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Virtual Animals In Virtual Environments

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The experience of interacting with wild animals has, for most of us, been replaced by the experience of looking at images of wild animals. Even the experience of gazing at sorry captive zoo specimens is struggling to compete in a world of electronic gadgetry. Zoos, their construction, and the changing role they play in society, tell us much about the marginalisation of animals in the Western world and the redefinition of the relationships between them and humans. John Berger's account of this changing relationship, "Why Look at Animals?", [Berger 1980, pp1-26], which provided the impetus for the discussion here, is still pertinent but could not have foreseen the direction of the current re-assessment of the role of animals which modern photographic technology, digital image synthesis, computer simulation and behavioural modelling has triggered. This is not only true where existent wild animals are concerned, it effects our whole outlook on the natural world's history and future.

No longer are children required to exercise imagination to animate beasts of the past from artist's watercolour impressions, from men dressed in latex and fur suits, or from assembled bones in the natural history museum. Convincingly rendered "extinct" creatures roam the cinema and television screen amongst city skyscrapers or New Zealand's rainforests. They rend not only carefully (mis)placed consumer goods and actors, but the fabric of time which we had grown so accustomed to wearing.

Previously our exposure to the early inhabitants of this planet has come through museum dioramas and book illustrations, or perhaps through documentary footage of the painstaking extraction of bone and hair fragments from a mountain of earth using only a toothbrush and pair of tweezers. Now we are shown "proof" that these creatures roam our planet still, crushing jeeps and battling giant robots. Proof perhaps as *King Kong* was proof of giant gorillas, but now in colour and with live action sound. This material is willingly consumed, even in an age so conscious of the manipulative image, and accepting of its seduction.

Not only are we shown ancient creatures supposedly long extinct, we encounter organisms from other galaxies (who conveniently speak English). We witness menacing alien beasts in our own forests, and in our inter-stellar space-craft (which we are yet to build). There is more still, as we do not need to operate beyond the "real" world to witness insects going about their business in a field, filmed so as to make the tiniest dung beetle fill the largest

cine screen, or a Venus fly-trap span an OMNIMAX hemisphere as it captures an ant as large as a bus.

All of these are virtual creatures, even those captured using standard optics here on earth. An ant is *not* ten metres long. It is a tiny black spec which stumbles on a grain of sand. The ten metre monster on the screen is referred to by the narrator as "ant" but this view is not an experience of the natural world. Even leaving aside the issues relating images to real objects of which Magritte was so fond, this "ant" is more like the computer animated dinosaur than the creature in the garden. This documentary may as well be Verhoeven's film *Starship Troopers*. Both of these works are gleefully fabricated, and for the most part adopted, evidence of a world we have never seen before.

Miyazaki's remarkable Japanese animation *Mononoke-Hime (Princess Mononoke* - possessed princess*)* portrays a forest world populated by gods and spirits pitted against human characters in a battle over space and resources. The forest is exceedingly lush, filled with massive cedars, miniscule mosses and exquisite flowers scattered with crystal streams and icy pools. Tiny *kodama* (echoes/kami/spirits) depicted as white humanoids with ratchet heads, gaping black eyes and mouths, playfully dance about the trees and bogs. Enormous boars, wolves, deer and other animal-gods dwell and debate in the clearings and hollows.

If there is one thing the animation makes clear, it is that the forest depicted is not ordinary. The protagonist has had to travel too far, the beasts are too large, the trees too astonishing, the scenery too rich for the animation to imply that *all* forests are like this one. This forest is so much more than the forests most of us have ever experienced that it appears quite unique and particularly vital. Mononoke-hime's forest is the idealization of the primal forest. Hence, it is not implied by the animation that a visit to any forest would result in the kinds of experiences which would be found at this special location. This view of a privileged forest contrasts with the impression given in Miyazaki's earlier animation, *Tonari no Totoro (My Neighbour Totoro)*, in which the implication is that in *each* forest, even the one behind the central characters' house, live ancient spirits — if one only knows how to find them.

It so happens that the forest of *Mononoke-hime* is not long gone. Although it is somewhat off the beaten track, intrepid hikers may visit the location and spend days tramping through the mountainous, rain-soaked forests and snow-blanketed alpine meadows. Having seen the film prior to traveling to the location from which its animators drew inspiration, a number of issues came to the fore in the mind of this author.

