centres on the notion of 'self' — are individuals 'self-aware', do they possess 'self-consciousness', and what does it mean to make such claims? Much research follows Gordon Gallup's 'mark' test, in which an animal is anaesthetized, a mark is placed on its forehead that can only be seen in a mirror, and the response to the mark is assessed when the animal wakes and is shown its reflection in a mirror. A hand movement towards the mark is taken to suggest self-recognition.

But not all primate species are suited to this experiment. Thus, although squirrel monkeys don't show evidence of self-recognition in a mirror, this does not mean they are devoid of all self-awareness. Furthermore, it is not clear that self-directed movements indicate that the animal possesses a sense of self or a sense of its own body. Given that many species have never been studied and that problems with certain analyses still remain, it is premature to draw up taxonomic borders for species differences in 'self-awareness'. Nonetheless, there seems to be a qualitative gap in self-recognition between hominoids and other primates.

There is still much to be learnt about primate cognition. Without an understanding of perceptual and cognitive skills, we cannot appreciate the elaborate patterns of social behaviour to be found in diverse species, or individual and within-species variation. This understanding is also essential for studying the evolution of sociality, social transmission and culture, and the mental processes that underlie the ability to read other individuals' mental and emotional states.

Japanese scientists have played a major role in the development of primatology as a scientific discipline. For 50 years they have studied the social behaviour of wild monkeys on Koshima, while chimpanzees in Tanzania and Guinea have been observed since the mid-1960s. Culture in animals was first described by Japanese scientists studying sweet-potato washing by Koshima monkeys. There are now many examples of culture in primates, and the finding of some 40 different behaviour patterns in chimpanzees — in, for example, tool use, grooming and patterns of courtship — shows that cultural variation exists in these animals.

The many significant contributions to animal cognition made by Japanese researchers can now be appreciated by scientists outside Japan. Tetsuro Matsuzawa has done a masterly job of editing this volume, even down to the fine details of organization and style. The book will have a major impact on future studies of animal cognition in all species. ■

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Science in culture

Rhythms and reflections

Life represented in architecture by the artist Andreas Horlitz.

Alison Abbott

It is a hollow steel column, lit from inside by neon tubes. The neon light shines through cut-out horizontal bars, which climb like the asymmetric rungs of a ladder up its dramatic 25-metre length. It stands in the atrium of the 1997 Gerling building in Düsseldorf, rising through all of its six storeys. At night its beam can be seen through the building's glass walls.

As part of the German movement known as *Kunst am Bau* — art within architecture — which is currently enjoying a renaissance, the column was designed by the Munich-based artist Andreas Horlitz.

Horlitz is perhaps the first to apply scientific motifs to *Kunst am Bau*. In this case, his motif is circadian rhythms. The column's horizontal bars represent seven years in the life of Alexander Borbély, a Swiss sleep researcher who has been recording his daily activity patterns since 1982 using a monitor strapped permanently to his wrist.

Each round of the column represents 48 hours. The open bars are times of low activity — sleep. The vertical shifting of the bars represents Borbély's trips to the United States and to Japan. The column could thus be seen as a monument to Borbély's life.

But Horlitz does not see his work in personal terms. Life's fundamental rhythms, like life's fundamental building-blocks, can be generalized, he says. He turned to circadian rhythms a few years ago, when a chance meeting with a circadian scientist in Munich's fashionable Schumann's American Bar introduced him to one of science's fashionable themes. Before that, he had spent many years working with the patterns of the biotechnologist's classical sequencing gels. In these gels, DNA fragments are separated along four tracks, one for each of DNA's constituent nucleotides, to determine gene sequence, and each fragment is seen as a spot.

DNA is a well-rehearsed theme in art. But Horlitz's approach, in which the spots are typically represented as mirroring overlaid on sand-blasted glass, has originality in that it plays on ideas of self-image. Horlitz is intrigued by the fact that individual variations in the human genome are so small, and sees his mirrored representations of a single sample of DNA as being universal. In his work, the mirroring reflects back the viewer's face while at the same time depicting a different type of self-portrait.

Horlitz does not accept commissions from biotechnology companies, which would use his ideas decoratively to represent their products. He wants his work — the representation of life at its most fundamental levels — to be part of the physical structures within which ordinary life is played out. Panels of his part-mirrored, translucent 'DNA' glass have been incorporated into the internal walls of a commercial building — Uniplan International — in Kerpen. Gerling is an insurance company. ■

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ANDREAS HORLITZ