VIè Seminari Arqueologia i Ensenyament
Barcelona, 26-28 d'octubre, 2006
Treballs d'Arqueologia 12, 2006

Playing With A Career in Ruins: Game Design and Virtual Heritage

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Introduction

I was invited to this seminar to present a paper provisionally entitled Applying Game Design Theory to Virtual Heritage Environments, the title of a short paper I gave to the Graphite 2003 Conference in Melbourne (Champion 2003). As the paper was only two pages long, and actually written four years ago, I would like to take this opportunity to extend the argument of that paper, give an overview of what game engines and game genres can offer virtual heritage and archaeology, and discuss some of the problems I have encountered along the way.

The world of Don Quijote

Before I do so, I would like to briefly mention Don Quijote, the 'hero' of El ingenioso hidalgo Don Quixote de la Mancha. Don Quijote is a great example of a virtual heritage specialist, for a start, he appears to have been often mad, and and even more often, wildly misunderstood over the past four hundred and one years (Parr 2000).

According to another Parr (Parr 2005), "Nabokov said that 'Cervantes... seems to have had alternate phases of lucidity and vagueness, deliberate planning and sloppy vagueness, much as his hero was mad in patches.' But this was the game that Cervantes played… in complaining about the translation of his own book as part of the story, allowed for suspicion at least that his errors were deliberate."

The book may be misread by its public, which is compounded by translation (Parr 2000). Don Quijote saw things that other people from his time could not, and his enemies were a necessary evil, for they made manifest to him what was most worth preserving. They inspired his identity, conjured up from fever-

ish reconstructions of brave knights of the past, and his mission, to defend the sweet maiden Dulcinea. Although she does not actually exist, it is this vision of her that keeps Don Quijote determinedly focused on his quest.

The appeal of games as learning platforms

Like the famous story by Cervantes, computer game design is not successful because of efficacy and accuracy. Successful game design has proved engaging, challenging, and intuitively usable, and helps create a fantasy world for participants. What is perhaps most important, eager youg minds want to play them. For example, Roper noted (Roper 2006):

Games (including PC, video and console platforms) offer an exploratory environment in which learners can engage in active problem solving. Games present authentic problems in context, offering a way to bridge the gap between theoretical or complex knowledge and practical skills. They ensure the learning is relevant and the learner is motivated to continue. Games teach higher-order skills, practical competencies and social skills. They allow players to participate in new roles and contain intrinsic motivation through fantasy, challenge, curiosity and competition… Games hold a special fascination for today's youth. Before the age of 21, the average person born today will have spent 10,000 hours playing video games. Whereas online courses struggle to reach 50% completion rates, gamers will devote hundreds of hours of time on task mastering the rules to win…

The technology of new games is also exciting. Spore, for example, allows you to build creatures from scratch, allow them to evolve and develop civilizations, and colonize other planets (Kosak 2006). Just the creature animating and modeling package that is part of the game is exœptional, intuitive, and far more advanced than many specialist commercial software applications. The creatures that are developed can be shared or fought against with other players. The game designer Will Wright noticed that a great deal of meaning in games is derived from self-discovery, user-modification, and communal sharing of user-developed assets. Yet the truly revolutionary part of the game is that it is procedural, for the very intelligence of the creatures is created on the spot by the player, and over time their intelligence evolves.

New interfaces and peripherals in particular that are developed by game companies are also highly innovative (Gamespot Staff 2006). Being mass-produced and user-tested, game peripherals may end up in museum displays due to their low-cost and 'pluggability.' They are often designed for teenagers so are not always suitable for a wider audience, but sometimes can be adapted for different game genres and platforms.

Physical embodiment is highly subjective, and games are traditionally designed to play on flat-screen displays. However, in archaeological visualizations, an idea of a built environment from the size and shape perspective of an indigenous person may be highly advantageous. Peripheral vision displays also give a greater sense of the surrounding environment. Unfortunately, games typical have chunky bounding boxes around the player's avatar, and require more space than traditional openings, for speedy navigation and to avoid physical collusion and camera occlusion problems.

Peripheral displays may also help combat the tendency of participants in virtual environments to only travel forwards, people do not realize that in real-world situations we are constantly taking in peripheral data, however virtual environments do not afford this. Conversely, computer games, especially first person shooter games, traditionally confuse the spatial memory of players in order to make each game level appear unique, and to keep each spatial navigation challenge fresh and intriguing.