The romanticized forest of the animation becomes impossible to separate from the real location. The two events, hiking and movie-going, blend inseparably. Visitors who have seen the film were, are, and will be unable to separate its experience from the experience of the forest. Even whilst one walks through the landscape the playful *kodama* slip out of sight behind the massive boulders, or are swept into the arms of the incredible cedars whose years number in the thousands. The deer here do not flee. They inquisitively sniff the air and continue to nibble the foliage — of course, they are protected by the mighty spirit of the forest and have no fear of visitors. The stone

lanterns and timber shrines indicate sacred places where the forest has been marked as a sign of respect for the Deer god and others which dwell within it.

But wait a moment! It is wet, muddy and blowing a gale. Sleet and snow are driving into your eyes. The rocks are covered in treacherous ice and you continually fall over them and the tangled tree roots. Your shins and elbows are bruised, your knees ache. You are freezing cold and soon it will be dark. This too is the reality of the region! Yet somehow you are cushioned from all of this by the animation. You cannot see this place as a bedraggled first-time visitor, but your "prior knowledge" is somebody else's well-rendered fiction. It is startling to recognize this and remain completely unable to side-step its effects. Similarly, the "ant" being swallowed by the massive Venus fly-trap at the OMNIMAX cinema remains tied to its tiny brethren in the garden, as do the violent bugs in *Starship Troopers*. All of these pieces of evidence forcefully influence our perceptions in the real world as well as where virtual lives are concerned.

Here is an even more damning diagnosis of the twentieth century: "A society becomes "modern" when one of its chief activities is producing and consuming images, when images that have extraordinary powers to determine our demands upon reality and are themselves coveted substitutes for firsthand experience become indispensable to the health of the economy, the stability of the polity and the pursuit of private happiness." [Sontag 1977, p153] Bring on the iconoclasts!

With computer-based interactive art works and museum exhibits, the viewer need not remain completely passive while the exchange between (images of) virtual creatures and humans is played out. Yet the experience of interactive images is not nearly as involved as a walk in a forest and may involve only a little more than interaction with a static image. How do the different modes of engagement with virtual creatures alter the way we perceive virtual nature? How exactly do the modes of presentation of these pieces of evidence influence our way of thinking about real organisms?

The various means by which the virtual world and the real world abut one another are brought into stark relief by our insistence on modelling, some insist *instantiating*, life digitally. Without wanting to sound too sentimental, the irony of placing so much value on an investigation into "creating life in a computer" (be it for artistic or scientific purposes) whilst we continue to decimate all kinds of physical life is not lost on the author. This has certainly influenced some of the ideas presented in the following material but is not the fundamental issue under discussion. Instead, we turn our attention to the similarities between people's view of real life and the Western society's electronically-derived, virtual substitute for interaction with the physical world.

Creating virtual animals

The programmer of a virtual world is responsible for defining data-structures (organizations imposed on locations in computer memory) and the algorithms (sets of rules or instructions to be carried out by the computer) which will act on these. They may also be responsible for determining the contents of the data structures, or at least the specification of the limits within

which their numerical values may fall. This may be achieved through direct assignment, through random selection from a set, or through changes to original values by the algorithm which acts on them.

The specification of particular algorithms and data-structures is a vital aspect of defining the relationship between the computer memory space and the human programmer. However, at least as important is the selection of the conceptual framework in which the behaviour of the chosen algorithms and data-structures will be understood or evaluated. This framework will of course influence the way in which the algorithms and data-structures are conceived.

For example, if a programmer constructs a data-structure and labels it *particle*, she is projecting onto it different assumptions than if she labelled an otherwise identical data-structure *organism*. This label carries through to the way the programmer interprets any visual representation of the data-structure and its changes. More fundamentally, it also effects the *kinds* of visual representations of the data-structure which will be transparent, and those which will conflict with its label. Under what contexts will the label have significant influence?

John Berger provides a well-known acid-test in his book *Ways of Seeing* in which he shows a painting by Van Gogh and asks the reader to take a moment to examine it [Berger 1977, p27]. On the following page in his book, the same picture is reproduced but this time accompanied by the caption, "This is the last picture that Van Gogh painted before he killed himself." The change in the image is unmistakeable, yet simultaneously, there is no change in the *image*, the change is in the viewer. This phenomenon is widely understood, acknowledged and documented within the art world. However ubiquity is bought at the cost of impact and it is therefore essential in discussions like this that the issue be brought to the fore, rather than be allowed to undermine the argument. The label assigned to an object preconditions the viewer to interpret the image in particular ways.

