



Apr
10

The Neuroscience of Yorick's Ghost and Other Afterimages

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By Stephen L. Macknik and Susana Martinez-Conde Alas! Poor Yorick. I knew him well. A fellow of infinite jest, of most excellent fancy; he hath borne me on his back a thousand times; and now, how abhorred in my afterimage he is! Well that what Hamlet would have said, had he been holding the vintage Pear's Soap advertisement bearing Yorick's skull in the accompanying slide, rather than a dug up and rotting Danish cranium. In this antique illusion, you can stare at the X in Yorick's left eye socket for about 10 to 30 seconds, then look away at a flat surface such as a piece of paper, wall, ceiling or sky, and you will see Yorick's afterimage as a ghostly apparition. Afterimages such as this one help us to understand how neurons in various areas of the brain adapt to the visual environment. Adaptation, in this case, is the process by which neurons habituate and eventually cease responding to an unchanging stimulus. Once neurons have adapted, it takes a while for them to reset to their previous, unadapted state: it is during this period that we see illusory afterimages. We see afterimages every day: after briefly looking at the sun, at a bright light bulb or after being momentarily blinded by a camera flash, we perceive a temporary dark spot in our field of vision. Vision scientists believe that the adaptation effect producing poor Yorick's afterimage largely takes place in the neurons of the retina. How can we know? Close your right eye and stare at the X again. Then look at the wall again to see the afterimage, but this time switch back-and-forth between closing one eye and the other. Only the left eye which was open during the adaptation period will reveal Yorick's ghost. © 1996-2009 Scientific American Inc

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