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Wanderer Beyond Game Worlds

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ABSTRACT
We discuss issues and opportunities for designing experiences with 3D simulations of nature where the landscape and the interactant engage in an equitable dialogue. We consider the way digital representations of the world and design habits tend to detach from corporeal dimensions in experiencing the natural world and perpetuate motifs in games that reflect taming, territorializing or defending ourselves from nature. We reflect on the Digital Songlines project, which translates the schema of indigenous people to construct a natural environment, and the inherent difficulty in cross-culturally representing inter-connectedness. This leads us to discuss insights into the use of natural features by western people in cultural transmission and in their experiences in natural places. We propose McCarthy and Wright's dialogical approach may reconcile conceptions of place and self in design and conclude by considering experiments in which designers digitally reconstruct their own corporeal experience in natural physical landscape.

Categories and Subject Descriptors
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General Terms
Design, Human Factors, Theory

Keywords
Computer Games, Representation, Spatial Practices, Dialogic, Indexicality

1. INTRODUCTION
This paper looks to the future of immersive digital representation in 3D environments by addressing constraints of the representational legacies behind current designs. We discuss issues and opportunities for designing experiences with 3D simulations of nature where the landscape and the interactant engage in an equitable dialogue. Too typically, the design of immersive digital worlds subsumes the role of the landscape to that of passive receptacle or slave in the spatial story. This western emblematic spatiality (e.g. [1], [2]) perpetuates Cartesian geometry in parceling the world for colonization, heroism, and consumption. In commercial 3D landscape simulations and game worlds the interactant experiences nature from some designed path, a road crafted to provide opportunities for meaning or meaningful play [3]. The carving of the road is enmeshed in an ideology of human power: the designer's "strategic" practice and the interactant's "tactics" [4]. We seek to harness the subversive potential of the videogame as an enlightening "graffiti on the cultural landscape" [5] that can yield experiences that are "as refreshing as taking a walk in the woods" [6] and interactional moments to "smell the roses".

To stimulate a "re-spacing" of immersive, visualizations we first consider the way modern "spatial infrastructures" [7, 8] tend to detach our experiences from the multi-sensory and corporeal dimensions of the natural world. Then we suggest that such detachment is perpetuated by contemporary visualisations via the legacy of enlightenment and modernist art [1]. Through these spatial infrastructures and abstractions our construction of self tends to be in apposition with natural places; our experience shaped by motives to tame, territorialise or defend ourselves from nature's forces. These inherently restrict the corporeal potential of experiences and contrast with transmission in cultures that have evolved more closely linked to the land. We refer to the recent Digital Songlines project that translates the schema of a non-western culture to constructing a natural environment [8] and reflect on the inherent difficulty in cross-culturally representing interconnectedness with landscape within a digital environment. Next, we discuss insights into how western people use natural features in cultural transmission and their experiences in natural places [9]. We propose harnessing the dialogical approach [10] to reconcile conceptions of place and self in design that leads us to considering strategies to enable the landscape to participate as an essential partner in the experience. We report on experiments to expand the "space of possibility" [10] in game and immersive world designs that attempt to unfetter us from our taming, territorializing or defending from the spaces of nature. Finally, we reflect upon whether these can contribute to freeing immersive digital media "from the iron cage of modernity" [11], those entrenched habits of design that act to constrain the potential of represented worlds as experiential spaces.

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2. INVESTING IN THE LANDSCAPE

The meanings emerging from our experiences as we act and interact with the physical world are shaped by layers of "spatial infrastructures" [7]. These topological, cultural, and historical structures govern our spatial praxis, or performance, in the world. Here, when referring to the *experience* of a place and the meaning emerging from that experience, we are not concerned with some absolutist definition of a type of place. Rather, our concern is with the relationship between experience and those infrastructures that shape meanings that emerge from such experience. So, by "natural places" we mean places where our corporeal reality in encountering their materiality depends on few layers of socio-cultural infrastructures and their material features exist without human intervention. But of course, we refer to an illusion (our very observance of such places intervenes). However, this illusory "natural" is only undone when we detect infrastructures acting on and through it. Often, these spatial infrastructures, and western urbanity, tend to detach us from nature, in apposition to it; our experience being shaped by motives to tame, territorialise or defend ourselves from nature's forces. Every road physically manifests containment and consumption. Paradoxically, while we pursue closeness to nature to relax we increasingly depend on spatial infrastructures that sanitize our experiences of this proximity. After all, nature in the fore of our corporeal experience may not necessarily feel pleasant; (e.g. an encounter with a rotting carcass is surfeit with natural processes).

Models of space underpinning the representations constructed by contemporary western society to depict natural landscape are not neutral [12,13]. Consider how the prime meridian of latitude used today in GPS is the historical product of an infrastructure of global exploration and control with a perspective of the world based in the epistemic context of the enlightenment. Contrast this with Amazonian Indians view where along with longitude there is" latitude, altitude, historical context, sacred sites, and spiritual or mythological sites, where invisible creatures mark watersheds and areas of high biodiversity as off-limits to exploitation" [14] or Tuan's description of an Aivilik woman's map where the world is defined by the location of trading posts [13]. Understanding a new natural terrain and its representation develops reciprocally; each, absorbing meanings generated through the other. So, we experience the world through these abstractions and the memories we associate with them. Our experiences of the world, shaped by dominant infrastructure, in turn shape our experiences of the abstractions. And thus, perspectival socio-cultural spatial infrastructures become perpetuated through abstractions and visualisations of the world. Flynn attends to western emblematic spatiality, for example the way linear perspective in Euclidean space emerged for a visualization to be "looked at" [2] rather than actively *engaged with* via the legacy of enlightenment. Indeed, perspective means "seeing through" [15] and drawing systems seem to echo the emergence of Cartesianism from rationalism.

