Artificial Intelligence enters next Millennium

A new videogame promises to lay the foundations for a revolution

Computer-based artificial life is poised to step out of the realms of science fiction and onto *Windows 95* desktops. Cambridge-based software house, Millennium Interactive, has developed the first engine to simulate organic life processes with any degree of realism. And its technology, which it has dubbed *CyberLife*, will form the basis of a *Windows 95* game called *Creatures*, due to be published by Warner Interactive this September.

Although endowed with the basic feel of the Sim-game genre, *Creatures* takes the concept much further. Each copy will come with a disk on which are stored six eggs, each containing dog-like creatures called Norns, each one bred from a special pool by Millennium. No two copies of *Creatures*, so Millennium claims, will contain Norn eggs with the same genetic make-up.

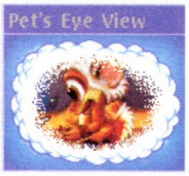
To start the game, you take an egg and place it in an incubator. Once your Norn has hatched and worked out how to get out of the incubator, you can start interacting with it, by stroking or hitting it, introducing it to objects in its environment and speaking to it.

If you are lucky – that is, your Norn manages to avoid viral infection or attack by the other animals in its microcosm (the nasty Grendels) – it will go through adolescence and then adulthood, changing accordingly. If you get two adult Norns running, they can mate and produce offspring, which will pick up the characteristics you have instilled in the first generation of Norns, and respond to your stimuli in a more sophisticated way. The fun of the game lies in observing the development of Norns over a period of several generations, and influencing that development. Because Norns accurately mirror living organisms, they will not always respond to your stimuli in a predictable manner – you cannot force them to act in any particular way.

Creatures will let you get inside your Norns, in addition to observing their external behaviour. You will be able to call up graphs tracing their level of happiness or discomfort, increase their metabolisms so they spend more time looking for food and even watch the neurones in their brains connecting as they learn or as their heart beats. **Michael Hayward**, managing director of Millennium, thinks that when enough copies of *Creatures* have been sold, players will start swapping Norns with each other over the Internet, and pledges that Millennium will post its own creatures, extra objects for their environments and even possibly new species on its Web site. The game's object-oriented structure enables this level of customisation to take place with the minimum of fuss.

Creatures is something of a Trojan horse, in that it allows Millennium to get its underlying *CyberLife* technology onto the market and thereby begin reaping its commercial potential. Perhaps the most fascinating aspect of the game is the multitude of potential uses for the *CyberLife* technology. Hayward says: 'We basically have a heterogeneous neural net which modifies itself. In order to train neural nets to perform a specific function, you have to go through thousands of possible inputs and outputs, answering "yes" and "no".' *CyberLife* is, in effect, a self-training AI engine. →

Millennium's *Creatures* is a cute simulation of life, from birth, through adolescence, reproduction, and eventually to death. Behind the colourful graphics and doe-eyed characterisation is an artificial intelligence technology which the company claims could revolutionise computing

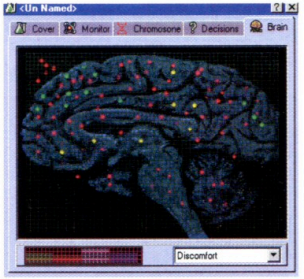


The pet's eye view window enables you to see the world through your creature's eyes

Detailed charts, such as this digestion graph, show how the creature makes decisions

DATA stream

Copies of 'Everything I do, I do it for you' by Bryan Adams sold in the US: **4m**
Most-rented video of all time: ET – hired out **228,168,939** times
Virtuality gross profits in year up to Dec 31, 1995: **£5.86m**
VictorMaxx (another VR company) net losses for 1995: **$11.7m**
Biggest grossing computer-related film in the US and Canada: War Games – **$79,567,667**
Number of cinema screens in England: **1,969**
Number in India: **8,982**
According to a Durex survey, amount of times Americans have sex per annum: **135**
Thai's: **64**
Global average: **109**
Number of stairs on the rocket escalator leading to Segaworld: **193**
Weight of the escalator: **31.5 tonnes**
Likely shipments of *Windows 95* this year, according to Dataquest: **62.7 million**
Number of calories per 100g of Kit Kat: **502**
Average height of the **Edge** editorial team: **6 feet 2 inches**
Number of lives claimed by the black death in the thirteenth century: **40m**
Population of China mid-1995: **1,203,525,741**
Population of UK mid-1995: **58,303,592**
Percentage of readers of The Official UK PlayStation Magazine who also read The Sun: **49%**
Percentage who read The Times: **9%**
Percentage who enjoy needlecraft: **17%**
Number of short-sighted individuals in North America: **70m**
Silicon Graphics reported revenue for its third financial quarter ending March 96: **$677m**
Net Income for the quarter: **$53m**



