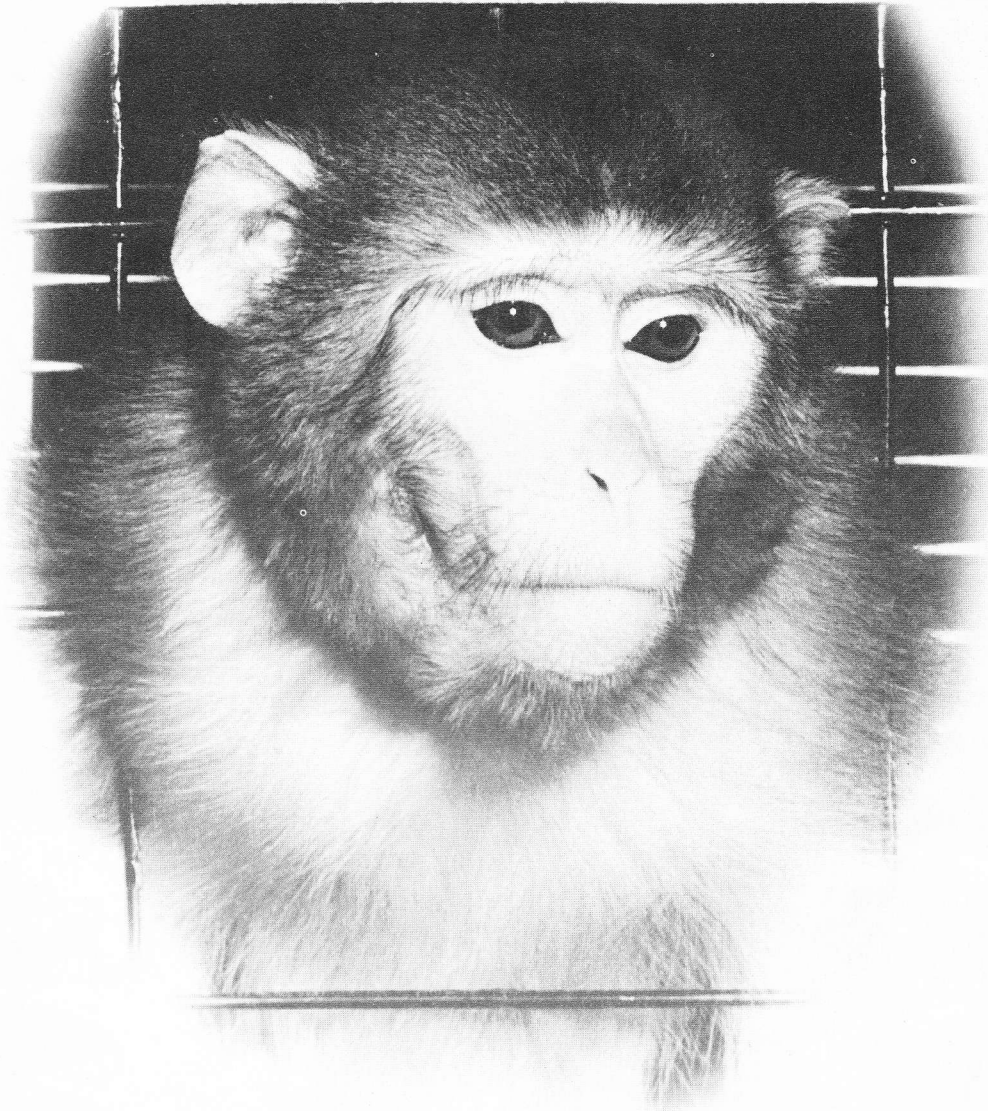


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A blind monkey that sees everything

**The automated battlefield
Altered states of consciousness**

Helen: “a blind monkey who saw everything”

Oxford Companion to Consciousness , ed. Tim Bayne, Axel Cleeremans, Patrick Wilken, pp. 343-345, 2009.

A rhesus monkey called Helen, who had the primary visual cortex of her brain removed, provided the first compelling evidence of the condition of sensationless vision that would later become known as blindsight (qv).¹ Nicholas Humphrey, who made the discovery, writes:

In 1967 there was a monkey in my supervisor Larry Weiskrantz’s laboratory at Cambridge, named Helen, who had undergone a surgical operation to remove the primary visual cortex, VI, at the back of her brain, with the purpose of discovering more about the role this area of cortex plays in normal vision. The operation had been done in 1965, and during the two years that followed the monkey had seemed to be almost completely blind, capable of discriminating little more than light from dark..