No representation of landscape is isomorphic to the original, even if constructed to the exact scale with attempts at multi-sensory mechanisms; for example replicating wind and smell. Any physical world landscape is larger than the sum of its parts [12] and objectifying a landscape dismantles its encompassing nature. Thus, in order to represent landscape, the designer or *representer* is faced with a choice of which aspect to represent within the frame of representation and medium of its surface. Choices on which aspect of landscape to represent are cultural; predicated by the emphasis of the society of the representation maker.

A current trend in commercial game world design exploits rich graphic photo-realism in the isomorphic quest, and 'ultra-reality' [16]. For example, in Crysis [Crytek] a player can lose items dropped on the jungle floor because the foliage is so dense; and can blast down trees and other landscape assets which remain on the ground to alter the arena of play and provide a persistent marker of the event. Oblivion [Bethesda] presents a world of such scale and with such attention to the small details of its inhabitant's back stories and lives that a player could simply follow a character around for a while and explore. Gears of War [Epic] offers more rich graphics and an occasional sense of sky and depth that seems an expression of love beyond that of simply the rendering of light [e.g. 17]. The landscape in all these examples becomes more present because of rich graphics and ultra-reality and yet remains subsidiary rather than protagonist.

The accuracy of physical representation and isomorphism of the landscape does not flesh out 'character' or sense of history [13]. This resonates with the historical evolution of pre-digital landscape representation. This developed from being accessible only to those who share the context, (e.g. the medieval landscapes of symbols [17]) through phases dominated by attempts to site the viewer in the shoes of the artist in the location by accurate topographical presentation, and then the more nuanced, evocative stages where the *feel* of the place depicted is seen as important [12].

In order to explore the potentials of the medium as a site of experience and presentation we need to move beyond the mere photo-realism of game worlds. Stockburger [18] argues that constructed game worlds and *spatial* representation that *are* complicit with spatial actions is unique to the medium, concluding that games should be investigated from a truly spatial perspective. "Truly" thus becomes a new problematic: true to what?

Because the meaning of experience emerges via reflection, the process of abstraction and representation privileges Cartesianism by separating the mind from the body and its surroundings. However, it is well recognized that perspectives on the relationship between space and function in natural landscape that are embedded in Cartesian abstractions do not represent all aspects of a person's interactions and experiences. Increasingly, design approaches recognize that people's immediate interactions in "being in the world" include much that is unreflective and unnamed [19] and further that a "felt-life" sensed through the experience of living has meaning but is not easily abstracted. The multi-corporeal meaning of an abstractive representation of natural places emerges only through interactions with that physical space. For example, consider the emergence of meaning from a map to guide a cross-country run: "*Over time looking at the map evokes those [] bodily sensations, and running the terrain evokes that convergence of lines [on the map]…. It is*

as if our sense of the situation and our sense of the map co-evolve." [20] As we reflect on our experiences *in situ* and on the map, we associate the situated ways of being, knowing and doing with particulars of the map.

All cultures have infrastructures that spatially apportion natural places; however, transmissions in cultures that have evolved more closely linked to the land appear to afford a wider repertoire of corporeal potential of experiences. In Australian indigenous (often called, Aboriginal) culture the concept of "*country"* refers to the physical terrain; but, unlike "landscape" it is also a view of life that encompasses richly symbolic and ecological interconnections of people, land, plants and animals, through generations. It is simultaneously a place that is lived *in* and a system of infrastructures for physiological, social and spiritual nourishment. The infrastructures shaping an indigenous person's experience of natural space and through which their encounters with space have meaning include relationships between land, water, flora and fauna. Thus, an indigenous person has access to a socio-cultural and ecological memory that is embedded *in the natural terrain* [e.g. 21]. In the absence of a built infrastructure the movements of Australian indigenous peoples in their country are a rich language *in situ*. The spatial praxis of their footsteps conveys a 'Living Knowledge' tightly coupled with natural multi-sensory indicators of meaning and these couplings perpetuated through representations of natural places (orally in stories, visually in art, bodily in dance, and aurally in music).

There are many layers of infrastructure by which western representations are tuned but those that seem to come to the fore in games bind people, as Allegra Geller[1] observes, "to accept so little but the possibilities are so great". The sensory dimensions of *data in* the individual experiences of indigenous and non-indigenous people in natural terrain are similar even though the socio-cultural infrastructures determining the *meaning of* that data and the practices to convey them differ. Further, while the meaning of encounters with natural places are shaped by different spatial abstractions, accounts and praxis there appear to be some phenomenological [20] processes common to all human experiences of the same place. Carrying the suburban myth of the bush unadulterated by human activity might blind us to the minutiae of meanings of the experience. Western tradition has been relatively slow to respond to natural landscape as a presence in representation beyond the object. For example, the Tang dynasty works that embodied "the universal longing of cultivated men to escape their quotidian world to commune with nature" carefully placed figures as small significants providing scale and emotional response. But, in the west, it wasn't until the 1900's when a similar focus on the land itself as present character appeared. Indeed, the presence of landscape even as setting or background did not became popular until C15.

In seeking ways to better connect the experiences facilitated by visualization with "felt-life" we explore accounts of the interdependency between physical terrain and ways of knowing, being and doing. We adopt an embodied approach to encompass a breadth of landscape experiences without privileging Cartesianism or the dichotomising abstraction of self and place [22].

