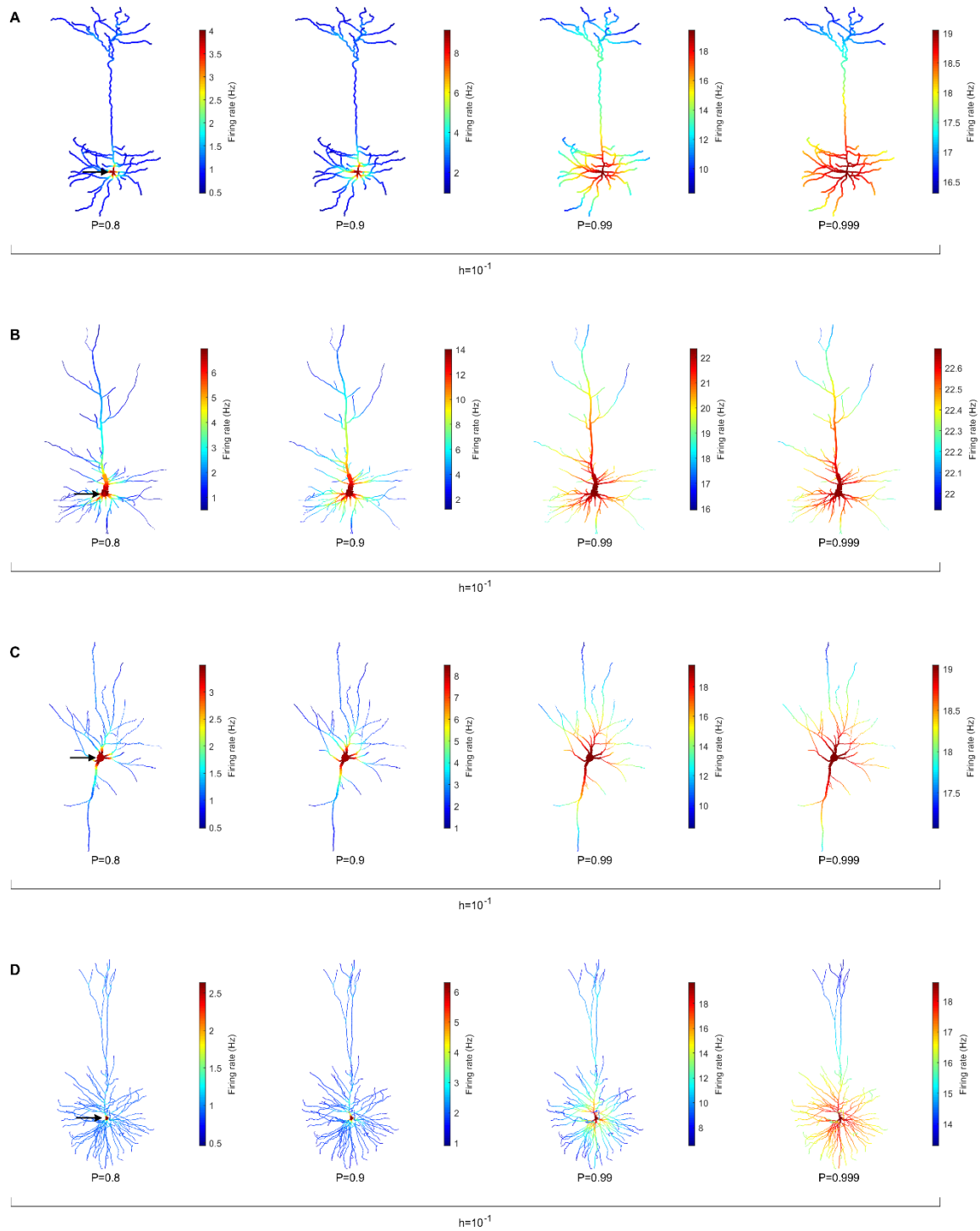
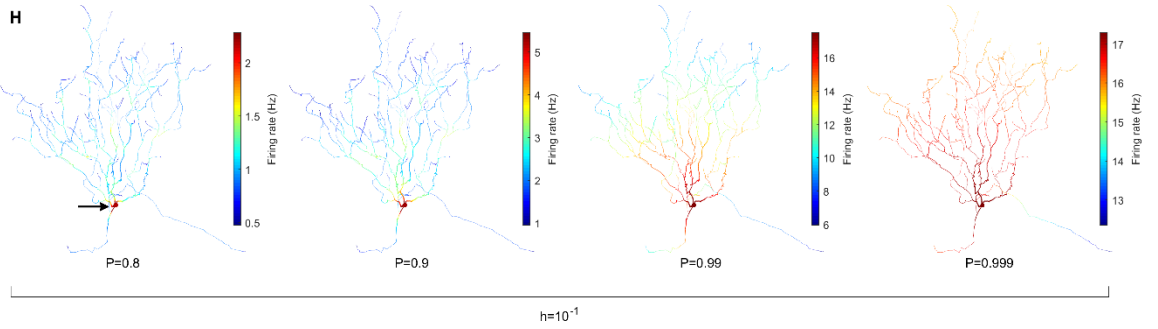
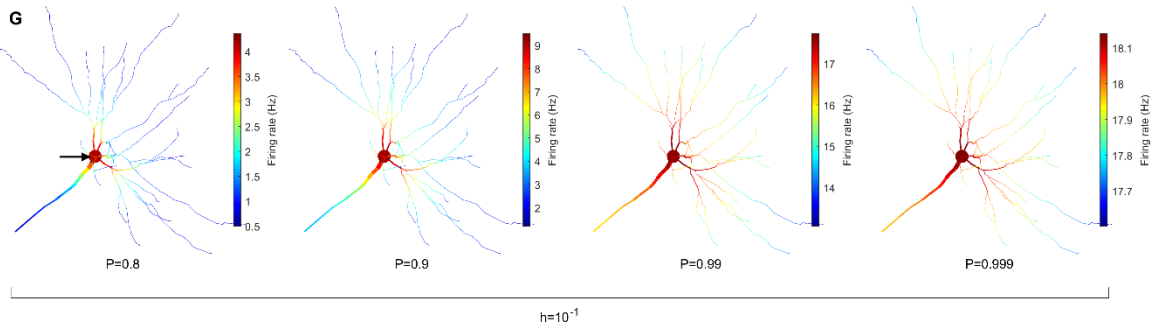
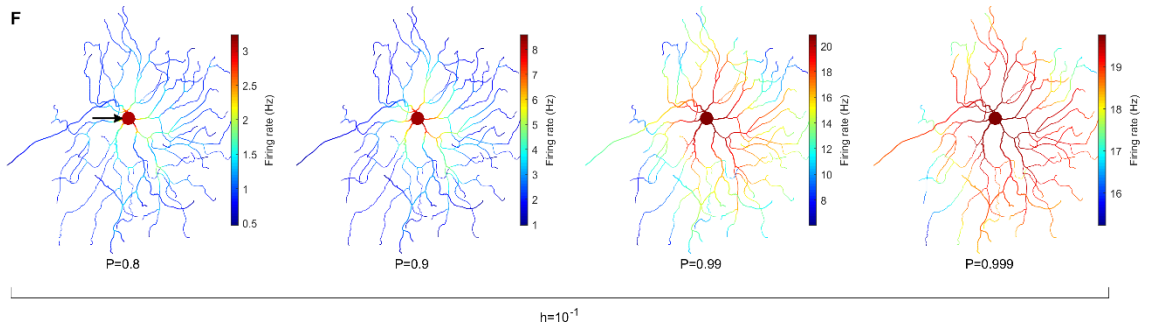
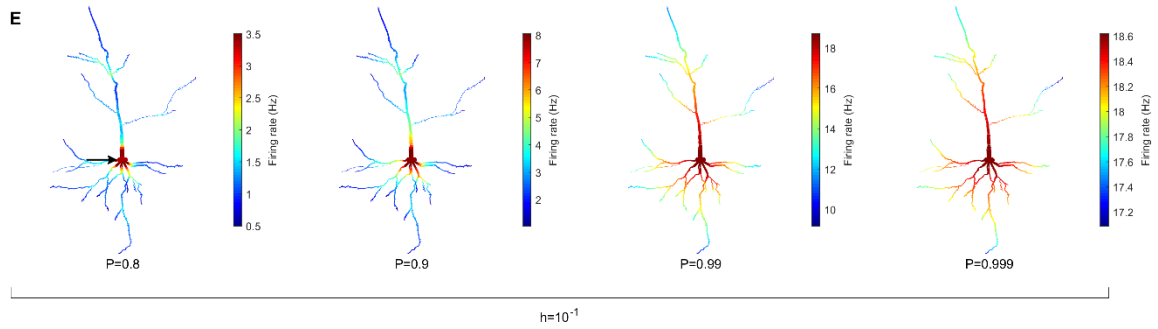
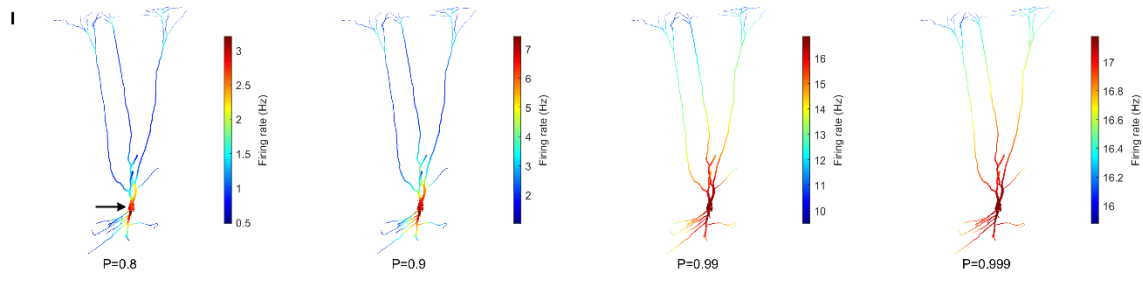


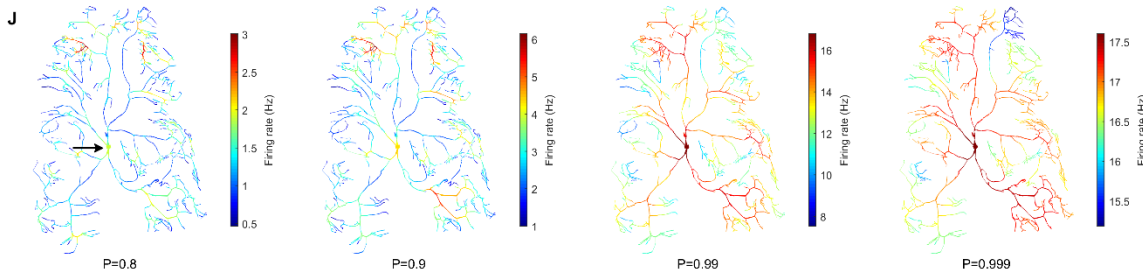
Figure S1. Firing rate heat maps of all neurons varied over P. The activation rate is held constant, $h = 0.1$ Hz, and the firing rates were averaged over five trials. The soma is marked by the arrow (left panel). Note the different color bars.



