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Trigens Can't Swim

Intelligence and Intentionality in First Person Game Worlds

This paper explores the role of the intentional stance in games, arguing that any question of artificial intelligence has as much to do with the co-option of the player's interpretation of actions as intelligent as any actual fixed-state systems attached to agents. It demonstrates how simply using a few simple and, in system terms, cheap tricks, existing AI can be both supported and enhanced. This includes representational characteristics, importing behavioral expectations from real life, constraining these expectations using diegetic devices, and managing social interrelationships to create the illusion of a greater intelligence than is ever actually present. It is concluded that complex artificial intelligence is often of less importance to the experience of intelligent agents in play than the creation of a space where the intentional stance can be evoked and supported.

Intentionality and Games

In 1969, seven years after SPACEWAR! (1962), but still quite firmly within the pre-history of computer games, Dennett argued that

> A computer can only be said to be believing, remembering, pursuing goals, etc., relative to the particular interpretation put on its motions by people, who thus impose their own way of life upon the computer […]. Thus, computers, if they are intentional, are only intentional in virtue of the intentionality of their creators (Dennett 1969:40).

Whilst Dennett was referring to an intentionality imbued into a system by its programmer, this paper deals with a slightly different concept: the intentionality created by a series of cues and effects

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attached to fixed-state systems in games. The fundamentally important issue with agents in games is not their intelligence but rather its appearance: the interpretation of their actions as intelligent by the player. A smart agent whose intelligence is not believable is not, to the player, a smart agent, regardless of their internal complexity. As games increase in complexity, in terms of both sensory fidelity and semantic structures, issues with breakdowns in the created diegesis are amplified. At the same time, agents become ever more important as means of carrying the action and controlling the flow of activity: it is telling that of the major first person shooter (FPS) titles released between 1998-2008, the vast majority contain persistent non-player characters (NPC) represented in-game, and over half feature either squad-based activity, or inter-agent conflict in significant portions of the ludic arc. It is recognized that game AI is usually fairly simple (in artificial intelligence terms, of course), with Adams and Rollings even going so far as to say, "most current video games do not, in fact, contain much real AI" (Adams/Rollings 2007:21). What this paper aims to demonstrate, however, is that when considering the impact of intelligence of agents in games, rather than the state systems themselves, it is often the cuing, by the system, of the adoption of the intentional stance in the player, and a selection of cheap and simple semantic tricks that achieves as much in terms of the player projecting intelligence into the system. Butcher and Griesemer report on play-testing the artificial intelligence of HALO's (2001) enemy avatars:

> Even if you make something as obvious as you can possibly make it, half the people will miss it the first three times they see it. In HALO the Grunts run away when an Elite is killed. Initially nobody noticed so we had to keep adding clues to make it more obvious By the time we shipped we had made it so not only does *every single* Grunt run away *every single* time an Elite is killed but they all have an outrageously exaggerated panic run where they wave

> their hands above their heads, they scream in terror and half the time one of them will say 'Leader Dead, Run Away!' I would still estimate that less than a third of our users made the connection (Butcher/Griesemer: 2002).

Intelligence in games is restricted by players; in terms of both what they will recognize and what they will accept. What Butcher and Griesemer are describing is a failure on the part of the player to read an intentional cue. The actual intelligence of the Grunts, as dynamic objects in a computer space, is largely irrelevant next to this issue. Another example may help here. BLACKSITE (2007) makes much of its squad based action, where keeping the morale of the assistive agents is of high importance and that the ongoing relationship with these agents was central to the affective experience of the game. Amongst the many faults of BLACKSITE, however, is the occasional inability of the in-game agents to look the player in the eye. Attempting to form a connection with a character who, regardless of one's attempts to rectify it, appear to stare obsessively over one's left shoulder is not simply unnerving, but hugely damaging to any sense of intentionality that the clearly complex state-system attached to the agent is trying to provoke. A failure to achieve something as fundamental as facing the avatar undermines any more complex AI than might be in the game. However, when this basic feature is attached to characterization, the result can be quietly breathtaking. Consider HALF LIFE 2's lauded persistent agent Alyx Vance. Glancing across from the driver's seat in EPISODE TWO's (2007) "Riding Shotgun", to catch Alyx smiling happily at Freeman, then looking away as if she realizes she's been caught staring is quite unnerving: it's simply such a (small) human action.

