

Figure S1. Comparison of SVM maps and conventional subtraction maps.

SVM weight maps (top row) and corresponding subtraction maps (bottom row) in two cases (case 1 and 3). Maps are 0° vs. 90° orientation maps obtained either with LG stimuli or MB stimuli. In each column, the SVM map and subtraction map were calculated from the same data set. Domain patterns were similar between corresponding SVM and subtraction maps. However, the noise in the SVM maps is much smaller than that in the subtraction maps. Such noise is mostly from blood vessel regions, chamber edges and their neighboring regions. Maps were clipped to $2SD$. Scale bar = 1 mm. A: anterior, M: medial.

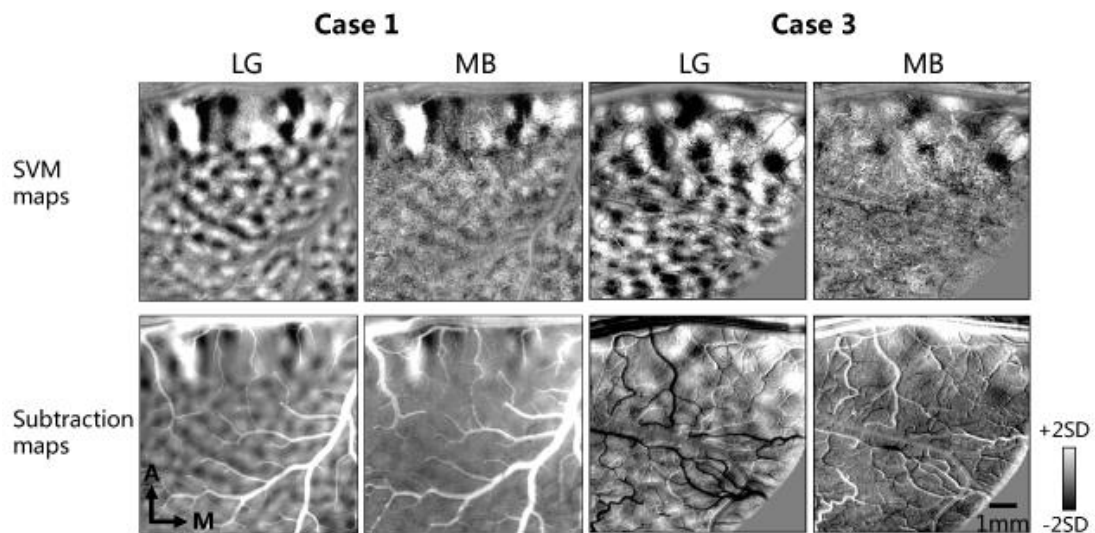


Figure S2. Quantification of orientation response to LG and MB (case 2, 3 and 4).

Three cases are shown in 3 rows. (A) Orientation maps obtained with LG stimuli. Dotted lines: V1 V2 borders. (B) Orientation maps obtained with MB stimuli. All

cases show strong orientation maps in V2, but very weak in V1. (C) Orientation response profiles for LG (solid curves) and MB (dotted curves). Red curves are obtained from V2, black curves are from V1. X axis denotes the measured orientation of the orientation maps, centered at the stimulus orientation. Response profile curves were normalized within each case to its maximum amplitude (V2 response to LG, and scaled to max-min values). Scale bar =1 mm. A: anterior, M: medial.

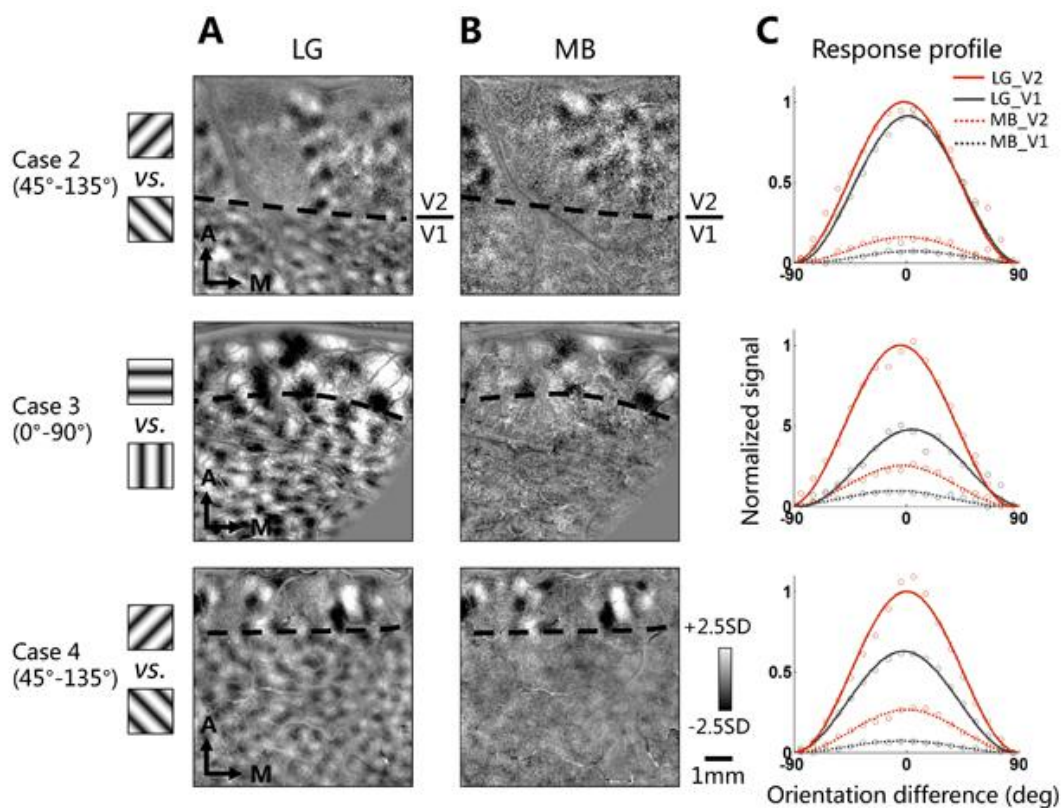


Figure S3. Potential boundary cues in the MB stimulus.

The MB stimulus contains 3 cues that potentially contribute to the MB responses we observed: motion direction differences; dynamic cue caused by appearing/disappearing of dots at the virtual boundaries; and motion streak discontinuity at the virtual boundaries. Our control experiment with TB stimuli

indicate that the first cue (motion contrast cue) is crucial to evoke MB orientation responses we observed, but not temporal dynamic cue or motion streak discontinuity.

