

5 Staying there: an activity-based approach to narrative design and evaluation as an antidote to virtual corpsing

Tim MARSH

Abstract. Interactive mediated environments (e.g. virtual reality/environments, computer games, the Internet, multi-media, interactive television) have the potential to induce experience in users. Engagement, involvement, agency, immersion and presence are widely used terms to describe the situation in which the inducement of experience in users of these media occurs. Implied in these terms is that experience presupposes that participants are absorbed in the illusion of interacting within the context created by these media. Without absorption, users' attention is shifted from the mediated to the real world, disrupting the illusion. Deriving from an acting term (UK) to denote falling out of character, virtual corpsing is used to describe this shift in attention. So instead of talking about 'being there' this chapter focuses on maintaining the illusion and is referred to herein as *staying there*. This is a consequence of two things, firstly, transparency of equipment and secondly, continuity of interacting within the social and cultural environment depicted virtually. Extending concepts from activity theory, this chapter describes a conceptual framework to inform and guide analysis and design of interactive mediated environments. To this end, models and tools are developed in which to reason about human practice and experience in mediated environments from low-level operations through actions/tasks to a holistic activity-based scenario/narrative perspective characterised by objective and motive. The degree to which objective outcome coincides with the motive that stimulates the user to a mediated encounter provides a measure of success. Furthermore, stimulating mediated encounters may generate new motives, encouraging users to stay there.

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5.1 Introduction

One of the most intensive and continued bodies of research in experiential design of computer-based systems has been from work in presence. Until recently, presence research has been carried out in relative isolation from much of the work in HCI and has at best been sidelined, or at worst ignored by that community. The reasons for this could be they regard presence as highly specialised, ill-defined, and/or best left in the realms of fantasy and science fiction. However, much work in presence has moved away from its original highly specialised focus of ‘being there’ [1] towards a wider arena as captured for example, in Lombard and Ditton’s definition of ‘perceptual illusion of non-mediation’ [2].

While encapsulating a wider perspective on user experience, the term ‘perceptual’ refers to ‘continuous (real time) responses of the human sensory, cognitive, and affective processing systems’ restricting discussions to experience that occurs ‘instant-by-instant’ or ‘moment-by-moment’. Therefore, rather than restricting discussions within these constrained boundaries, it is argued that a shift towards a wider arena in which all experiences occurring in unfolding events, episodes, the ‘big picture’ of a scenario that are, or have been, witnessed or evoked in users interacting with mediated environments is more useful. Work in HCI has likewise seen a shift away from its more specialised performance-based and work-related tasks towards a more experiential perspective. While a proliferation of work identifies the experiential potential of new and emerging media, HCI design and evaluation methods and techniques (e.g. [3]) are however, insufficient to account for this shift to an experiential perspective.

The work herein argues that *transparency* and *continuity* of mediated environment use helps users to stay there and induce *experience*. These three are antidotes to ‘equipmental breakdowns’ [4], continuity breakdowns and experiential breakdowns respectively, that are potential triggers for virtual corpsing [5]. To account for this, it is argued that usability and user experience should be considered as complementary and harmonious. In short, they are different sides of the same coin. To this end, what is required is a conceptual framework and basis in which to reason about human practice and experience of performing activities in scenarios in the context of use (i.e. social and cultural environment depicted virtually) within mediated environments. Furthermore, this theoretical approach must provide a means of incorporating/transforming physical interactive devices into a virtual tool in the context of use and so provide the illusion of acting directly within a mediated environment rather than with an ‘intermediary’. Such a conceptual basis is found in concepts provided by activity theory originating from Soviet psychology [6] and formulated from ‘sociocultural’ studies [7]. The adoption of activity theory has been seen by many as an alternative to the limitations of cognitive science to inform HCI (e.g. [8]).

Furthermore, Mantovani and Riva [9] have proposed a sociocultural approach as an alternative concept for considering presence. Activity theory provides a hierarchical framework and theoretical basis in which to view human practice (i.e. individual and social) in contexts, mediated by artifacts (i.e. mental and physical), through the unity of consciousness and activity.

