

Movie S1 Motion boundary (MB) stimulus.

Movie illustration of two stimulus conditions of the MB stimuli used in this study.

The dot motion are the same in these two conditions (towards up-right or down-left), while they create horizontal or vertical MBs. Comparing cortical responses to these two conditions results an orientation map in V2 (Figure 2D). The same MB can also be induced by dots moving along another diagonal axis (not shown). Note that the border locations are fixed.

Movie S2 Temporal line (TB) stimulus.

Movie illustration of two stimulus conditions of the TB stimuli used in this study. The only difference between TB and MB is that all the dots in TB are moving at the same direction while in MB dots in neighboring strips are moving at opposite directions. Nevertheless, in both TB and MB, all dots disappear and appear at the virtual boundary locations. Unlike MB, the perception of boundaries is very weak for TB stimuli. Imaging also showed no obvious orientation map in V1 or V2 for TB stimuli (Figure 4).