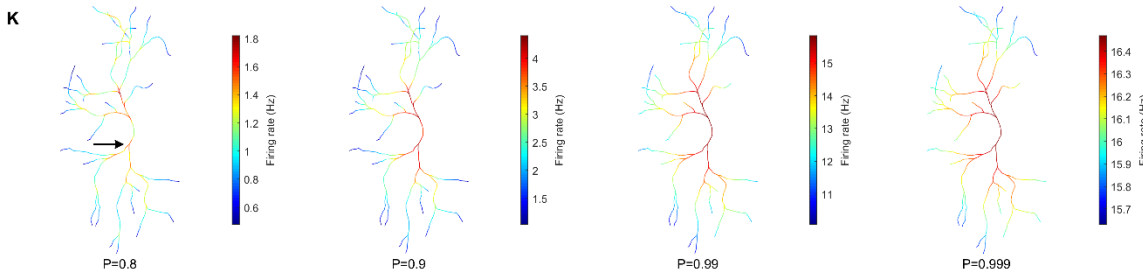




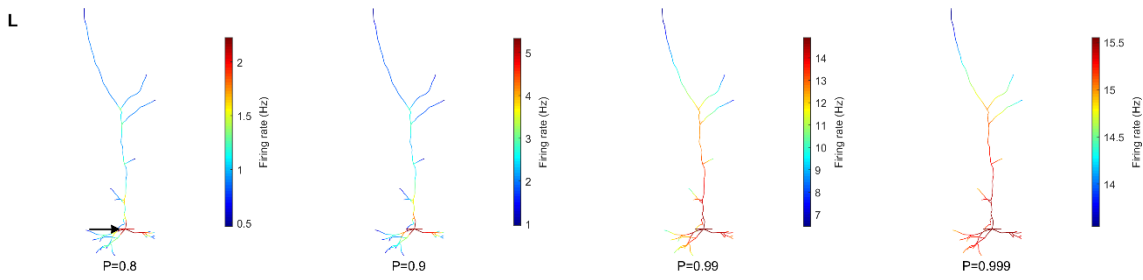
$h=10^{-1}$



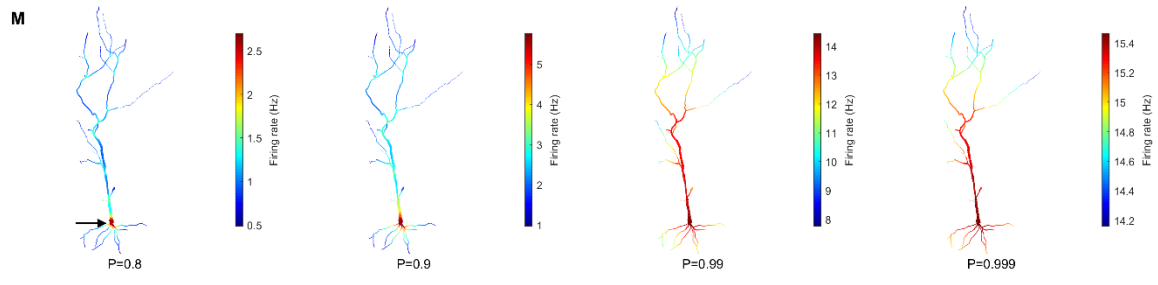
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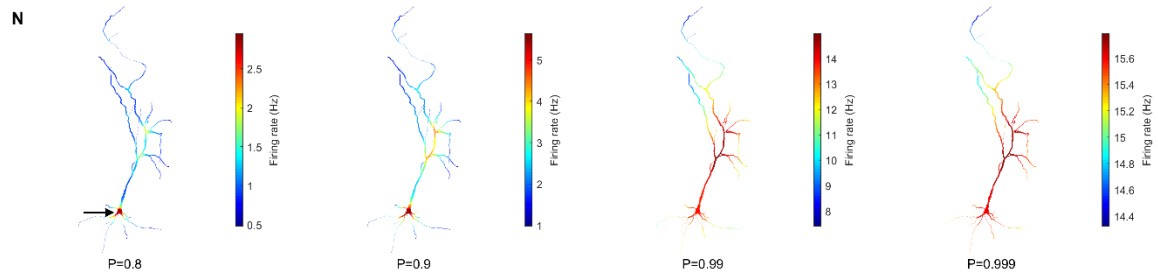
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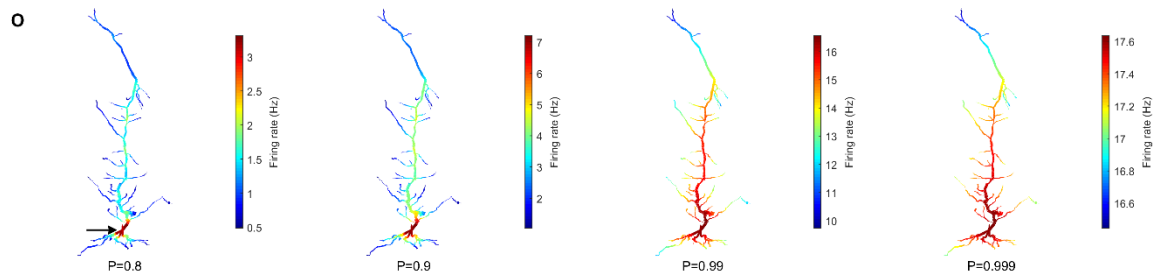
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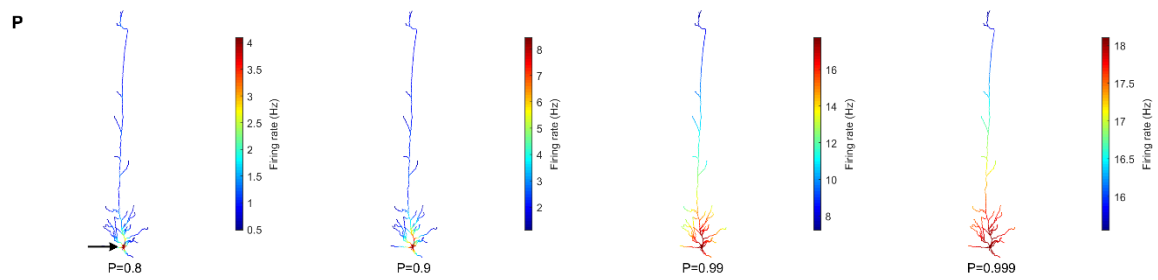
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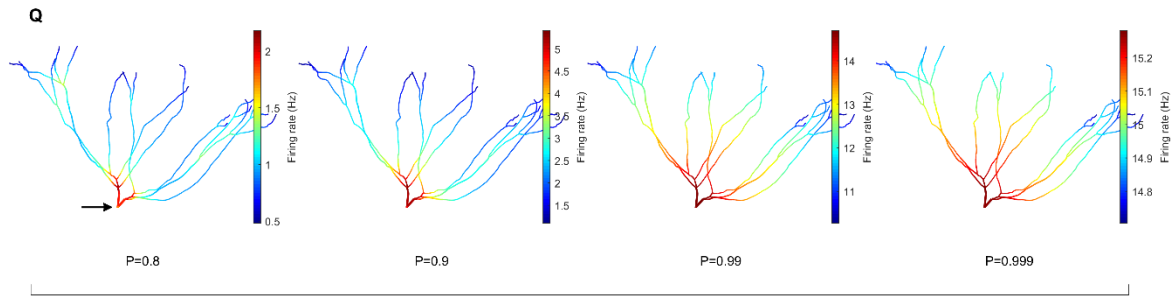
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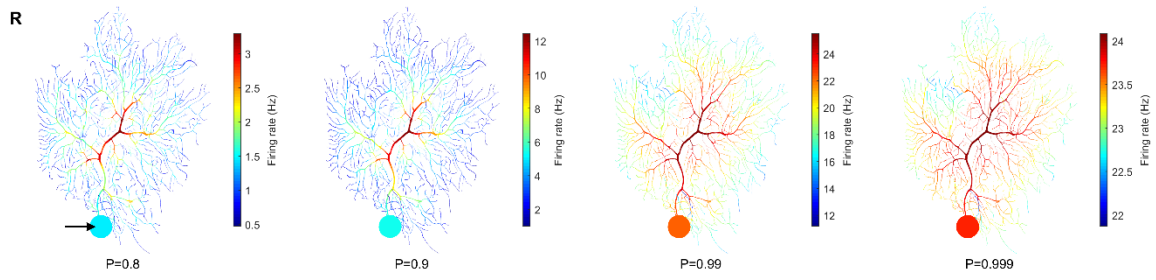
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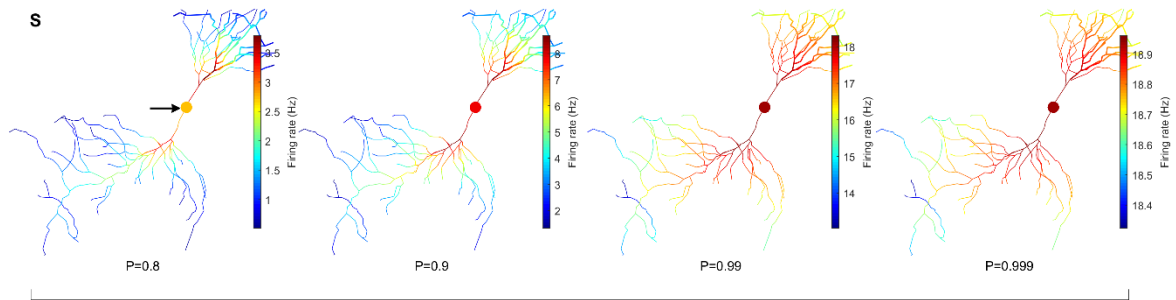
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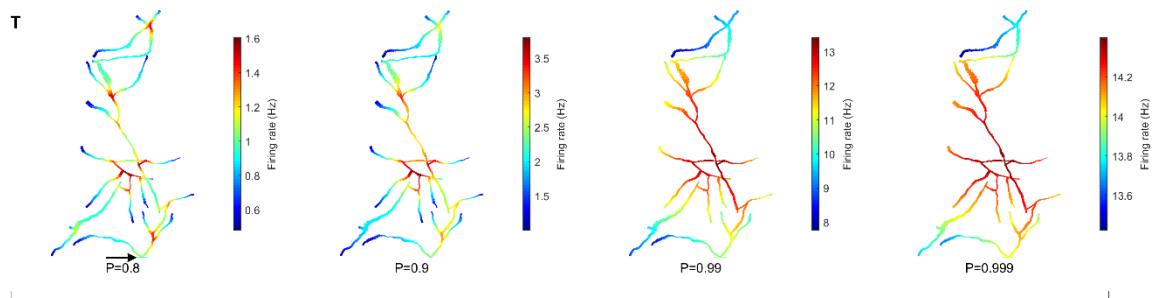
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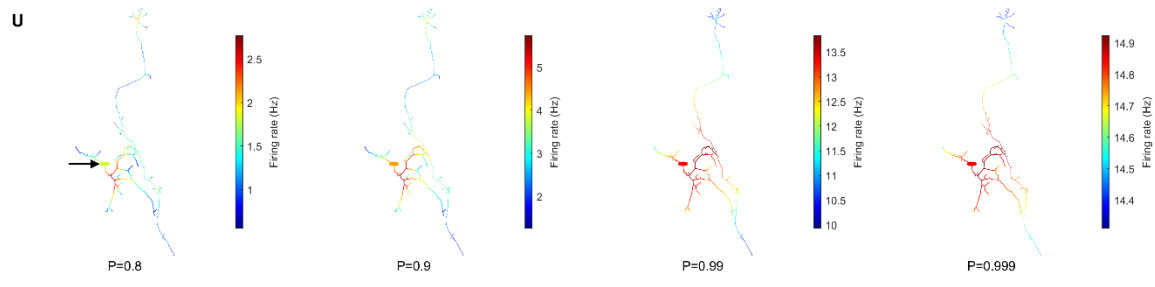
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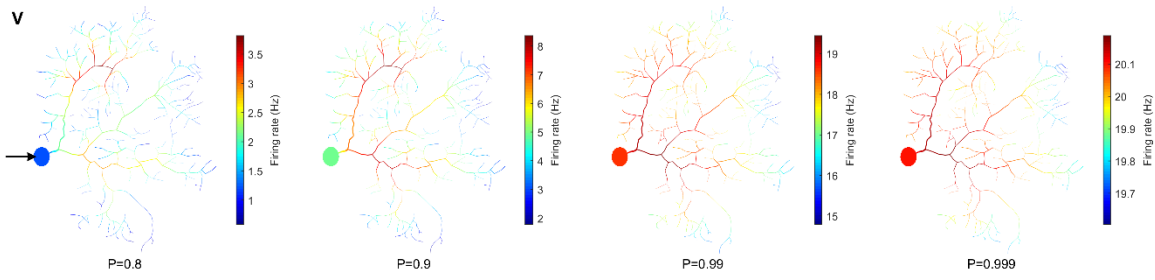
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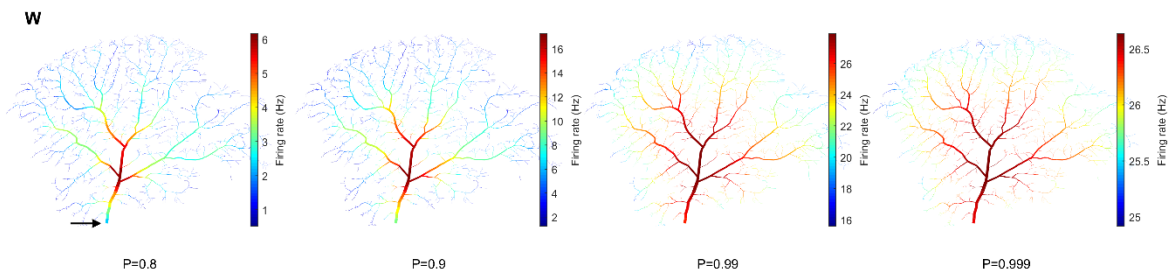
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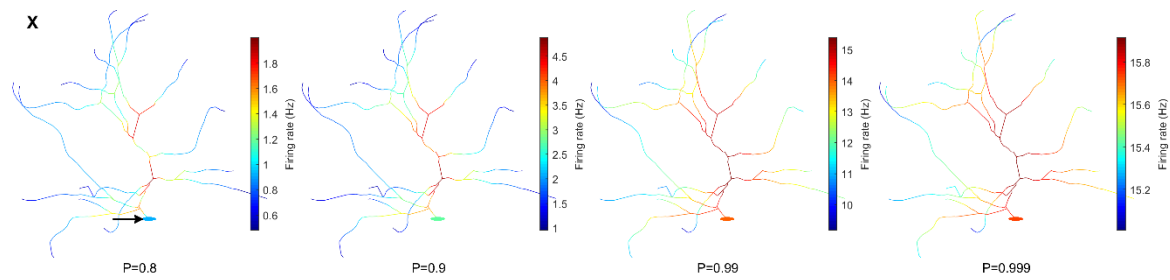
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$h=10^{-1}$



