**SUPPLEMENTAL FIGURE LEGENDS**

[**https://github.com/horwitzlab/V1-double-opponent-receptive-fields**](https://github.com/horwitzlab/V1-double-opponent-receptive-fields)

**Figure S1.** Reclassification of cells with reversed cone weight criteria. Shown are the normalized cone weights of simple (black), DOLM-opponent (red), DOS-cone sensitive (blue) and unclassified (gray) cells. Under these criteria, cells were classified as simple if the L- and M-cone weights had the same sign, that together, accounted for 80% of the total cone weight and individually accounted for at least 20%. Cells were labeled as DOLM-opponent if the L- and M-cone weights had opposite sign, together accounted for 80% and individually accounted for at least 10% of the total cone weight. Classification of DOS-cone sensitive cells was unchanged from the description in the Methods.

**Figure S2.** Model comparisons and spatial opponency analyses after reclassification of cells. **A.** Cross-validated is plotted from Gabor fits and from DoG fits for simple cells. **B.** Identical to **A** but for DOLM-opponent cells. **C.** Analysis of best fitting phase (φ) of Gabor fits to all simple RFs (white) and those that are better fit by the Gabor model than the DoG model (black). **D.** Identical to **C** but for DOLM-opponent RFs. **E.** Analyses of best fitting aspect ratio (γ) of Gabor fits to all simple RFs (white) and those that are better fit by the Gabor model than the DoG model (black). The median γ is plotted for all simple cell RFs (open triangle) and also for cells better fit by Gabor model (closed triangle). **F.** Identical to **E** but for DO RFs. **G.** Cross-validated is plotted from Gabor fits and from non-concentric DoG fits for simple cells. **H.** Identical to **G** but for DOLM-opponent cells. **I.** Histogram of spatial opponency indices (s) for simple cells based on spatial weighting functions. **J.** Identical to **I** but for DOLM-opponent cells.

**Figure S3.** Comparison of Gabor and DoG model fits using three different analyses. **A.** Cross-validated prediction of spike-triggered stimuli using the area under receiver operating characteristics (ROC AUC) is plotted from Gabor fits and from DoG fits for simple cells. **B.** Identical to **A.** but for DOLM-opponent cells. **C.** Identical to **A.** but for DOS-cone sensitive cells. **D.** Cross-validated sum of squared errors (SSE) is plotted from Gabor fits and from DoG fits for simple cells. **E.** Identical to **D.** but for DOLM-opponent cells. **F.** Identical to **D.** but for DOS-cone sensitive cells. **G.** Bayesian Information Criterion (BIC) is plotted from Gabor fits and from DoG fits for simple cells. A better model fit yields a lower BIC. **H.** Identical to **G.** but for DOLM-opponent cells. **I.** Identical to **G.** but for DOS-cone sensitive cells.

**Figure S4.** Comparison of Gabor and non-concentric DoG model fits using three different analyses. **A.** Cross-validated prediction of spike-triggered stimuli using the area under receiver operating characteristics (ROC AUC) is plotted from Gabor fits and from non-concentric DoG fits for simple cells. **B.** Identical to **A.** but for DOLM-opponent cells. **C.** Identical to **A.** but for DOS-cone sensitive cells. **D.** Cross-validated sum of squared errors (SSE) is plotted from Gabor fits and from non-concentric DoG fits for simple cells. **E.** Identical to **D.** but for DOLM-opponent cells. **F.** Identical to **D.** but for DOS-cone sensitive cells. **G.** Bayesian Information Criterion (BIC) is plotted from Gabor fits and from non-concentric DoG fits for simple cells. A better model fit yields a lower BIC. **H.** Identical to **G.** but for DOLM-opponent cells. **I.** Identical to **G.** but for DOS-cone sensitive cells.