What puts the creepy into robot crawlies?

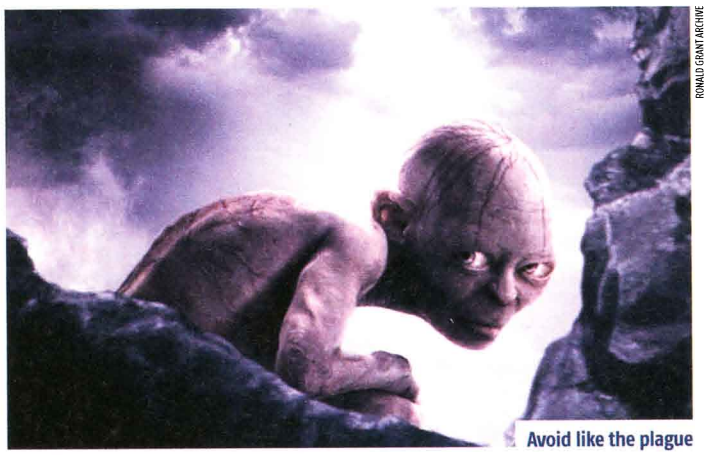
WHEN fantasy fans praised *The Lord of the Rings* films for their special effects, they often singled out the character Gollum (pictured). His animal-like hands and feet, combined with his human-like body shape and voice made viewers' skin crawl.

Now the brain mechanisms responsible for our horror at such human-like creatures, and why this response evolved, are being revealed. Understanding this effect could help robot designers predict how people will react to their creations.

The Gollum effect is an example of a phenomenon known as the "uncanny valley". If a robot is clearly a robot – with metal limbs, say – people are rarely troubled by it. But pass a certain threshold in realism, such as giving it skin or a human-like voice, and it starts to seem eerie. The response is particularly pronounced when one feature is conspicuously more or less human than the rest. Animators already exploit this. Gollum's designers, Weta Digital of Wellington, New Zealand, gave Gollum a voice that sounded human, while his body and movements were animal-like.

To investigate how the effect works, Thierry Chaminade and Ayse Saygin of University College London scanned the brains of subjects being shown videos of a lifelike robot picking up a cup, as well as the same movement performed by a less realistic robot and a person. The results reveal there is a network of neurons in the parietal cortex that was especially active in the case of the lifelike robot, Chaminade says.

This area of the brain is known to contain "mirror neurons", which are active when someone imagines performing an action they are observing. While watching all three videos, people imagine picking up the cup themselves. Chaminade says the extra mirror neuron activity when viewing the lifelike robot might be due to the way it moves, which jars with its appearance. This "breach of expectation" could trigger extra brain activity and produce the uncanny feelings.



RONALD GRANT ARCHIVE

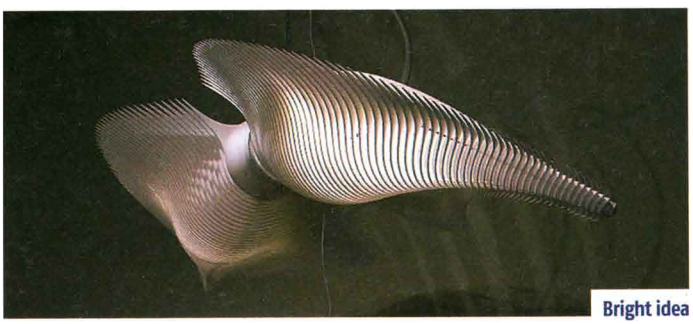
Avoid like the plague

"A breach of expectations could be the trigger for uncanny feelings"

The response may stem from an ability to identify – and avoid – people suffering from an infectious disease. Very lifelike robots seem almost human but, like people with a visible disease, aspects of their appearance jar.

To test the idea, Karl McDorman, who researches human-robot interaction at Indiana University in Indianapolis, recorded the emotions experienced by more than 140 subjects who viewed moving robots of varying likeness to humans. The results show that those which prompt feelings of uncanniness also tend to provoke fear, shock, disgust and nervousness. Since these emotions are typical responses to diseased bodies, MacDorman suggests that the uncanny valley phenomenon may stem from a "fear of one's own mortality" and an "evolved mechanism for avoiding pathogens". "The uncanny valley is about a mismatch in human expectations," he says. **Jim Giles** ●

The lamp that learns to match your mood



ASSA ASHUACH

Bright idea

GENUINE mood lighting just took a step closer. A shape-shifting lampshade can monitor brightness and movement in a room and then gently adjust the amount and quality of light it emits.

Brainchild of London-based designer Assa Ashuach, the AI Light consists of a light bulb surrounded by a flexible nylon "skeleton" that forms two lobes (pictured). Thin rods running through the centre of each lobe are controlled by built-in motors. They can rotate and bend to shape the skeleton in different ways.

More light shines through areas where the skeleton is spread out, while squashed regions emit less. So different combinations of rod position create a range of light quality.

The motors, created by Sia Mahdavi of Complex Matters, a spin-off from University College London, start by randomly varying the shape of the lampshade. This produces a variety of different intensities of light at different times of day. The owner then needs to "train" the software that controls the motors. They can press a button when they like what the lamp is doing. The software remembers the lamp's setting and position at that moment, and uses sound, motion and light sensors, also on the lamp, to record the conditions in the room.

Over time, the software "learns" what the motors should do under different conditions. "You teach it how to behave," Mahdavi says.

Design and technology consultant Nico McDonald of Spy in London says that having to train the lamp could limit its appeal. On display at the Rabia Hage gallery in London, its £26,800 price tag might also put some people off. Duncan Graham-Rowe ●