representation or its metaphoric counterpart, and better coverage of human visual field will enhance immersion and performance; or that organising digital information on corresponding spatial models (desktop, malls, stores metaphors) will enhance interaction with computational media. [Sawyer and Mariani 1995]. The notion of space is taken as "as seen", where seeing and acting are separated – not a *link* between the optics and neural activity but a point of *contact*. [Gibson 1979. pp.222] While on one hand, these developments have contributed substantially to bringing closer the represented and the real referent - that is, heightened correspondence through photorealism; engagement in such media has continued to be an independent problem until recent. McCullough provides several cases against such belief in naïve-cognitivism sighting events around the mid 90s [McCullough 2004]. He highlights an intrinsic pattern within the development of media that has indeed come to terms with the shortfalls of this attitude. This includes, much promoted concept of cyberspace and virtual reality [Laurel 1989] [Walker 1989] as some 3D construct's being formally abandoned with ACM announcing its interest in ubiquitous computing in a plenary

conference and calling it "*After* Cyberspace" [ACM43, pp.3], The themes of VR related dystopia in films being replaced by more mature themes of hacking of information and networks, Failing of VR to take stronghold in consumer markets, Much expected 3D GUI's never developing, or the Failure of avatar based 3D online worlds. [McCullough 2004] Inadequacy of graphically superior and literal representations alone in addressing the issue of engagement is a further aspect of this dichotomy which can be stressed through looking at the user engagement studies carried out in film and television [Reeves 1993], [Nystrom 1992], [Detenber 1999], which show that the level of arousal and thereby involvement in given media does not depend as much on resolution, detail or graphical superiority. [Hochberg 1986] Studies in videogames, similarly demonstrate that photorealism does not account as much in engaging the player as the structure and plot of the game does. For spatial metaphors used in GUI, Chalmers suggested of discrepancies within spatial expliticity of the metaphors [Chalmers 1999], and Dourish's, observations in social computing as it occurs in CSCW, MUDs and IRC further supported that primacy of space to which events subscribe, remains evidentially apparent and rich even in predominantly textual environments. [Dourish 2004] Dourish and Chalmers [1994] discuss various models of user navigation in CVR, MUDs, and multimedia environments, and draw distinctions between "spatial", "semantic" and "social" navigation where they report that patterns of such navigation occurring through "personal hot-lists" or interest- matching systems such as Ringo/HOMR and GroupLens [Shardanand 1995], [Resnick 1994] demonstrates that spatial behavior doesn't need graphically represented space to contain it. Although, the behaviors exhibited in such environment are similar to those which spatial models try to support. Further to this, Blackwell suggested that universal faith in metaphors within prevalent models of HCI (direct manipulation model) may be overstated, as his research showed that apart from mnemonic assistance, explicit and given metaphors do not account for much in carrying out cognitive tasks. [Blackwell 1998, pp.1]
This brings us to considering that while spatiality forms an inevitable ground for human performance and engagement in screen-based media, neither explicit representation of 3D-space nor its metaphoric counterparts (GUI) is paramount for engagement. Hence the issue of space in media is not a legacy of representation alone but far more complex a phenomena.

2.2 Phenomenal Space

Phenomenology speaks of space as a fluid construct that emerges as a consequence of engagement. Heidegger's [1971] example of the old bridge in Heidelberg explains the concept of location and place; to which a location comes into existence by virtue of the "thing". "The location is not already there (unlike Cartesian notion) before the bridge is. Before the bridge stands, there are of course many spots along the stream that can be occupied by something. One of them proves to be a location, and does so *because of the bridge.* Thus the bridge does not first come to a location to stand in it; rather, a location comes into existence only by virtue of the bridge". By bridge, what is meant is not the equipment aspect of it but the gatherer of the *fourfold*. The notion of *Dasein* in Hedegger's work defines the conceptual basis of being inseparable from the world and focuses on how *Dasein* is oriented toward the world to which, aspects of care, freedom, and remaining are central, that space comes about/revealed as a consequence. For phenomenological paradigm reality, and/or spatiality, comes into being strictly through praxis. Unlike the notions of the space and the real forwarded by empiricism, which finds real within that which is objectively given, verifiable and reducible; the phenomenological real is dynamic and ineffable; it appropriates exclusively to the activity of *Dasein*. The well known neurological experiment[1] by Richard Held and Alan Hein [Varela