This chapter describes the extension of concepts from activity theory and fusion with concepts from HCI and film, providing an arena in which to plan, describe, model and reason about human practice and experience of low-level operations through to a holistic activity perspective, rather than task/goal-based interface (i.e. tool) use in isolation (i.e. traditional HCI). The treatment of human practice in this way provides the basis for the analysis and design of scenario or narrative in mediated environments characterised by the coincidence of objectives and motives. The degree to which objective outcome coincides with the motive that stimulates the user to a mediated encounter provides a measure of success. Furthermore, stimulating mediated encounters may generate new motives, encouraging users to stay there.

5.2 Hierarchical structure of activity

Leont'ev proposed a hierarchical framework of activity into: *activity*, *actions* and *operations* [6]. Their decomposition is characterized by *objective*, *goals and conditions*, respectively. This is decomposed into the *activity* itself and is directed towards achieving an *object* or *objective*. The term 'object-oriented' is widely used to denote this. The objective is a process characterizing the activity as a whole. For example, in reference to Figure 5.1, this is to find a book in a bookcase located in a virtual library. Object is closely related to motive and both have to be considered in the analysis of activity, the smallest meaningful unit of analysis in activity theory [6]. Interestingly, it appears that little work in HCI deals with these separately, either suggesting analysis of 'object or motive' [11], linking them together as illustrated through 'objectified motive' [12], or not dealing with motive at all. This is a very important concept that, if not addressed, could unnaturally inhibit activity theory's application to interactive mediated environments. This is returned to later in the chapter. Say for example in the virtual library the motive is to find a poem in a book. If the poem is not in the book or the book cannot be found, then the outcome does not coincide with the motive, in which case it is not an activity. On the other hand, if the objective outcome of processes is to find the poem then this coincides with the motive and is 'activity proper' [6]. When the objective is fulfilled the activity presents itself (i.e. the existence of the activity is demonstrated) and at such a point an activity ends. The activity is made up of one or a combination of *actions/tasks*. Actions are processes performed with conscious thought and effort, and are planned and directed towards achieving a *goal*.

Actions may be made up of sub-actions directed towards sub-goals. The collective outcome of processes is the activity's objective. For example, the action of searching for the book's subject category is made up of sub-actions/goals such as navigations in-between chairs, tables and along the aisles of bookshelves and so on. Each sub-action/goal has to be fulfilled in order to fulfil the higher-level action. Actions are performed by a combination of *operations*. Operations are unconsciously performed processes in the use of tools triggered by conditions of actions. For example, in virtual reality these are operations of 3D mouse movements, button presses, and head-mounted display (HMD) movements in order to perform actions. The early phases of learning to use a tool will have been performed with deliberate and conscious attention. At this point they are actions. When they become well practiced and experienced, actions become routine. That is, they do not need to be planned and at such a point are performed without conscious thought or effort (i.e. actions become operations). These are issues relating to the mastery of external devices and tools.

Conversely, operations become actions when something breaks down and/or impedes execution as represented by the vertical arrow.

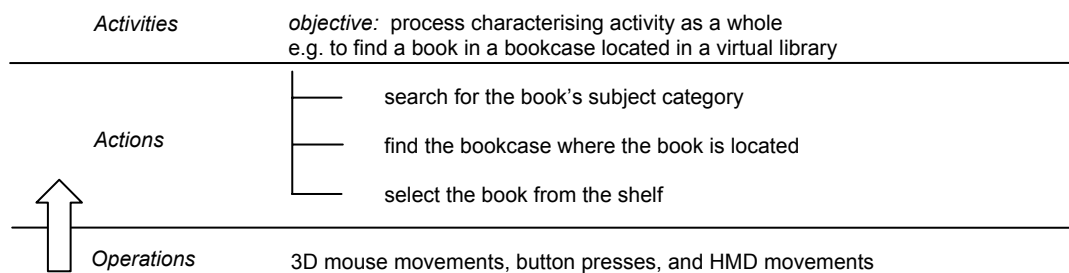


Figure 5.1 Activity-based hierarchy: objective, goals, conditions

5.3 Formation of functional organs within mediated environments

Central to activity theory is mediation and the unity between consciousness and activity.

