

Where Are My Legs? Embodiment Gaps In Avatars

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ABSTRACT

This paper identifies “gaps” in the manifestation and behaviour of avatars that commonly occur in games. These gaps in embodiment are sometimes surprisingly conspicuous, and cannot always be attributed to simple hardware or software limitations. Most of these gaps appear to be errors and/or oversights by the designers of the games, and can compromise the player’s experience of being in a virtual space/environment.

Nevertheless, these gaps are overcome everyday by game players to achieve compelling experiences, as is evident from the continuing popularity of games as a past time. This apparent paradox is examined in a detailed analysis of gaps in the rendering of avatars in well known classic and current games (the *Myst*, *Doom*, and *Half-Life* [19] [20] [21] series). Comparison is made to the means of embodiment used in both text only rendered experiences and non-game interactive virtual experiences. These include Interactive Fiction (*Adventure* [22] and *Zork* [23]), and Virtual Reality art (Char Davies’ works *Osmose* and *Ephemere* [24] [25]).

This comparison highlights the difference between the mimetic and immersive functions of virtual environments, and the complexity of the relationship between them.

Keywords

avatar, embodiment, presence, immersion, synesthesia, mimetic, mimetism, first person shooter, *Osmose*, *Ephemere*, *Myst*, *Doom*, *Quake* [26], *Half-Life*, *Adventure*, *Zork*, *Afternoon* [27], *Victory Garden* [28]

1.0 INTRODUCTION

There can be little doubt that the use of avatars in games greatly increases the player’s sense of involvement and presence, producing a more compelling experience. Games, and other digitally mediated interactive experiences, have shown a clear evolution towards greater and greater audio visual detail and “realism” over time.

In 1997, in discussing the demise of Interactive Fiction as a mainstream, commercially viable game genre (a text only rendered experience with language recognition), Aarseth described the “inevitable progression” towards visual renderings that occurs as soon as the technology is capable [1]. Laurel points out that immersion is contributed to by the one to one correspondence of the virtual representation to the real world [2]. Salen and

Zimmerman acknowledge that the rendering of an interactive experience is an important part of its engagement [3]. Others agree that the sensory aspect of the rendering, while *not exclusively* important, is a big part of the experience [4]. It is very surprising then, to find that the rendering of the avatar that establish the player’s presence in a virtual space often lag so far behind the general level of the game’s sophistication.

This essay first details the various kinds of gaps in the manifestation of avatars in games, identifying two broad categories, visual and behavioural. These findings are derived primarily from experiences in games that use a strong first person representation, the *Myst* series, and the first person shooters *Doom* and *Half-Life*.

A discussion then examines how game players overcome these gaps, and then outlines a model for understanding the range of mimetic features in a game. This is done with reference to other forms of digitally mediated virtual experience.

Finally, the conclusion presents the complex relationship between “immersion” and “mimetism”, and anticipates how this will continue to cause “gaps” for both players, and designers, of games. . This may shed light on how games (and other virtual environment) interfaces might (need) to develop in the future.

2.0 FAILURES TO EMBODY ME

Perhaps the most obvious gap in the rendering of games is that of the lack of legs and hands in so many game avatars.

2.1 Where Are My Legs?

Released in 2001, *Myst Three: Exile* [29] is the third instalment in the *Myst* series.

The original *Myst* (1993) is one of the most often referred to computer games [1] [5], [6], [7]. *Myst* anticipated the consumer CD-ROM revolution and became a multimedia sensation, selling over seven million copies. It even outperformed *Doom* in sheer sales, and was a much larger popular phenomenon than is now generally realised [9]. The original *Myst* has had four direct sequels, *Riven* (1997) [30], *Exile* (2001), *Revelation* (2004) [31] and *Myst V: End of Ages* (2005)[32].

Exile continued the *Myst* series’ trademark game play style in which detailed observation of the richly rendered environment allows puzzle solving. This all occurs from a

first person point of view, in which there is no obvious visual avatar, or body parts of an avatar.

A weird and somewhat unsettling aspect of *Exile* is that when you look down at the ground, you can see that your body is not there. This draws attention to the fact that you are not really embodied in the environment.