[1] In 1963, Richard Held and Alan Hein's neurological experiment involved two kittens connected to each other through a central pivot and could move only in a circle around it. While one was able to move freely around a circular track, the other was strapped in a suspended gondola. As the free cat moved, it pulled the other one around with it. Their actions and perceptions were integrated into their own individual neurological systems as in one kitten's motor and vision perceptions were coupled, but remain disconnected in the other kitten that moved passively in space only as a consequence of the first kitten's motion. Upon releasing both the kittens after several weeks, the strapped kitten that only experienced passive motion could not move around space relying on its visual perception.

1991, pp. 174-175] suggested how action and vision are intertwined in the act of perception; and therefore, how praxis and spatiality are linked and can not be contemplated disembodiedly.

3. ASPECTS OF ENGAGEMENT

To the several aspects connected to this conception of *Dasein* and meaning, and spatiality encountered through engagement, we will elaborate the following clusters of concepts relevant to the subject at hand to understand particularities of engagement in media and there by notion of spatiality.

- **Intentionality:** Key feature of Psychological phenomenon for orienting towards objects - connects to *Daisein's* aspect of care
- **Affordance and Coupling:** How an intentional reference is brought into effect, and the spectrum of intentions permitted to connect to an object or its properties
- **Augmentation and Esctasis:** De-constrainment related to *Dasein's* aspect of freedom
- **Ontology and Metaphor:** Structure of the domain of discourse and its representation within a medium – relates to meaning in context
- **Repetition and Ritual:** An experiential Gestalt consisting of sequences of actions for re-affirmation or exploration of the given domain

3.1 Intentionality

Intentionality refers to the directedness of meaning[2] – a relative space between entities and their understood meanings or essences. Thoughts, memories and imaginations are intentional acts for how they imply an intentional reference directed to the understood concept of that object or entity. Dourish elaborates its relevance to HCI for if computation is representational (interface and system-design), than the issues concerning intentionality relate to both the software design and the interface layout. Structure and nature of databases, variables and expressions demonstrate a duality of being *abstraction* and *reference* simultaneously and hence confirm to the issue of intentionality that characterises the nature of space between the encountering subject and the object concerned to this encountering. [Dourish 2004 pp.134-138] Intentionality significant in Husserl's work, can be credited to this conception of Brentano, that eventually links to Heidegger's notion of orientation and care. "Orientation, in Heideggerian terms is a further aspect of care for how one cannot be oriented equally to everything, that is, to all the equipment within one's sphere of concern or action all of the time. We face that about which we are concerned "[Coyne 1999]. Intentionality thus pertains to both interaction design and more internal application side system ontologies. "Computational world relate to the notion of "derived intentionality"[Dennett 1987] for how, for example, computational actions represent original action (i.e. clicking the "open" tab to access a document stored in a PC refers to the *concept* of opening - original intentionality). Husserl argues that the objects of intentionality are always essences; and to Heidegger, the word essence does not inscribe fixed meaning of the traditional essence, but rather an essence in a state of flux that unfolds constantly from dynamic engagement. In case of the example above the word 'open' acts as a pointer to the understood concept of opening something, which, when followed by 'Cmd+O', signals an activity of pressing specific keys to enable the intended action (opening). Where as in the case of folders in GUI (representation of real folders), a folder points to the concept of a folder or its essence. The understood meaning of a folder however is not limited to containing documents. Real folders are subject to a myriad array of intentionalites such as, using folder as a pad to write on, or to hide personal documents lying on the desk, etc. This brings us to the idea of Affordance, which we will discuss in the next section. However, double clicking the folder icon to open it is an example of derived intentionality and so is familiarity with the graphical user interface as a whole.

