Supplemental Materials

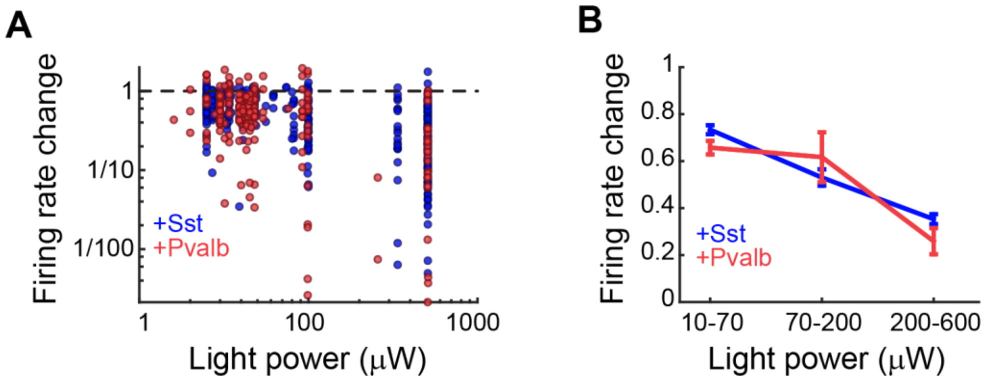

Figure S1 (related to Experimental Procedures): Average suppression as a function of light power.

(A) Light-induced changes in stimulus-evoked firing rate, as a function of light level, for neurons recorded in the Ai32/Pvalb (red) and Ai32/Sst (blue) mouse lines, reveal significant neuron-to-neuron variability.

(B) Mean light-induced changes in stimulus-evoked firing rate for the light levels used to generate the data in Figures 1-5 (10-70 mW), as well as moderate (70-200 mW) and higher (200-600 mW) light levels.