Games and serious games in particular, have their prophets, who awe believers with impressive statistics on the size and spending power of the gaming audience (Graft 2006), but the statistics can be misleading (Smith 2006), and the games unsuitable for specific types of learning. Market research is often undertaken by people working for game developer industry consortiums and used by authors selling their services as serious game-based learning consultants.

There are hardcore gamers and casual gamers, and popular media can get the two (often distinct) markets confused and it is hard to design for both. Education is also hard to combine with entertainment, using a game in a classroom does not mean the students have effectively learnt something (De Souza e Silva & Delacruz 2006: 240).

Games and game genres for archaeological learning

Calef et al. have written (Calef et al. 2002):

> *Taking advantage of realtime 3D game paradigms yields several advantages: increased user enjoyment, increased use of the application, and transparent learning. Games have been designed from the ground up for usability and fun. The more hours a user spends in a game environment, the better it tends to do in the market place, and the more money it makes. As a result, the primary focus for most game companies is on making 3D environments that are highly functional, easy to learn, and enjoyable to use.*

Usability and fun are only part of the appeal, for unlike well designed software, games are meant to be easy to learn but difficult to master, (Malone 1982).

The most interesting part of game design for me is thus designing challenging interaction; unlike many virtual environments, games are highly interactive, and it is this very interaction that creates a great deal of their appeal. Could we incorporate game-style interaction into virtual heritage environments?

Unfortunately, there are many strengths and weaknesses in applying game engines, game genres and game-style interaction for archaeological or anthropological learning.

Seen as a learning application, games allow students to learn by trial and error and at their own pace. However, games often involve simplistic interaction (such as testing hand-eye coordination) and don't engage the brain to reflect on fact and controversy. For example, America's Army is a free, downloadable simulation engine that is actually a marketing tool designed to train and recruit players as potential soldiers. As Zyda remarks (Zyda 2005), players are "twice as likely to consider a career in the US Army as those who didn't play the game". While Zyda calls the game "the most widely used and successful serious game to date [in the world]," America's Army teaches players how to shoot and to react, not how to think.

Games are accessible and popular especially amongst the young, but because of their engaging nature, games can compel students to stay in "game mode." I have found from my own evaluations that

telling participants a virtual environment was a game actually resulted in increased task performance results but did not actually help improve their memory or understanding of the archaeological content (Champion 2006). The large cognitive loading of reading text while navigating spatial environments is further exacerbated by games; to compensate for the lower detail and amount of original content logistically possible in a simulated environment, they can deliberately overload the participant's cognitive processing in order to heighten engagement and reaction.

In computer "shooter" games the artifacts are limited to weapons, medicine, and opening or closing things (Fig.24). These games are predominantly artefactual settings of instant use and destruction. The restricted range of artifacts almost certainly limits the emotional states possible; cultural artifacts are not just for war but violence is a dominant feature of computer games.

Games also trivialize consequences; one takes silly risks and does not care about others unless respect and recognition of their social status is required by the gamer. In this respect, online worlds may offer some hope for developing meaningful learning, but they tend to be liberal with their relation to authenticity.

As computer game interaction is typically unsuitable for learning the value of preserving things, transferable knowledge and skills learnt through gameplay are not always immediately obvious, and students may confuse fact with fiction. In previous papers I have called this the Indiana Jones problem (Champion 2004). Films and games such as Tomb Raider and Indiana Jones have promoted archaeology, while at the same time portraying it as a way of traveling the world, meeting different cultures, fighting them, and stealing or destroying their most sacred items.

While speed, lighting, avatar creation and movement, peripheries, networking etc are often very good, commercial games and real-time rendering engines use non-proprietary formats, are typically platform specific (and use either OPEN GL or Direct X). So the games (especially commercial games), may dictate what technology can be used to experience them.

For game development, education discounts are often available, and some games are easily

"modded" for a fraction of the cost of commercial virtual reality software. Games that allow this include Quake, Unreal Tournament (Fig. 25), and Half-life or Half-life 2: Source. On the other hand, commercial games are often built by expensive software development kits and commercial licenses, and are expensive as a classroom set. Some games feature simple scripting languages which would allow students to modify the game, but changing game engine code may require extremely good levels of programming.

It is also essential when modifying a game to support a type of archaeological visualization, that the inherent game genre supports the type of interaction required, and has in-game assets that can be easily converted to create a suitable theme. While the commercial games Neverwinter Nights and The Elder Scrolls IV: Oblivion have easy to use game editors, their content and ready made code are best suited to medieval re-enactments. Real-time rendering engines that are not game-specific, such as Quest3d, Blink3D, and Unity offer advantages for generic virtual environment development but they may not have readymade built-in game tools and quickly deployable 3D assets, or specifically useful readymade code.

