

LAST BUT NOT LEAST

Darwin Illusion: Evolution in a blink of the eye

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Received 14 July 2009

To commemorate the bicentenary of Charles Darwin (1809–1882), we devised a new visual illusion with an evolutionary theme. Figure 1 shows two monkeys. To see the illusion, stare at the centre of the picture for about 30 s without moving your eyes. Next, look to a white wall and blink a few times. The monkeys should suddenly transform into a perfect portrait of Darwin.



Figure 1. The Darwin Illusion: Adaptation diversifies primate species.



Figure 2. Evolution of the Darwin Illusion.

The illusion combines two visual effects. First, staring at the picture produces a negative afterimage, in which the black-and-white pattern is reversed. Second, the ‘resolution’ of the afterimage is lower than that of the actual image, and so the thin white lines vanish, making it impossible to see the monkeys (see Harmon and Julesz 1973). To our knowledge, the Darwin Illusion is the first demonstration in which the *positive* image and its *negative* afterimage each form distinct and meaningful percepts.

In biology, ‘adaptation’ refers to the gradual process by which a species becomes better suited to its environment. For example, humans and monkeys evolved from a common primate ancestor (Darwin 1859). Psychologists use the term adaptation to refer to rapid changes in perceptual sensitivity, including the brain’s adjustment to brightness that gives rise to the negative afterimage in the illusion (Clifford and Rhodes 2005). So, in both senses of the word, our commemorative Darwin Illusion shows adaptation in action. Basing the illusion around an afterimage also seemed especially appropriate, given the interests of Charles Darwin’s immediate forebears: his father (Robert Darwin) and grandfather (Erasmus Darwin) both carried out pioneering research into this curious optical phenomenon (Wade 2002).

Figure 2 shows how the image was created from a photographic portrait of Charles Darwin. First the photograph was blurred to smooth the edges, then reduced to two-tone black-and-white. The black-and-white regions were then inverted to produce a contrast negative image for trial purposes. Isolating the outline helped us to visualise constraints on the shape. Then began the game of ‘Monkey Tetris’—an attempt to fit simian anatomy to the available contours in a parsimonious fashion. With increasingly committed pencil lines, a draft began to take shape. The finished sketch was then inked-in to produce the image presented here.

References

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