That is, the idea that the relationship between humans and things in their environment are mediated by cultural and social tools, signs and language, etc. Vygotsky used the term artifact to refer to these; its use in HCI to refer to this wider perspective (i.e. ‘psychological tools’) and not just to physical tools is prevalent [8, 10]. The use of tool and artifact is used herein interchangeably. Aside from acting directly with nature (e.g. picking a berry from a bush), everything humans do in the environment that surrounds them is mediated by tools.

Following Kaptelinin, the ‘link’ between humans, tools and their environment can be illustrated schematically as shown in Figure 5.2 [13]. The mechanisms underlying tool mediation in activity theory is elegantly described in the formation of ‘functional organs’ [6]. ‘Functional organs are functionally integrated goal-oriented configurations of internal [sic: mental, idea, heuristic] and external resources [sic: things, material, devices]’ [13].

This means that ‘tools external to an individual integrated into functional organs are experienced as a property of the individual’ and following their mastery ‘support or complement natural human abilities in building up a more efficient system that can lead to higher accomplishments’ [13]. For example, a builder uses a saw to cut wood, a hammer fixes nails and joins wood, etc. In normal use, the saw and hammer become an extension of the builder rather than belonging to the external world. Consequently, the builder is able to focus on cutting the wood or driving the nail and not on the operations of (or reflect on) the saw and hammer in use. Zinchenko takes the ideas of functional organs one step further by arguing that tools appear not just to extend or amplify human capabilities per se, but also, ‘as a continuation of the human soul’ [14]. Functional organs encapsulate notions similar to that of Heidegger’s *readiness-to-hand* and the concept of transparency in human-computer interaction as discussed further below.

Tools mediate between humans and their tasks with computers. Kaptelinin draws attention to the importance of tool mediation in computer-based systems by suggesting that ‘perhaps the central problem of HCI can be defined as that of optimal integration of computer tools into the structure of human activity’ [13]. For example, tasks with applications running on a standard PC/desktop configuration are performed using tools such as windows, icons, menus and a pointer (WIMP) within a graphical user interface (GUI). Like transparent use encapsulated in concepts of functional organs, many writers in the HCI community advocate the seamless or transparent nature of tools, acting directly with the objective of a task rather than with an interface itself.

For example, Shneiderman’s idea of ‘direct manipulation’ with objects of the interface and the resulting ‘feeling of involvement directly with the world of objects rather than of communicating with an intermediary’ [15]. This is similar to Laurel’s idea of a first-person experience of interacting directly with an unmediated computer-generated environment rather than with an ‘intermediary’ and the resulting sense of ‘direct agency’ (i.e. ‘the power to take action’) [16, 17]. Likewise, Bødker [10], Winograd and Flores [18] and Norman [19] view the success of tasks by the way an interface remains transparent or invisible.

Nardi suggests that transparency is used in HCI ‘to describe a good user interface...one that is supportive and unobtrusive, but which the user need pay little, if any, attention to’ [20]. Similarly, specifically relating to ubiquitous technologies, Weiser coined the term ‘calm technology’ to refer to an interface that ‘functions without calling itself to our attention...it stays out of sight, effectively not even noticed’ [21]. Finally, but not least, Holzblatt, Jones and Good suggest that the ‘experience of transparency’ enables users to remain in ‘flow’ and ‘focus on the accomplishment of their tasks, and feel satisfied with how their work is moving along’ [22].