However, I had reasons for thinking this might not be the whole story. As part of my own PhD research I had been studying the visual-responses of single cells in the superior colliculus of monkeys, and had found evidence that this “primitive” subcortical visual system, which remains intact after removal of the visual cortex, might be capable on its own of supporting quite finely-tuned visually guided behavior.² I wondered now whether in Helen’s case this secondary visual system could somehow be brought into action. Thus, one week when I had time on my hands and the monkey was not involved in Weiskrantz's research, I decided to find out more.

Over several days I sat by Helen’s cage and played with her. To my delight it soon became clear that this blind monkey was sometimes *watching* what I did. For example, I would hold up a piece of apple and wave it in front of her, and she would clearly *look*, before reaching out to try to get it from me. As the game continued, she soon changed from being a

monkey who sat around listlessly, gazing blankly into the distance, to one who had become interested and involved in vision again.

I persuaded Weiskrantz to let me go on working with Helen. Over the next seven years I took her with me to Oxford, and then back to Cambridge, to the Department of Animal Behaviour at Madingley. I became her tutor on a daily basis. I took her out on a leash in the fields and woods at Madingley. I encouraged her and coaxed her, trying in every way to help her realize what she might be capable of. And slowly but surely her sight got better. Eventually she could, for example, run around a room full of obstacles picking up crumbs off the floor. Anyone who was unaware that she had no visual cortex, could well have assumed she had completely normal vision.

Yet I was pretty sure her vision was not normal. I knew her too well. We had spent so many hours together, while I continually wondered what it was like to be her. And, although I found it hard to put my finger on what was wrong, my sense was that she still did not *really believe* that she could see. There were telling hints in her behavior. For example, if she was upset or frightened, she would stumble about as if she was in the dark again. It was as if she could only see provided she did not try too hard.

In 1972 I wrote an article for the *New Scientist*, and on the front cover of the magazine they put the headline, under Helen's portrait, "a blind monkey that sees everything" But this headline surely was not right. Not *everything*. My own title for the paper inside the magazine was "Seeing and Nothingness," and I went on to argue that this was a kind of seeing of which we had never before had any inkling.³

With a monkey, who could not describe her inner world, there seemed no way of knowing what her experience was really like. To find out we would need evidence from human beings, and at that time there were no human cases comparable. Indeed what evidence there was suggested that people with similar brain damage would *not* recover

vision. I wrote:

When people suffer extensive damage to the visual cortex it is said that their blindness is total and permanent. Perhaps with a more flexible definition of vision, it will yet be discovered that there is more to seeing than has so far met either the clinician's or the patient's eye.

Then, within a couple of years, Weiskrantz, spurred on by what we had found with Helen, moved the research to a new level by showing that a human patient with extensive damage to the visual cortex could be coaxed, like the monkey, into demonstrating a significant degree of vision in the blind part of his visual field. But now, with this human patient, it was possible to have him tell the researchers what it was like for him. And, to everyone's astonishment it turned out that, yes, this was indeed a kind of *unconscious vision*. The patient believed he was blind, and *reported that he was having no visual sensation*, and yet he could still *guess* the position and shape of objects.⁴

No human patient with primary visual cortex damage has yet reached the same level of skill as Helen when using the blind part of their field; nor apparently do human patients find their capacity of practical value in their lives, as Helen clearly did (she could climb trees, catch cockroaches, feed herself, etc. under visual control). Compared to human cases, Helen had "super-blindsight". Perhaps the difference can be explained by the fact in all known human cases the damage to the visual cortex is incomplete, leaving the patient with normal vision in part of the field – and hence with less incentive to rely on blindsight in daily life. No case of a clean total lesion of VI is likely to occur in humans, so we may never know.

Helen was killed in 1974 so that her brain could be examined and the extent of the lesion confirmed.. To be sentimental about her would be inappropriate. Nonetheless I think we should acknowledge our debt as scientists and philosophers to a creature who, through a

human experiment that deprived her of visual consciousness, has taught us so much about what consciousness is all about ⁵

1. Described in a series of papers, beginning with N. K. Humphrey and L. Weiskrantz, 1967, "Vision in monkeys after removal of the striate cortex," *Nature*, 215, 595-597; ending with Nicholas Humphrey, 1974, "Vision in a monkey without striate cortex: a case study", *Perception*, 3, 241-255.
2. N. K. Humphrey, 1968, "Responses to visual stimuli of single units in the superior colliculus of rats and monkeys," *Experimental Neurology*, 20, 312-340.
3. Nicholas Humphrey, 1972, "Seeing and nothingness", *New Scientist*, 53, 682-684.
4. Lawrence Weiskrantz, 1986, *Blindsight*, Oxford: Clarendon Press.
5. For further reading, see Nicholas Humphrey, 2006, *Seeing Red: a Study in Consciousness*, Cambridge Ma.:Harvard University Press, from which this account is partly taken..