$h=10^{-1}$



$h=10^{-1}$

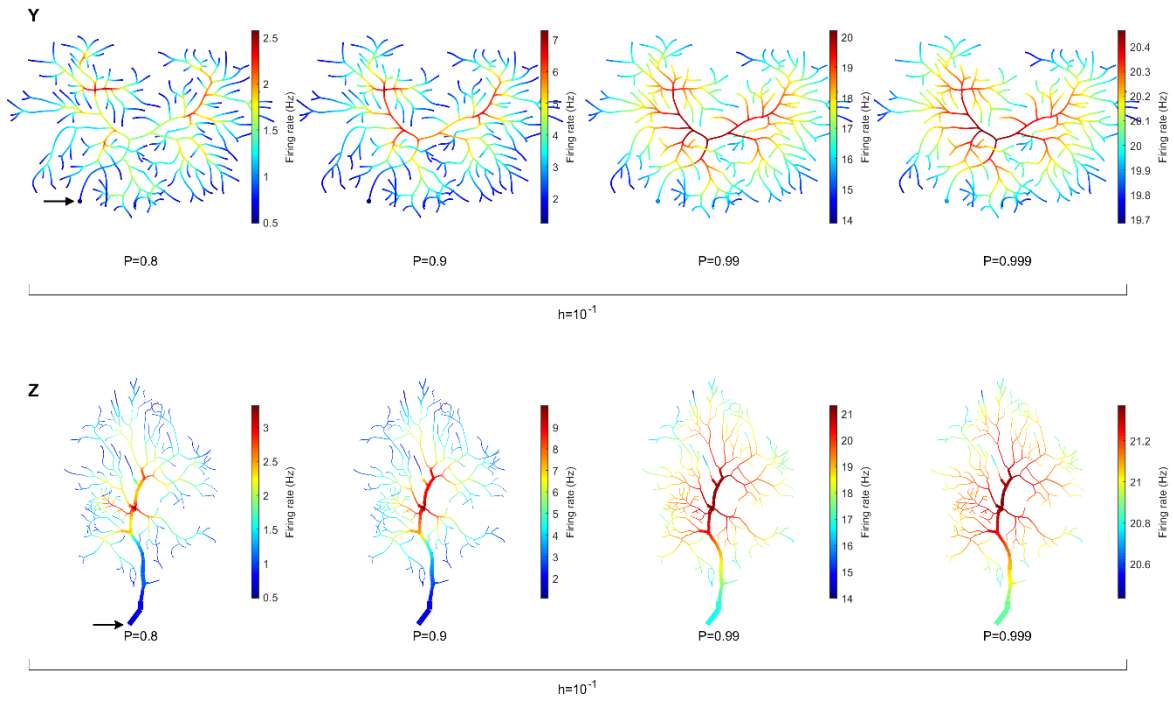
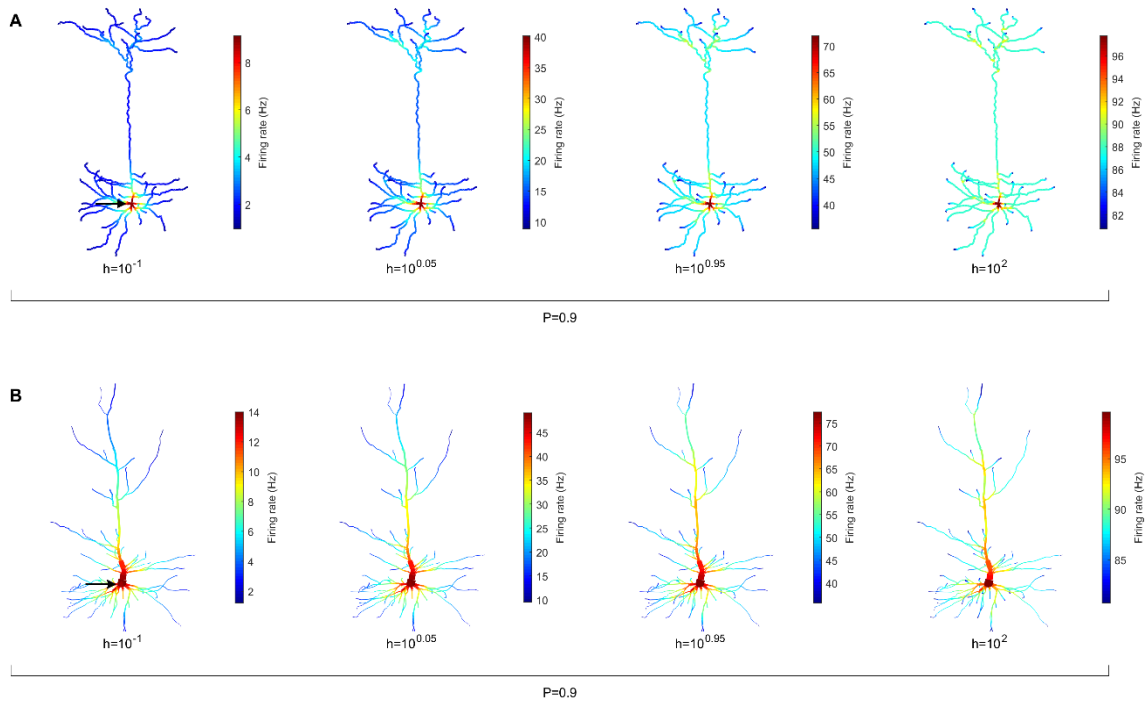
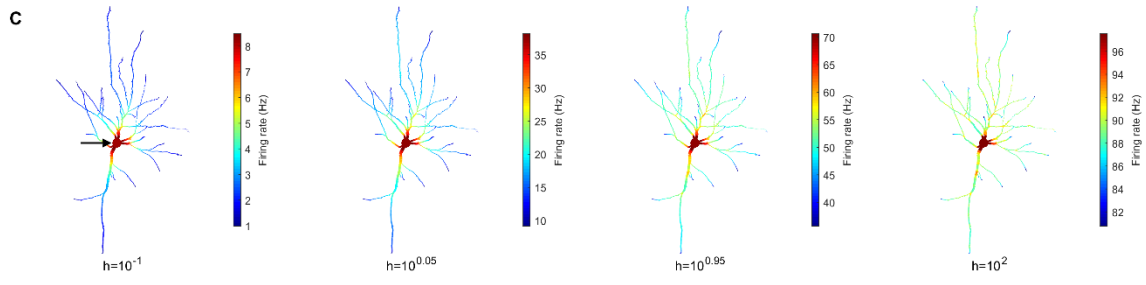
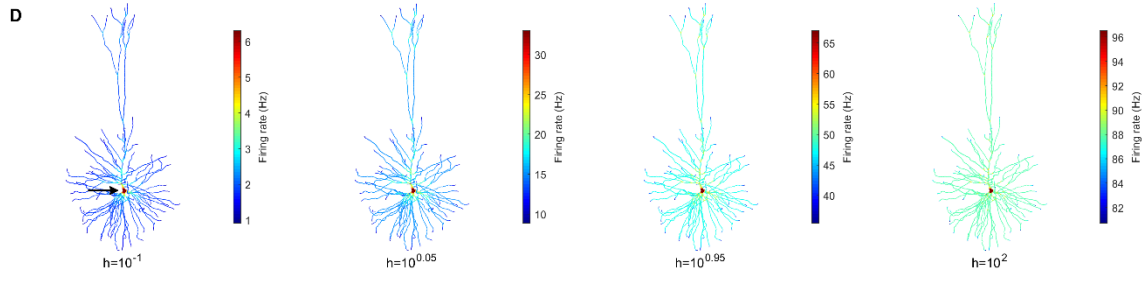


Figure S2. Firing rate heat maps of all neurons varied over h . The transmission probability is held constant, $P = 0.9$, and the firing rates were averaged over five trials. The soma is marked by the arrow. Note the different color bars.