The original *Myst* did not use real time three dimensional modelling and rendering, as its famous contemporary *Doom* did (and still does). Instead, *Myst* provided the player with view points or “nodes” from which they could view the world. Each node was made up of four still, pre-rendered images, one for each of the north, east, south and west views. *Myst* sacrificed the more mimetic “free look” of real time three dimensional modelling and rendering for the much higher resolution still images that provided the richness of the *Myst* world. Additional still images were provided for the up and down views, if these were required by the game play.

Exile also uses the original *Myst*'s essential space construction technique of “node” view points. However, instead of four different *still* pictures together creating each node's 360 degree view, in *Exile* the player can move the virtual camera around and look anywhere at all, up, down, around - providing a continuity of free look from any node point. Rather than the designers themselves having moved the virtual camera and chosen *carefully composed* specific views from the “node”, the player directs their own gaze. Thus, the lack of legs, is revealed.

While *Exile*'s distinctive pre-rendered audio visual treatment, and technical limitations at the time, may have made the lack of legs difficult to overcome, the same cannot be said of the latest generation of real time rendered first person shooters. Both *Half-Life 2* (2004) [33] and *Doom 3* (2004) [34] have continued a tradition of having no legs that has survived from the 1990s.

Although the designers have gone to the trouble of carefully rendering the arms and hands that hold various weapons, when we look down at the ground past those arms, we still have no legs. In *Exile*, the lack of legs is an odd moment of realisation, a breaking of the surface tension of the immersion, but it does not specifically impact on the game play. However, in *Half-Life* and *Doom*, there are times when it is important to stand accurately in particular places, in order to progress the game. For example, in *Doom 3*, the player must stand their avatar exactly on a sensor plate. To help in this regard, the plate has “STAND HERE” written on it. However, it is not possible to simply put “your” feet on the words, since you have no visual representation of these feet. It is a matter of trial and error (in your real world efforts) to activate the (virtual world's) sensors.

These invisible feet become a significant problem, particularly in the *Half-Life* series, where physical dexterity is an import, constantly recurring part of the game play. Standing on the exact edge of a ledge or cliff in order to see, shoot or jump is critical to solving puzzles/challenges. In the real world, with our real bodies, we could do this in one of two ways. We could feel the edge with our toes/feet, or just look down to see our feet's

position. In *Half-Life*, we can do neither. Trial and error are the only solution while you learn to judge the relative position of your whole field of view and the object where your feet “are” in the game's logic, but not in the game's visual rendering. While it could be claimed that this is in itself part of the challenge of the game, it seems to me to be simply a tradition/convention left over from the early 1990s. I personally find it to be a disincentive to the genre. There are plenty of challenges presented within the game world, without adding to the problems of merely “being there”. The guns themselves have sighting positions, and/or we can observe the fall of the bullets to aim them. Why don't we have renderings of legs to facilitate their use?

2.2 Where Are My Hands?

Not surprisingly, since *Half-Life* and *Doom* are first person shooter games, representations of hands are included in the operation of weapons (including the use of just the hands as weapons). However, when the player's character holds objects other than weapons, the hands/arms are suddenly absent. This is most common in the moving of boxes, climbing of ladders, driving of some vehicles (eg: the water bike in *Half-Life 2*). The difference between the use of hands for weapons verses the use of hands for other objects is an embodiment gap, and not just a visual one.

The interaction gap is that “moving the box” is not in the same physical (keyboard) or logical array of choices as using your hands to take a different weapon. The process of changing weapons (including selecting a grenade) is a matter of choosing from the number keys across the top of the keyboard, or cycling through the available weapons by pushing a single key on the keyboard repeatedly. In contrast, the process of moving things is a rather more complicated combination of other keys, clicking the mouse and “direction of motion” keys/mouse.

There is, of course, a certain logic to this (*the game is about shooting stuff, everything else is secondary*), but it is not a logic derived from the player's experience of the real world, or their real body. It is a logic (unconsciously?) derived from a combination of the limitations of the physical interface, and a lack of analysis of how the visual interface might work better. The provision of the animations of hands to operate the guns that do exist (including pumping shotguns/reloading ammunition, throwing of grenades) could easily have been extended to the climbing of ladders, opening of doors, operation of vehicles, etc. These inconsistencies are not a matter of a lack of processor power, or a limitation of the craft of programming.

The danger of this privileging of weapons is that if the interface (operation logic and visual rendering) convention remains biased towards “just shooting”, the convention becomes a structural impediment to the development of not only first person shooter games, but also to other games, and then other virtual experiences, that use first person shooters as a reference point, or literally use first person shooter game engines.