3. SIMULATED LANDS

Worlds constructed as game environments are many and various in their design approach, from the textual hinting of a world to be discovered of the early adventure game, the backdrops of platform games, to the richness of explorable worlds such as World of Warcraft (WoW) [Blizzard] and Oblivion [Bethesda]. The focus here is on the design of worlds that aim to simulate the experience of being *somewhere*, in particular games *in* virtual environments where the player is a "present explorer". These First Person Point of View (POV) constructed worlds try and position the player in the 'shoes' of the avatar. The landscapes depicted in these games, from Second Life's estates of the American dream to Unreal Tournament's twisted architectures [Epic], is neither hero nor villain but implicit to the plot to a greater or lesser extent depending on the core mechanics. So, while the richest graphic realism allows the landscape to become more present; its 'character' and history remain insubstantial [13]. Creating simulated worlds as game spaces relegates the landscape to fifth business[2]: neither protagonist nor bit player, neither antagonist nor minor character. To emphasise the potential issues that arise when promoting the role of landscape as protagonist we now, briefly, describe a project in which the goal of the world representation is to forefront the landscape.

3.1 Landscapes in Cultural Worlds

The recent Australasian CRC for Interaction Design (ACID) Digital Songlines project translates the schema of a non-western culture to construct a natural environment [8] as a cultural heritage activity. Through participatory relationships with indigenous communities the landscape is fore-fronted, indicative of its primacy as a protagonist in cultural transmission. It aims to convey an indigenous Australian point of view by visualizing envisioning landscape as an entity [21] and protagonist in the experience. Songlines is a response to the observed "*problematic disjunction between the structured information to be found on a computer, and the integrated, holistic, lived and performed knowledges of Aboriginal people on country*" [23] and Nakata's observation that such approaches tend to form knowledge of 'Others' that are quite discontinuous with indigenous historical contexts [24]. The project is also a response to the fragility of indigenous culture in the face of the disintegration via the process of colonisation. Critically, the stories told by the indigenous communities actually belong to the landscape; they are the feeling and nuance of the landscape itself as the community interrelates with it. Ironically, this most apparently concrete inscription medium is also the most contentious and fought over: thus, it is urgent for the indigenous communities that they possess a means of

[1] Allegra Geller is the game designer character in Cronenberg's 1999 Existenz

[2] The term 'Fifth Business' is taken from the Robertson Davies novel of the same name.

demonstrating their meaning of encounters with, not the landscapes and territories of the west, but *country*.

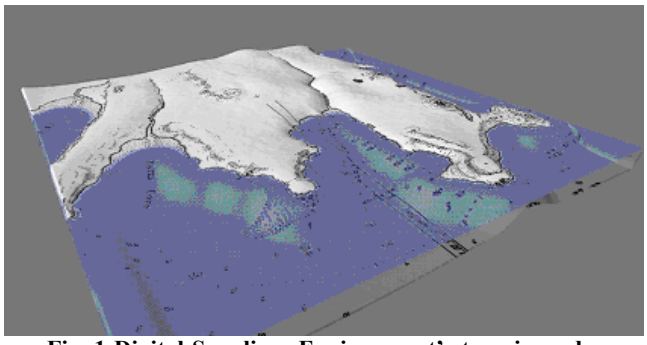

Fig. 1 Digital Songlines Environment's terrain under construction in the game engine

The Digital Songlines Environment uses a commercial middle-ware game engine to visualise the cultural landscape of individual indigenous Australian communities by placing cultural artifacts and stories within a virtual topographic reconstruction of the appropriate traditional lands. This re-presented world exploits the 3D visualization technologies of the engine to allow the player to explore the lands as a first person avatar. The design prioritises the cultural context of the communities through topologically accurate representation (Fig. 1). This endeavour intends to support a sense of being there, living that life [25]. It aims to support an experience from which deeply cultural meanings of the environment as somewhere, a particular place, can emerge rather than remain *terra nullius*, offering the potential to recognise heterogeneity in such a cultural group and represent the actual traditional homelands in appropriate natural worlds. Thus, each iteration of the Songlines environment is developed closely with the traditional owners of the area reconstructed. For example, one iteration of the project focuses specifically on the area of Carnarvon Gorge, Queensland in order to give the artist, Vincent Serico, a context in which to place his work. Another, being developed in conjunction with the Juluwarlu Indigenous Corporation, is the area around Mill Stream, Western Australia. A further project looks to recreating the landscape of pre-colonial Sydney harbour area. This multiple iteration approach is a critical recognition of the tendency to dichotomise Indigenous Knowledge systems [26] against those of the Canonical western tradition, seeking in preference to represent the difference between tribal groups via place, via country as character. Such an emphasis on exact place via topographical representation also intensifies issues of design habits and indexicality discussed here.

The iteration described below is named after Gunggari Elder, Irene Ryder, one of the few remaining speakers of the Gunggari language of the Maranoa, Warrego, Condamine and Balonne regions of Queensland. Irene provided the visions and many of the stories embedded in the world and in particular contributed her knowledge of bush tucker and bush medicine to the simulation. A strong guiding design principle for the world is that it would feel as if one were 'walking the country' with Irene.

Fig. 2 Digital Songlines Environment's Irene's World: By the Maranoa River (Detail)

Irene's world represents two square kilometers of an area by the Maranoa River. The basic simulation is constructed carefully and as accurately as possible using Digital Elevation Models (DEM), topographic surface represented via Cartesian coordinates. The map is then given texture and mood by using photographic data taken from life. This 'canvas' is then populated with flora, again constructed from photographic data. Trees, bushes, grasses are all laced into the map according to Irene's personal memories of the area and known ecology.