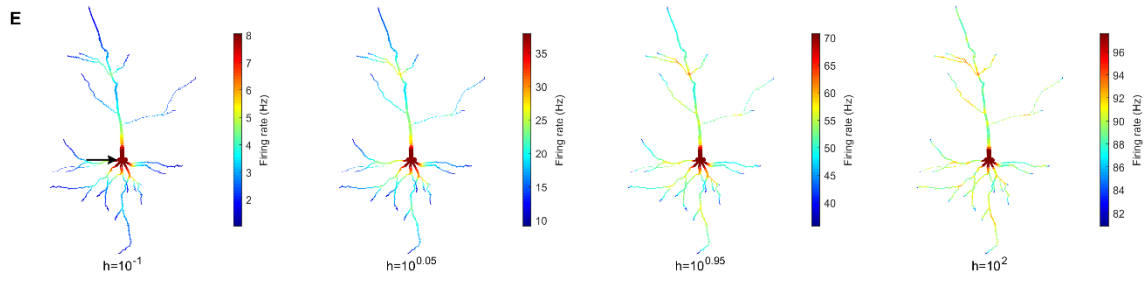




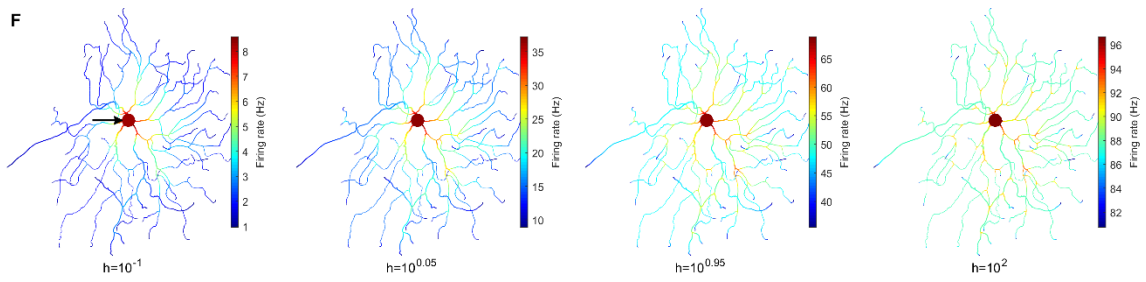
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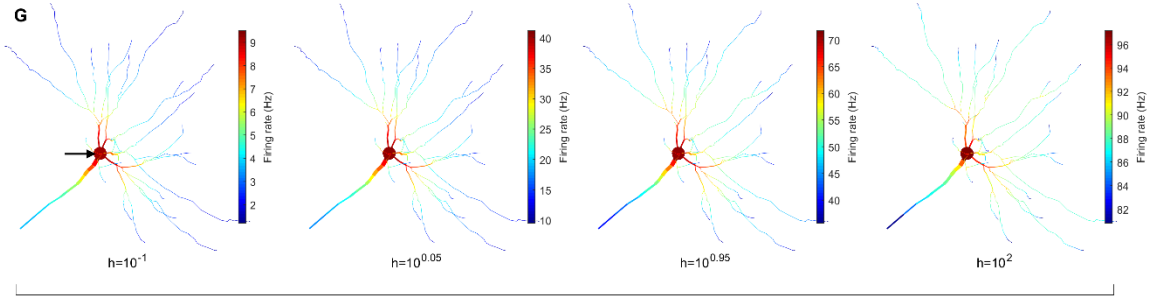
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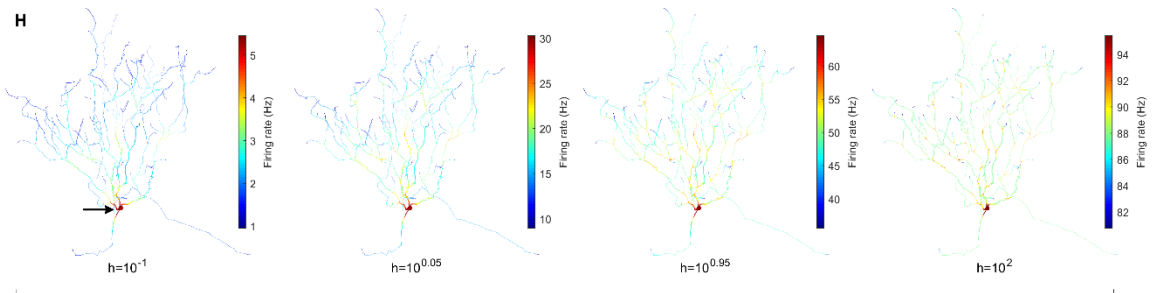
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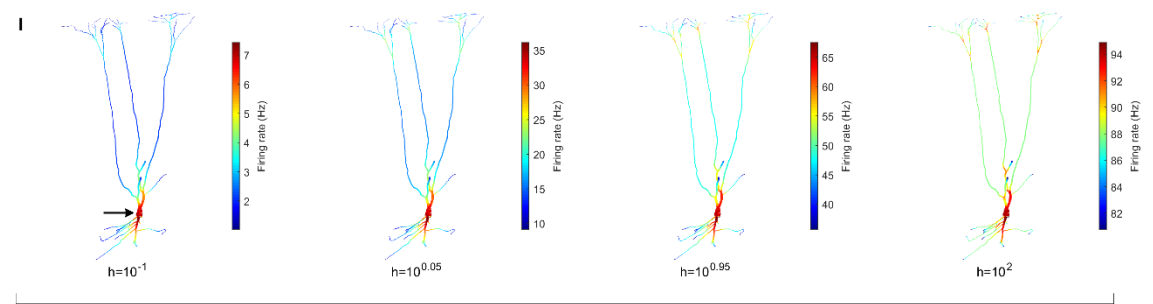
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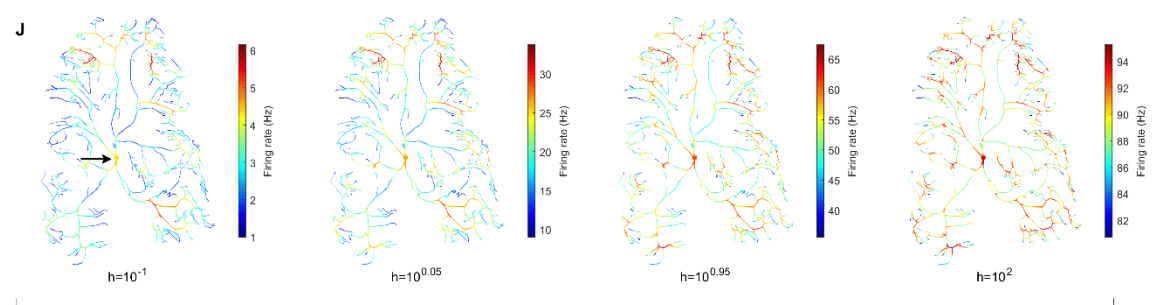
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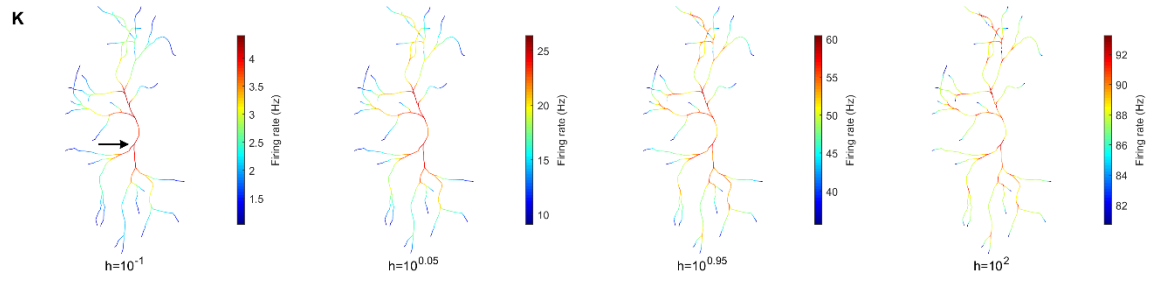
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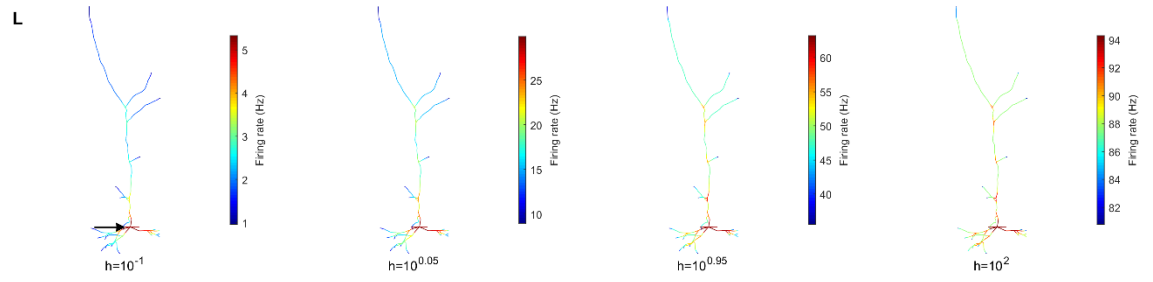
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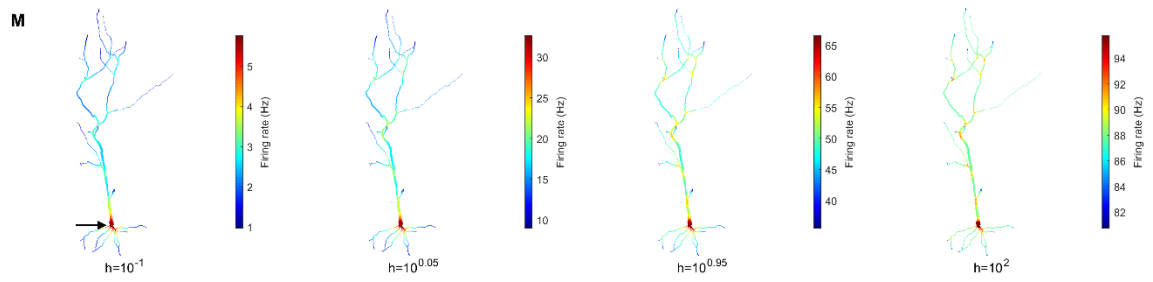
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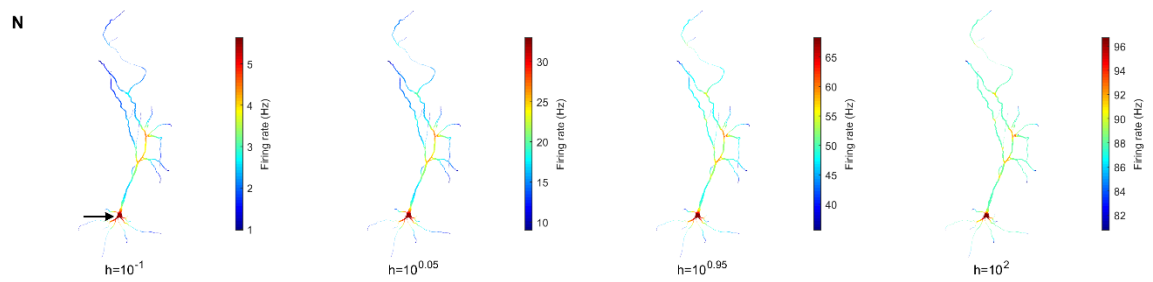
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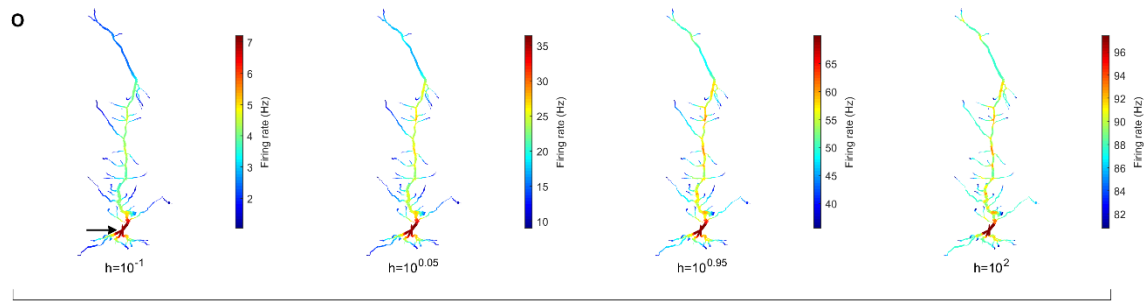
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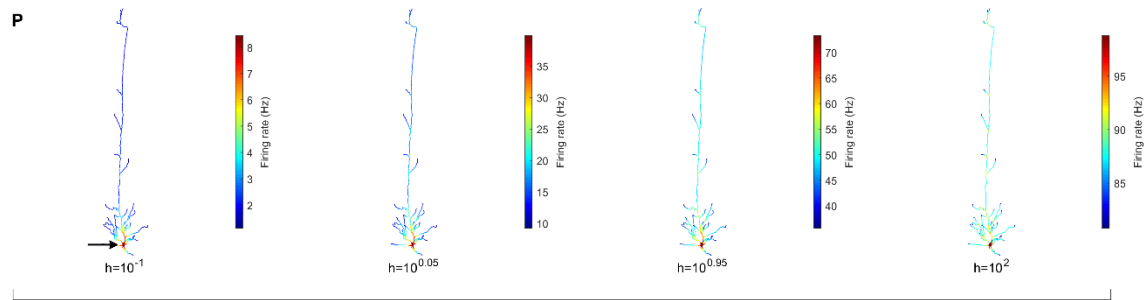
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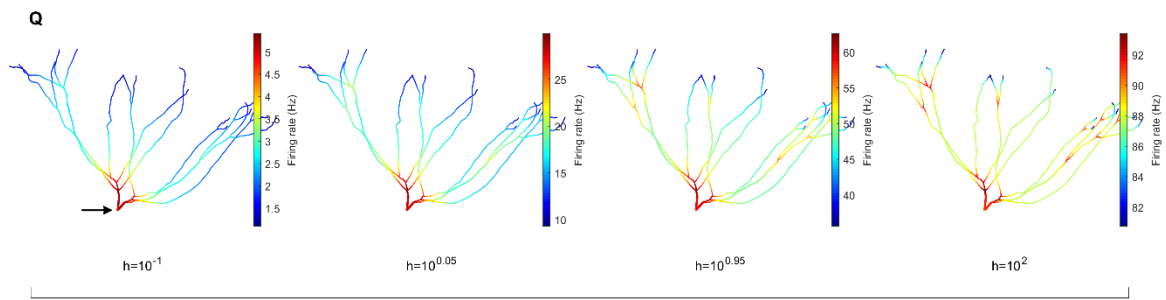
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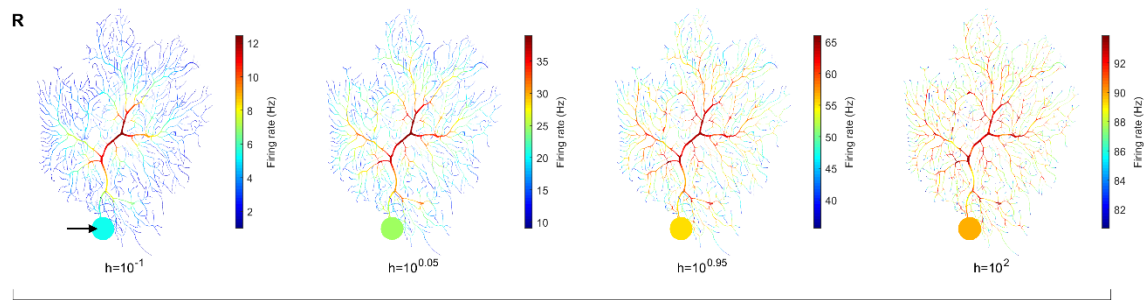
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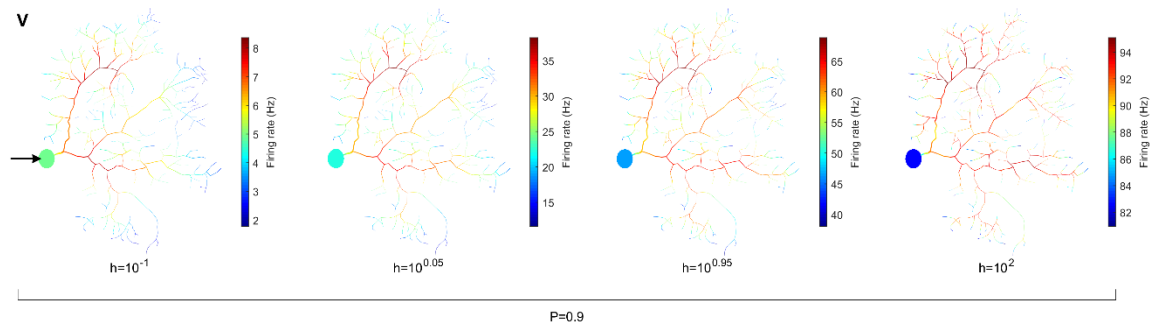
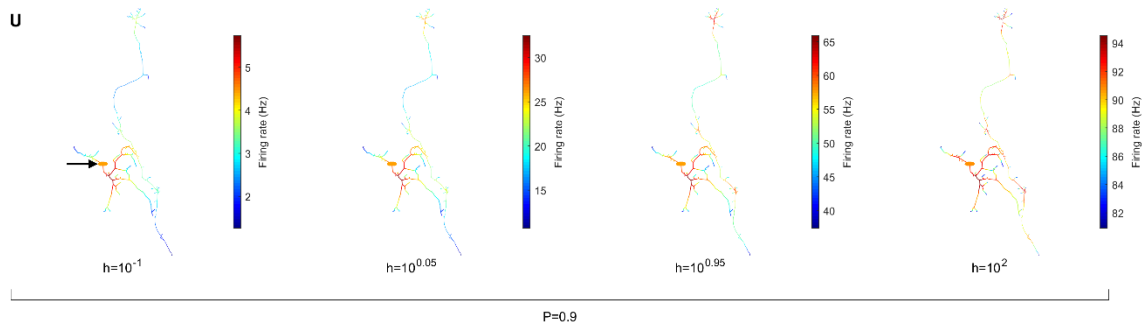
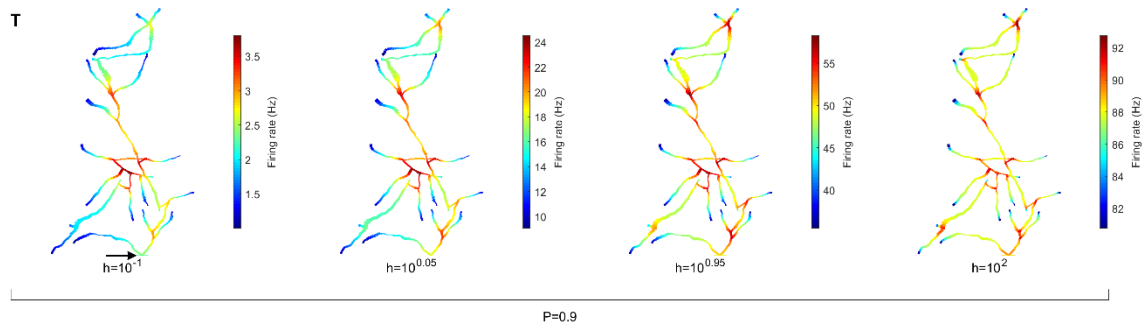
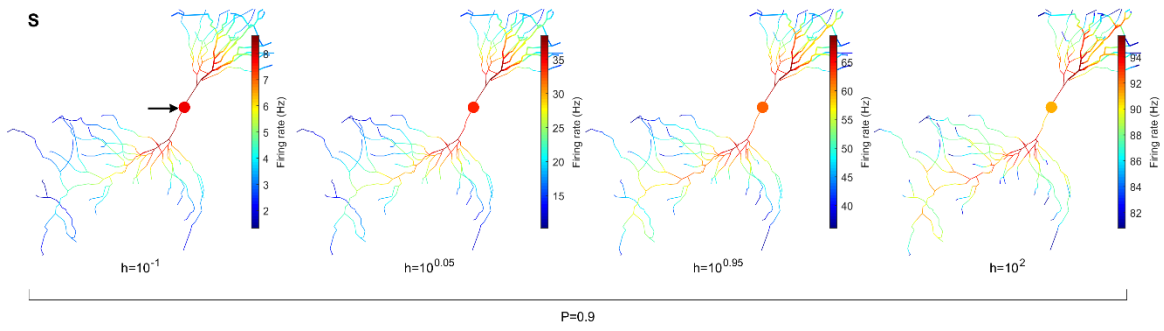
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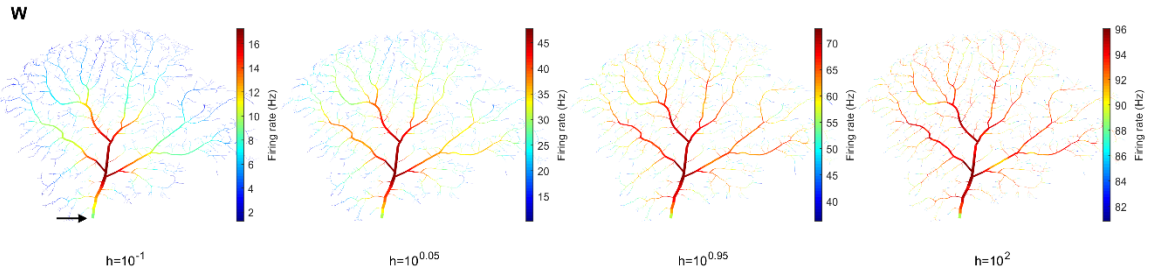