2.3 My Whole Body is Missing!

In some cases, games leave us totally without any body at all. In *Quake 3 Team Arena* (1999), during the training mission, you are led to face a full length mirror so you can see “yourself”, embodied in a highly unrealistic avatar. Since this is a first person shooter, you probably shoot the mirror before you realise it is not an opponent. The game software shows the damage caused by your shooting, and I take this to be a sure sign that the placement of the mirror is not an accident.

The game designers have included this black humour joke where you symbolically shoot yourself before the game has even begun. It is important to note that this joke only works *because* you do not recognise your avatar. Other reasons why you are given a chance to see your avatar are not clear. Mirrors do not appear anywhere else in the game. You do not see your avatar during the combat play (unless you are lucky enough re-spawn on the spot where you just died, in which case you get to see your own body melt into the floor). The only time during the entire game experience when you see your avatar is at the end of a round, so you might recognise “yourself” standing on the Olympic style podium.

If you should look down during the combat play in *Quake 3 Team Arena*, you have no legs, not even those of the default avatar. Ironically, you do have a small, circular shadow directly underneath your body. It is not the shadow of any kind of humanoid body, and it does not change its angle or density as you move between different lighting arrangements. This shadow seems like a jarring “in world” technical artefact left over from the game’s development phase. We know that games are produced in a context of financial limitations, like any other creative endeavour, so it is possible that this is a detail that was simply never high enough a priority to get resolved. The provision of legs (or not) when you look down is treated in a variety of ways in other games using real time three dimensional modelling and rendering eg: *Medal of Honour* [35], *Battlefield 1942* [36], *World of Warcraft* [37], ranging from nothing, to animating shadows of legs moving, to full animation of legs, so it certainly is technically possible.

This lack of a whole body is disruptively evident in several ways in the much more contemplative, slow moving, *Myst* sequel *Exile*. The game has several locations where highly polished marble surfaces in “your” view clearly reflect the doorway “you” must be standing in, but the doorway is completely empty. Such immersion breaking visual disembodiments were carefully avoided in *Exile*’s predecessors, *Myst* and *Riven*. Once again, this moment of disembodiment is a *functional impediment* in that it causes doubt about the shape of the space the screen images represent. If I stand in a doorway with the sun behind me, I intuitively use the way the light is blocked out, and the way my shadow falls, to understand the space inside. This gap in embodiment could easily have been resolved by the designers, without creating a specific image for the avatar, by showing a blurry, humanoid silhouette in the doorway in the reflection.

One of the places you can visit within the *Exile* game is the forest world of *Edanna*. I noticed that I was continually unsure of “my size” relative to *Edanna* (and this spatial confusion was noted in several of the walkthroughs I used). *Edanna* was without any of *Myst* and *Riven*’s trademark architectural constructs to provide a relative scale, and perhaps this contributed to the confusion. However, I suspect that an additional factor is that the still images in the audio visual treatment of *Myst* and *Riven* allowed the designers to “cheat” the composition of each image, providing a better sense of the *intended* relative scale of the player and the environment. This “cheating” of the representation of a real space so that it overcomes the loss of relationships introduced by the technology is common practice in film and television production, particularly when shooting inside buildings, and has been used to good effect in *Exile*’s predecessors (*Myst* and *Riven*). It is ironic that *Exile*’s “free-look from a viewpoint” technique for overcoming the “stillness” of its predecessors seems to have actually introduced a dissonance of perspective that is a practical problem in the clue finding, puzzle solving game play.

Many virtual environments give a very specific embodiment that we see as our avatar (*Doom*) or we can control as a puppet (*Everquest/World of Warcraft* [39]), but few actually point out our absence of presence. One that does is Char Davies’ Virtual Reality art works, where you can also look down to see that you have no body at all. While this dis-embodiment is a deliberate, designed intention in Davies’ *Osmose* and *Ephemere*, it is quite clear that it is not intended in the *Myst* series, *Doom* or *Half-Life* series.

3.0 UNUSUAL DEVICES

While the gaps in avatar representation described above in the appearance (or non-appearance) of bodies/body parts are disruptive, they do at least become consistent features of the game that one can adapt to. Another category of gap in embodiment is the “one off”, unique occurrence of an object in the game world that produces a break in the game’s established convention.

