Supplementary Figure 1 Examples of ES-induced responses in alert monkeys: T-statistic maps and time courses of visually (left panel) and electrically (right panel) induced response in V1 and V2. Regions of V2 that retinotopically matched the activated V1 region show positive BOLD responses during visual and negative responses during electrical stimulation of LGN. Conventions are as in Figure 1 and 2. All maps were thresholded for p<0.0001.
Supplementary Figure 2 V1 and V2 responses for different stimulus strengths: (a) Activated volume in V1 (upper plot) and V2 (lower) as a function of current strength. In V1, the activated volume decreases monotonically with decreasing intensity. (b) Thresholded t-test maps from voxels that were activated/deactivated for all intensities of the electrical stimulus. Shown are slices with consistent activation during injection of currents of different strength. (c) Time course of the voxels shown in (b). PBR (red) in V1 is induced by all intensities, and so is NBR (blue) in retinotopically matched regions of V2.
Supplementary Figure 3 Dynamic characteristics of pulse responses (Sessions = 14, Groups = 35): (a) The plot shows the profile of pulse-responses of the first cluster (long inhibition) as a function of current strength. Responses for 6 different current intensities are shown with traces of different width and color. They are all characterized by an intensity-dependent drop inactivity of 40-70% of the baseline level (see peak response amplitude on top right) occurring approximately 20-50 msec after the pulse (see Time-to-Peak plot on bottom left). The strong inhibition was followed by a slow recovery with a Tau value of approximately 150 msec independent of current strength. (b) Peak responses as a function of stimulation current strength. Boxes indicate the 25th and 75th quartiles; middle horizontal lines denote the median of maximal percent change of spiking rate across recordings sites. (c) Time to peak for the long inhibitory response. (d) Time constant (Tau) of the response.

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Supplementary Figure 4 ICA clusters and their corresponding time courses (H05.np1): (a) The spatial patterns (thresholded at 1.3 st.dev.) of four independent components were selected on the basis of significant (p<1e-15) ES-induced modulation in the pre-injection period. (b) IC time courses centered (subtraction of the pre-injection mean) and expressed in units of the standard deviation (s.d.) of the activity in blank intervals of the pre-injection period. The two top plots show ICs within V1 (cyan) and V2 (blue). The bottom plots show two additional ICs localized around the injection tip (red) and a retinotopically matched V2 region (magenta), respectively. The first two clusters were consistently found in regions distant to the injection site and its corresponding V2 projection zone.
Supplementary Figure 5 Signal propagation during electrical stimulation: (a) Low-frequency electrical stimulation (leftmost cortical hierarchy) of an LGN site suppresses the activity of all regions that are retinotopically matched to the stimulation site. Red and black boxes indicate activated and deactivated cortical regions, which receive direct and indirect LGN input, respectively. Increasing frequency still induces NBR in all areas beyond V1, but PBR in the primary visual cortex due to enhanced thalamocortical activity (red). Injection of bicuculline in V1 enables signal propagation in extrastriate cortex. (b) Cortico-pulvinar-cortical connectivity may enable signal propagation during the ES-induced disruption of the cortico-cortical pathways.