[2] Intentionality, a concept from scholastic philosophy, was reintroduced in contemporary philosophy by Franz Brentano in his work Psychologie vom Empirischen Standpunkte; simplistically summarised as "aboutness" or the relationship between mental acts and the external world that Brentano defined as the main characteristic of "psychical phenomena" (psychische Phänomene) distinguished from "physical phenomena" (physische Phänomene).

Spatiality hence emerges as a virtue of such intentional relation between the object and the acting subject in the act of acting. The folder icon could be anything once the relation is learned. In this light, the problem with VR and photorealistic 3D games comes when the intentionalities related to real-worlds objects contradict with functionality afforded by exact replicas of these objects in 3D worlds. For example a realistic book lying on a table in a game environment may not necessarily be lifted or moved but only be opened upon encountering. This rupture, or what Heidegger calls "break downs" are both the means of withdrawal from engagement and contemplation. Things, objects, and entities, are revealed to us as things, objects and entities only [...] in response to ruptures in the fabric of involvement; that is, withdrawing from embodied engagement to focus on disembodied contemplation of the phenomenon. This aspect of phenomenology is already known in HCI within the studies of computational theories of cognition and interaction [Winograd and Flores 1986]. Examples of such breakdown are where something presents itself as out of reach, too far, too large, out of place, or too small, too heavy etc. Reality is perceived in a qualitative manner and with value. Things are encountered as contextual, embodying our immediate concerns. To Heidegger, objects are not perceived first to which qualities are applied or interpreted and fit into a context, but interpretation takes place in the moment of perception.

3.2 Affordance & Coupling

3.2.1 Affordance

Affordance is a property of environment that affords action to appropriately equipped organisms – a three-way relationship between the subject, object and intentionality. Based on Gibson's study of ecological psychology of visual perception [Gibson 1979], Norman elaborated the concept of affordance in design and interaction [Norman 1988, 1993]. The movement Weiser called Ubiquitous Computing in early 90s [Weiser 1991] [Weiser 1996] to which, Embedded Computing, Tangible Computing [Ishi 1997, 2000], and Pervasive Computing [Mark 1999] are somewhat part, regarded the potential within familiarity and affordance in everyday objects and spatiality, against the objectivist abstraction model of HCI. By this criterion, embodied brain acts in space by exploring its physical affordances. Studies of "flight-strips" (8x1" strip that represents particular air plane and contain crucial data about its heading, altitude, speed, direction, and so forth in Air Traffic Control) provide crucial cues around the issue of affordance. Despite sophisticated on-screen radar and control application, flight strips remain the primary focus of the control activity. Flight data is manually updated on strips by crossing out the old entries; and their arrangement in different racks indicates status of the flights. Such physical system affords quick-judgement, at-a-glance over view of air-space, its history, collaborative action by multiple individuals and an infinite possibility of their relative arrangements to suit meaning and handling of air-space [Hughes et al. 1995], [Rognin 1998], [Berndtsoon 1999] - a classic case of utilizing affordance provided by simple paper-strips. Tangible User Interfaces (TUIes), on the other hand, demonstrate potentials for coupling actively mediated digital representations to physical objects where digital information could be manipulated/controlled via sensing mechanisms embedded within physical entities,[Wisneski 98] or information represented through changing physical state of embedded actuation media within objects to take advantage of the affordance pemitted by physical objects[Walner 93]. Amongst numerous projects, *Media Blocks* [Ulmer 1999] [Ulmer 1998] and *PinWheels* [Ishi 2001] respectively provide examples of physical objects being representation, manipulation and response media. It is the spectrum of intentionalities or the affordance that characterizes how one understands and intervenes space through embodied action.