Part of Juul’s model of the “half-real” is the aspect of “incoherence” in fictional game worlds where there is a lack of unifying logic, the world is implausible, or cannot be imagined as a cohesive, logical entity. This characteristic does not matter, he says, since the player’s “half-real” engagement with the game does not depend upon real world credibility. Juul specifically raises the example of *Grand Theft Auto*’s “big blue arrow”, in which a large arrow appears hovering over parts of the action to indicate some detail to the player ([9] p161).

However, it needs to be pointed out that Juul’s application of “incoherent” is not the same as “inconsistent”. The “big blue arrow” is consistent in, and fully conforms to, the *internal* logic of the *Grand Theft Auto* [38] game world. It is incoherent because it is part of the implausible, improbable, irrational nature of the fictional game world. But it is very *consistent* in that incoherency. It is the *consistency* of the incoherence that stops these features

from rupturing the experience. Unfortunately, even very well known games are full of rupturous inconsistencies.

The *Myst* series has no obvious avatar at all, in the sense of a visual manifestation of a body. Instead, it utilises what might be called an “invisible interface”, adopting the pointing finger/hand icon so commonly found in operating system/application software. The cursor changes from a simple ‘pointing finger hand’ icon to a ‘grabbing hand’ icon to indicate the ability to move, or to interact with levers, handles, etc. Cleverly adopting the standards for the cursor icons across both Macintosh and Microsoft operating systems, the earlier *Myst* and *Riven* games managed to keep the world of the game separate from the world of the computer.

However, the *Myst* games contain jarring disruptions to this “invisible” interface, quite out of consistency with their own standard. Special cursor icons occasional appear for the operation of special devices. This is a convention not unheard of in gaming environments, but certainly out of keeping with the *Myst* series in which the control of objects has almost always been via control of “in game world” panels/interfaces.

An example in *Exile* is “the swing icon”. Twice during the game, in the plant world/age of *Edanna*, the player must use a swing to move from place to place. Without any precedent in the game, the cursor changes to a unique icon, a small picture of the swing. It is a disruption to the interaction interface, and *an unnecessary one*. In *Riven* (*Exile*’s immediate predecessor), a similar hand swing was used to lift the player up, and ‘grabbing it’ was accomplished without the need for an extra, customised cursor.

Other similar exception are the ‘steam boiler match’ (in the original *Myst*), and ‘looking through flowers’ and ‘quarters of spheres’ puzzle, (both in *Exile*). These three rare exceptions could have been overcome with a little more consideration to the continuity of the experience.

A more frequently occurring example of this inconsistency in the *Half-Life* series is what happens when the player needs to use the train. An “out of game world” text overlay appears on the screen with an arrow, telling the player that they can now “use” the train. The player interacts not by clicking on the control panel of the train, or by clicking with the mouse on the text overlay, but by using the keyboard. The train is then set in motion, and accelerated and decelerated, by pushing on a single keyboard key. Once again, it seems like a clumsy way to resolve the problem of a unique device, involving at least two levels of cognitive disruption to the normal interaction mode, and taking the player out of the game world.

The problem of altering the player’s mode of interaction when operating transport vehicles was also described by the creators of the text only interface to the Interactive Fiction *Zork*, to do with boats [10]. In *Everquest*, the similar problem of operating boats has been removed by having the boat simply start up as soon as the player steps aboard, without any crew to operate it. This is also well outside of the game world logic, in which everything else has to be paid, bargained, or fought for.

Half-Life has several places where the player can, or has to, make use of a heavy machine gun they find already set up inside a scene. The heavy machine gun is, in the fictional world, set on a tripod, and so to direct its fire to the left of screen involves moving the handle end of the machine gun to the right of screen. This is technically correct, relative to the real world. However, it is not only the exact reverse of how the player operates the usual array of weapons, (the weapons pivot from the hip) but also at odds with the way the player uses the mouse on a computer outside of the game. This change occurs every time the heavy machine gun is provided in the game, and so the player has to adapt to this change (while under fire from the bad guys!) In the real world, the change in the way the weapon is operated would be bodily intuitive, but not when you are without your body, and mediated through the mouse. It seems likely that the designers of *Half-Life* have in this case been *too* faithful in their reproduction of the weapon’s real world nature. To maintain the flow of the game, the heavy machine gun could have been “cheated” to work like all the other weapons.

