Supplementary Information

Gaussian pyramids for retinal transform

Figure S1. Precomputed 3-level Gaussian pyramid for an example natural scene. Each pyramid level is computed by convolving a Gaussian filter with the original image.
Depending on the location of a particular fixation, we selected appropriate pyramids for each eccentricity and then blended the boundaries together according to the implementation described in Geisler and Perry (1998).

**Search performance**

We verified that monkeys were able to perform the task on consecutive days of task performance. We found no significant trend in search behavior (fraction of successful trials and number of fixations required) across days (Figure S2).

**Figure S2.** Search behavior in natural scenes. Black: Fraction of trials in which targets were successfully found on each day. Red: Number of saccades required to find the target on each day. Error bars show 2 standard errors of mean. Left: Vertical Gabor search, Right: Horizontal Gabor search.
Evolution of search strategy within a trial

To understand how saccade planning evolved at the relatively short time scale of within a single trial, we correlated the visual features at fixation with the fixation order (first, second, third, etc.) and the length of the saccade made to land at that fixation. Figure S3 shows the results for monkey MAS16 with identical results for MAS15 shown in the main text (Figure 7).
Figure S3. How does search strategy evolve within a trial? Spearman’s rank correlation coefficients between fixation order (black diamonds) or saccade length (blue squares) and visual features: saliency, edge–energy, relevance, orientedness, and verticalness are shown for one monkey (MAS16) for each task. Filled shapes show effects for fixated patches and unfilled shapes for shuffled controls. Error bars show bootstrapped 95%
confidence intervals. The symbols on the x-axis indicate the image processing done prior to feature computation: the first three data points correspond to a retinal transform followed by averaging over 1°x1°, 2°x2°, and 4°x4° windows respectively; the fourth data point indicates averaging over a 2°x2° window without applying any retinal transform. The star indicates a significance level of $p < 0.0001$.

**References**