If some data within a data-structure is assigned to represent position, the data-structure as a whole comes to represent not just an object, but a *situated* object. As the position data is updated, this situated object is said to "move". There is nothing "mobile" about the data-structure, it is just a section in memory which is storing different values at subsequent intervals of time. If the values in the data-structure are mapped to a position on a display device and this is updated as the values are updated, then a viewer will be able to interpret the simulated movement of the simulated object through simulated space. Anybody who insists that such software is "not a *simulation* of anything but is a *realization* of a computational system with its own behaviour" is misled. The software *is* a system, but it is also a simulation of physical space, objects and motion. The simulation does not create movement (nor flying, nor flocking, and especially not living), it only represents these things.

If the virtual trajectory of a data-structure/object representation labelled *organism*, is calculated in the same way as that for an otherwise identical data-structure/object representation *particle*, the two simulations of movement through space will be read differently. This is due only to the labels the programmer has assigned and the meaning then assigned to the images

which visualize them on a screen. Hence usual means of describing the results would take into account that an organism may "fly" or "dive" but an inanimate particle would probably just "float" or " fall".

What if the data-structure is labelled "X"? In this case the viewer is left with the question, "What is this?" (The equivalent of leaving an artwork untitled.) If the point moves across the screen it will be assumed to have some underlying logic to its behaviour. By Ockham's razor, the simplest explanation of the behaviour is the most likely explanation, all else being equal. Hence, if the dot seems to follow a parabolic trajectory, it will probably be assumed to represent an inanimate mass, a particle.

If on the other hand, the point wanders crazily around the screen making seemingly random changes of direction, a viewer would be more willing to attribute some level of intelligence to the point. The point would then have a sense of *agency*, perhaps even the *motivations* of a buzzing insect — but it would still only be a simulation of these things — depending on one's definition of intelligence.

So the same data-structure can be used to represent a stone or a fly. The data-structure's label and the movement of the point on the screen produced by algorithmically updating it, both effect the way in which its state changes are understood. Yet the data-structure remains just a way of conceiving of patterns in computer memory, and the point remains just a blip on the screen. Labels and screens are indeed powerful cues!

The point's label is a cue to the viewer which undermines his ability to conceive of the object in question as *merely* a blip on a screen. Artificial Life researchers may argue the point, but as far as a viewer is concerned, virtual life seems easy to bring into "existence". The static representation of a life form — the data structure — is a symbol which under certain circumstances may stand in for (i.e. replace) an organism. The important qualities of this virtual organism, maybe "eye-colour" or a "species" identifier, will be enumerated in its variables. These values may be "read" as *actual* properties, even though they are only *representations* of properties. Different values in a variable of the data structure represent different states for the "organism", states which may include the not particularly special case of "position".

For an artist or critic, the very issue of representation may be the main point of interest above and beyond the thing being represented. For an Artificial Life researcher, the representation is usually just a means to understand the thing represented. A problem may occur when it is forgotten that the representation of the organism is *constituted*, it is not *processed* and hence, to paraphrase Fuller, the simulation is a "material embodiment of a scientist's expressive activity" [Fuller 1988, p28].

This does *not* mean that scientists may (or do) make up just any old representations! In science, useful representations may allow predictions to be made, or be used to draw conclusions about the way systems operate. In science, not all representations are useful representations. Whilst it may be tempting for an artist to view science as "just another mode of enquiry", there are clear differences between the scientific mode of enquiry and the manner in which artists practice. Whilst there are similarities between representations

used for art and those used in science, the two are not equivalent, as the issues of interest and the context in which the representations will be applied, differ widely between the disciplines. This being established, let us explore how the expressive activity of creating models in an artistic context arises from, and influences, our thinking about virtual animals.

Interacting "directly" with virtual animals

Berger discusses the gaze which passes between animal and man[1]. He writes, "The eyes of an animal when they consider a man are attentive and wary. The same animal may well look at other species the same way. He does not reserve a special look for man. But by no other species except man will the animal's look be recognised as familiar. Other animals are held by the look. Man becomes aware of himself returning the look." [Berger 1980, pp2-3]

To take this idea of a gaze between a self-aware creature (human) and a creature which is not self-aware (or only marginally so – if that is possible) into the domain of virtual animals like those discussed above is not, in this context at least, a great leap. It is probably not particularly controversial to state that our current computer-based virtual creations are *not* self-aware (although they may be representations of self-aware creatures). If they appear to "understand" us and consider themselves to be aware of our gaze and their returning it, it is probably due to us projecting our own expectations and assumptions onto them that *we* feel this way.

