Moving Pictures

Take the graphics on your computer, multiply the quality by a thousand, and you have a computer animation system

The entire process of producing moving pictures, whether on film or for television, relies on the brain's inability to 'freeze' an image. By presenting the eye with a rapid succession of images an impression of motion is created.

The first attempts at producing the illusion of movement in pictures involved piercing a drum with slots, pasting a strip of drawings around its inside, and spinning the drum. Looking through the slots, one sees a crude representation of one picture or 'frame' after another. The Zoetrope, as it was called, predates the science of photography, but naturally photographs soon replaced the drawings on the inside of the drum. The next stage, the motion picture, required relatively fast-acting photographic emulsions, capable of recording an image in less than one sixteenth of a second, since the early films were projected at 16 frames per second.

Simulating Movement

Strangely, it was quite some time before the film industry conceived the idea of hand-drawing each frame, photographing the drawings and then projecting the result to produce animated cartoons. Bearing in mind that each second's viewing requires the creation of 24 separate drawings (the projection speed of modern film), it is clear that the production of even a five-minute film requires a tremendous amount of work — 7,200 frames in this case. It is not surprising that the style of illustration is formalised — the most important requirement is precise repeatability. It wouldn't do to have Bugs Bunny looking different from one second to the next!

Repetitive and precise tasks like these are readily performed by machines. When the computer takes over the job of animation — adjusting speed of movement, changing perspectives and geometry, lighting and shading, changes in volume, rhythm and pace — the artist is then free to concentrate on the quality of the image. At this point animation changes to being a true graphic art, where the artist's time is spent in creating the image that the computer will cause to move.

In its simplest form, this process uses sprite graphics (see page 152) to create the 'cast of characters', which are then transferred onto the screen and moved about, producing the sort of animation used in simple video games. To create the illusion of change as well as movement (for example, someone walking) it is necessary to repeatedly substitute one sprite for another. As we saw, the creation of sprites is a comparatively slow business, given the graphic quality of the results, and the image has to be nothing more than a very simple two-dimensional representation.

The next stage of animation requires the animator/programmer to construct an algorithm that introduces a feeling of depth into the image according to the rules of perspective. Objects can then be defined on the screen in terms of their X, Y

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Frame By Frame
Conventional animation, like these frames from 'The Pink Panther', requires the artist to draw each picture separately — though common features need not be redrawn unless they change their appearance or position. Transparent film is used so that the entire image can be made up from a series of overlays. The artist will concentrate his attention on the key frames of the sequence, leaving the intervening sections to be filled in by assistants known as 'in-betweeners'. The finished drawings are then photographed using a rostrum camera, in the order that they will be seen