Transparency ensures users' focus of attention is not diverted to the use of the interface. Disruptions to the interface shift users' focus of attention and may potentially impede the

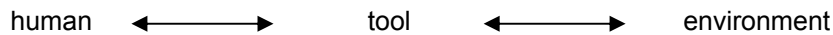


Figure 5.2 Two interfaces of human-tool environment interaction

task at hand. Hence, transparency can be described as the antidote to disruptions. Winograd and Flores refer to disruptions as *breakdowns* stating that when an object or an environment becomes part of our consciousness then a *breakdown* has occurred [18]. That is, building on the works of Heidegger, 'the interrupted moment of our habitual standard, comfortable *being-in-the-world*' and only when '*things*' do not perform or function in the way that they are intended to behave, do we become aware of their existence [18].

That is, tool use presents itself or becomes part of our consciousness only when some kind of breaking down has occurred. Consider the earlier example of the builder: when a hammer or saw slips marring the wood, or if tools cannot be found when needed. The hammer/saw and their operation are now described as *unreadiness-to-hand* or *present-at-hand* and are no longer part of the *background*.

Likewise, breakdowns with computer-based systems occur 'when work is interrupted by something ...the tool behaves differently than was anticipated' [23]. Although breakdown is a negative aspect of tool/interface use and wherever possible should be avoided, Winograd and Flores however, assert that the anticipation or identification of breakdowns in the design of computer-based systems leads to opportunities for informing design [18].

A similar concept to that of breakdown are focus shifts. Bødker describes focus shifts as a change in focus of attention 'that is more deliberate than those caused by breakdowns' [23]. She elucidates its meaning through the example of a teacher instructing a novice about the technology, and hence, presents 'openings for learning' [23]. In this chapter, breakdown and focus shift will be referred to under the umbrella term 'breakdown in interaction' [24].

5.3.1 Boundary between real and mediated environments

Just like tools support human interactions in the surrounding world as argued by Leont'ev [6] and Heidegger (see [18]), and interactions with traditional computer-based configurations, it is argued that interfaces to interactive mediated environments be considered through the integration and formation into functional organs. The formation of functional organs essentially implies that the interactive artifact in use remains transparent and as a consequence, sees that it is experienced as a property of the user acting directly within the mediated environment as depicted in Figure 5.3.

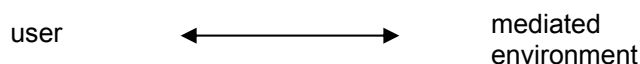


Figure 5.3 Interacting directly within a mediated environment through the formation of functional organ

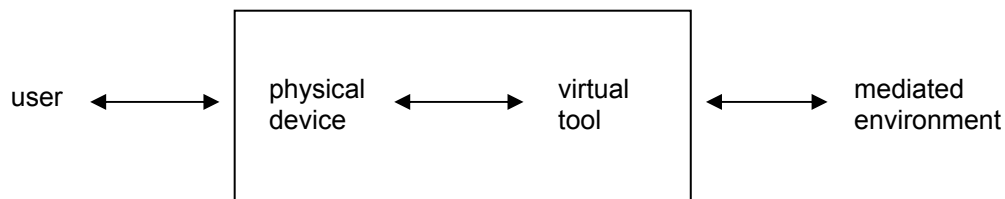


Figure 5.4 Formation of interactive artifact in human-mediated environment

However, Figure 5.4 illustrates that the integration of functional organs in interactive mediated environments may involve an additional formation from the physical device to a virtual tool. For example, the integration between the user and the tool (i.e. physical interactive device: e.g. cursor keys, 2/3D mouse, VR gloves, specialised or/and novel device, etc.) transformed into a virtual tool (i.e. computer-generated or ‘electronic’: virtual hand/arm/body/tool/artifact, etc.) – *the user-tool-boundary* - and between the virtual tool and the mediated environment – *the tool-environment-boundary*.

Figure 5.4 provides a convenient way to represent the often complex and highly novel interactive artifact of interactive mediated environments and a structure in which to reason about their design in use. The intention here is not merely to provide a mapping between a physical device and a virtual interactive artifact, nor is it proposing the evaluation of interactive artifacts and their techniques of operation performed within artificially constructed study tasks and considered in isolation from other enabling technologies and other parts of a mediated environment in which they are performed. But, it is proposing an extension to the philosophy of functional organs and a way in which to consider a shift to a wider framework of human practice within interactive mediated environments. In essence, this is arguing for an approach that incorporates a holistic perspective (e.g. [8, 11, 18]) and this move is supported by, and encapsulated in the philosophy, concepts and frameworks provided by activity theory (e.g. [10]). That is, the formation of functional organs sees that it is experienced as a property of the user acting directly within the mediated environment as illustrated in Figure 5.3.