Indeed, several recent research papers have, rather than trying to make agents smarter, tried to make them more natural (Horswill/Zubek 1999, Freed et al. 2000); which is to say they try and improve the likelihood of behavior being interpreted via the intentional stance.

Gorman and Humphrys, arguing for an AI model based upon agents learning to imitate player behavior, lament that

> Modern, commercial computer games rely primarily on AI techniques that were developed several decades ago, and until recently there has been little impetus to change this. Despite the fact that the computer-controlled agents in such games often possess abilities far in advance of the limits imposed on human participants, competent players are capable of easily beating their artificial opponents, suggesting that approaches based on the analysis and *imitation* of human play may produce superior agents, in terms of both performance and believability (Gorman/Humphrys 2006:1).

We will not dwell on the performance issue here; it is the question of believability that concerns us, in particular the inherent criticism Gorman and Humphrey make that old fashioned, fixed-state artificial intelligence falls short of offering this. However, Dennett's intentional stance does not, critically, require the object of its gaze to actually be in any way intentional in itself. Rather, it is down to us: "*we* must *treat* the noise-emitter *as an agent*, indeed a rational agent, who harbors beliefs and desires and other mental states that exhibit intentionality" (Dennett 1991:76, italics mine) and we can demonstrate this by offering a simple example from perhaps the earliest of what we might call the modern shooters.

One of the many brilliant things about DOOM (1993) is the fact that if a Zombie accidentally shoots an Imp, the Imp retaliates by hurling a fireball right back at the guilty party. Once a player has realized this, they can use it to their advantage, trying to maneuver different classes of agent in front of one another in the hope of starting an inter-agent gunfight that will thin the opposition out before they have to wade in themselves. What is also added to the mix, perhaps even more importantly, is the ability of the player to virtually bootstrap the actual intelligence inherent in the system, to a higher,

anthropomorphized level. An extremely crude input-output response provides the player with the tools they need to enhance their projection of intentionality onto the agent, deepening the experience and layering capacity into a system that outstrips its actual complexity.

Fig. 1: Imps and Zombies in Doom (Screenshot): Both AI and visual representation are very simple.

DOOM's imps and zombies are intelligent in only the most rudimentary way but it does not matter. The imp turned on the zombie because it was hurt and responded in rage; the reaction is easy to anthropomorphize because it is so familiar. Critically, although it does not require intentionality, cognition, or any form of evident higher order deliberation to be anchored to the agent, merely a simple rule, it is recognizably, anthropomorphically instinctive and causal. The imp attacked the zombie *because* the zombie shot the imp.

From Simple Rule to Complex Behavior

"Functions" according to Searle, "are never intrinsic, but are always observer relative." (Searle 1995:14). – Consider the following:
IF [CHANGE AGENT STATE] = reduce HEALTH by 10 or more, THEN:

HEALTH = HEALTH -*n*
MOVE = MOVE +10
RESPONSE TIME = RESPONSE TIME +20
% of SHOOTING = % of SHOOTING +20
ACCURACY = ACCCURACY -20

This is obviously a very simple version state system, but what it demonstrates is that adjusting even a small number of pre-existing variables provides high potential for interpretation. Our agent, on being wounded, will move faster and react more quickly. It is much more likely to fire on any object that fits the definition of a target (at the most simple, an object moving within a defined field relative to the agent), but it will be much less accurate. A subjective interpretation of rage or panic is unproblematic – it perhaps even resembles the 'fight or flight' reflex.

Any cues for anthropomorphism, once added to the agent's available actions, and judging by the simplicity of the state-system and visual representation of DOOM's Imps, are enough to initiate the intentional stance. Very simple rules of behavior, supported by an appropriate context of action, enable the anthropomorphizing tendencies of the intentional stance to bootstrap function into new conceptual – and illusory – degrees of projected mind.