The tendency for anthropomorphism has been shown to be common where computer representations are concerned. This has proven to be especially pertinent where software capable of engaging in "communication" with humans is concerned. The 60's software psychotherapist *ELIZA* for instance, highlights some particularly interesting effects of employing a Turing Test to discern intelligence. These effects in turn have many implications for our ability to determine whether another organism is self-aware.

For the most part, the "creatures" we perceive in a typical computer simulation are in no way aware of us and no attempt is made by the programmer to make them appear that way. For the scientist in particular, the external observer is often *deliberately* eliminated from the equation. The software agents do not return the viewer's gaze. They do not fear him, they cannot eat us nor be eaten by him. They do not even exist in the sense which matter exists. The domain in which the interactions which are interpreted as "movement" even is, as discussed above, not one which is usually considered to entertain the *possibility* of movement… despite the label we give the data-structures and the variables they contain. In works of Artificial Life art however, non-interaction is not a given. The influence of the viewer may be sought instead of precluded.

Richard Brown's interactive installation *Mimetic Starfish* (2000), was first exhibited at the Millennium Dome, in the U.K. [Figure 1]. The installation teases the viewer and philosopher alike. It consists of an image of a starfish

[1] Implicitly humans are "not animals". Berger's aim seems to be to distinguish us from the remainder of the animal kingdom as creatures capable of conscious thought and self-awareness — an idea which is not as clear-cut as he implies, but one which is outside the scope of this discussion.

projected onto a large circular tabletop. Visitors to the work may come and place their hands on the table. If they move too quickly the starfish recoils. They may also tickle it, or coax the starfish into "touching" them. The starfish might not be a starfish in the sense that a biologist would consider it —it does not metabolise nor swim— however it is certainly *some kind* of reactive system. It seems aware of the viewer and is able to articulate this through the movement of its tentacles.

In *Mimetic Starfish*, contact with the creature is maintained by the transparent interaction between the projected image and the viewer's hand gestures. As far as visual cues are concerned, the starfish and the viewer's hand implicitly exist in the same space. Despite the *appearance* of contact being an essential element of the work, physical contact between the real and the virtual is not possible (by definition). Works such as this are physically engaging when the illusions remains intact. However, once the bubble bursts through the mismatch of touch and vision, the disconcerting conflict raises issues about the void between software and flesh. The perception of the user shifts from perceived affinity with the starfish, to a feeling of hopeless, frustrating separation — as if one were somehow reaching out to touch a ghost — bringing into question the assumptions the gallery visitor makes about the world of software-based Artificial Life and the reality of its "inhabitants".

This approach and its perceptual outcome contrasts with the typical experience of cinema. In the cinema, the space in which the audience is located is excluded. The physical existence of the audience is denied and people take no control over the events they will witness. This parallels the approach taken by a scientist in producing a world of virtual organisms. As long as the denial of the viewer continues, the audience cannot be asked to contemplate the divide between the onscreen world and that in which they are located.

Degrees of separation

Whilst first-person perspectives may turn cinema into theme-park rides (typified by the marketing hype of the *IMAX experience*), the viewer is deliberately kept from observing their real surroundings. Every effort is made to give them the illusion that the visual field extends all around them by using large or even hemispherical screens. The lights in the cinema are dimmed to remove other audience members and the viewer's own limbs from the world. The audio also moves around the audience and travels through the space about their heads and audience members (at least in Australia) are expected to remain silent.

Hence, by experiencing virtual life in the cinema, viewers are encouraged to project past the screen and into the world it shows by actively excluding the world in which they themselves exist. We are all familiar with the disruption which occurs when a person in the audience keeps talking, or when the person in front of us shifts from side to side in their seat or is too tall for us to get a clear view of the screen. These elements are considered to detract from the cinematic experience, they are not typically welcomed.