5.4 Context of use in mediated environments

In order to identify the boundaries between the real and mediated environment and distinguish between the types of interactive mediated environments, this section elaborates Bødker’s models of activities [10, 23]. The most notable modification to these models is in the use of the arrow to represent the interactive tool/artifact and incorporate the notion of functional organs in the integration of the user with the mediated environment and also, user with a group of people or/and material objects. That is, incorporating ‘a link that provides the integration of a computer tool [sic: and artifacts in the mediated environment, such as, signs and language] into the structure of human activity’ [13]. To identify the context of use, first the *object* of activity must be considered. In activity theory, object is used to mean both a physical/virtual object (i.e. ‘a thing having existence’) and its ‘narrower, special sense’ objective (i.e. ‘object of its activity’) [6]. Object and objective are used interchangeably. Identifying the object that characterises a process of an activity as a whole and where it is directed, informs ways to reason about and identify the context of

use. In this work interest is in interactive mediated environments in which the context of use lies through or within a mediated environment.

5.4.1 Through the mediated environment

The concept of presence has its roots in ‘telepresence’. Telepresence is a sense of being in a remote or hazardous environment (e.g. space, deep sea diving). It occurs when a user or tele-operator’s interactions with a device (e.g. force-feedback manipulator) are mirrored literally ‘through the interface’ by a robot or/and mechanical arm within a remote environment. The interactive tool/artifact as represented by an arrow is the ‘link’ between the user and the mediated environment. As a consequence, users describe a sense of acting directly within a remote environment. This effect can be described well through the formation of functional organs.

The adoption of the concepts from telepresence in VR provided a convenient way to describe the effects experienced by users interacting within virtual environments. Figure 5.5 illustrates activities performed through the mediated environment with a material object (e.g. tele-operation in a hazardous environments) or with another user (e.g. communication: cable or mobile). Furthermore, this represents Internet-based interaction through a camera located in a distributed location. The objective of the activity takes place literally ‘through the interface’ in the environment in the real world where the remote user/material object/camera is located and hence the context of use in these situations is in the remote environment.

5.4.2 Within the mediated environment

Figure 5.6 illustrates the objective of an activity to be within the mediated environment performed through an artifact (i.e. interactive) by a single user or group members (i.e. many individual users) without any contribution to, or from sources and/or resources external to it (i.e. from the real world). Hence, the context of use is the mediated environment. In this situation, effective interaction requires users to maintain their focus of attention within the mediated environment [24]. The interactive tool/artifact as represented by an arrow is the ‘link’ between the user and the mediated environment. Examples of mediated environments are in entertainment (e.g. single and multi-user computer games), training (e.g. vehicle/flight simulation), design (e.g. single or distributed designers designing within a mediated environment), and communication (e.g. between distributed users within a mediated environment). Furthermore, Figure 5.6 represents systems such as the Internet, interactive TV and cinema.