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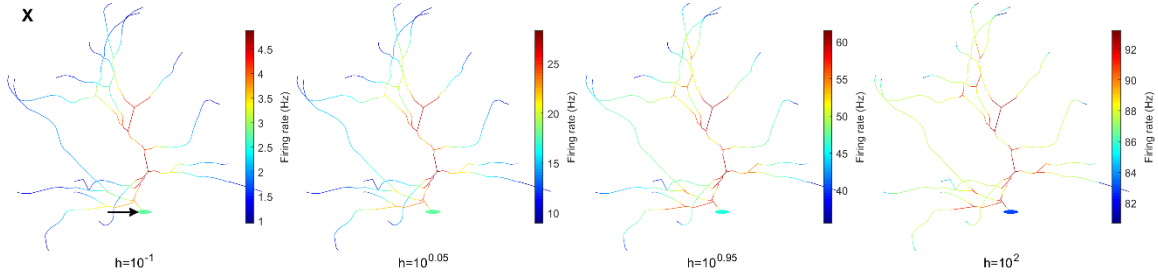


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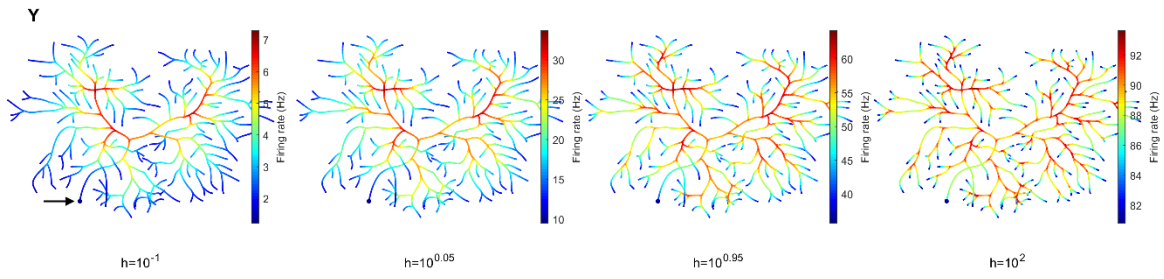




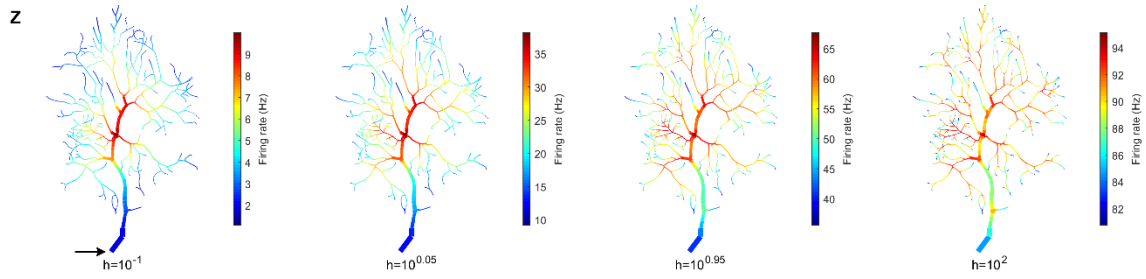
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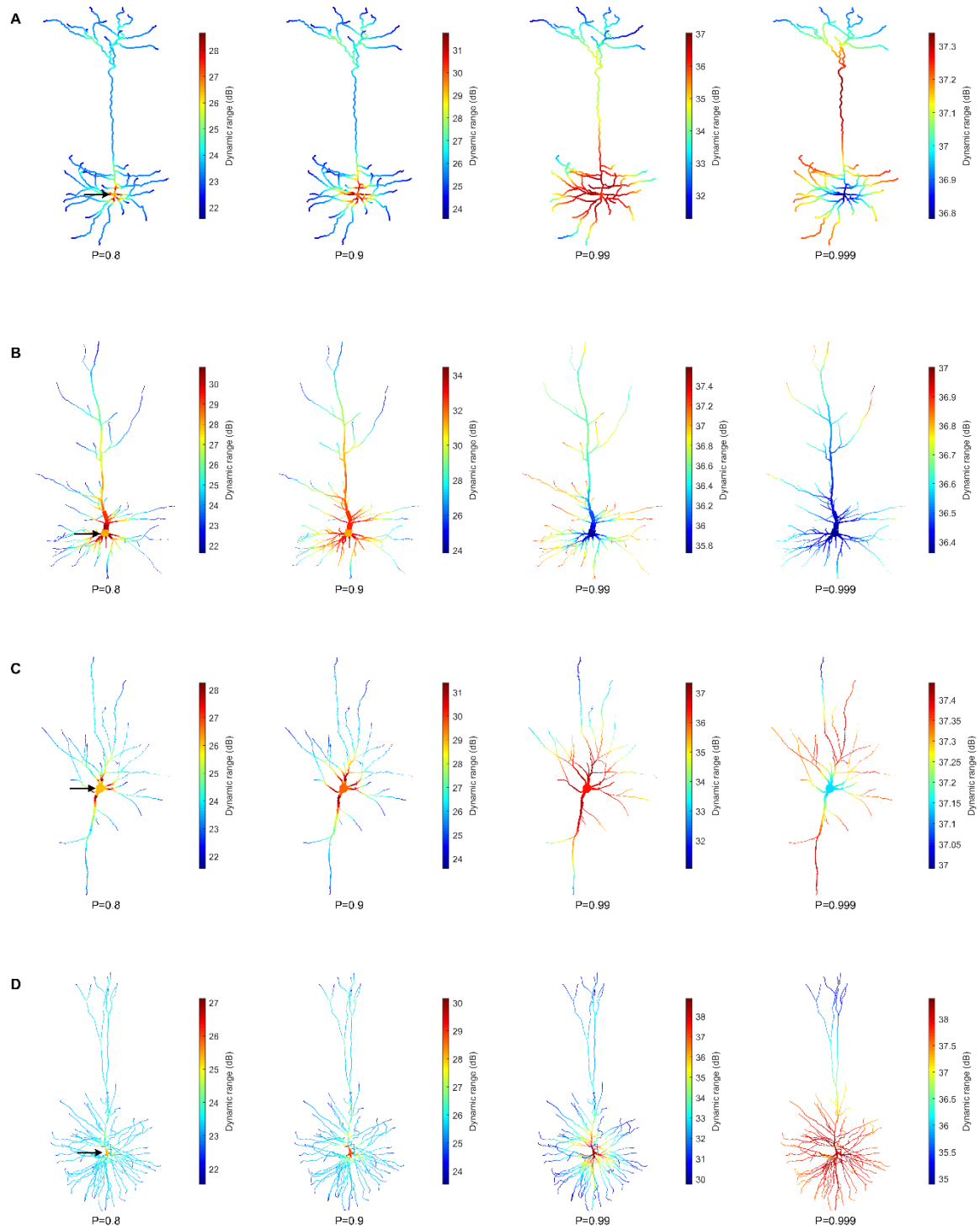