Degrees of separation : discontinuous cinema

In interactive works, cinematic devices may be employed to draw in the visitor instead of the kind of direct feedback process found in *Mimetic Starfish*. For example, Jon McCormack's interactive laser-disk work *Turbulence* (1994) employs a cinema screen in a darkened room with a central plinth. Upon this is a glowing touch screen for user-control of the cinematic material's playback. The user interface on the plinth is distinctly "button-oriented" in its approach, whilst the cinematic display makes no explicit reference to the world in which the user is operating. This forces the user to separate the act of operating the interface, from the act of observing the "real world" of creatures which has seemingly been captured and presented as cinematic documentary footage.

The discontinuous mode of operation of this cinema necessitates a certain amount of mental gymnastics as the user is forced to continually switch between real world activity and virtual world passivity. These discontinuities effect the way the footage is read and have considerable implications for the "life" portrayed. Of *Turbulence*, McCormack's writes, "In many ways the work is a type of futuristic natural history museum made visible through the synergetic combination of mind and machine - a document of a type of life that exists only within the abstract pluriverse of computational space." The interface McCormack selected, subtly highlights the *non-existence* of the creatures in the world the work depicts.

Typically a group of gallery visitors watch the cinema screen whilst a single user operates the *Turbulence* interface to trigger the sequences. Each viewer approaches the interface afresh, usually having seen a few sequences triggered by the person operating the interface before them, but unaware of the specific controls which triggered the footage. Hence, as the users operate the interface, they can't help but replay the shots they have already seen. A visitor who spends some time in the work will inevitably see the same footage of the virtual creatures played multiple times as new users operate the interface (or the same users re-activate it).

A single screening of a section of animated footage from *Turbulence* gives the viewer a cinematic view of a world inhabited by creatures the like of which they had never imagined [Figure 2]. Repeated screening of *the same footage* however, changes the perception subtly but fundamentally. By the cinematic convention what is witnessed on screen is a view through a window or portal into another world. Yet in this case, the windows may be re-opened by the user and each time, exactly the same set of events unfolds. The illusion of the world beyond the looking glass is shattered. The more the sequence is repeated, the more canned the fantastic world appears, until what remains are mechanical puppets going through the motions of life *ad infinitum*.

This change in perception from "live" to "archive" footage enforces McCormack's idea of *Turbulence* as a *museum* and all this entails about *extinct* life forms. Australian museum visitors will certainly be familiar with the footage of the last known *Thylacine* (Tasmanian Tiger) restlessly pacing its cramped cage prior to its death in the confinement of the Hobart Zoo in 1936 [Figure 3]. This haunting footage has become an unmistakeable record of Australia's natural history through countless screenings in local museums

and on television. The repeated film sequence has also, at least in the Australian museum-going public's collective consciousness, become inseparable from the concept of extinction at the hands of the white settlers to this continent.

The repetition of video sequences in McCormack's work inadvertently references the footage of the last known *Thylacine* and with it the idea that the creatures depicted no longer exist, there being only a glimpse of what *has been* available for scrutiny. This is true even though the creatures which McCormack displays in *Turbulence*, have *never* been — making them all the more affective.

Like the preserved DNA of a lost organism, the data which created McCormack's virtual life is a long-lasting blueprint. The virtual organisms of *Turbulence*, whilst currently extinct and observable only on archive, are currently being reanimated as the software is ported to a current operating system. In a somewhat strange twist of fate, a project to reanimate the Thylacine from the DNA of a preserved specimen is also currently in its infancy.

Degrees of separation : cyclic cinema

Whilst the touch screen interface and replay feature of the laser disk in *Turbulence* collapse the view into a coherent world, this is not apparent in traditional linear cinema. Here the temporal field is strictly controlled by the director, the viewer is not (usually) given repeat performances. Even where the film is extremely short, perhaps a single shot long, the viewer is taken along for the ride. Changes on screen transparently depict changes in the world on the other side of the window.

It is interesting to contrast this with the meaning implicit in a still photograph. The photographic image is a frozen moment from the "past" which permits an unnatural view of an invisible sliver of time. Once the image is replaced by a sequence, the meaning is no longer "time frozen" but "time flowing". The moving image *is* change. It explicitly depicts events passing as the viewer's heart beats. Whilst a scratched or sepia-tone cine print may give a superficial impression of events past, as the shot unfolds before the viewer, the changes it depicts also unfold, in the same temporal dimension as the viewer's own experience of time. This is not the case with the still photograph which remains essentially unchanging as the viewer changes before it. Its content does not run parallel to a viewer's experience.