4.0 BEHAVIOURAL GAPS

Sometimes the gaps in embodiment that occur are not spatial, or visual, but behavioural.

4.1 Autistic Player

Books are very important in the *Myst* series, being of great background and puzzle solving significance. A resulting problem in the game play of *Myst* was the need for the user to laboriously travel from one island to another simply to refer to the books kept in the central library. In the much more ambitious *Riven*, this problem is solved by the use of an ‘inventory’, a visual strip along the bottom of the screen where the books are kept. The books also act as significant objects of plot fulfilment and character motivation in the game play.

Significantly, the books appear automatically in the inventory whenever you first encounter them at their original location. Significantly, you cannot choose *not* to pick up a book, and you cannot put a book back down from the inventory once it appears there. Further, you cannot refuse to accept a book from a character who gives it to you. Characters can take books from you without you having any choice at all.

Aarseth refers to this lack of natural behaviour on the part of the characters in an interactive fiction/adventure game as a kind of ‘functional autism’, in which the non playing characters in the game have to treat the player’s character as though they are incapable of normal relationships ([1] p 117). In his 1997 discussion, he was referring to a pre image and sound text only adventure game. It is fascinating to see that his description fits just as well the limitations of the player’s character in a sophisticated audio-visually rendered adventure game. To make matters even more confusing, this autism is inconsistent, because you *can sometimes*, in both *Myst* and *Riven*, refuse to give characters books they request (although this simply delays the various endings, as opposed to creating new ones).

4.2 Possessed Player

Aarseth's notion of the effective autism of the player can be extended to the will of the player in the *Myst* series, particularly in *Exile*, where the player is not only autistic, but possessed.

The ultimate achievement of visiting each "age" in *Exile* is to reach a viewpoint where you can witness a symbol embedded into the landscape, which is revealed by a sudden, magical rearrangement of the landscape. In the game world, you need to copy this onto a piece of paper, return to the central island and use the paper/symbol to activate a transport machine. However, rather than the actual player noting down the symbol, an animation occurs in which a piece of paper magical appears from nowhere and a pen automatically draws the symbol onto the paper, complete with sound effect. The piece of paper then deposits itself into the inventory at the bottom of the screen.

This automatic drawing of the symbols at the end of each stage of the game solves many problems for the designers of the game, including the possibility that the play will not know what to do with the symbol, but it seems very heavy handed, since every game player has already solved several puzzles to get to this point, each requiring much greater powers of observation than are required to notice the symbols.

The "possession" of the player in these moments may not be intended to make it easier for them, but rather to ensure that they witness, cinema style, the great event that is the fulfilment of their journey to that point. This possessed nature is also found in the 'auto-pan' function of the game. Whenever an impressive event occurs, the player's free look inside each view point is taken over by the game and 'auto-panned' to the correct place to see the opening of a door, raising of a building, or whatever. You literally cannot miss these spectacles (many of which are very imaginative and impressive).

These 'cut scenes' ('cut' in the sense that they are both carefully edited and non interactive), are a far cry from the original *Myst*, where the rotation of an entire building was described by just a sound effect. The player's position at the control panel, deep inside the rotating building, precluded actually seeing the rotation. Realising what had happened was part of solving the puzzle. In *Exile*, however, every control panel is ideally placed to witness the unmotivated spectacle that will occur when a puzzle is solved. The 'auto-pan' cut scene makes sure you do not miss a thing, making it feel like a theme park ride. This is a connection between special effect/action movies, video games and theme parks already noted more broadly by Andrew Darley [5]. This guarantee of delivery of the spectacle is bought at the cost of the sudden loss of control of the user's presence in the virtual world.

A very important technique to overcome this 'cut scene' possession/interruption was part of the success of *Half-Life 1* (1998). The cut sequences occur from exactly the same first person perspective as the game play, and the player can literally walk around inside the real time rendered "narrative" scene as it unfolds, and even miss

important events if they are looking the wrong way. This "free look and movement" technique use by Valve for *Half-Life*, was noted for its positive "immersive" impact on test audiences [11]. This "un-possessed" control is established even during the title sequence, as the train pulls into the station at the beginning of each game. In *Half-Life 2*, the possibility that the player will miss important exposition has been reduced. The non-playing characters follow and face the player's character while delivering the important information.