Fig. 2: Far Cry's Trigens (Screenshot): Prior to seeing them, we are told they are genetically engineered apes, the visual appearance and movement then supports this.

Let us start with FAR CRY (2004) and their mutant monkey menace: Trigens. In the game, Trigens can't swim: a Trigen will drown if it enters even relatively shallow water. This co-opts our folk theory about apes (consider the last time you saw, whether in daily life or via television, a gorilla swimming). Trigens will not thus not enter water, but may be tricked into doing so – a quick duck as they leap to attack can become a potent weapon. Given the information that Trigens cannot swim and Trigens do not normally enter the water, the most economical interpretation is the anthropomorphized *Trigens are afraid of water*. This, given our lack of experience of swimming gorillas, makes ecological sense. In essence we are filling the gap between cues with an inference deliberately set-up by the system. A gorilla that leapt into the water and commenced backstroke is something that, based on our folk understanding of the world, would give us pause for thought.

On the other hand, people can swim, so it would be strange to find an entire army of non-swimmers. Thus, FAR CRY's Mercs will happily enter the water and swim. Here, however, we can find a good example of a breakdown of implied intentionality. On entering the water, Mercs have a bad habit of staying put until they are encouraged to leave or are picked off by the player. Indeed, whole groups can be enticed into the water at once by a few well-aimed shots or even tossed rocks to get their attention. This creates a kind of odd pool party, complete with eight to ten professional killers treading water together indefinitely whilst hurling abuse at an unseen adversary. Unlike the apparent – and apparently sensible – reluctance of the Trigens to enter the water, the Mercs appear to love paddling so much they see no reason to get back onto dry land, despite the fact they cannot use their weapons whilst swimming and appear fully aware that an armed and dangerous enemy is in the vicinity. There are two things we can draw from this: firstly that a breakdown of intentionality is caused by a conflict of two behaviors: the Mercs have shifted state into a combat mode (i.e. they are tracking the last sight/sound of the player and are barking appropriately) yet they have rendered themselves defenseless and are not seeking a resolution to this problem. The second is pure inference based on ecological validity: no human being in their right mind would put themselves in such a position, and the pool party effect does not fit any imported schema for human behavior within this ecological context.

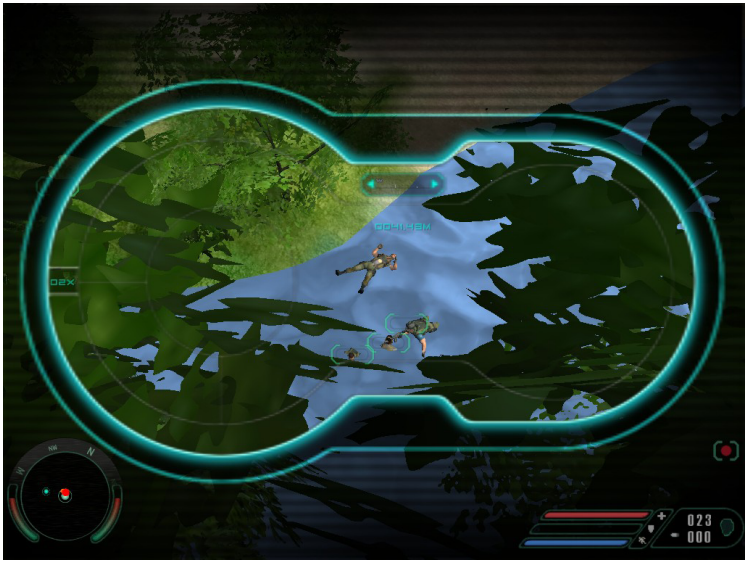

Fig. 3: A Far Cry 'Pool Party' (Screenshot): Even though the Mercs are being shot at, they continue to swim defenselessly.

Compare this to the kinds of overheard conservations between Mercs triggered by the player aiming the binoculars at them from a safe distance.