3.2.2 Coupling

Coupling is how an intentional reference is made effective. It is an intentional connection that arises in the course of interaction. To Dourish [2004], concept of coupling is crucial to grounding the notion of intentionality in computation, for how it is the engagement, detatchment and re-engagement with interfaces and their elements (icons) that determine the

process of interaction within such abstract system. However, in order for coupling to occur, available affordance must be signalled; for how the realm of computation is both symbolic and abstract. We will go back to the example of the realistic book lying on a table in a game world. In the physical world a book may suggest a possibility of flipping the pages, turning a chunk of pages together or even using the book as a heavy object to throw at something! Intentionality thus comes about by virtue of *experience-with* and *knowledge-about* an entity. In the game world however, what is possible and what is not must be suggested explicitly i.e. the book cannot be lifted, for example. Based on the engagement with such objects with different set of affordances associated to them, intentionalities re-shape and meanings evolve. Coupling on gaming hardware such as on joy-sticks, steering wheels etc is made to rely both on derived intentionality and symbolic mimicking of original intentions. i.e. if pressing "enter" key represents confirming interest, and if "up" represents forward motion, a user would intuitively apply these combinations onto the book to demonstrate his intention to lift and move the book possibly to break a window; but this action would in turn return the book's opening or may be nothing, and in case lifting and throwing is afforded, may be nothing would happen to the glass if breaking is not afforded by the window. Intentionality and coupling hence form basic modes of operation, that in turn reveals characteristics of the domain.

3.3 Augmentation & Esctasis

Augmentation is central to all equipment including media. In philosophy, the concept of augmentation relates to the notion of Esctacis or transcendence and freedom, and even violation. According to Csicsery-Ronay, "the computer represents the possibility of modelling everything that exists in the phenomenal world, of breaking down into information and then simulating perfectly in infinitely replicable form those processes that pre-cybernetic humanity had held to be inklings of transcendence". To be free to Heidegger is to be spared, *(Friede or Fry)* [Heidegger 1971] – an aspect of *Dasein*. On-screen representation of spaces or spatiality provides access to phenomenal space of praxis, which is in turn analogous to enjoying freedom, wandering, flying, working, diving or discovering. Regardless of the nature of representation, the notion of freedom and transcendence is central to virtuality; including VR, videogames, and even browsing the web. Heidegger further elaborates the significance of idle wandering and its significance in conception of space through his example of the *flaneur* – an urban wanderer. Videogames, and VR for example, present an acute case of sensory augmentation through pictorial representation of distant sites, imaginary spaces, and unique navigatory and operational affordace provided to the user; such as ability to break through concrete walls, jumping across buildings, flying through the city etc. Web-browsing on the other hand presents a more symbolic notion of exploration and freedom where multiple identities, entering and leaving public chat-rooms, or participating in blogs etc. denote such notion of free-play. Within Ubiquitous paradigm, Context Aware Computing [Lenat 1999], [Lieberman 2000], [Salker 2000] Tangible Computing [Ishi 1997], Wearable [Pascoe 1998], [Brown 1998] and Pervasive Systems [Mark 1999] relate closely to the theme of augmentation through attaching of additional affordances and fusing of media content into physical objects and body. Number of large-scale initiatives spanning from smart-space, ambient media, CSCW spaces and future-home themes demonstrate some aspect of augmentation. Roomware [Streitz 1998], Oxygen at MIT, EU initiated Equator, PlaceLab, HouseN, and so forth are only few of the several such initiatives. Lasy Susan for example is an augmented conference-table prototype for collaborative viewing and manipulation of information through gestural interface and physical icons [Omojola 2000] where physical coasters containing RFID tags act as containers of specific information that can be viewed through ceiling mounted projector upon placing the disk on the side of the individually assigned viewing surface on the table. Multiple users can review different documents by selecting associated disks and placing them on the table surface. Such augmentation provides viewing, manipulation and interaction with information within/through physical objects (coasters). For Benedikt, "in patently unreal and artificial realities such as cyberspace, the principle of the ordinary space and time, can, in principle, be violated with