A more recent example of avatar possession is *Doom 3* (2004). Perhaps influenced by the amazing success of *Half-Life's* combination of outrageous gun fest with linear storyline, id Software have incorporated significant aspects of narrative into the *Doom 3* game play. *Doom 3*, however, adopts the interesting technique of moving the player's perspective from first person to third person, not by the use of a cinema style cut, but by literally sliding out the back of the head of the avatar to the cut scene. The player then hovers behind their own avatar, watching the scene unfold, before sliding back to resume play.

These gaps are of great interest, because while they clearly do NOT present a "fatal error" to the experience, they do point out the extreme narrowness of the presence we have in even very successful interactive experiences. The current conventions of games interfaces are both limited and inflexible.

5.0 HOW GAME DESIGNERS AND PLAYERS OVERCOME GAPS

The great skill of the game/experience designer is, of course, to make assets of these limitations. For example, we do not have the technology to make credible interactive characters, so *Myst* drip feeds you only hints of its characters. We can only know them from their writings and see them fleetingly, but this becomes part of the mystery of the game. *Doom 3* strives for more extreme monsters, but the limits of real time rendering of the models makes this difficult, so its designers go for speed, and lots of dark corridors. The action moves so fast that the player will never notice the low polygon angles on the monster's heads. Char Davies' works *Osmose* and *Ephemere* avoid any humanoid characters at all, devoting themselves to a sublime, abstract world. The poor quality of the head mounted display is overcome by deep, rich, careful sound scapes.

The contrivance of these different experiences to suit the limited technology of the times is part of what Aarseth has describes as the "ergodic intrigue" ([1] p 113). It is a very consistent incoherency in the fictional world, part of the rules. The player quickly accepts this as a convention.

Juul's "half-real" model goes some way to explaining how so many games, and games players, work with these inflexible interfaces and interaction modes, and we can point out the inconsistencies as specific accidents, or lapses of design, or unavoidable, reasonable work-arounds to get on with the game. However, the fact that we have to put up with "big blue arrows", or not being able to see or feel our own feet when we are supposed to standing on

narrow ledges, demonstrates to us just how “not there” we are.

But the fact remains that millions of people get over these limitations every day to enjoy games, and the size of the games industry, tells us that these experiences still work. People become engrossed with them, and find them worthy of a lot of time ie: they are “immersive”, to use a term with a wide variety of specific definitions [12] [13] [14] [15].

What is of interest here is the very clear distinction that needs to be drawn between immersion in an experience, and mimetism as one means by which immersion might be enhanced. The increasing mimicry of the experience (and the interface to the experience) is one that characterises the development of computer games over the years, and it proves useful to place a range of digitally enabled virtual experiences on a sliding scale of mimetism.

5.1 The Sliding Scale Of Mimetism

We would find, for example, Hypertext Literature on one extreme. Works in this genre, perhaps best exemplified by *Afternoon* (1987) and *Victory Garden* (1992), are almost entirely text only rendered stories, where the reader links from one text fragment to another by hypertext links. These works demonstrate that text (the alphanumeric coding of meaning) is a very sophisticated way of communicating complex ideas. However, it is totally non-mimetic. Not only does it require the user to be able to read the particular language being used (English in the case of both *Afternoon* and *Victory Garden*), but it also required that they understand the conventions of literary writing. It is *anti-mimetic*.

Interactive Fiction (*Adventure* and *Zork*) would appear somewhere near Hypertext Literature on the scale of mimetism, possibly closer to where we current regard video games, because it uses less “literary” language, and there is a clearly articulated world which can be explored (one of the often given criteria for an adventure game) [16]. However, like Hypertext Literature, it is still rendered in text, and is therefore non-mimetic.

The next thing we would find on the scale moving towards fully mimetic is the modern video game, and both *Myst* and *Doom* (both 1993) have become canonical examples. Both of these games have current day descendants, and it would be reasonable to expect to find these later versions further along the scale towards mimetism, since they are more sophisticated in their audio visual rendering.