While community support via internet forums is often very good, support by the actual company can be slow, and they may avoid listing intended future features. One could use open source game engines such as Ogre 3D, Crystal Space, or Blender 3D, but they often contain bugs, depending on speedy releases of specific features is risky, and game documentation is not as helpful or as up to date as the commercial game engines.

In terms of institutional value, games as research are not taken seriously, and game genres are not often well classified (Tychsen, Hitchens, Brolund & Kavakli 2006). On the other hand, there is great scope for employment for enthusiastic and motivated students in the industry, and for combining game design skills and archaeological expertise.

And the actual process of designing a game can work as a teaching tool. Over the last two years alone I have taught game design to more than one hundred students, and I do believe that actually building games helps students learn the principles of interaction design (Fig.

26). With open source games, students can also take these virtual environments home, personalize and modify them, as well as share information with other students. However, it can be hard to control what gets created and shared in the game.

The above issues lead us to the question of what are useful archaeological applications of game-style interaction. In order to solve this problem, when I attempted to create and evaluate virtual online archaeological environments, I asked myself the four following questions (Champion 2006).

What creates a sensation of place (as a cultural site) in a virtual environment in contradistinction to a sensation of a virtual environment as a collection of objects and spaces?

Which factors most help immerse people spatially and thematically into a cultural learning experience?

Does an attempt to perfect fidelity to sources and to realism improve or hinder the cultural learning experience?

Does an attempt to make the experience engaging improve or hinder the cultural learning experience?

I believe these questions helped me see the pedagogical problems of conventional virtual environments used to convey reconstructions of past cultures, and why they are not as popular with students as computer games. There exists a degree of separation between games that develop procedural knowledge, and virtual environments' tendency to follow traditional pedagogy by presenting prescriptive knowledge. Gamers want to change things, to learn by trial and error, to see how they are affecting the environment, and to view and share feedback on their progress towards understandable goals. An obvious example of procedural learning is the "shooter" genre. Progress in these games is through procedural learning, knowledge learnt through trial and error. There is also sometimes a degree of social instruction, but in general the accompanying guides, manuals, and even cut-scene introductions do not engage the gamers.

Hence we could crudely separate games into those that attempt to unravel narrative (such as Myst and other types of interactive fiction), and those that allow interaction through doing (the competitive adventurer-explorer games). Archaeology is usually attempting to uncover

prescriptive knowledge, knowledge of events, what happened when, and who did what. The detective style games are much closer in spirit to the learning found in archaeology, while contextual travel (rather than commercial luxury tourism) is much closer to adventuring.

The strategist type games, such as Civilization IV, where one tries to develop empires through selecting resources (and sometimes throwing dice), may be a blend of the above, as it incorporates procedural learning (via calculated risk taking), and prescriptive learning (by the game providing historical facts about the resources that may help player decisions). This type of game may expose the workings of previous civilizations, and it may incorporate historical events in the way it works out permutations of player decisions, but as a learning platform, it encounters the problem of how to separate fact from fiction for the player.

The aims of archaeology include the presentation of findings and fossils, preservation, re-enactment. Engaging and interactive, and academic visualization of potential archaeological and anthropological theories are possible and likely to engage a wider audience, however traditional findings of the social sciences are presented textually and language not easily accessible to the wider public. I suggest that not only does modelling reveal new archaeological insights not always obvious via text, (Frischer 2003: 2); a textual medium is not suitable for presenting culture as a process rather than a product.

Place as an inhabited artifact that records traces of its owners is a concept shared by cultural geographers, archaeologists and anthropologists. For an expert, place is the interpretable staged slate on which historical interactions are inscribed by intent, accident, ritual, and habit, a storehouse of users' meanings and identities. Specialised knowledge, general field experience, and an enquiring imagination have helped trained archaeologists and anthropologists extrapolate cultural perspectives from dust and soil formation, from bones and pottery, or from inscriptions and tribal myths. The resulting platial extrapololation is not easily or accurately visualised by the public in book form.