Fauna in the worlds has been carefully modeled and animated and in some cases given artificial personality. Models are accurate in appearance, ecology and memory. Effectively, life is given to the landscape via simulation and embedding as much visual and audio detail as possible. However, the sharing of an individual's experience and memory of the place provide vitality. In particular, the careful construction of a rich ambient audio environment lends depth [12]. For example, on approach to the Maranoa River; the chorus of a variety of frogs creates a sense of being in a different zone to the dry bush scrub of the majority of the world. This rich audio immersion technique seems again more resonant with memory of place than a more accurate simulation in which the frog chorus would be silent at particular times of day. The simulation has become 'Ultra Real' in order to speak to experience and create that sense of 'living that life'.

On arrival in this designed world, the guest finds a vista of SE Queensland: a broad expanse of dry scrub under an untouchable sky. In one direction the smoke rising from a *Yumba* or camp can be seen, in another direction there is the just discernible movement of emus startled into flight by the presence of a person. An eagle flies overhead and the whole representation of landscape does indeed provide a strong *presentation* [12] of the actual country via what we can best term: an inhabited topographical representation. Interaction in the environment triggers audio files of stories at certain proximity points; so, when approaching a camp, a voice tells the totem story of the people whose camp it is. This is in keeping with a traditional manner of entering another's country, one where greeting and recognition given of the country itself in the name of its traditional owners. On the edge of the camp, the sounds of the community are heard, as if on the wind, getting louder when approaching various groups. Groups of men tell a story by the billabong, women sew

fishing-nets and grind seeds; men cook kangaroo and goanna and prepare spears for the hunt. Children run and play.

The camp implementation inspired a considerable discussion during focus sessions with indigenous groups from the simulated country. The camp as it stands (e.g. Fig 2) is the result of this. Women in the focus group wanted to be able to see greater richness in the detail of the animated characters, not just ciphers for a way of life. They wanted to hear a lot more noise of chatter and talk and individuality in dress. Their desire for knowing who these women actually were is an important desire, resonating with an attitude to people in their culture having an identity and place or relationship. The men in the same group were more concerned with the practicalities of the camp's lay-out; for example, before the trees were implemented near the billabong, one member found its placement out in the open rather foolish. We see such comments as an important indicator of the success of the enterprise in engaging the members of the group in the representation of their lands. One Gunggari community elder said of the representation: "I can almost feel the dust between my toes". In one play test members of both the Gunggari and other SE Queensland communities discussed what they would like to see in the Songlines environment; many of the desires were for the interactions where particularly cogent meanings could emerge, such as dying of thirst.

3.2 Culture Clash

Songlines intensifies dilemmas on multiple levels arising from the production brief to 'save' or support the feelings of the communities and communicate understanding to others; and, constraints embedded in technologies and design practice. Key to this discussion is the manner in which the digital world is both a representation and a navigable environment. Representations of landscapes have evident parameters in that they are not the actual landscapes, they are surrogates, material objects with their own material properties [12]. Representation within the navigable, interactive worlds of game engines mean that we can attempt a sense of the isomorphic but the relationship of the interactant to the representation is coerced by the material tendencies of the medium.

Topological data in Songlines is generated from GPS co-ordinates. This extrinsic view of the world is tainted by historical antecedents in naval exploration and by contemporary socio-political power structures implicitly parceling and objectifying the world. Some liberties have been taken with this data to create a sense of actual world. For example, the edges of the world have been elevated along its boundaries, hiding the visibility of the edge of the digital map and creating a frame for the representation, thus emphasizing its material nature as a represented object [12]. Further this data is then rendered in linear perspective, where the world's geometry is inherently at the mercy of the interactant's position in the world. The game-world map currently used to construct the environment is also the result of legacies of rationalism and Cartesianism and associations with a history where maps are the weapons of colonialism, anticipating empire. [27]. A map option is again an aspect of standard game world strategies, be it a map that is exposed by the navigational activity of the player (Civilisation) or a readily available overview of the whole world (Oblivion).

The Irene's World iteration also uses devices offered by the game engine according to established game world conventions to support navigating the terrain. For example, 'Heads Up Displays' (HUDs) which are typically used in games to show inventories, health and location etc. This temptingly convenient extrinsic view detaches the world from the visitor. Moreover, it informs the visitor to Songlines that they are still a player in a game, a tourist [28] who beyond the magic circle of the game will remain unaffected and who can affect the world only in the way designed.

The conventions exploited in Songlines suggest immunity to the experience "this is just a game". Indeed, the presence of the HUD encouraged focus groups from non-indigenous backgrounds to expect further game-like strategies within the Songlines iteration described here. HUDs as interfaces are another layer between the explorer and the world; much like using a map or a GPS in the physical world this spatial abstraction exerts a particular interpretation of moving in the space.

Fig. 3 Digital Songlines Environment's Map and HUD showing compass and inventory

The available map in the Irene's World iteration of Songlines makes a brave effort at conforming with the aspects of the country important to the community. For example, the Yumba is marked as are kangaroo tracks through the bush but also spots where local creatures can be found and important bush tucker locations like a sugar bee nest. However, Australian indigenous maps are not the cartography exploited by the game engine, rather symbols such as concentric circles are used together to form a design, a pattern or Songline that is interconnectedness. These symbols describe rather than measure the landscape, showing special features with important mythological relevance to the subject matter depicted, they also tell stories instead of depicting sites and objects [29].