> *Merc One:* We're twenty feet from the equator here, genius. It's Micronesia, for crying out loud.
>
> *Merc Two:* Sure, but if it's not the heat it's the bugs. I hate bugs.

There are three things to note about this. Firstly, it does not involve any intelligence to be attached to the agents in any way; it is simply a triggered audio file. Secondly, it is not essential; the player can complete the entire game without experiencing this conversation or any other conversation like it. No actual information of any significance to play is delivered by it; unlike if one of the Mercs had said "…and I spent six hours guarding that goddamn grenade store in the locked

hut by the beach… You know the one with the brass key we keep hidden under the bucket in the pig shed". What it does do is expand the potential for the intentional stance to be adopted towards the Mercs: we are given information that allows this to happen by telling us that they *know* where in the world they are (and thus also reaffirms they are in the world); one *dislikes* the heat but not as much as he *hates* bugs (he has thoughts about many things). Finally, we are also given a status relationship between the two, as the derogatory "genius" comment suggests we are hearing a conversation between two equals (they have a social life outside the game). Finally, the conversational tone, its informal banter, sets up a relationship that has a temporal span: we can project that these agents *know* one another and have done for some time (they have a history outside the game).

What is essentially happening is that the intentional complexity is being virtually increased by a triggered audio file. This extends the process noted with the original DOOM's inter-agent conflict in personalizing two agents. We are given specific information that can be used to derive extended intentionality. Now, as soon as they become aware of the player, they will revert to depersonalized combat behavior but, however fleetingly, they have been individualized, and this has been accomplished by supporting a relatively simple, shallow deployment of information that works because it is ecologically valid: two bored men stand around complaining about their lot. The very banality of the conversation gives it a depth; it is eminently recognizable, and it humanizes what are for all other intents and purposes, simple agents. Likewise, a Covenant Grunt in HALO will scream and run away when its Elite is killed, but it will never beg for its life. But the panic and cowardice that is displayed is enough to help the player bootstrap the simple bot up to a more complex level of intentionality.

Ecological Validity

Avoiding water is just one way in which an agent can relate to the environment. Just the simple act of ducking for cover enables us to draw the inference from an agent that it is environmentally aware – it has a degree of self-knowledge. If it can distinguish between a normal barrel (a good place to take cover) and an exploding barrel (a bad place to take cover), this is increased dramatically. The way in which Steelhead Chimeras from RESISTANCE: FALL OF MAN (2006) use their Augur rifles is another good example of this. One of the game's several special function weapons, the Augur will target enemies and hit them through walls, and Steelheads will use this rather than engage the player directly. In system terms, this *decreases* the complexity of the task of line-of-sight aiming, as the Steelhead just orientates to the player's position regardless of what is between the two points. From an affective point of view, however it *increases* intentionality: the Steelheads *know* where Kale is hiding and will flush him out into the open by targeting him through a wall. They *know* their capabilities in relation to the environment. Just as a Trigen is not only *aware* of water; it *understands* it should not enter water, a Steelhead is aware of Kale and understands that even though it cannot see him, it can still hit him. A Merc is both aware of, and understands the purpose of (and, on a third level, can exploit) an alarm box on a tent pole. A Trigen is perceptually aware of the pole, in terms of collision detection, but has no demonstrable capacity to understand that the alarm box will summon more Mercs let alone the capacity to therefore set it off. Thus, for a Trigen, the alarm box affords nothing more than a constraint to movement, whereas for a Merc, it affords a means of calling reinforcements. Note that both of these are entirely ecologically valid according to likely expectations. It would be as ecologically invalid for a Trigen to pick a phone and call for help as it would be for a Merc *not* to use an alarm. The point is that the semantic characterization of the agent has a profound influence upon

the expectations of its behavioral set and that, in turn, can be used to manage the actual state system required in order to implement it.