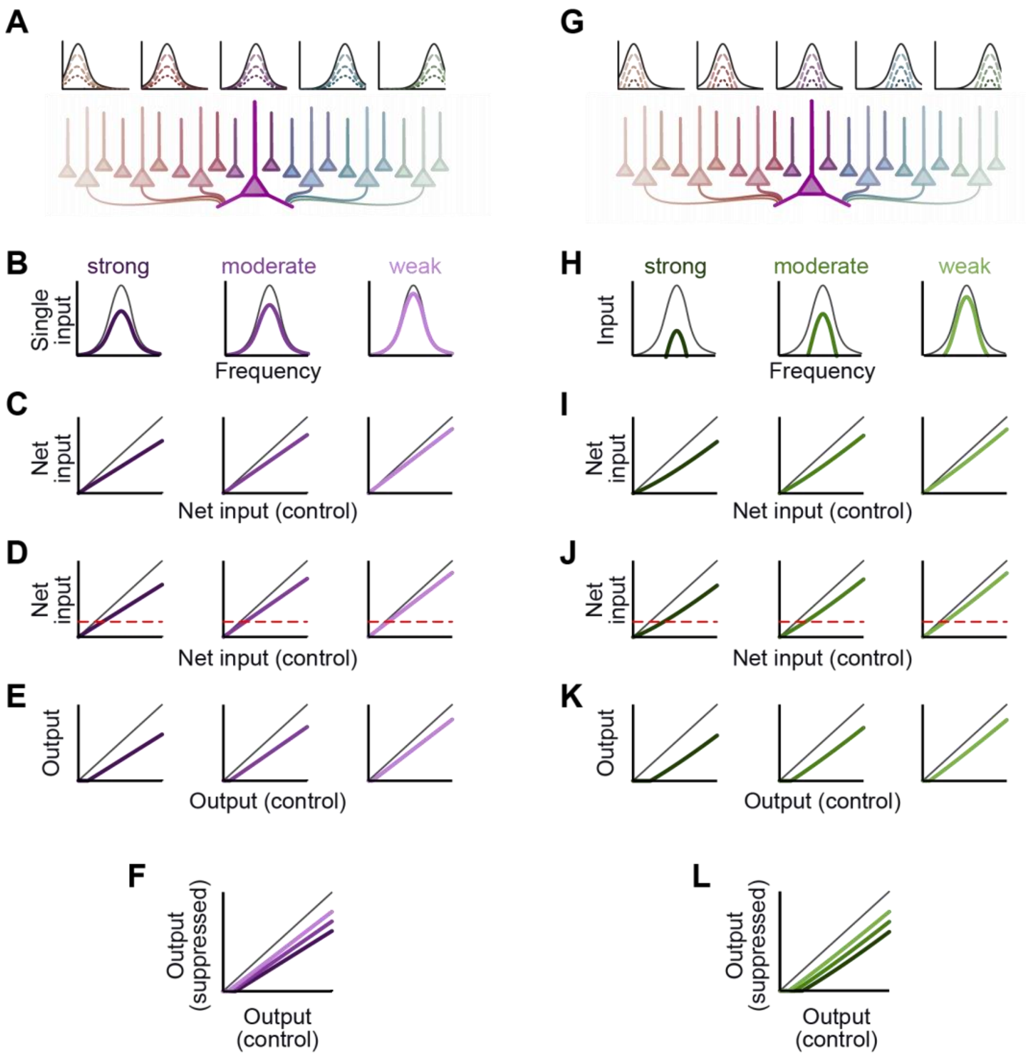

Figure S2 (related to Figure 8): Stronger suppression of inputs causes output suppression to appear more divisive.

(A) Schematic showing different strengths of divisive suppression of the inputs (upper row) projecting to a target neuron (large purple).
(B) Three example strengths of divisive input suppression.
(C) Total input in the suppressed condition (purple) as a function of the input in the control condition (black). Shallower slopes correspond to stronger input suppression.
(D) Action potential threshold (dashed red), overlaid on the total input (from (B)). (In this example, action potential threshold is held constant.)
(E) Spiking output of the target neuron in the suppressed condition, as a function of its output in the control condition, reveals that as suppression decreases, the slope of the suppressed-vs-control firing rate function increases (i.e. appears less divisive).
(F) Overlays of spiking outputs in (E) show changes in slope of suppressed-vs-control firing rate function for different suppression strengths.
(G-L) Plots corresponding to (A-F) when the inputs are subtractively, rather than divisively, suppressed. Again, weaker inhibition produces suppression that is less obviously divisive.

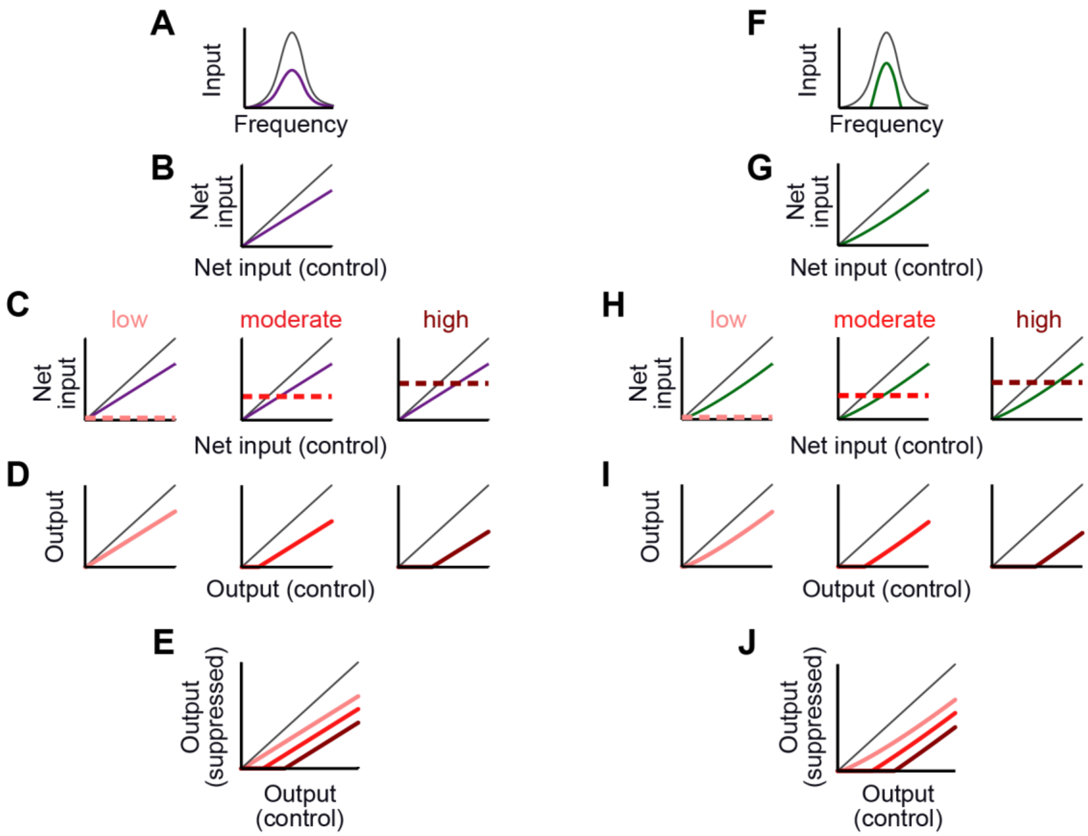

Figure S3 (related to Figure 8): Higher thresholds cause output suppression to appear more subtractive.