In many instances, cultural information is embedded in the Songlines world via pop ups which strive for a companion voice via further use of audio recording whilst also including as much of the community language words as survive. Here the external goals of the project to make the culture accessible for transmission is problematic but also demonstrate the very experiential aspect of constructing experiential worlds. The richly simulated environment and the overheard snatches of

conversation support a memory space for the community members. Additionally, the world design exploits western traditions of design practice to present culture. This archive of cultural information is important, given that the ongoing disappearance of the oral language of Gunggari, but raises critical design dilemmas.

Layered on the Renaissance realism [1] of the simulation and topographic desires are modernist techniques to enable the interactant to explore the object of interaction. From one perspective Songlines may resist or subvert some of these implicit containments. For example, Songlines' use of these spatial tactics may empower indigenous cultures with respect to contested places; just as Nietschmann says: *More indigenous territory has been claimed by maps than by guns. This assertion has its corollary: more indigenous territory can be reclaimed and defended by maps than by gun"* [30]. However, from another perspective access to a western-mode map undermines these spatial tactics [4] and the depth of the experience.

Memories that are not easily abstracted into software design, with its methodological legacy of rationalism in elevating the mind over the body [32]. This scaffolds the walls of the iron cage of modernity, limiting communication of the feelings of the communities to others who have not lived that life. As Coyne describes [32]: *In computer systems design and research this is translated as an interest in cognitive models, knowledge representation, formalised procedures, and generalisations about human behaviour in terms of variables. Computer systems do not rate highly as physical objects to be touched and handled that occupy space. Paradoxically, even virtual-reality systems deny the importance of engaging the senses in the physical world*

Country may be the main protagonist in the Songlines environments for indigenous communities. It also exposes the assumptions underpinning our design habits as problematic. The environment is an interactional device by which the strategic power relations operate through the dominant infrastructures of space [4]. We compare this with Weber's 'iron cage' by which we close the door to worlds to support experiences from potentially new meanings of connectedness. So we seek a way to facilitate opportunities for cross-cultural understanding of indigenous views of interconnectedness [e.g. see: [33]].

4. PHYSICAL LANDSCAPES AS EXPERIENCE

We are also interested in how simulated environments can support experiences from which a sense of interconnectedness with nature might emerge for people whose culture does not overtly support that. Thus, we now explore aspects of the way western people use features in nature as aide mémoire and in communication. These insights arise from data depicting people's egocentric visual, audio, and tangible experiences as they traverse natural places which we gathered using a panoramic head-mounted video camera system [9].

We captured four participants' unreflective visual and audio interactions from an egocentric point of view (egoPOV) [9]. Separately, each recorded egoPOV data *in situ* while traversing one of two natural sites, which they had visited regularly in the past. Each walk lasted about 20 minutes and happened in either Alligator Creek south of Townsville or the Bald Rock area in Townsville Town Common. Alligator Creek, part of the large

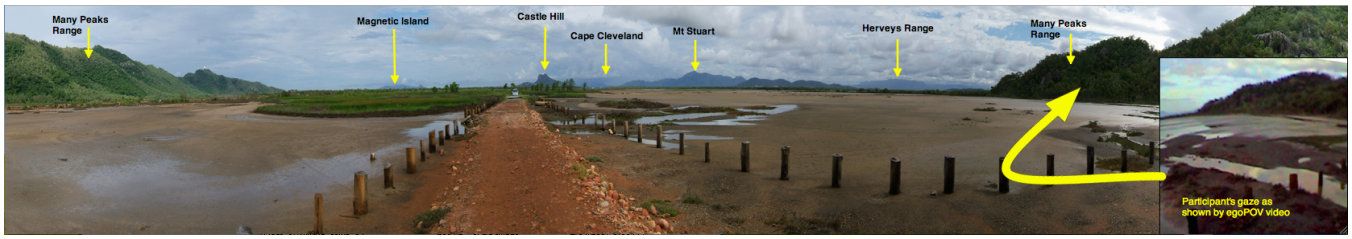

Fig. 4 A 300∞ panoramic view of hills from Bald Rock in the egoPOV study; b) EgoPov video view (indicated by the large arrow in a) as the participant gazed at the hills he was talking of 'going around'.

Bowling Green National Park, is popular with families who swim and picnic at weekends but otherwise quiet and suited to walking and watching wildlife. This contrasts with Bald Rock in Townsville Town Common, north of the CBD that is popular as a starting-point for walks skirting the Many Peaks Range to Shelley beach, and with bird-watchers who use a hide some 500m away.

We explored how natural places hold memories by asking the participant, while capturing egoPOV video, to describe what made the site personally significant. This helped us to uncover ways in which people recreate and augment place in managing space in subsequent visits (e.g. [10]). By co-locating the researcher and the participant, the participant could articulate references to physical resources that revealed contingently and opportunistically "customizing" spatial features as mnemonics. It also showed that interactants reflexively tailor their verbal and deictic communi-cation with physical contingencies to construct meaning. One hour after visiting the site, participants were recorded verbalizing any additional information that came to mind while viewing their egoPOV video [9].

We analysed the detail and dynamics of participants' engagement and inter-subjective construction of natural places shown in the egoPOV video by transcribing all dialogue and open-coding verbal content, visual content, and qualities and ambient sounds. We axially extracted themes from the initial coding. These related to: familiarity with the place; family activities and concerns; social relationships;

affects; aesthetics; motives for visiting; and, the rhythm of a visit. These draw, and are drawn by, the physical site, into the discourse, and enrich insight into *in situ* dialogue between participant, researcher, and spatial resources. [1]

4.1 Indexicality

EgoPOV video provides some insights into processes that draw landscape into a shared understanding between participants. This offers some potential in informing the design of environments to mediate a sense of connectedness with nature. Embodied interaction is situated in particular concrete cultural situations in "a world of physical and social reality" [7 pp 3]. This shared context, or indexicality, enables meaning to emerge dialogically from the experience of an action or interaction. Thus, indexicality renders actions socially intelligible and coherent [19] in specific contexts. It is both a resource and a product, part of a feedback loop in which reflection acts to partially constrain activity and evolve the encompassing sociality [31]. So, indexicality provides a dynamic resource for future use, even during the instantiation of the current situated action.