impunity"[Benedikt 1991b, pp.128] which Mitchell associates with disconnection of physical movement and phenomenal motion [Mitchell 1995, pp.37]. The notion of esctacis also relates to primordial ambition of human nature to transcend and violate certain structures. McLuhan's conception of "extensions" relate to this aspect of human nature that is responsible for all technological development [McLuhan 2002]. Bakhtin's concept of the pre-modern carnival [Bakhtin 1984] as involving the suspension of conventional morality and the reversal of hierarchies constitute to instinctive human desire to dwell (or its temporal pretension) beyond the imposed structure through temporal violation. Augmentative nature of media plays a key role in determining our will to engage.

3.4 Ontology and Metaphor

While ontology pertains to the most general branch of metaphysics concerned with the nature of being, computation readily regards ontology as nature of the structure of programs, codes, systems or data. [Dourish 2004] If Metaphors in language [Lackoff] are claimed to have primordial relevance in understanding the nature of the discourse, and if computation is a metaphoric realm; discussion of ontology and metaphor is essential. With the rise of empiricism and objective science, however, use of metaphors (especially in language) was regarded as absurditory and misleading and they became "objects of contempt" [Lackoff 1980]. For Hobbes and Locke, they are "*ignes fatui*; reasoning upon them is wandering amongst innumerable absurdities; and their end, contention and sedition, or contempt" (Leviathan, pt.1. chap.5). Within Empiricist tradition they are enemy of truth and means of distorting the reality. Lakoff and Johnson argue in favour of metaphor for how they are not only paramount in interpretation of a domain but also provide novel insight into the nature of the domain. For reality, domain or truth is ineffable, metaphors reveal aspects of such truth. Also spatiality is inherent in the use of metaphor. In language for example "feeling low", or "running after status" demonstrate inevitability of spatiality in determining meaning (i.e. low = not high, and feeling is understood in spatial terms, that is "down" not "up", or in the second example, status is understood in terms of entity that one could run after *in space*). Ontology, on the other hand, is an aspect of meaning in the sense that it provides the structure from which meaning can be asserted. Heidegger proposed that understanding arises from praxis; ontology arises from a state of awareness in which we can reassess our relationship to the objects in the world, and we thus formulate/reveal meaning. To this criterion phenomenology confirms primacy of ontology against the ontic approach favoured by objectivism.

The development of graphical interaction techniques led to a model of metaphor based interface design known as *direct manipulation* in which these elements are combined and extended. The fundamental principle in direct manipulation interfaces is to represent explicitly the objects that users will deal with and to allow users to operate on those directly (dragging a file icon and dropping it into a folder etc.). The direct manipulation style of interface extends the idea of the visual metaphor to a richer model in which the abstract objects that make up the systems ontological model, be they records, files, connections, servers, transactions, or whatever are realised in a metaphorical world that also defines how they interact with each other. User interface metaphors including desktop and more recent streets, malls, offices deploy buttons, pages, dialogs, files, menus, dragging, dropping, cut, paste and a number of different mannerisms. The use of metaphors essentially extends the intentional range of systems by providing new ways to conceive actions, and providing new entities for us to be oriented towards. […] The key to metaphors is the ability to manage the relationship between the metaphorical vehicle and the referent, to which affordance and coupling are central. The value of the metaphor is in suggesting intentionality. In addition the notion of augmentation is inherent in metaphors for how the computational referent of the metaphor has a set of capabilities that the metaphorical object does not. Randall Smith [1987] points out that the design of a metaphor depends on the moment when the metaphorical vehicle is abandoned and magic, or the extra power that the system adds, takes over. If there were none of this "magic", then one'd have a simulation of a desktop rather than a metaphor. In terms of our discussion here, then metaphor hinges on the ability to decouple the metaphorical vehicle from its referent, while being able to maintain the coupling long enough and effectively

enough to smooth the accomplishment of a tasks. Metaphor therefore depends on coupling and also it is relevant to recall that it is metaphoricity and not the metaphor that is claimed. While metaphoricity is essential to language and computing, it is in the quality of metaphors in understanding one thing in terms of another and its ability to cross-reference that makes them effective, and not the representation in itself (i.e. folders on desktop, or shopping cart in online store).