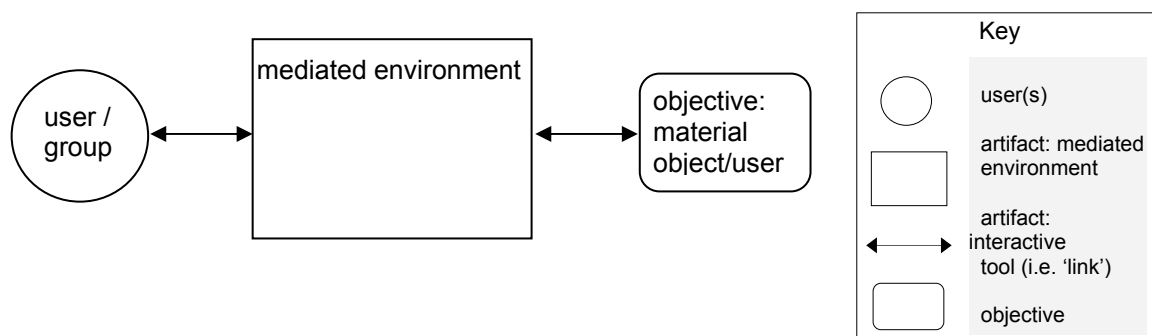


Figure 5.5 Objective present in the distributed environment: e.g. tele-operation, communication

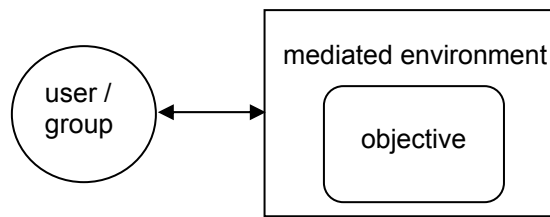


Figure 5.6 Objective present within the mediated environment: e.g. computer games, design, training, communication, interactive TV, the Internet, cinema and TV

5.5 Formation of interactive mediated illusion for experience

A holistic approach means that the underlying individual enabling components blend together in some way to form a whole - this creates a mediated illusion. For the successful formation of an interactive mediated illusion it is argued that two things are necessary: first, the formation and integration of interactive devices into functional organs; second, the objective of processes of activities must be within (Figure 5.6) or through (Figure 5.5) the mediated environment. In reference to Figure 7.7, the consequence of these two situations is that the user performs processes (i.e. actions) of an activity directed towards an objective and these appear to the user to be unmediated by technology.

For the continuation of user's experience of the mediated illusion, a user must maintain attention in the mediated environment. Conversely, shifts in focus of attention from the mediated to the real world will disrupt or break the formation of functional organs.

Likewise, disruptions or breaks in interaction (i.e. to a functional organ) may potentially (but not necessarily) break the illusion. It is argued that these interrelated issues are central to the successful interactive mediated environment use.

5.5.1 Maintain the illusion of the mediated experience

Breakdown in the mediated illusion occurs when a shift in user's allocation or focus of attention from the mediated to the real world reaches a point that is detrimental to activities performed in the illusion, and thus, impedes effective interaction. As a consequence, it is argued that in the same way disruptions or breaks to the illusion of film break spectators' experience, disruptions or breaks to the illusion of interacting within a mediated environment potentially break a user's experience.

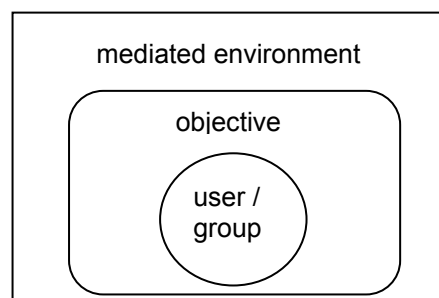


Figure 5.7 Experience of interactive mediated illusion: objective present within mediated environment and formation of functional organs

Like film, one of the main goals of interactive mediated environments (as illustrated in Figures 5.5 and 5.6) is to maintain users' attention in the context/illusion. As a consequence, users are able to keep in 'flow' of performing activities within the illusion of a mediated environment and this provides a mediated experience. This occurs without any constructive contribution from the world external to it and hence, as previously argued this is the context of use. Maintaining attention in actions (i.e. goals) of activities directed towards an objective in the context of use and in the formation of functional organs sustains the situation as illustrated in Figure 5.7.

Accepting this situation as encapsulating effective interaction provides ways to inform the hierarchical model of activities with the concepts of illusion, context of use and an arena in which to consider the formation of functional organs in mediated environments.

The integration of these concepts is achieved by the addition of a rectangle to the hierarchical model of activity from Figure 5.1 to represent the context of use (i.e. mediated environment) as shown in Figure 5.8. Thus, providing an arena in which to reason about activities and identify potential problems in design through breakdown in interaction (i.e. vertical arrow) and illusion (i.e. horizontal arrow).