Situated actions depend on indexicality; there cannot be situated action without indexicality. Indexicality underpins the tacit assumptions that are the foundations for any social interaction and any reflection on social interaction [36]. Without indexicality communication between interactants would be longwinded, with every object in that communication tediously indicated on every occasion. Of course, there is a wide array of contexts that might be part of the overall representation, ranging from cultural, social and historical to temporal and spatial, each of which might be shared to a greater or lesser extent. This leads us to consider how interactants in an exchange acknowledge indexicality and establish the extent to which various contexts are shared.

From the egoPOV video we observed participants glancing at and repeatedly scanning landmarks as indicators as they commented on specific spatial contexts even when they did not name or describe the salient referents. For example, during a conversation about the location of past activities, a participant described how he circumvented a particular set of hills (i.e. one of six groups in view) to get to an unseen beach. He did this without ever naming or pointing to the hills but just turned his gaze toward them on several occasions (Fig. 4). The recipient of the remarks might acknowledge this indexicality by indicating in a very similar way that the context was shared, i.e. by gazing in the same direction.

Once indexicality has been established interactants can reflect on the theme related to it. For example, the participant indicating the hills whilst out of sight of the particular location, discussed the possibility of recreating the journey to the beach at some later date. On that occasion he used the previous conversation as an indexical resource, no longer needing to specifically mention the hills, though he did make an oblique reference to them as he described 'driving round' to the beach. Still later he could reduce the reference to 'walking half-way round', no longer even using the destination as a means of locating the action.

Indexicality is dynamic and processual. It underlies the assumptions that we draw upon as meaning emerges during interaction, but in a dialogical process is itself informed by that interaction. As we traverse a place, a variety of objects and landmarks come into view and prompt recollections, provoke recall of similar features, cue recall of various intellectual aspects such as affects, as well as providing receptacles for retaining information for later recall. EgoPOV video shows participants' glances and gazes 'touching' such resources and then using them to flexibly extend verbal threads and to smoothly transition between themes. For example, a participant at Alligator Creek rapidly transitioned between eight themes in 2.5 minutes, revisiting some of them a number of times, with most of the changes being preceded by glances at landmarks she then drew into the conversation some seconds later [9]. Interactants pick up on such dietic indicators as well as a variety of verbal indicators of shared understandings. The resulting continually emerging indexicality allows conversational extensions and theme changes to occur smoothly.

So landscape and landmarks play a vital role as a means to establish a shared context of location and allow a lightweight understanding in which interaction can occur. They also participate in embodying meaning at a personal level in uniting self and place. Experience of a place can perhaps be conceptualized as an interrelationship between person and environment [10]. For example, feelings of familiarity and wistfulness relate personal history to activities around specific landmarks and changes to infrastructure. More generally, axially coded themes emerging from the egoPOV video, such as family activities and concerns, draw, and are drawn by, the physical site, into the discourse.

4.2 Corporeality

Proprioceptivity offers an interesting illustration of the dialogue between participant, researcher and the spatial resources in the landscape. People traversing natural places expend considerable resources in retaining their posture in relation to the ground. During walking, an average of 25% of the time the video showed the ground. This depended on the relative unevenness of the terrain traversed. For example, the video captured by an older participant walking along a stony, unpaved road and a muddy track often showed ground as he looked down to ensure safe footing. Another, walking mainly on smooth tarred paths and wooden walkways, looked at the ground only 10% of the time.

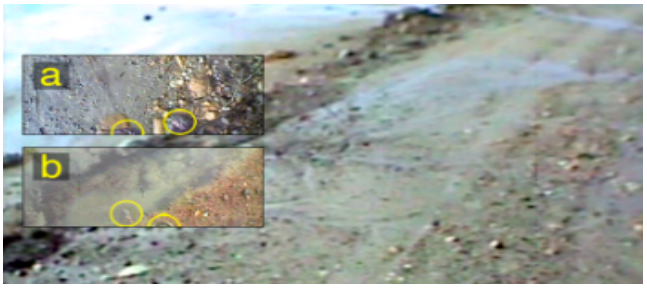

Fig. 5. The muddy track in the EgoPov video. Inserts show an egoPOV still of a participant's foot (a) just after he'd

stepped into the mud and his later attempt to wash off the mud (b).

Experience of direct contact with the environment might be as mundane as the way someone passes over it but it can also be a rich source of information. A participant walks along the remnants of a disused road that is muddy due to recent rain (Fig. 5). Whilst picking his way along not much more than a dirt track, he steps into a very muddy area and exclaims, "Oooh! Jesus Christ! Let's get up on the dry... Shit! Ugh! Yukkity-doo-dah!" Subsequently, this participant particularly remembers not only the muddiness but that the incident took place along the old access road, and, by contrast, that the new road was much drier, if somewhat stony. In addition, the act of stepping into the mud led to the participant reflecting on memories of the location always being wet and hence populated by large numbers of waterfowl in bygone times; quite different from recent on-going drought conditions.