(A-B) Divisive suppression of inputs (A) produces a sloped control-vs-suppressed input curve (B).

(C) The control-vs-suppressed input curve from (B), with either a low (left), moderate (center), or high (right) threshold marked in red.

(D) Suppressed-vs-control firing rate functions, constructed by assuming that the output firing rate is a linear function of the suprathreshold input.

(E) Overlays of spiking outputs in (D) show how as threshold increases, the y-intercept of the suppressed-vs-control firing rate function increases and the resulting suppression appears more subtractive.

(F-J) Similar plots to (A-E) for subtractive, rather than divisive, suppression of inputs.

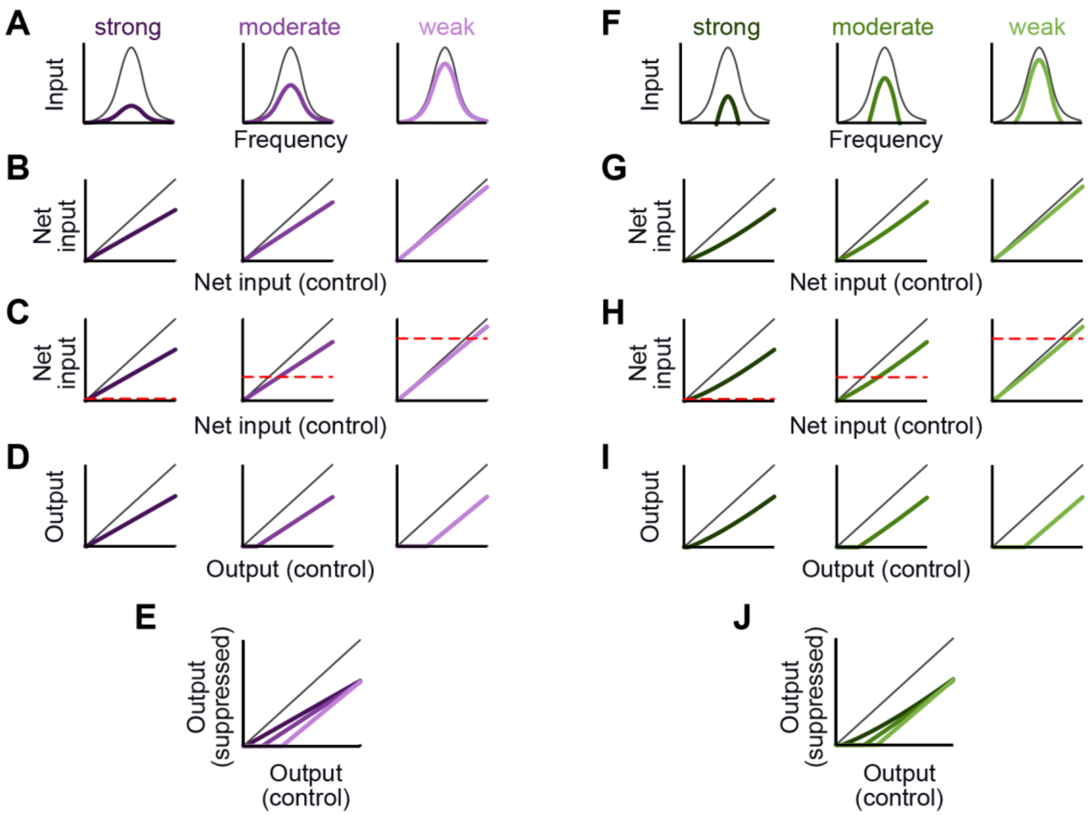

Figure S4 (related to Figure 8): Either divisive or subtractive suppression of inputs can produce divisive or subtractive suppression of outputs, depending on suppression strength and threshold

(A) Examples of strong (dark purple), moderate (medium purple), or weak (light purple) divisive suppression of inputs.

(B) Total input in the suppressed condition (purple) as a function of input in the control condition (black). Shallower slopes correspond to stronger input suppression.

(C) Action potential threshold (dashed red) overlaid on total input (from (B)). In this example, each suppression strength corresponds to a different action potential threshold.

(D) Spiking output of the target neuron in the suppressed condition, as a function of its output in the control condition. Strong suppression of inputs to a low-threshold neuron appears almost purely divisive (y-intercept close to 0, dark purple), while weak divisive suppression of inputs to a high-threshold neuron appears predominantly subtractive (y-intercept far from 0, light purple).

(E) Overlays of spiking outputs in (D) show how covarying the strength of divisive input suppression and threshold can shift the net output suppression from predominantly divisive, to mixed, to predominantly subtractive.

(F-J) Similar plots to (A-E) when inputs are suppressed subtractively, rather than divisively.