5.6 Assessing experience: objective coincides with motive

Interactive mediated environments such as virtual reality/environments, computer games, the Internet, multi-media, interactive television have the potential to induce experience in users. It is argued that any encounter with technology can be considered an experience.

This may include, for example, the experience of learning and training, entertainment, information and shopping. The degree to which a mediated encounter provides users with experience that matches their expectations gives an indication of its success. In activity theory terms, a user's motive for interacting with mediated environments may be, for example, for 'some special need', interest, 'to understand', 'to comprehend', to feel emotions, or perhaps feelings of being present. If the objective outcome of performing processes of an activity within a mediated environment is the inducement of appropriate experience, the objective will coincide with the motive that stimulates the user to an encounter. Consequently, users' attention is maintained in the mediated environment's context and hence, an antidote to virtual corpsing. Conversely, if the objective outcome does not provide experience (i.e. anticipated or otherwise) because it is badly designed or doesn't match up/deliver on expectations or purpose, or it is dull, boring, uninteresting, then it does not coincide with motive. In which case, it has the potential to shift a user's attention from the mediated to the real world, i.e. to virtual corpse. However, if a mediated encounter is stimulating then it may generate new motives, encouraging users to stay there.

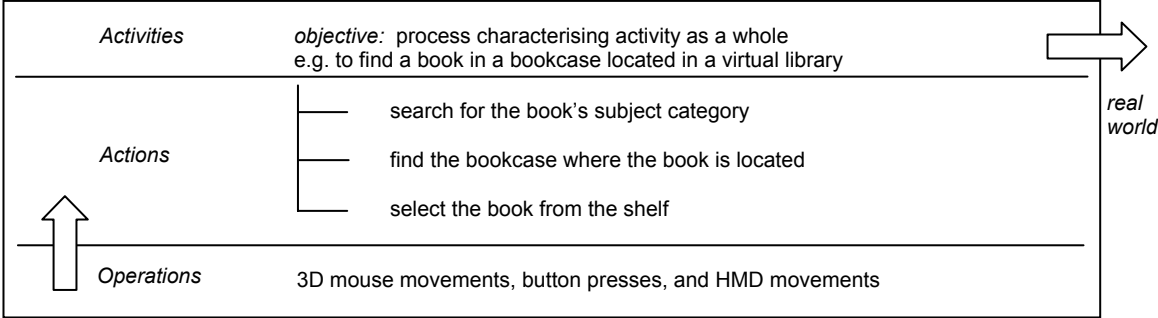


Figure 5.8 Activity-based scenario within a mediated environment

That is, according to Leont'ev a special case arises in activity theory when an action is so enthrusting that it drives itself and transforms into an activity [6].

This transformation takes place when ‘an action’s result [sic: outcome] being more significant...than the motive that actually induces it’ [6]. Hence, it can be postulated that if any outcome of interactive mediated environment use is stimulating enough, then users do it because they want to and so transforms into ‘activity proper’ and becomes the meaningful unit of analysis in activity theory.

5.6.1 Narrative design using activity-based scenarios

In contrast to old media (e.g. literature, radio, film), new media gives the user control of their encounter and so allows them to formulate their own non-linear narrative structure.

Because the unit of analysis in activity theory is activity, it provides us with a kind of ‘cut-up’ similar to spliced storylines or edits of a film. That is, as activities are characterized by the coincidence of objective and motive they can be considered as self-contained, and the fulfilment of an objective marks the end of an activity. This makes possible the undertaking of activities in different orders. This is of course dependant upon critical paths and social and cultural rules and constraints (e.g. time constraints, availability of resources, opening hours, appointments, shift work, etc.). For example, in ‘a day in the life’ scenario shown in Figure 5.9, it would be considered out of the ordinary to go to the restaurant for an evening meal before one goes to work (i.e. unless one works night shifts).