To put this another way, DOOM 3's (2004) assorted demons and zombies are profoundly stupid, in that they rarely take advantage of the environment, but their lack of complex interaction with the environment is validated by their semantic attributes: they are zombies, after all. As a result, a vastly simplified relationship with the environment can be established that retains ecological validity. DOOM 3 bypasses the problem of requiring complex relationships between agents and environments by using the living dead or beasts from Hell – with a distinctly less than human lack of interest in anything other than dismembering the player. HALO's marines and Covenant are somewhat similarly marooned on an alien and ineffable world. Not only do they thus have no real means of interacting with Forerunner technologies, but they are in extreme, pseudo-liminoid psychological states that support this non-interaction: the Covenant are *fanatics*, the humans are *desperate*. Thus, a powerful means of ensuring the state system has ecologically valid behaviors of doing this is adjusting the semantic characteristics of the agent in question.

Thus, simple rule sets are often deployed within a liminoid world, where everyday activity has been suspended, or through liminoid entities, which exist outside the expected complexities of normal behavior (Pinchbeck 2006, Dovey/Kennedy 2006). The crew and Marines of the Pillar of Autumn are in battle from the outset, as are the troops battling across the surface of Stroggos in QUAKE 4 (2005). It would simply not be ecologically valid to find them shopping for vegetables or cleaning their cars. Even easier to manage are demonic or alien populations: the majority of the FPS populations fall into this category, and the system can assume a far greater degree of control over the expectations of validity inherent in such populations. Intentionality is sandwiched between expectations managed through semantic characterization on one hand, and ecological validity as evidenced by appropriate actions on the other.

Fig. 4: Two Human Agents in S.T.A.L.K.E.R. (Screenshot): Although they belong to different factions, they are the same basic agent.

Similarly, they are useful for adding complexity where an increase in agent numbers may damage ecological validity. DEUS EX (2000) may be futuristic, but it attempts to create a recognizably 'realistic' cyber-punk near-future; having too many non-human agents would place a strain upon this diegesis (it could be argued that it already struggles with Greasels and Karkians, although, perhaps due to its co-option of well known conspiracy themes, not with Greys). The large number of competing factions in the game, however, allows for a huge diversity of human troop agents simply by affiliation (and a few adjustments to visual appearance). By contrast, QUAKE 4 has many agent types, but only two factions – human and Strogg. This distinction establishes a very different approach to play: in the latter, if it's not human, it's safe to shoot without any further thought. In the former, there are implications for both action (is this the right human to be shooting at)

and prediction (if I shoot the NSF agent, the UNATCO troops will side with me, but this may affect my ability to get inside the Mole People's tunnels). In other words, by imposing factions into the population, the game system is suggesting that higher orders of intentionality are at work – and at stake. The Strogg have limited intentionality: it is enough to believe that they want to kill anything human, including the player. On the other hand, the NSF may want to kill UNATCO troops, but this is actually because they *believe* UNATCO troops to be supporting a regime *responsible* for the spread of a lethal virus. Indeed, DEUS EX forces a confrontation between the initial political and moral stance of the player and the plot's development when it is revealed that the player has been betrayed. The sequel, INVISIBLE WAR (2003), goes even further by not settling on an unambiguous nemesis like Page; all the factions are problematic and the player can side and switch until late in the game. Thus, the ramifications of their actions can be inferred through simple reactions of factional agents, increasing the order of intentionality the player has to invest in the game which, in turns, requires a different, more cognitively engaged style of play, which has implications for attentional resources and attached significance.

Not only this, but factions allow broad-stroke reactions to be delivered across a wider group, in a conceptually similar manner to Selfridge's Pandaemonium (1959). What matters is the overall effect of many stupid process taken as a whole. Thus, rather than packing many demons into few agents, it is easier both in terms of system capacity and design, to include a larger number of stupid agents and make intentionality *a product of generalized reaction across a factional group.* For example, the Templar and Illuminati are fundamentally opposed in Invisible War, and ApostleCorp are opposed to both. In the Cairo Acrology towards the end of the game, the player enters a hangar controlled by the Templar. The player has the choice of cooperation or refusing. In the latter case, they must fight the Templar,

but gain respect from the Illuminati. In the former, they gain the allegiance of the Templar but lose this with the Illuminati. Whatever the outcome, the player then finds Paul Denton's body in suspended animation. Denton can be revived or killed. Reviving him angers both Templar and Illuminati, but serves the agenda of ApostleCorp; killing him does the opposite.