Only by following the embedded and embodied process of cultural beliefs and rituals, do we gain an empathic understanding of their situated importance. While

this may not immediately appeal to scientists, traditional societies did have a mythical perspective, part of their intangible heritage, which today may appear to us to be flights of fancy. Hence games may offer particular emic advantages to anthropologists who wish to contextually constrain their audience to see the 'world' from a different point of view. One literary example is the book A War of Witches: A Journey into the Underworld of the Contemporary Aztec by anthropologist Timothy Knab (Knab 1995). Many of the artifacts and rituals he encountered in order to understand the local village beliefs of the curanderos (witches) could be incorporated via game-play.

The book describes culture in the form of an adventure novel. In this retelling, Knab observes and spies on the locals. They only think he speaks Spanish but he also knows their native language, Nahuatl. Hence he can find their hidden artifacts, and gain their trust. Knab then take hallucinogenics in order to find out how to cure a local witch from a curse, which is a sickness resulting from proximity to radioactive bat dung planted by a jealous competitor. The way Knab has engaged the reader is through creating a quest, and embedding the character in a different world, where cultural beliefs are realities. Game immersion can also do this, but it must overcome the problems and constraints I have mentioned above.

Knab's book is a form of anthropologically attuned and socially immersed role-playing. Two of the most popular recent computer games have been role-playing games (Fig. 27). These are The Elder Scrolls IV: Oblivion (single player medieval-styled quest fantasy played on game consoles and computers), and World of Warcraft (an online multiplayer role-playing fantasy).

The degree to which players can choose their character attributes allows them to undertake the game using a myriad of skills and strategies in order to solve a variety of challenges. They do not buy these games because the games are programmed to have conditions and triggers, they do not play these games because the games are rule-based systems; they play these games because the games challenge them to change the world and to explore how these character roles embody and express aspects of their own personality. I believe that player customization of digitally animated characters would increase the appeal

of archaeological reconstructions.

Dynamic expression, and customisation

Games do not offer full physical immersion, nor is automatic player feedback incorporated into a game. The avatar is really an animated group of polygons and only reflects the intentional mouse or keyboard input of the player. Yet the avatar could have its own behavioral triggers created by the environment, which may help explain the cultural setting to the player. Real-time facial expression is also missing from avatars and non-playing characters (NPCs), but recent research, and even game-engines like Half-life 2: Source, raise the possibility of web-based real-time facial expression. A camera can record the face of a human character, including lip movement, and facially animate a virtual character as well as lip-synch them in real-time. I find this an astounding development. The lack of physical expressiveness, body language, and feeling of another's agency could be immediately rectified by using these techniques in virtual environments, highly desirable in any virtual environment that relies on animated guides or other avatars to deliver information.

Biofeedback devices could also record the player's physiological states and affect either the environment or the game in order to heighten individual behavioral states, record engagement, and create an individually recognizable avatar. I am working with Andrew Dekker, an honors student, to develop such a scenario using Wild Divine and Half-life 2: Source (Fig. 28).

Could biofeedback be useful for archaeological reconstructions? Yes I believe so.

Biofeedback can be used to convey different reactions, and to make the participant feel totally immersed in the experience. I supervised another group reconstructing a mythical labyrinth (as well the actual labyrinth of Knossos) inside Unreal Tournament. The player must find the Minotaur and slay it. The player wears a head mounted display (which exacerbates the sense of loneliness and forward vision of a labyrinth), and the player carries a light (that acts as a joystick), and sword (with digital input). The students built their own biofeedback device which is attached to the player, and the heartbeats of previous players searching for the Minotaur is played back at the specific spatial locations inside the labyrinth where they

were recorded to heighten a sense of engagement. Biofeedback can evoke the physiological sensation of being at a site not available from reading books.

Indeterminable space and vague knowledge

Games and game engines such as Crytek's FarCry are used for urban and landscape visualisation (Germanchis, Cartwright & Pettit 2005; Ch'ng & Stone 2006). Their ability to create vast landscapes of fractal terrain using GIS data is remarkable. However, virtual environment designers have great trouble in conveying phenomenologically bounded space and a contextually meaningful sense of place. A decade ago Dace Campbell wrote the following (Campbell 1996):

> *Architectural place is created in the context of the geographical limitations of the physical site, approached from other spaces and places. A virtual world, without a geographical context and a traditional means of approaching a site, exists in the context of abstract, infinite space. An attempt must still be made, however, to create meaningful places in this limit - less space.*

Virtual environments are too often geometrically and not phenomenologically bounded, ground planes and skyboxes just suddenly stop. They typically provide global and not contextual knowledge, hence overloading the player with not-yet-required information.