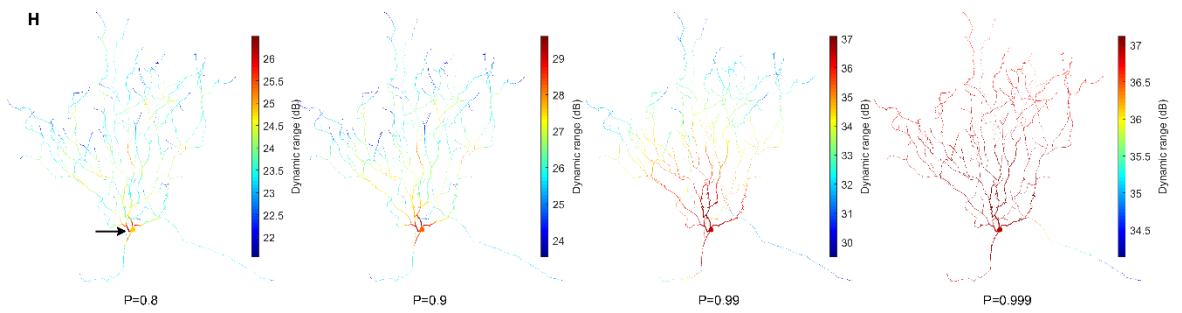
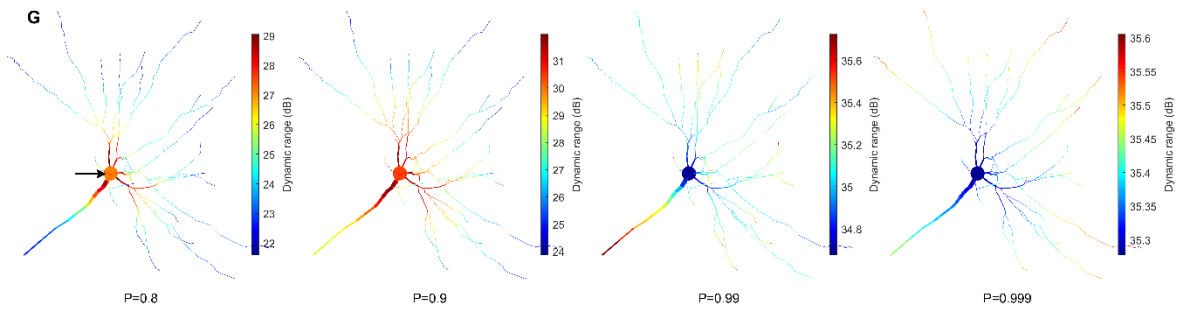
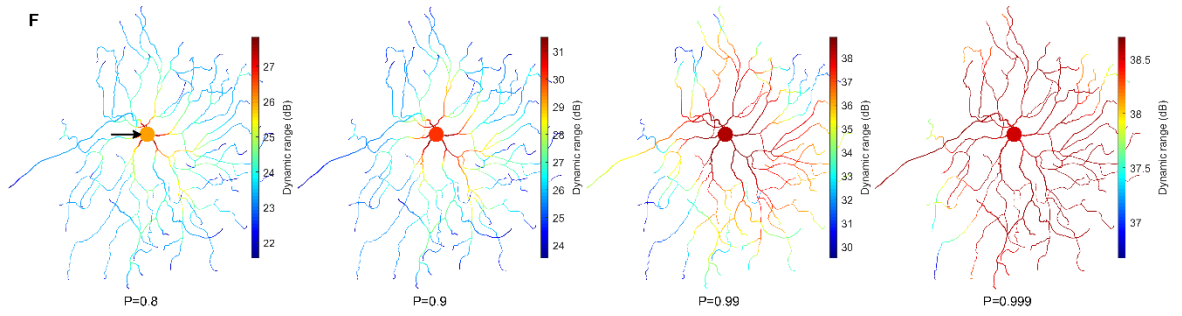
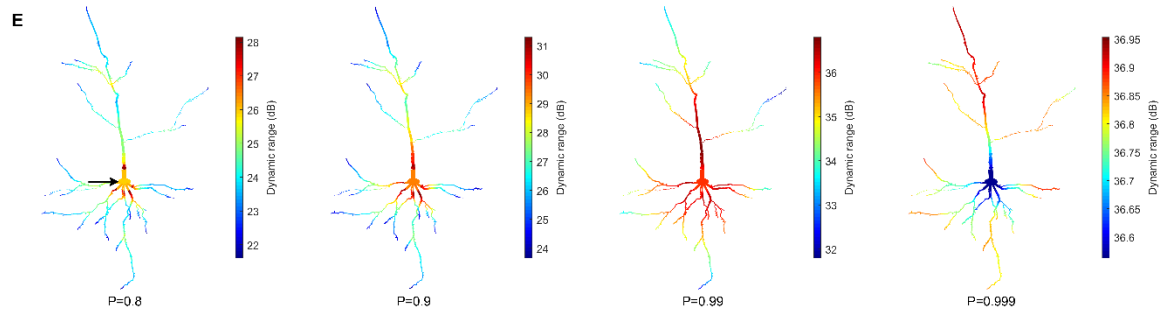
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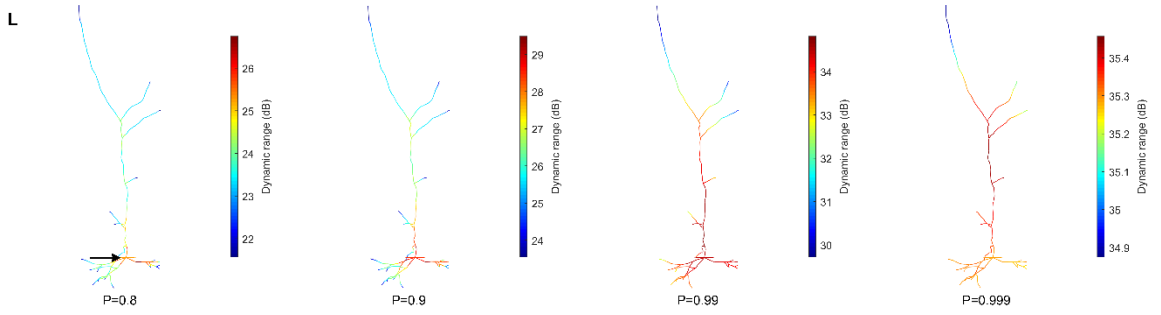
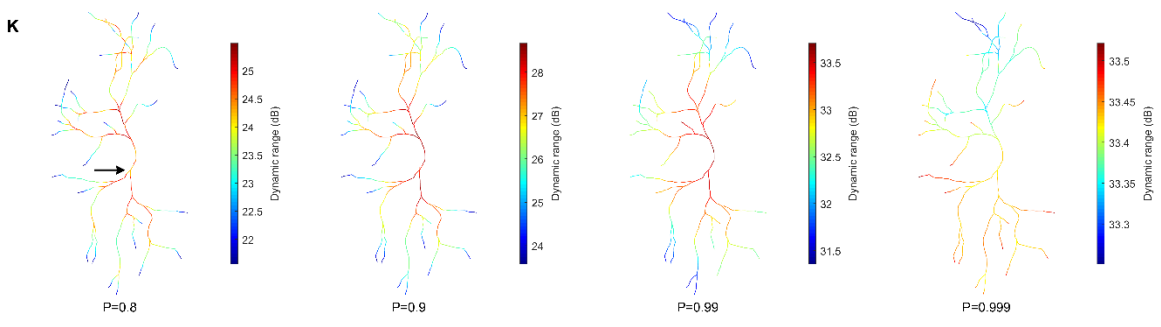
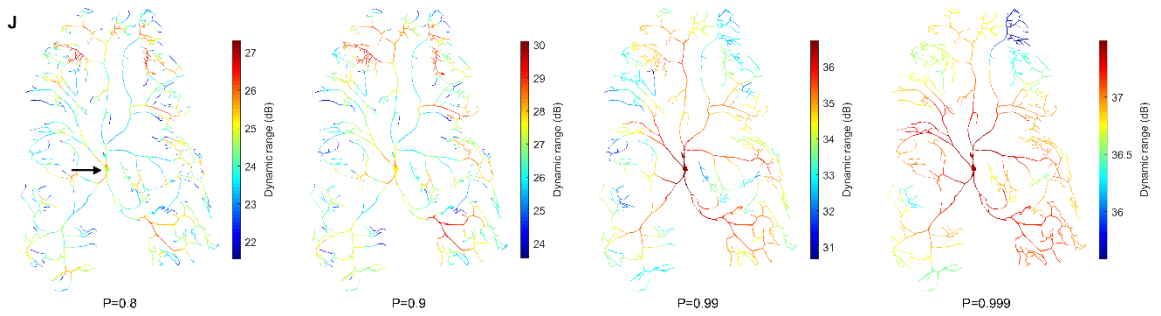
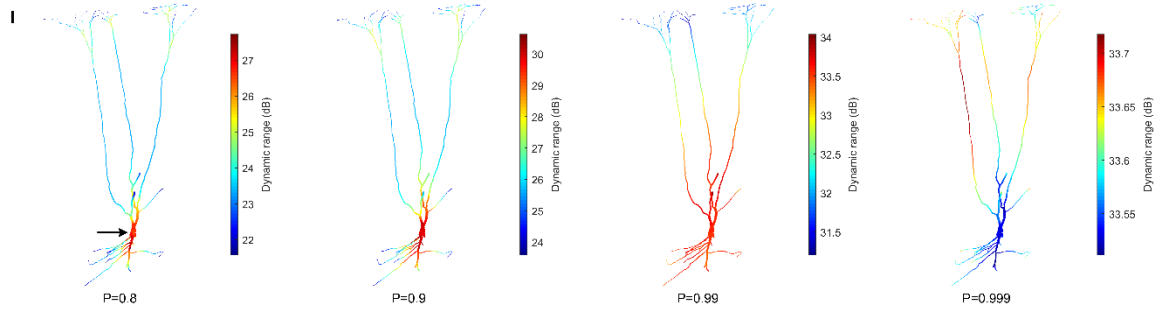


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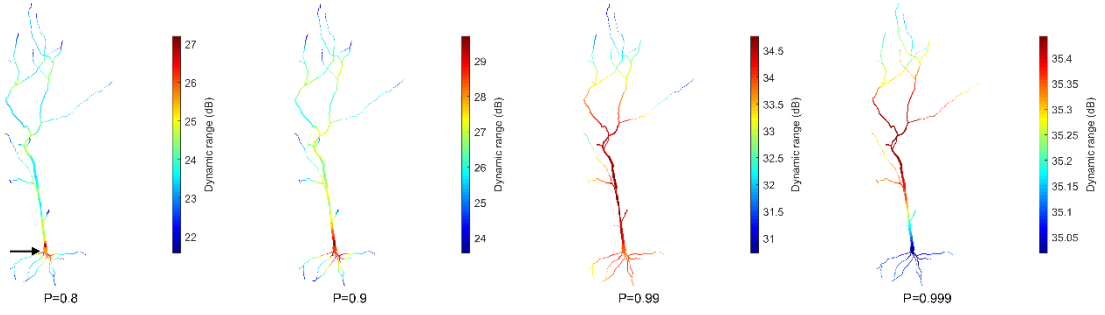
Figure S3. Dynamic range heat maps of all neurons varied over P. Values were averaged over five trials. The soma is marked by the arrow. Note the different color bars.