The contemplative interaction that occurs simultaneously with immediate corporeal and affective experience is an important aspect of the way meanings associated with places emerge from experience (e.g. [28]). People in the physical world compare their immediate embodied interaction with their reflective recounting of prior situated interaction and their knowledge of the context in which both take place. So, the participant we described who stepped into the mud is pleased to discover the area is wet, even at the cost of muddy shoes. It is as he remembers it from his youth, in contrast to recent years, which he knows have been very dry and, he suspects, devoid of birdlife. Such reflection is likely to change with future experience of the place. However, people tend to engage in, what McCarthy calls a finalisation fantasy as meaning emerges during their experience. This is the notion that a place is a closed world about which everything that can be known is known. Thus, we propose that when confronted with a fresh *in situ* situation during a revisit people re-establish that fantasy by referencing their immediate experiences, incorporating changes to the environmental objects in a place, to recollected experience.

5. Reconciling Our Selves with Our Place in Nature

We propose that whoever we are there are processes and devices that support the way meanings of experience are embedded in the world through actions and interactions. For example, indigenous and non-indigenous people use features *in situ* and in simulations of natural settings indexically, without explicating salient referents; as aide mémoire, prompting meanings about places or similar features; and, as mnemonics to retain information in the flow of our stories. We propose leveraging this in designing digital experiences can help us break "free from the iron cage of modernity".

During interactions with a representation, be that a verbal story a map or a virtual world, the sense of a situation changes as meanings emerge during reflection. These experiences are absorbed by the usage situations of those representations. For example, imagine being told the story of a paradise beach which we later visit. It is only when we are directly multi-corporeally experiencing the beach that we begin to know its aspects in a deeper way; and, know our selves in this environment. The imagery of the beach gives way as our gait adapts to its deep sand, we notice the exertion required to wander bare-foot or move toward the water as the tide brings it to lap onto our toes. Every moment shapes our expectations of the trajectory of our actions within the beach; perhaps, revealing the illusion of our imagined self (e.g. wafting romantically as if borne by the wind). Interactions with simulations rarely offer us the minutiae of this ongoing shaping to reconcile our concepts of self and place within the environment. For example, people in the communities mention that allowing a wanderer to die of thirst if they foolishly ventured out without sufficient water or covering against the sun would improve the Songlines environment.

It is rare for the terrain to demand minutely adaptive behaviours by players. When it occurs, the interaction with the terrain is designed from a ludic perspective in which the terrain is subservient to gameplay. For example, avatars interact with objects in the environment or are required to be in a particular location to perform an interaction such as WoW it is possible to use a telescope from a vantage point to survey the landscape. In 'XIII' [Ubisoft] rather than carrying an inert NPC, (the 'President'), which slows movement and limits fighting capacity, players hide the body, clear the way ahead and then retrieve it. These few attempts to ground interaction and effort in the physics of the terrain work are towards game-play; and tend to mean that we leave these landscapes untouched.

It is also rare for behaviours to shape landscapes, other than where that is the object of play. There maybe minor changes in the game world, such as the effect of the discharge of weapons on buildings and terrain over time. For example, Red Faction [Volition] had terrain that was deformable by the use of explosives. Anecdotally, players particularly enjoyed this effect. The Death Match mod of Epic's Half-Life 2 featured a gravity gun that allowed players to 're-arrange' objects in locations, and these would remain over time. WoW has weather effects but these are purely visual since rain does not cause changes in terrain and avatars do not travel slower because they now have mud on their boots. Perhaps a significant but under utilised feature of WoW is that players can leave footprints, but they fade quickly and there is no wearing of paths into the landscape even though players use common off-road shortcuts that they have discovered [35]. In environments that do encourage effort to change the landscape the motive remains heroic, consumptive and/or territorialising. For example, blasting trees in Crysis is about territory. While, god-games supporting real estate perpetuate a capitalistic motif and any manipulation of landscape simulations for socializing (e.g. Second Life) treats the land as a malleable, dimensionless "gigantic filling station" [22] with no penalties for building on sand.

In these simulations landscape does not participate as partner in creation of the meaning of the experience. It has a passive role in the meaning emerging during the player's passage. This limits opportunities to breathe richer life into the meaning of the experience of the interaction by its integration into

people's felt-life. For example: rewarding the efforts of a wanderer in climbing a mountain in the environment with a beautiful view; or a serendipitous discovery of a tiny flower, only because walking through mud slowed their passage. It also limits opportunities for the subtlety with which emotions are attached to landscape; for example, the temporally evolving meaning of pathways worn smooth by many feet. The effects of our actions on the world reveal aspects of our selves to us and reconciling conceptions of place and self may suggest ways that landscape participates as an essential partner in the experience. Perhaps this will also alert us to how we should exercise our agency in physical natural places with caution and care. With increasing environmentalism this also might mean that different meanings associated with experiences in nature may contribute to transforming motifs of the world to promote behaviours attuned to ecological sustainability.

6. DIGITAL LANDSCAPES AS PRACTICE: ONE STEP BEYOND

Exploring opportunities for dialogics in simulated natural landscapes is a way to expand the "space of possibility for design" [10] and experiment with the "possibility spaces" of games [34]. We are interested in reconciling place and self such that the sense of being somewhere is not some dualistic abstraction and emergent property but integrated into the experience itself. Songlines demonstrates the manner in which digital representation can be used as a mnemonic for experience while our analysis of egoPOV reveals aspects of what meaningful relationships emerge from experience within context. To build a bridge between these we now consider the potential for dialogical processes that might occur when a designer digitally reconstructs their own corporeal experience in natural physical landscape.