Char Davies’ works *Osmose* and *Ephemere* derive much of their power from the dedicated interface hardware, notably the head mounted display. Despite the (now) low visual resolution of the early 1990’s display, the mimetic value of them is undeniable. When you move “your” head in a conventional game on a conventional screen by moving your hand on a mouse, keyboard or console, the game world moves inside the tiny frame of the screen. With a head mounted display, when you move your head, your entire field of view moves, *exactly as it should*. This is much more mimetic, and we might describe this mimetic

interaction as *intuitive*. So *Osmose* and *Ephemere* might appear to be quite close to the mimetic end of the scale.

However, to place current VR at the “fully mimetic” end of the scale would be to deny the very definition of mimetic ie: “to copy or imitate closely, to resemble closely” [17].

5.2 Not Yet Mimetic

Even the most sophisticated game or VR environment is far from “closely resembling” the real world in its audio-visual appearance, the way we interact with it, or the way it behaves. Of these three aspects, it is certainly the audio-visual rendering in which the most improvement has been made so far. However, it is important to realise that, relative to mimicking the real world, these improvements are rather limited.

The term “photo-real” is often used to describe three dimensional modelling and rendering, but the chunky, pixelated textures of a video game on a computer or TV screen are a world of detail away from a professionally taken photograph of a real, complex, illuminated scene, such as sunlight falling through the leaves in a tree immediately after a rain shower, with resulting colour filtering and light refractions. Even if you could afford to enlarge the resulting picture to the size of a whole wall in a house, the photo will still be a poor, *visual only*, representation of a *single moment* of the experience you were having.

Games are not, despite the advertising to the contrary, anywhere near close to “photo-real”, and being *real* real is not yet on the horizon. And the audio-visual rendering is the most developed mimetic aspect of games so far. With regard to user interaction, games are still using almost exactly the same hardware interface techniques as they were in the 1980, and the role of Artificial Intelligence, and its relationship to the interactive possibilities of plausible automated characters, remains highly problematic [18].

Therefore, all games, and also *Osmose* and *Ephemere*, are actually grouped very close together on the scale of mimetism, and still quite close to the non mimetic text rendered experiences of hypertext literature and interactive fiction. As we move towards the fully mimetic end of the scale, there is nothing at all, until we get to the as yet unrealised dream of natural language, seemingly unmediated, virtual reality that we know from science fiction, such as *Star Trek’s* Holodeck, or the “jack in” of cyberpunk fiction. Current games with their haptic “rumble packs”, and even the astonishing *Osmose* and *Ephemere* head mounted display works, are an early gesture towards what might be possible, and what is really *mimetic* – “like reality”.

6.0 THE CONCLUSION

It is important to acknowledge the huge innovative, creative and craft effort that has gone into the creation of computer games as we know them today. Huge technical problems have been overcome to create genuinely

engaging experiences, using technology largely borrowed from other crafts, such as television and computer science.

However, as designers have pushed the limits of what can be done in all three areas of mimetism (audio-visual, user interaction, world behaviour), they have inadvertently created gaps in embodiment, which are made worse by a dependence upon old conventions. As *Half-Life* developed the first person shooter genre to a level where the player's physical adeptness at climbing and jumping were important in the game-play (more like the real world), the convention of "no-legs needed" became problematic. *Myst's* careful exclusion of the player's avatar, so sublime in the original game, becomes a disorienting deficiency in the more detailed, information rich sequels. It is the push to more compelling, mimetic, "immersive" renderings that produces these gaps, and so detracts from immersion itself.

The other great cause of a breach of immersion is lack of consistency. Juul's "half-real" notion adequately demonstrates that high levels of real world logic (ie: mimetic world behaviour) are not necessary in a game, as long as the logic is consistent.

And so convention, consistency and mimetism together play a part in a complex tug of war relationship that somehow contributes towards that ideal state that we call "immersion". More mimetic audio-visuals, interactions and worlds will not produce more compelling, satisfying experiences, without a simultaneous development of all of the other aspects of this complex.

This problem would largely disappear if we had *completely* mimetic virtual environments ie: that were essentially just like real life in every way. We are yet to see the creation of the 'mimesis' engines, and hardware interfaces to them, that will allow the great leaps forward that are idealised in science fiction.

Until the days of perfect mimeticism (including natural gesture and verbal language recognition), increasingly mimetic renderings will be at the cost of immersion, as well as increasing it. Enabled by (slowly) improving technology, game and virtual environment designers face the interesting challenge of finding just the right balance to yield the immersive benefits from mimetism, without generating the gaps in embodiment.

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