This is all fairly straightforward, but what is important to note is that the response to the player's actions needs not be subtle. Because the political decisions are depersonalized, the level of required representation is reduced. When the player tells the Templar to "Go to Hell" and they immediately attack, each individual Templar's reaction is unnecessary as they operate en masse. Each of the Templar is extremely stupid and has a tiny behavioral response set: Alex agrees to give blood: do not attack. Alex refuses to give blood, attack immediately. But the combined mass of Templars enables a virtual, more complex affective response to be insinuated by the system. Likewise, all any individual Dutyer or Freedomer 'knows' is the relative position of Strelok along their allegiance bar, whereas the overall effect is of a group of individuals responding to the shifting tactics of the player. The system is responding apparently intelligently to the player, but the requirements of each individual agent are reduced, as the shift is illustrated by the avatar's relative position to factions, rather than personalized reaction.

So factions, in other words, may assist an ethical framework for activity, which itself requires a higher assumption of intentionality. A singular faction of agents, as we find in DOOM 3, leaves no room for consideration of approach. Inter-factional conflict, such as that found in HALO, DEUS EX, S.T.A.L.K.E.R. or FAR CRY inferred projected intentionality without the system having to do much additional work. Trigens will attack Mercs as well as they players, and Mercs see Trigens as every bit as much of a threat, so the groups can be maneuvered into a position where they will attack one another, allowing

Jack Carver to slip past unnoticed. The application of this strategy depends upon the expectation of agents to act intentionally. Exactly the same is true of the Flood and the Covenant in HALO, and essentially all DEUS EX and Invisible War do is allow a degree of choice in how this is manifested exactly. The *actual* behaviors of the Mercs and Trigens remains highly limited, but the simple factional conflict response allows a greater degree of intentionality to be inferred: We believe that the Mercs are *concerned* about the threat of the Trigens, who *want* to kill them, therefore, they will engage the Trigen *unless they think* we represent a greater threat.

An agent's capacity to both enable and manage the adoption of the intentional stance in a player is as important to its projected sense of intelligence as any innate properties of the underlying fixed-state system. Not only that, but this can be achieved without complex artificial intelligence, indeed, with just a few simple tricks and proper understanding of the role of environmental and social context in intelligence. With only a few simple rules, complex behaviors can be extrapolated and when these have a clear ecological validity, we naturally assume the intentional stance as the most economic means of dealing with the behavior. Thus, rather than noting the ludic structures which mean that Trigens will not enter water as they will be immediately removed from play, we opt for the simpler version: Trigens do not enter the water because Trigens cannot swim. On the same level, Mercs *should* trigger alarms to get help because they are 'intelligent' people; Stroggs may be stupid, but this is alright, because they are little more than crudely reanimated cyborg corpses; Grunts are cowards, not technicians or philosophers. Simple evidence of predictable, contextual behavior is enough to trigger the intentional stance, through a process not dissimilar to narrative closure, and an information load that gives just enough to enable this process – but no more – will cover the remaining cracks.

Thus, when Grunts run away, it makes the Covenant that much more acceptable as a virtual enemy. Faced with a one-man killing machine your comrades are already calling "The Demon", who has cut swathes through your ranks and just wiped out your Elite line manager (who is twice your size and the only one amongst you likely to stand a chance in a fair fight), we can empathize with this response. It's a truly sensible thing to do, a choice we'd all probably make under the circumstances. And with that simple masterstroke, it no longer matters where the Grunts sleep on their staggeringly empty battleship, or who brings them their food, or letters from home, or any of the other things we may expect of a reasonably intelligent creature. We empathize, we attach intentionality because we recognize an ecologically valid act. If agents are to be believably intelligent, they must have characteristics we can identify with as showing evidence of intentionality, in an ecologically valid context, and this frequently has little to do with the complexity of the state system. Indeed, agents in games have a great deal to say to us about the notion of intentionality and its relationship to intelligence in general.

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