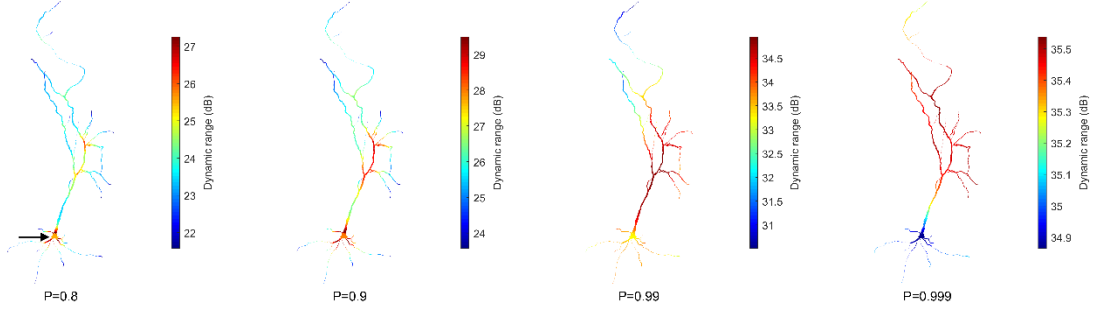




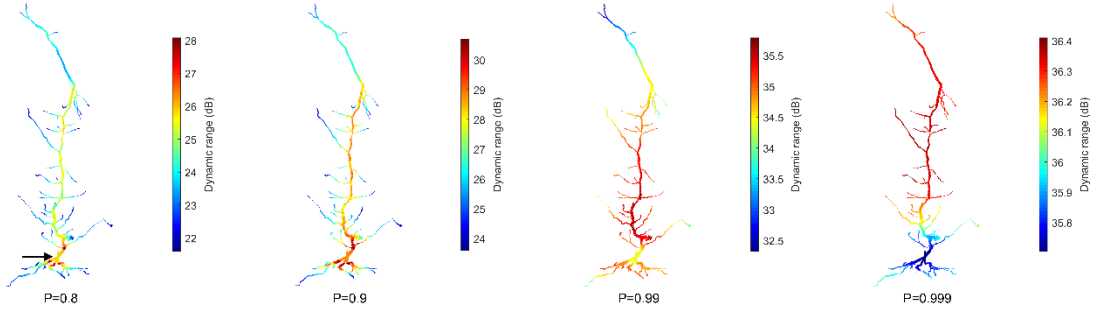
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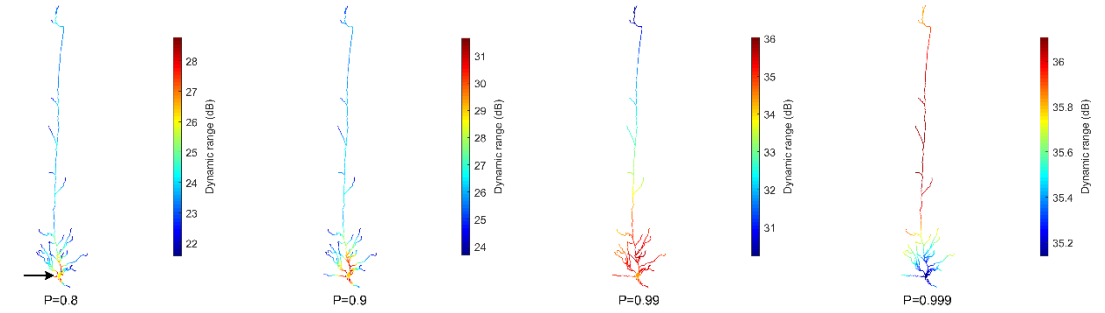
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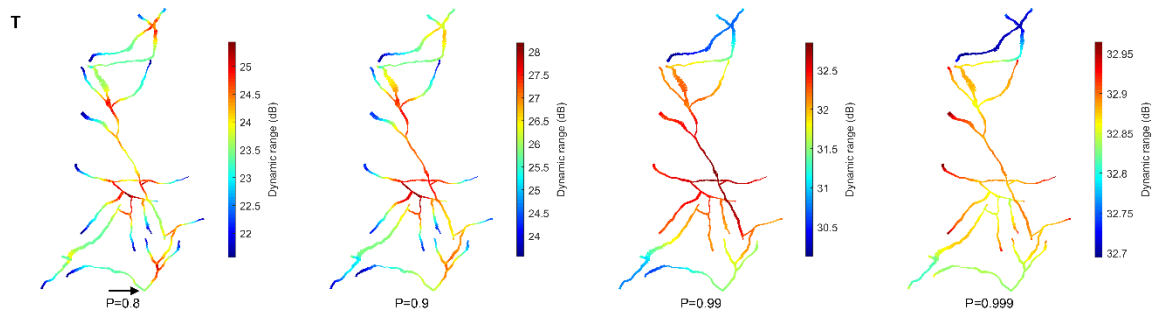
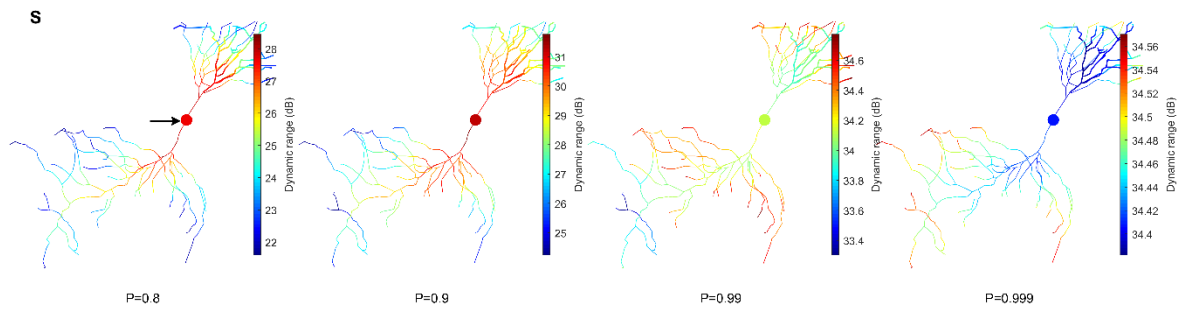
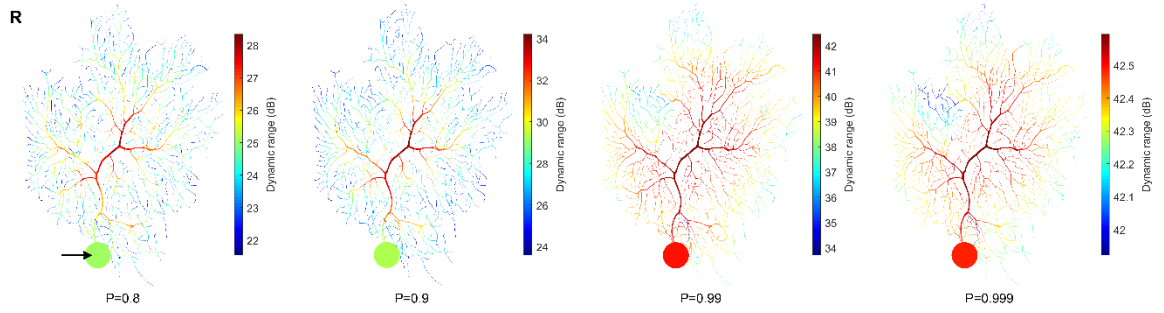
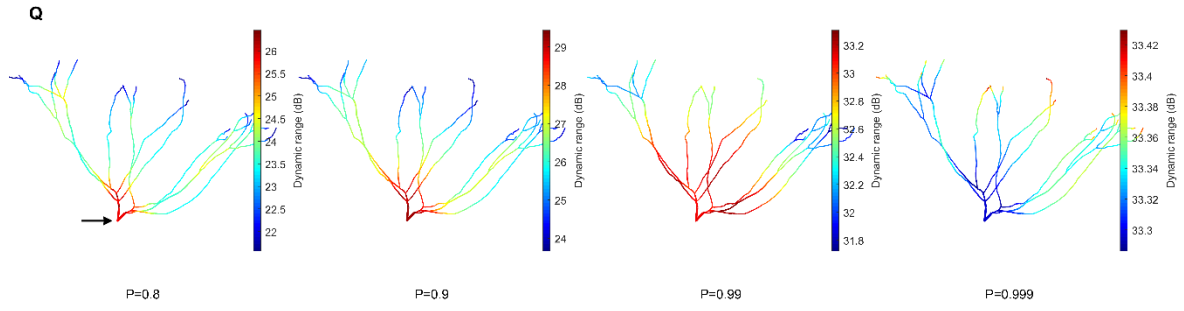


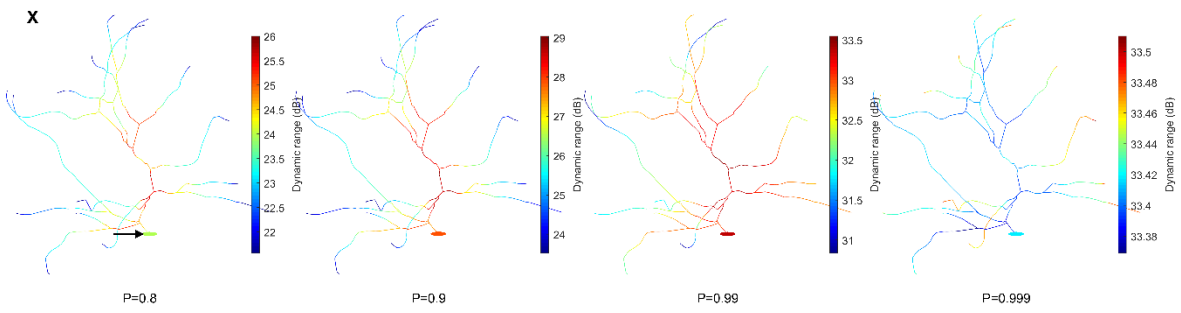
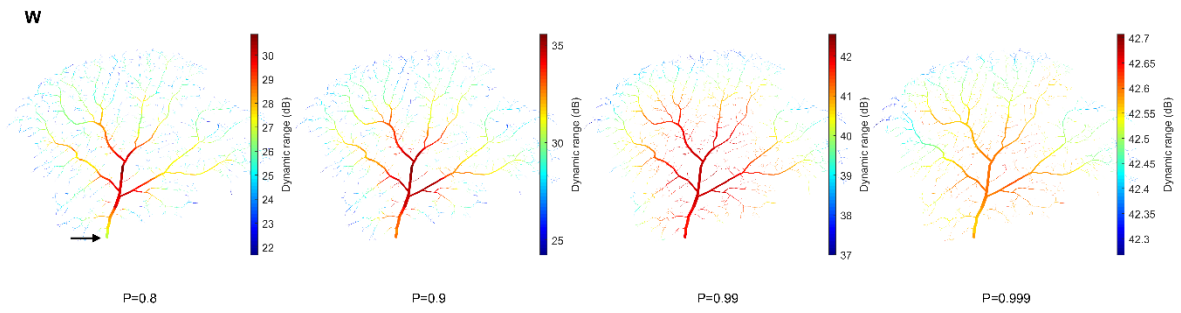
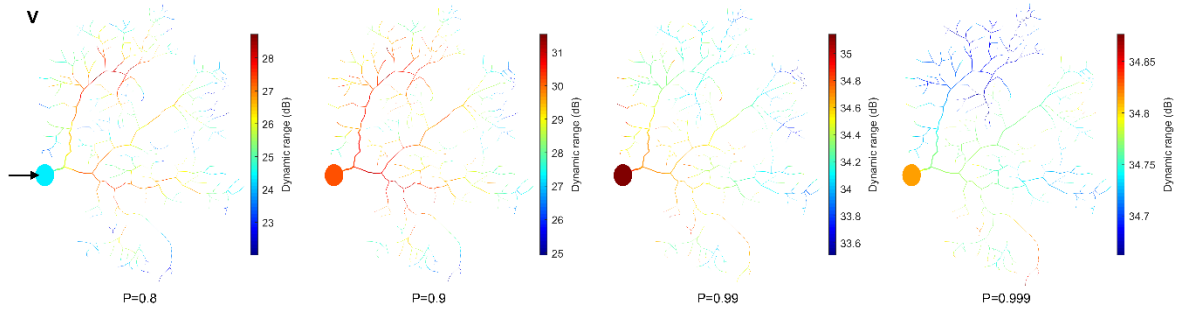
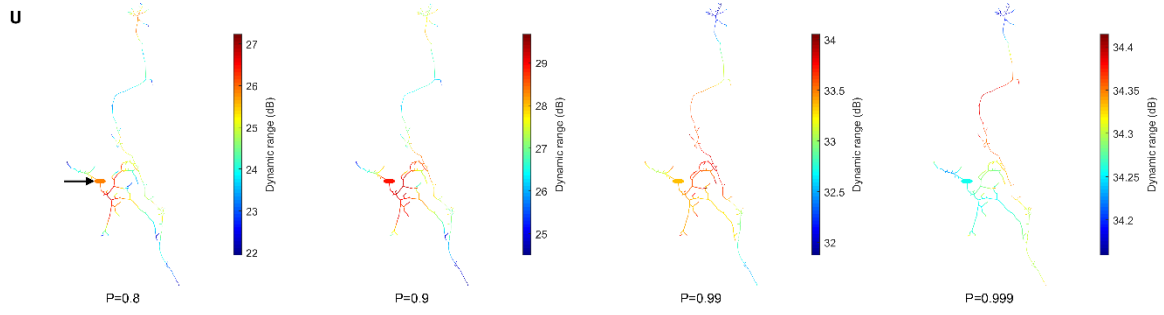
O



