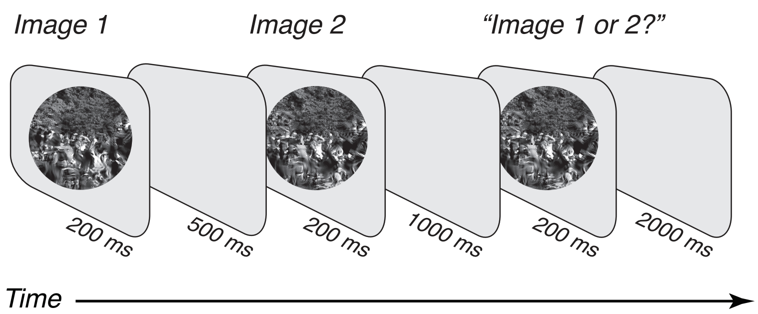
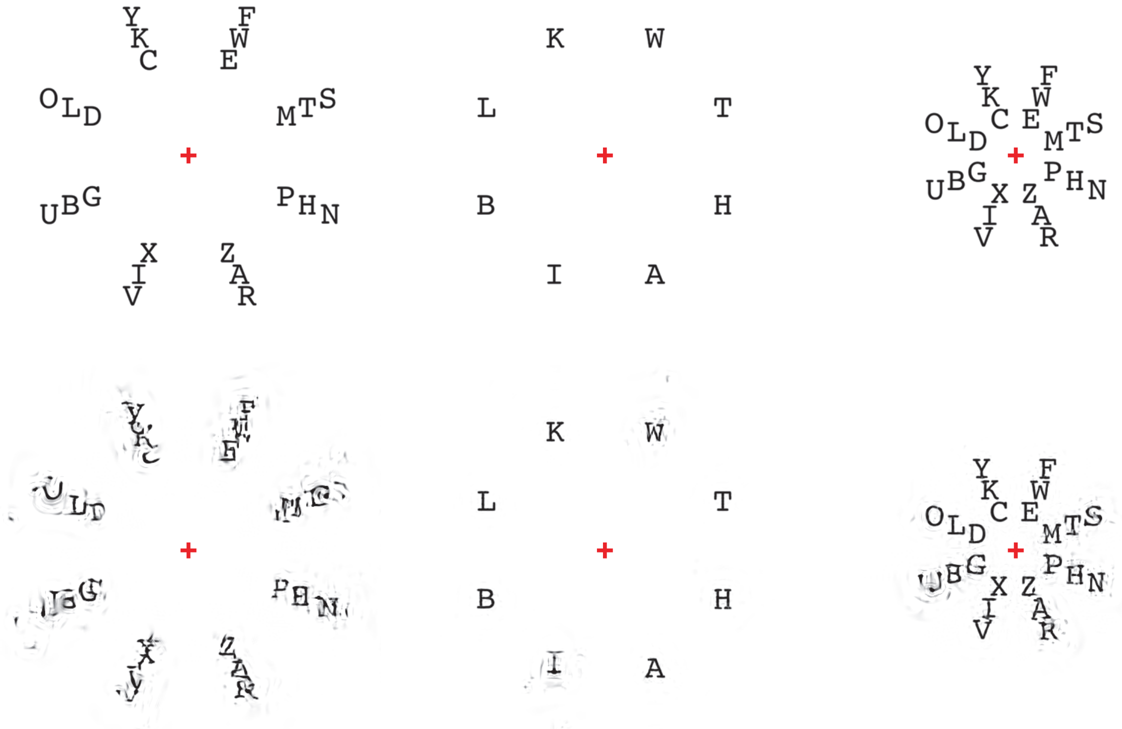
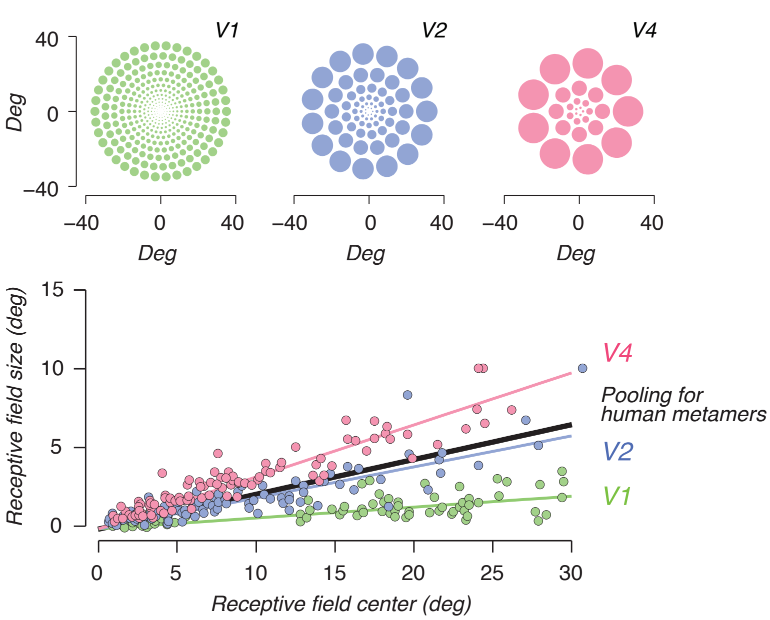


Psychophysical task. At the start of each trial, observers are shown two different images in succession. The two images are synthesized to be matched for local statistics but are otherwise as random as possible. After 1 second, one of the two images is repeated. The observer reports which of the first two was identical to the third. Chance performance is 50%. Fixation is maintained at the center of the image.

Synthesized images. Each row shows a pair of images. The image on the left is an original, naturalistic scene. The image on the right is synthesized to be as random as possible while still matched to the local pairwise statistics of the the image on the left. While fixating the center (red cross) the images in each pair (left and right) should appear similar, despite the distortions in the periphery. The first row was created using pooling region sizes that yielded near-chance (50%) performance in our psychophysical task. The second was created using sizes that yielded approximately 75% performance. In the actual experiment, all stimuli were black and white, and observers discriminated between multiple synthetic stimuli, each as random as possible subject to the statistical constraints induced by an original image.



Simulating crowding. The top row shows stimuli similar to those used in standard crowding experiments (Pelli et al., 2004). Fixate on the red cross at the center of each upper display. In the top left, the letters are closely spaced, and the middle letter within each triplet should be difficult to identify. This is crowding. In the top center, the middle letters are presented alone, and should now be easy to identify. Removing the flankers alleviates crowding, demonstrating that crowding is not due to a loss of acuity. In the top right, the letters are presented closer to fixation, and the middle letters should again be easy to identify, demonstrating that crowding depends on the spacing between letters relative to their distance from fixation. The bottom row shows synthetic stimuli, each matched to the local statistics of the corresponding image in the top row, generated using pooling region sizes that yielded near-chance performance in our psychophysical task. For the leftmost display (which produces crowding, above), the letters in the synthetic image (below) look jumbled, and unidentifiable. For the other two displays (which alleviate crowding, above), the letters in the synthetic image are more identifiable (below).



Ventral stream receptive fields. The top row shows cartoons of receptive field sizes in ventral areas V1-V4. The plot below shows physiological measurements of classical receptive field size (radius, in deg) as a function of the eccentricity of the receptive field center (in deg) in macaque monkeys, for visual areas V1, V2, and V4 (data replotted from Gattass et al., 1981 and Gatass et al., 1988). A slope relating size to eccentricity is estimated using linear regression (best-fitting line shown). The cartoons (above) show receptive fields as circles that grow in size with eccentricity according to the fitted regression lines in the graph (below). The black line shows the scaling estimated from our psychophysical data in human subjects.