



**Fig. 2** Computing the smoothest velocity field along contours. *a*, Three-dimensional stimulus first used by Wallach<sup>62</sup> to demonstrate the ability of the human visual system to derive three-dimensional structure from the projected two-dimensional motion of an object (kinetic depth effect). The top part shows three views of a figure as it is rotated around the vertical axis. The initial measurements of the normal velocity components  $V_i^N$  are shown on the lower right. The velocity field computed using equation (4) is shown on the lower left. The final solution corresponds to the physical correct velocity distribution. Recent electrophysiological evidence implicates the middle temporal area of the monkey as a site where a similar motion integration may occur<sup>63</sup>. *b*, Circular helix on an imaginary three-dimensional cylinder, rotating about its vertical axis (barber pole). The projection of the curve onto the image plane, together with the resulting two-dimensional velocity vectors are drawn on the left. Although the true velocity field  $V$  is strictly horizontal (left), the smoothest velocity field (right) is vertical. This example illustrates a case where both the algorithm and the human visual system suffer the same optical illusion. Adapted from ref. 23.