The author has in the past, for this reason, preferred to make short computer animations of his artificial life creations (although he has collected many still images of extinct creatures who's digital DNA has long since been lost). The cinematic form lends these virtual creations credibility as *existent* organisms which the author feels cannot, yet, be rivalled by other means, even by interactive works such as those employed in Brown's *Mimetic Starfish*. The reason for this lies not in the media themselves, but in the way they are read by the gallery or cinema visitor.

Cinematic language is read transparently by movie-goers who do not question at every shot "What is this?" but read a conventional film

subconsciously. Interactive works such as *Mimetic Starfish* are, on the surface, transparent also. However, works such as this, even with a seamless interface, naturally pose the question, "How does this trick work?" This state of affairs is not stable, the language of interaction is always developing. If pieces such as this continue to be made, audiences will come to take for granted their interaction with projected images. Perhaps then the cinema will be overtaken for its unique view into the realm of animated representations.

In the meantime, it is the contradiction between existence and immateriality which the author has been interested in addressing. One aspect of the author's works *Hydroid Medusae* (1994-1995), an animation generated using Artificial Life simulations [Figure 4], and his off-the-shelf animation *Apoidea* (1995), ought to be recounted here in particular.

Hydroid Medusae and *Apoidea* have each been shown on different occasions in "repeat mode" on large screens at film and new media art festivals, in museums and exhibition halls. In some circumstances their display has amounted to little more than high-tech wallpaper. In others however, viewers have been encouraged to sit down and watch the animations. Whilst the looped mode of presentation was not anticipated when the works were made, it has had the fortuitous effect of clarifying (for the animator/author anyway) the audience's relationship to the creatures depicted.

Both *Hydroid Medusae* and *Apoidea* are cyclic in their approach to structuring time. The animations follow the reproductive cycles of virtual invertebrates and plants respectively. This neatly circumvents the onset of "Thylacine syndrome". Even after repeated viewing, no break in the temporal field occurs for the viewer. Hence there is the feeling after watching this film once, or many times, that the process is an ongoing cycle, rather than a re-run of what has come before.

The author's animation *Ambient 5, Music for Casual Encounters* (1997), also produced using Artificial Life software, takes this idea one step further. It consists of a single shot of virtual cell-like organisms drifting gently in space… one frame looks much like any other. The effect is akin to watching a waterfall or a lava-lamp. There are no "events" to mark time [Dorin, 1999]. Repeated views of this animation, or even sections of the animation, do not become indicators of extinction, since the cells drift through all time[2].

Readers with a background in electronic interactive art or computer games, may be wondering why, if the aim was to portray continuing existence of virtual creatures, the author did not turn to real-time interactive spaces such as those employed in video games. The issue of how we see virtual life in interactive spaces will be discussed next in relation to the works of Troy Innocent.

Degrees of separation : real-time worlds

One style of video-game interaction opens a view into an ever-changing dynamic world which unfolds in some respects quite regardless of the actions

[2] Unfortunately this effect is somewhat nullified by the title sequence and end credits – trappings of more traditional approaches to presenting cinema.

of the observer. Virtual creatures walk around, rivers flow and barrels roll. As long as a "restart" button is not included in the interface, the viewer is captured in a stream of continuous time. The illusion presented to the viewer is different to that encountered in a re-run of pre-rendered animation footage. This is especially true where the viewer is given third-person control of a character or first person control of a camera, and where they may navigate through a space to view some events and therefore miss others.

The illusion also holds where the viewer is given a bird's eye view (a la *Pacman*). Although repetitious behaviour of creatures may be noticeable in this case, this will not interrupt the flow of interaction. Characters which move about the space independently of the viewer are given their sense of agency partly through autonomous movement. Even if the virtual character is seen to move in a perfectly regular and repeating fashion across the space, the continuity of events as far as the viewer or their avatar is concerned ensures that time flows uninterrupted in this space. Hence, no reference is made to the repetition of archival footage in a museum of natural history.

This virtual world is instead more akin to a wildlife park viewed through the window of a vehicle. The viewer's vehicle wanders at will amongst the animals who may be so docile or subdued as to pay it no heed. Alternatively, where the viewer controls a realistic avatar — a guide who leaves the vehicle to feed the dangerous wildlife — perhaps they will be treated to the spectacle of their guide herself becoming the meal. The *player* does not die, the virtual organism (for example, Lara Croft) dies.