3.5 Repetition and Ritual

Notion of repetition pertains to primordial concepts of wandering, discovering, practice and praxis of that, which concerns us, that which characterises our being-in-the-world. While this relates to empiricist account of truth where repeatability of events (scientific experiments) in space account for truth of the phenomena, hermeneutical repetition produces something new with each iteration, such repetition is replaced in hermeneutics by "free play". Certain computer systems developers have woven the idea of play into their methods of software development and into the systems themselves.[Kay 1990] Also, repetition, a concept related to time, is only implicated through its succession space. According to Bergson, we understand succession in time in terms of rhythm in space, and the most prominent metaphors of time are spatial. Videogames, desktop computing or other media often dwell on the notion of repetition, ritual and discovery. Take for example, car racing game as a whole, or certain smaller loops of mundane user actions without any particular reason that take on a more ritualistic form similar to making morning coffee, tuning into a radio-station at specific time each day or eating with family etc. For this is true, computation pertains to the notion of space in this way. To Lakoff, [1980] we give structure and significance to out activities (and so spatiality) through such experientialist gestalt for there is no culture without rituals. "We are partially preserved in rituals […] our conceptions of our selves and the values we live by are most strongly reflected in the little things we do over and over …"[Lakoff 1980 pg.234]

CONCLUSIONS:

In this paper we discussed how spatiality is at the heart of computational media, how vision and space are linked to reason, reality and the idea of truth. From this base we continued to introducing the difference between the way spatiality is approached by objectivist tradition, that is, as abstracted, reduced, verifiable and representable notion of space - as some enveloping entity that pertains to Cartesian program; and the phenomenological approach to space as fluid and dynamic entity realised through subject-object unity and embodied action of *Dasein*. We then reported on the limitations of objective representation of space on media and literal use of metaphors in desktop computing, to demonstrate inadequacy of the objective approach. In the main body of the paper we elaborated on five clusters of concepts central to being-in-the-world that best illustrate the notion of space from embodied perspective. Core aspects of *Dasein* such as care, freedom, exploration and remaining were discussed through intentionality, affordance & coupling, augmentation & esctasis, ontology & metaphor, and repetition & ritual. Here we saw how intentionality relates to the idea of care and characterises spatiality between the concerned subject and the target object. Spectrum of intentionalities permitted to attach to an object defines the ways in which we can intentionally orient to objects through coupling and decoupling. We saw how notion of augmentation and escape relate to the idea of freedom, transcendence and violation and act as the basis of our will to engage. Ontology and metaphor, on the other hand, were addressed as ways in which we structure and understand a given domain. Finally we looked at repetition and ritual as ways of exploration and reconfirmation of remaining, or being – again a primordial aspect. We argue that formation of spatiality and praxis are one and they depend on these aspects of primordial nature. For space cannot be thought of in isolation, effectiveness of spatial themes depends on how well we address the issue of engagement; and not visa-versa. For computation is both abstract and representational and for interaction is connected with the specificities of the corporeal world and how we are in it, confirms the relevance of embodiment based paradigm in design of computation. If computation must refer to space and embrace spatiality, it is not in the literal correspondence to the physical phenomena but in the deeper understanding of

spatiality and engagement in the phenomenal world that would constitute our natural being in the representational world of computing. Recent departures in HCI and computation evidently show fragments of such theme where routine objects, places and people form active constituents of computation. When we take a broader look at the developments in CSCW, Gaming, Context-aware and Embedded computing together, we begin to see a distinct pattern pointing towards a view of computing that attempts to be embodied in the social and praxical fabric. In this paper we tried to crystallize the underlying principles behind such theme to further our understanding of engagement and immersion that might inform the way spatiality is addressed in computing and the way computing could be handled in space.

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