Though, if this activity was to satisfy hunger, then eating before work or indeed at any time would of course be considered socially acceptable. Likewise, the activities of shopping or taking the cat to the vets may be constrained by opening times and appointments. If no restrictions were placed on these activities then they could be undertaken at any time and in any order as illustrated in Figure 5.9.

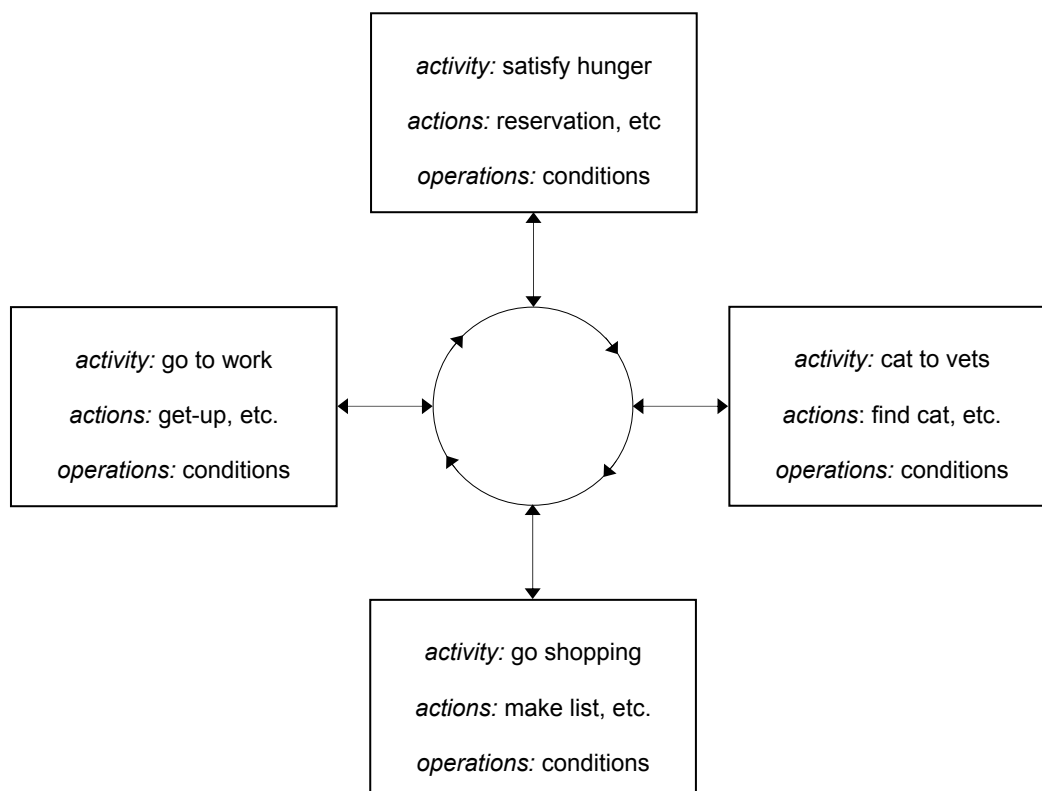


Figure 5.9 Narrative design of a Day in the Life using activity-based scenario

5.7 Conclusion

Building on work developed in the author's PhD thesis [25] this chapter argues for a concept of staying there. This is a consequence of two things, firstly, transparency of equipment and secondly, continuity of interacting within the social and cultural environment depicted virtually. The outcome of both these is the inducement of experience. The concepts, models and tools developed in this chapter provide a way to trace the progress of users' activities from low-level operations through goal-directed actions to a holistic activity perspective characterized by objectives coinciding with motives. This works towards providing an arena in which to reason about human practise and experience within interactive mediated environments and a way to reason about shifts in consciousness so providing a framework to capture breakdowns in interaction and illusion. Hence, a way to inform and guide analysis and design of interactive mediated environments. Furthermore, by using an activity-based scenario approach, complex narratives can be planned and modelled in a hierarchical structure.

Future work can use this as foundation to further consider mediated environments by their social and cultural depictions, an approach that has already been argued for by Mantovani and Riva [9].

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