The ongoing Tabernacle project is a practice environment, still under construction, to explore forefronting landscape in an experience that is not constrained, as is most usual for digital worlds, by some external goal. It offers a sandpit in which to explore engagement in a photo-physical world for the sake of the experience itself. Tabernacle is named after the 6th Century creations of Cosmas Indicopleustes who, despite his experience in the physical world shaped and presented the tabernacle maps as a visualization of the world to articulate his faith. It aims to follow Huizinga's call to present history as a lived experience [25], giving the participant a sense of what it was like to be alive in that place, at that time. A guiding idea in Tabernacle is to explore the sense of being in the landscape through the way the interactant sensorily experiences the materiality of the medium itself. The project has not yet reached such a stage, however it has created opportunities for the development team to explore this same sense of experience. This is particularly true for those working with the audio environment for the project.

Tabernacle's current map covers a few square miles of the Northern British coast and hinterlands. Some of the world to be represented is fertile and farmed, the northern part is moorland, and to the west is the sea, at once a site of sustenance and an always present threat during the era of the project. This is a landscape with a personality. It is cold and damp and windy, sometimes with extraordinary bright skies. The design intention is to provide a sensory experience, a landscape that is far exceeds the sum of its parts, echoing Tuan's description of a particular site having an aura of history that made it a very different place, redolent and evocative [13]. The design brief for the project is such that visitors will need to look for landmarks and to listen to the sounds of the land in order to find their way around. Gulls fly inland in the mornings from the sea and back towards the sea in the evenings; the sea itself has a strong voice and the open (and fey) moorlands to the north echo with the eerie sound of the wind. These are the only directional indicators, replacing the visual HUD with an indexical audio environment. In this indexical audio environment, the context has to be 'heard' and taken into account.

We refer to aspects of the way the team of designers involved in Tabernacle interacted with physical landscape by first considering their experiences in seeking the 'right' kinds of audio for the project. The experience of the entire production team in developing the environment has some similarity to that of the Impressionists who immersed themselves within landscapes to communicate through the materiality of the medium evocative experiences for others. However, it differs because the production team did not visit North East England, either back in the 6th Century or in the present day, and further the visual-representation of the world tributes the realism of Renaissance practice. For both audio and visual design the various team members had to find some approximation of their own understandings of such a world in order to re-present this in the designed environment. Here, we focus on diegetic audio as an aspect of a landscape's personality to avoid the constraints of imagery. This provides an opportunity to consider how connections with land via lived experience might transcend cultural differences.

An early goal of the project was to explore the potential of the audio environment as both ultra-real, providing depth of experience and affording directional clues for spatial navigation. For example, we wanted to support the experience of the wind '*wuthering*': a wild, almost animal sound associated with moorlands. We wanted this wuthering to evoke the mood of the open moorland, as we described it to the team, and act as a world boundary device, informing the explorer that they should go no further. The project audio team with absolutely no idea of what this sound might be engaged with all sorts of other wind noises to try to approximate the feelings of the wuthering noise that they had had described to them. Firstly, the audio team tried recording wind sounds from nature and then adjusting these via software and then they explored and played with non-wind noises that seemed to them resonant of our wuthering descriptions. We propose that this process is indicative of a kind of dialogic where the audio team took the context and emotional 'felt' aspects of wuthering, as we had described them, out into the physical landscape. The team's experience of the genuine wind sounds in the physical landscape contributed to clarifying aspects of the sound that needed to be emphasized. Their experience in the physical world often gave them a sense of the difference between the aural landscape in their experience and their

imagined moorland landscape. For example, one audio team member walked out into the fields around his home to record cows lowing and crows cawing. He subsequently brought the audio to the team with the concern that "British crows in a British world might not sound like that."

In representing and perceiving landscape people select relevant information from low-level stimuli. For example, selecting the components of a wind and wind-like or crow sounds to be represented. The audio designers, in their naïveté of the historical British landscape, may be involving an analogical process that might be relate to landscape in a way resembling what we have proposed when people re-establish their "finalisation fantasy" of a place. For example, they might reference their immediate experiences of the landscape they are in to aspects of the landscape described to them. So, while Australian and British winds and crows may differ, the design teams sensory experiences of those sounds that were accessible to them may provide aspects of the corporeal experience of the places. Paradoxically, the design team, unable to physically capture or encroach on the genuine physical landscape, required a surrogate physical landscape to lead their perception. Components of this physical surrogate then provided a means for indexical references for the imagined landscape and a basis on which to build evocative sensory experiences beyond isomorphic representation and realism.

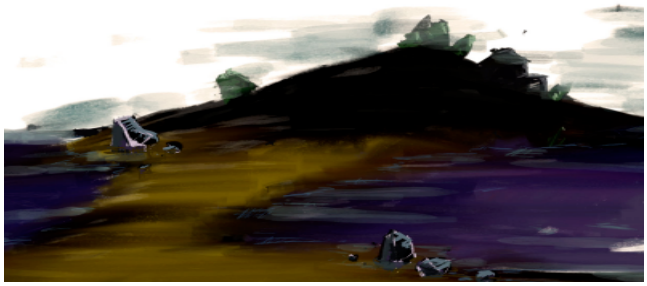

Fig. 6 Concept art for the Tabernacle landscape

7. REFLECTIONS

Any physical world landscape is larger than the sum of its parts [12] and containing a landscape as an object dismantles its encompassing nature. We believe that to support experiences of interconnectedness in digital representations of landscape designers must engage in a dialogic with the physical *representum* or another landscape. That is, to support experiences with digital media that are "as refreshing as taking a walk in the woods" [6] the designer must "smell the roses" in the physical world!

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