***Creatures* enables the player to examine the Norn's neural network, or just dissect the brain into components**

→ He adds. 'It could be used. for example. to give the players brains in a football computer game. You could then play against a friend. and you would be training each of the 22 players as you played. Then you could send your team off to play on the Net. and. playing against a team with a different mode of play. it would come back with a new set of skills.'

Outside the games world. the potential applications of *CyberLife* are enormous. So enormous. in fact. that Hayward finds the prospect of embedding his technology rather daunting. 'Because we've made a game with the technology. we haven't built into it the accuracy required in real-world applications. The next stage is to create supersets of *CyberLife*. We want to exploit the technology before anyone else does. but we're just an entertainment technology company from Cambridge – we can't do it on our own. We need to forge partnerships with other companies.'

If you look at the sort of applications Hayward has in mind for *CyberLife*. you can see why. 'Say you want a smart search engine for a Net browser. At the moment. it takes 15 minutes to download everything and comes back with 87 hits. most of which are of no use. Imagine if you had a creature which lived on your machine. which you could teach to search for information on. say. microchips. and leave running in the background for days. The creature could email you when it has found what you're looking for. Traffic control systems are another application – a milk float might break down in Acton at 5.30am and cause a chain of events leading to gridlock at Trafalgar Square at 10.30. Imagine if you had an intelligent set of traffic lights. each of which could talk to one set either side of itself. and which could adjust its timings in such a way as to keep the traffic flowing as fast as possible at all times.'

Hayward cites intelligent TV programme selection systems as another potential *CyberLife* application. and believes the technology could even end up embedded in household consumer electronics items: 'Sharp. for example. has an intelligent microwave – you can tell it what food you're putting in and it will cook it for the correct length of time. It took a long time to develop. because somebody had to put every type of microwavable food into it and tell it when it was cooked.'

Whether or not Millennium Interactive manages to find partners and make piles of money out of embedding *CyberLife* in all sorts of unlikely outposts of modern life. you will be able to examine its technology when *Creatures* ships. If the game succeeds. the spectacle of artificial life proliferating throughout the world's computer systems could prove fascinating. Hayward thinks that. 'After several generations of Norns have been bred. you might find types with distinctive characteristics emerging from different countries. say. French or Japanese Norns. It would then be interesting to breed these with each other and see what happens.' Whether the artificial world steers clear of human phenomena such as war remains to be seen. however. E

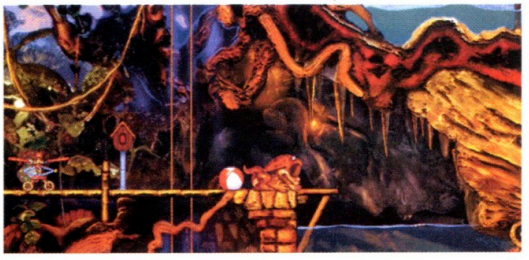
32bit prices plummet

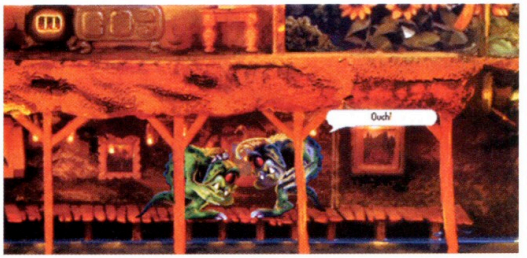
Perhaps influenced by the imminent arrival of the N64, both Sony and Sega have dropped the prices of their 32bit consoles to $199 in the States.

In Britain, the PlayStation and Saturn are now being sold, by most dealers, at £199. In contrast, the N64 is likely to retail for $249 in the US (£200 in the UK).

Meanwhile, HMV are selling off 3DOs for £99 and 3DO games for £10.

Teach the creatures how to interact with different objects, such as these toys





By reacting to different stimuli, such as pain (above), the creature learns its way around the world, eventually gaining self awareness