Where the avatar is not realistic but symbolic, or when the view of the world is presented in the first person, the player seamlessly fuses with the symbol (such as the *Pacman* pizza-shaped character for example) or places themselves in the space. (See [Poole 2000] for wide ranging discussions of this effect.) Where there is a symbolic character, the virtual creature and the player are united as with no other mode of interaction. Here the virtual creature is not alive *independently* of the player. The player's life and the creature's are intertwined. The player exclaims, "He's chasing *me*!" Where a first person view is presented, the player is brought to a cinematic world in which they are asked to actively participate. Once again they may exclaim "He's chasing *me*!" and the urgency here relates to their own life apparently being at risk.

Innocent's work *Memespace* (1997) [Figure 5] and also his later work *Iconica* (1998-1999) place the viewer into a world with a first person view. Innocent has also experimented with a third-person view in the arcade-style installation *Artefact*>>> (2001). These works play to some extent off the relationships to video game worlds described above. However, in the case of *Memespace* and *Iconica*, although we are presented with a self-contained world, we interact with its inhabitants via iconic languages developed for the purpose. This level of removal from the space parallel's the interaction we might have with a tropical fish tank filled with bright and marvellous specimens. We know a lot about the creatures through careful study and we supply their needs, but we are not one of them. We may only interact with them by supplying what they need and tapping clumsily on the glass.

The level of interaction with Innocent's spaces is much more complex than a tap on the interface between us and them since it inherently employs

language. However the difficulty in mastering the language, combined with the need to devote sufficient time to interact with the creatures to witness the effects of one's interference, reduces the immediacy of the virtual space. It remains a space which unfolds with the viewer's perception of time, but one which nevertheless remains "in there". It is therefore neither about what *has been* nor what *will be*, but about what *is somewhere other than here*.

Better living through virtual chemistry

It is clear then that the process of creating virtual creatures is simple. Our relationship with them, and that existing between them and real animals is however, far from trivial. This relationship is redefined by every virtual life we create, describe or destroy. It is effected by every interaction between us and these simulacra, and with every subsequent interaction between us and other organisms of flesh and blood. The practice of creating representations of animals is perhaps the earliest practice of creating representations of any sort, and it is certainly set to continue. Where does the future lie?

It is clear (and something of a cliché to remark) that our utilization of electronic media is expanding. As this occurs, our relationship with virtual animals will continue to develop also. We will move from having the disembodied head of the *Talking Moose* on our Macintosh desktops (as early as 1986), to cockroaches which hide under the windows of our SGI workstations, to e-sheep which dance all over the windows of our PC display, and we will have… wait for it… dancing paperclips which attempt to help us complete word processing tasks made impossible by poor user interfaces.

No! Hopefully this is not the future of the virtual organism. With luck, our interactions with virtual organisms will be as rich and varied as they are in the works described above. We have much to learn about life on this planet and our relationship to the rest of the animal kingdom. This investigation continues on scientific and artistic fronts. May it continue to be as creative as it has been in the past.

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Figure 1. Brown, R., *Mimetic Starfish* (detail), 2000,
interactive installation. Image courtesy of the artist. Photo., Cohnwolfe.

Figure 2. McCormack, J., *Turbulence* (detail), 1994-1995,
interactive laser-disk installation. Image courtesy of the artist.

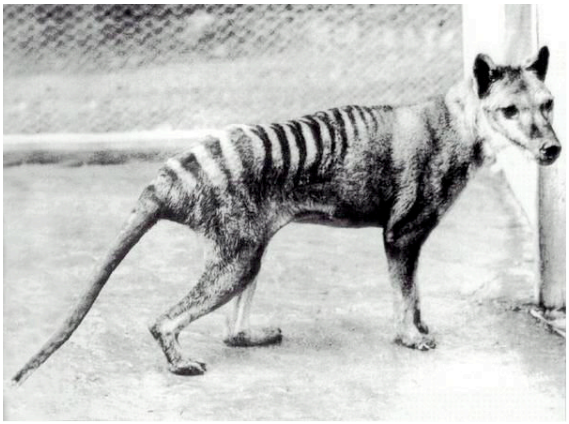

Figure 3. Thylacine (Tasmanian Tiger), 1936.

Figure 4. Dorin, A., *Hydroid Medusae* (detail), 1994-1995, computer animation.

Figure 5. Innocent, T., *Memespace* (detail), 1997, interactive installation. Image courtesy of the artist.