Conversely, a striking design feature of commercial games is how they can motivate people without explicitly showing them what lies ahead. These games are mysterious knowledge structures that loom out of the dark, closed portals surrounded by long-lost instructions, or meeting grounds of conflict and competition where players do not actually know what happens next, only that there is the possibility of eventual success.

Archaeological reconstructions could use these game techniques, and develop their own thematic ways of conveying historical uncertainty (Zuk et al. 2005). For example, buildings could slowly sink, fog could increase in relation to the doubtfulness of the reconstruction, rain and storm sounds could convey impending ominous historical events. Glare could be used to highlight key details at select times (Fig. 29).Even the laws of physics could be directly related to the cultural beliefs of the local inhabitant characters.

The natural laws would then be thematically delimited by the boundaries of the social realms in order to explain local customs and perspectives.

Palenqué has been recreated in several game engines (Ibanez et al. 2004); however, the above project was not just an interactive real-time 3D environment. Students Andrew Dekker and Mark Hurst imported my Palenqué project models into the Unreal Tournament (UT2004) game engine; they then added proxemic sound, interactive artifacts, floor sensors for feet-directed movement, and a 3D joystick (Fig. 30). The game was then projected onto a curved mirror which in turn projected the game level onto 3 walls and a ceiling as truly three-dimensional experience. The game design incorporated mini maps that could only be understood by learning the Mayan calendar, local avatars and fauna with default behaviors, and a ball-court portal that transported the player to Xibalba (the Mayan underworld).

Detective-style games are a possible way of conveying prescriptive knowledge through a thematic reward system. Rewards are a universal feature of games-they may be internal (as game feedback), or external (awards and status conferred by other members of the gaming community).

In many games knowledge is unfolded, directly related to the increasing success of the player. As one progresses there are many rewards, new weapons, changes in levels, and revealed secrets. For example, a world that attempted to combine historical learning and game-style interaction, the Renaissance Community project, using Blaxxun VRML environment shown below (Fig. 31), asked the visitor to answer certain questions in order to develop money or fame. The design aim was to engage the visitor in learning authentic seventeenth century courtly manners distilled from authentic Renaissance documents. However, one did not see other players or see how well they were doing; there were also some technical issues. We used similar ideas in a student project that created an Egyptian Temple puzzle game using Elder Scrolls III: Morrowind. Visitors to the temple were told information about the gods using inbuilt diary writing features, if they answered correctly they were given the Egyptian god's powers. The Elder Scrolls game editor, which comes free with the game, allows simple scripting, control

of Non Playing Characters' (NPCs) artificial intelligence, moving objects, and changing the abilities of the player's character.

Conclusion

I have compared Don Quijote to a virtual heritage specialist, but in truth, the life of Don Quijote bears similarities to the computer game played by a hardcore gamer. Don Quijote's life featured symbols for an alternate reality only he could see, daunting opponents that he felt compelled to challenge, and a noble though doomed quest for goals that never quite materialized however enthusiastically he pursued them. The book was and still is popular; after all, Venezuela gave away one million free copies (BBC 2005). Yet although like games the book has been widely distributed, it has also been widely misunderstood. So engaging evocation does not always ensure full understanding.

From the point of view of archaeological visualization, what has the story of Don Quijote told us? Make your constraints work for you. To quote Barr again (Barr 2005):

> *If nothing else, the characters and language of Don Quixote are what make it great. One of the panelists praised Cervante's skill, developed as a playwright, in setting up scenes and creating dialogue. That orality of the text adds even another dimension to be considered because mistakes are inherent in speech and the sound of the words becomes even more meaningful.*

What engages people and inspires them is not what is there but what they are led to believe they see. The huge technical and logistic constraints of virtual environments, online worlds, and archaeological visualizations can be massaged to appear necessary thematic elements. The real challenge of game design applied to virtual heritage is not the technology, and it is not the ludicrous impossibility of recreating a book in four dimensions, but of creating an entertaining and appropriately educational environment with playfully significant interaction that suits the task at hand. I would like to end with a quote from Jacobsen and Holden (Jacobsen & Holden 2005):

> *Ultimately, it is the instructional design of any learning activity which will determine its success, not the technology it employs per se.*

Acknowledgements

Paul Bourke, Andrew Dekker, Mark Hurst, Peter Claire, Bonnii Weeks, Wen Ling Pu, the Blaxxun Renaissance Community Project, Epic Games, Bethesda Softworks.

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