P







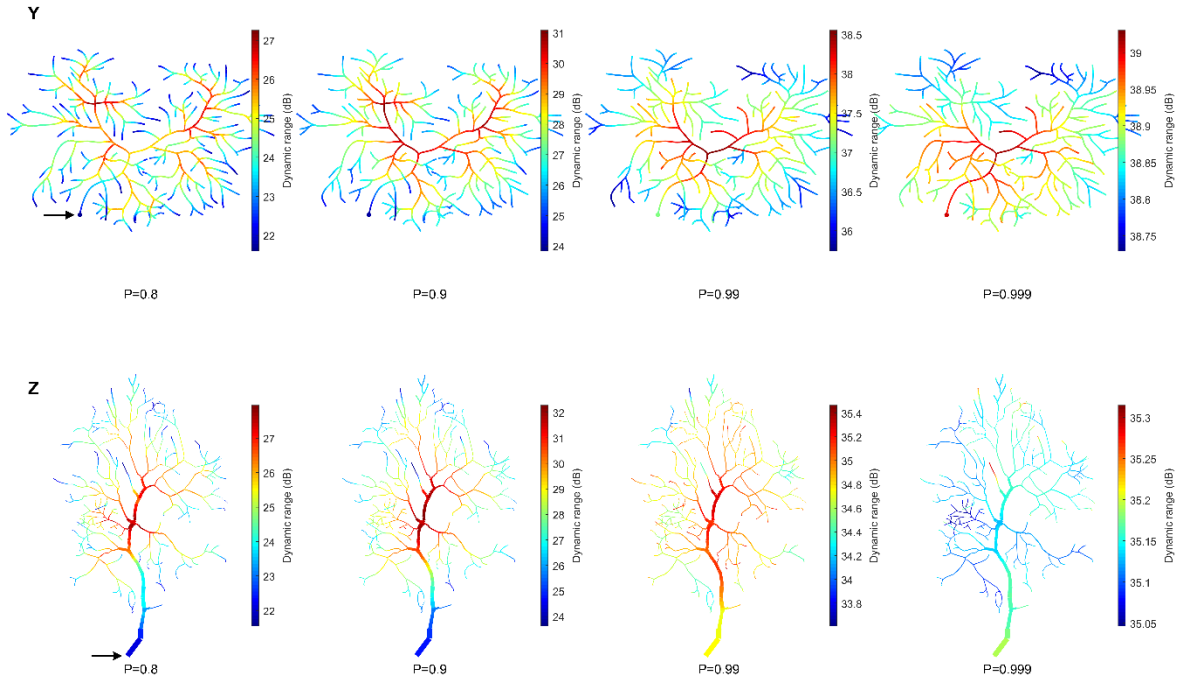
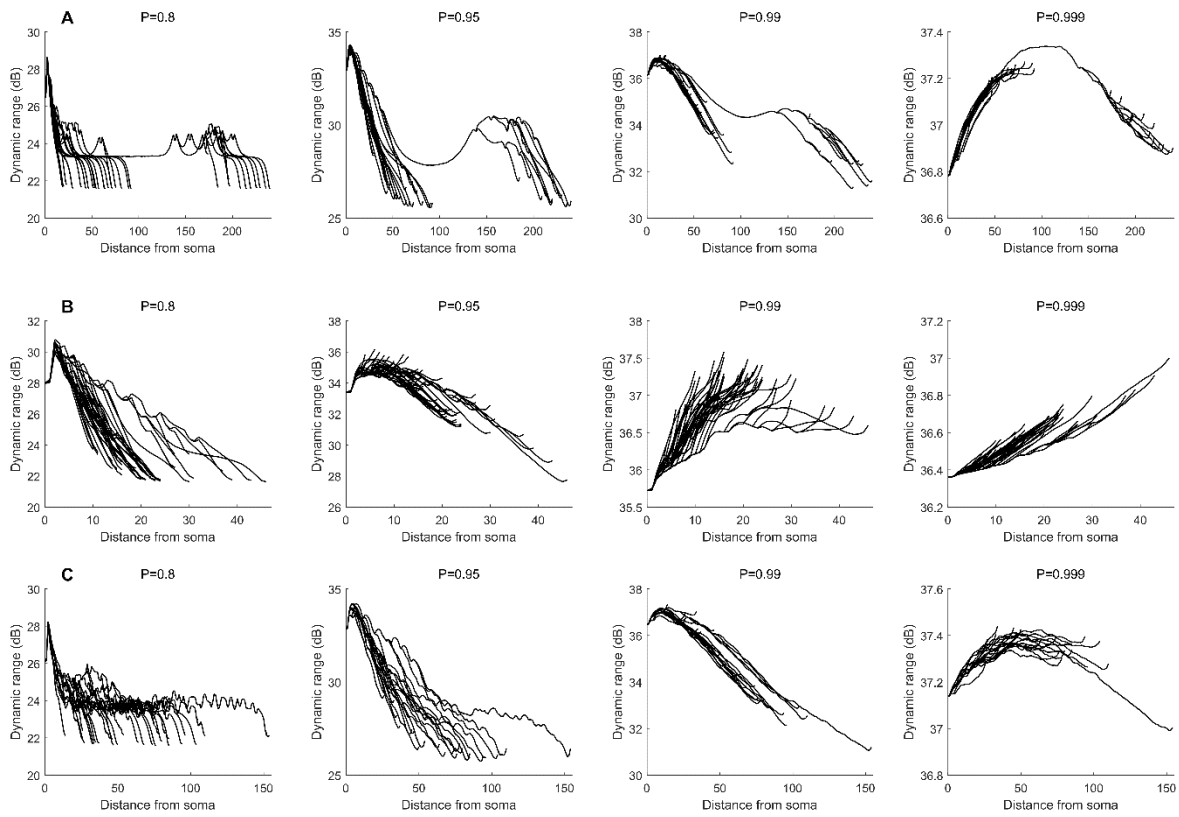
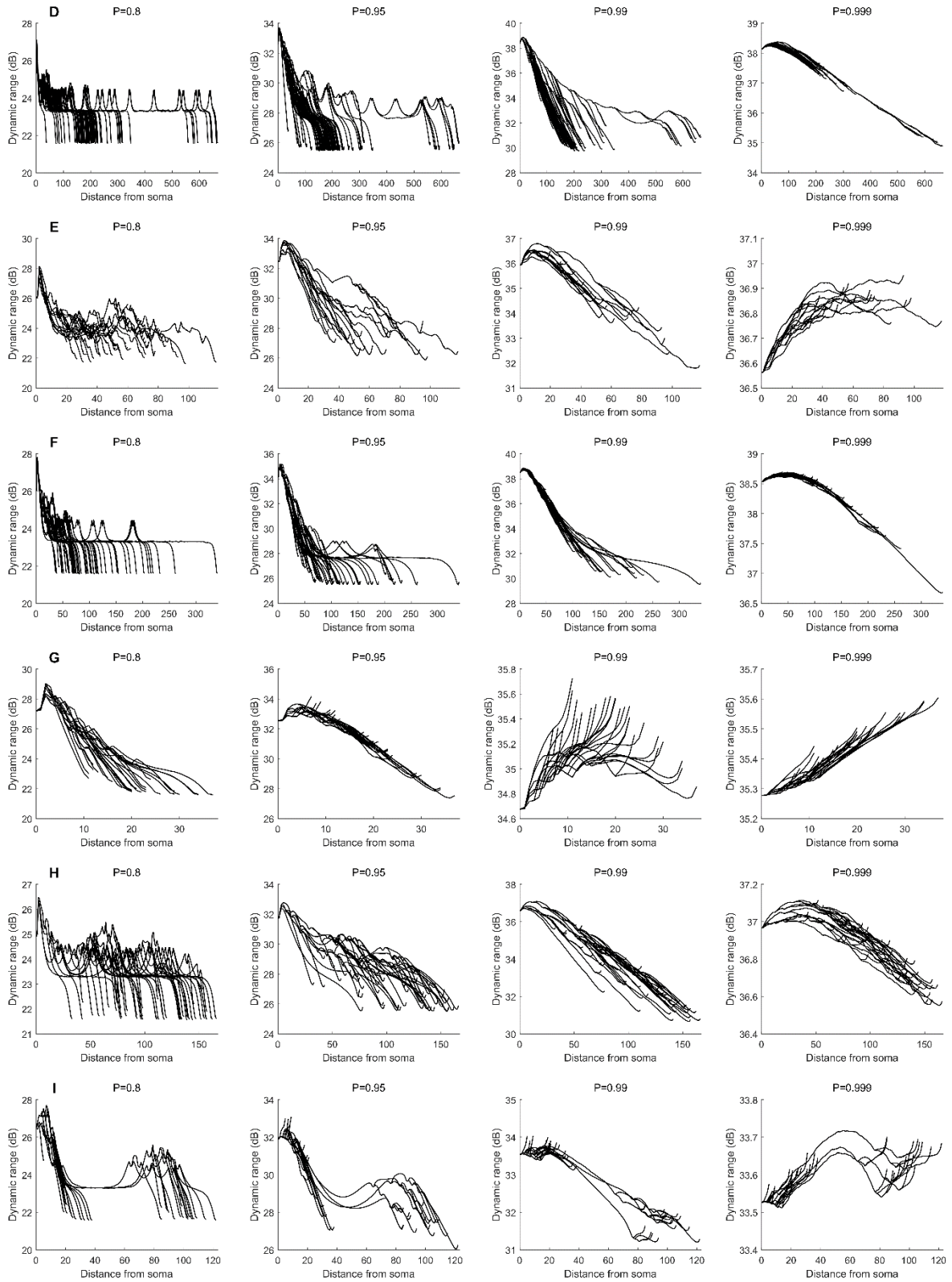
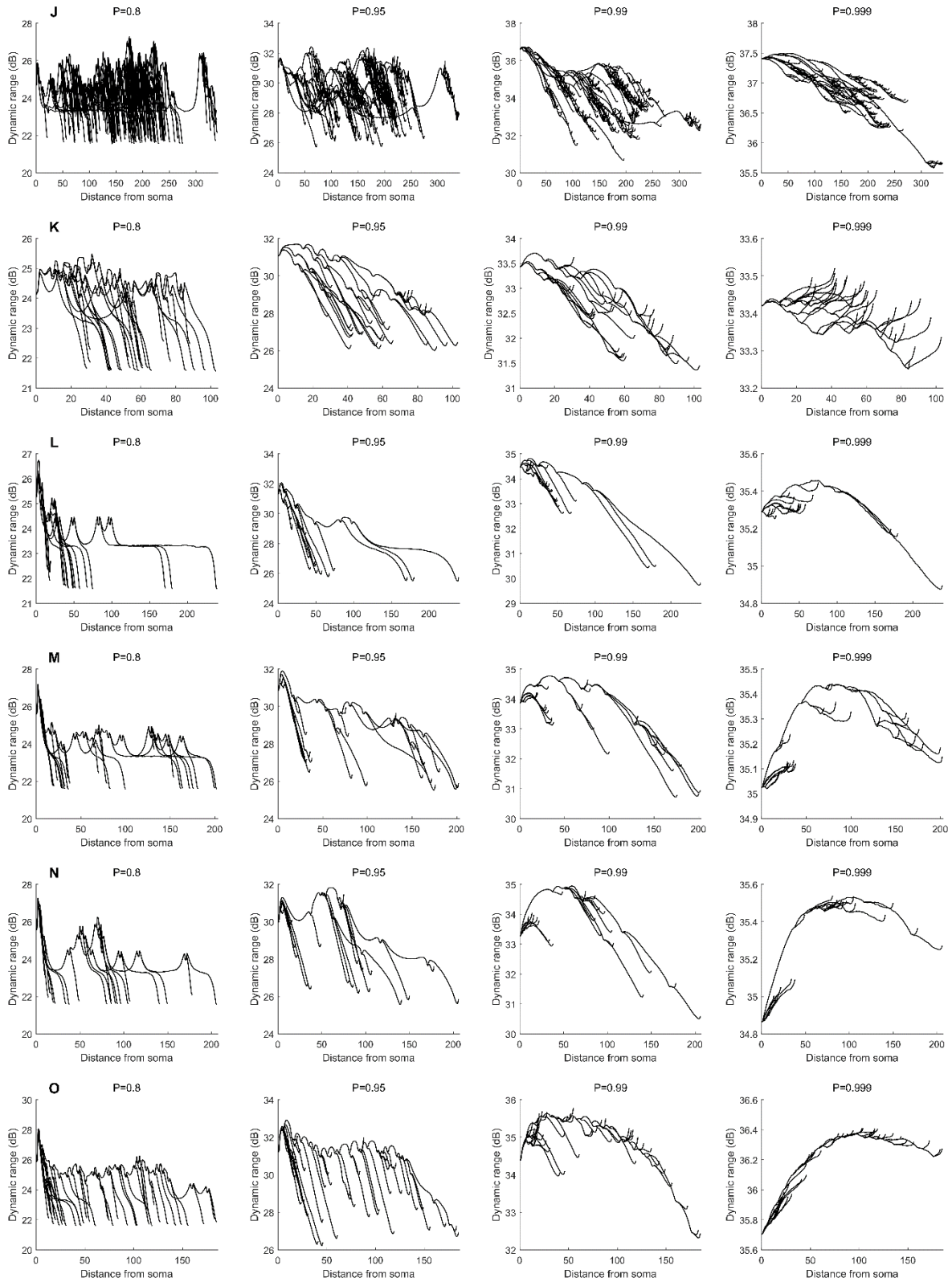
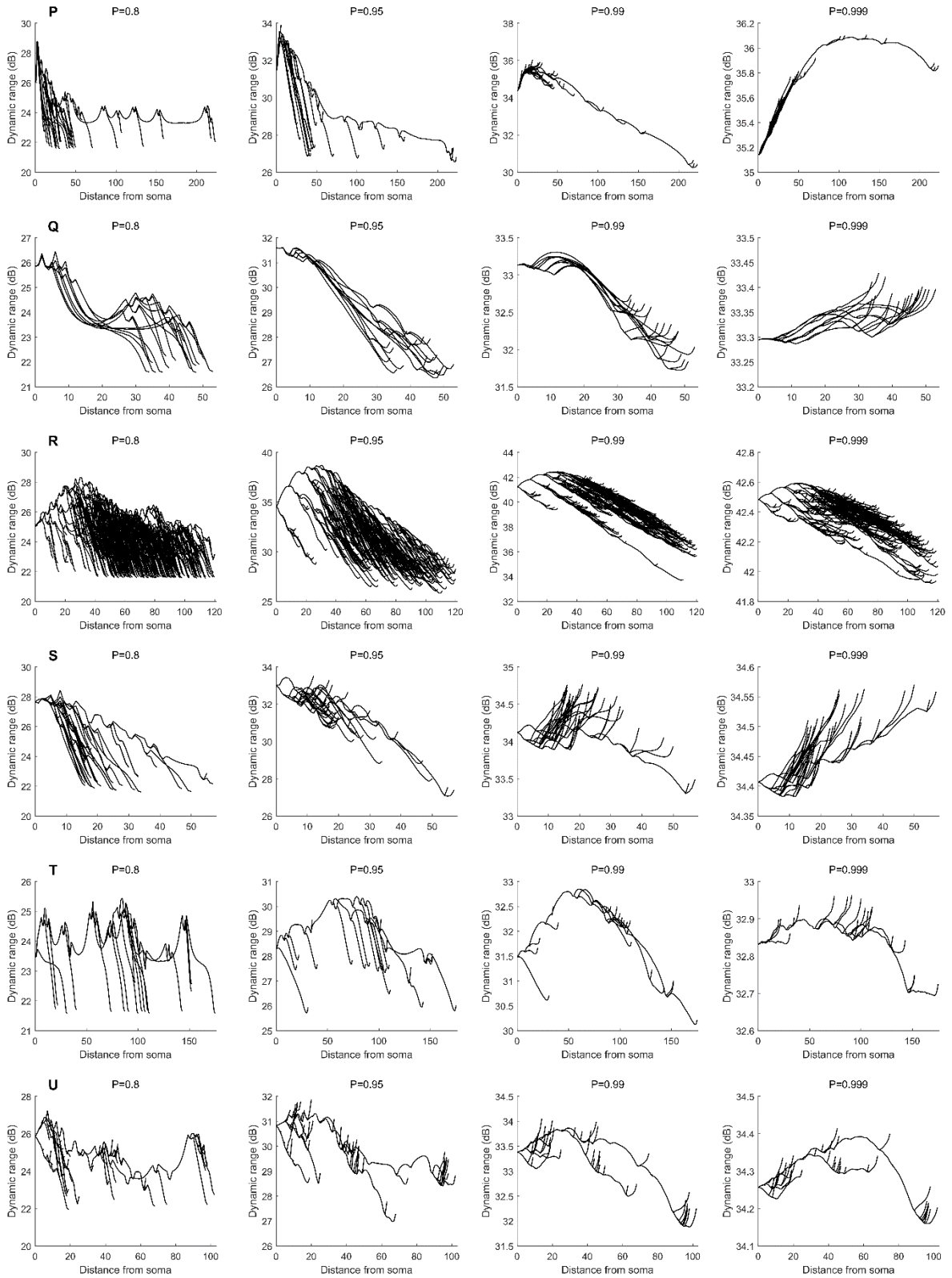


Figure S4. Compartmental dynamic range as a function of distance from soma for all neurons. See methods for description of the neurons.









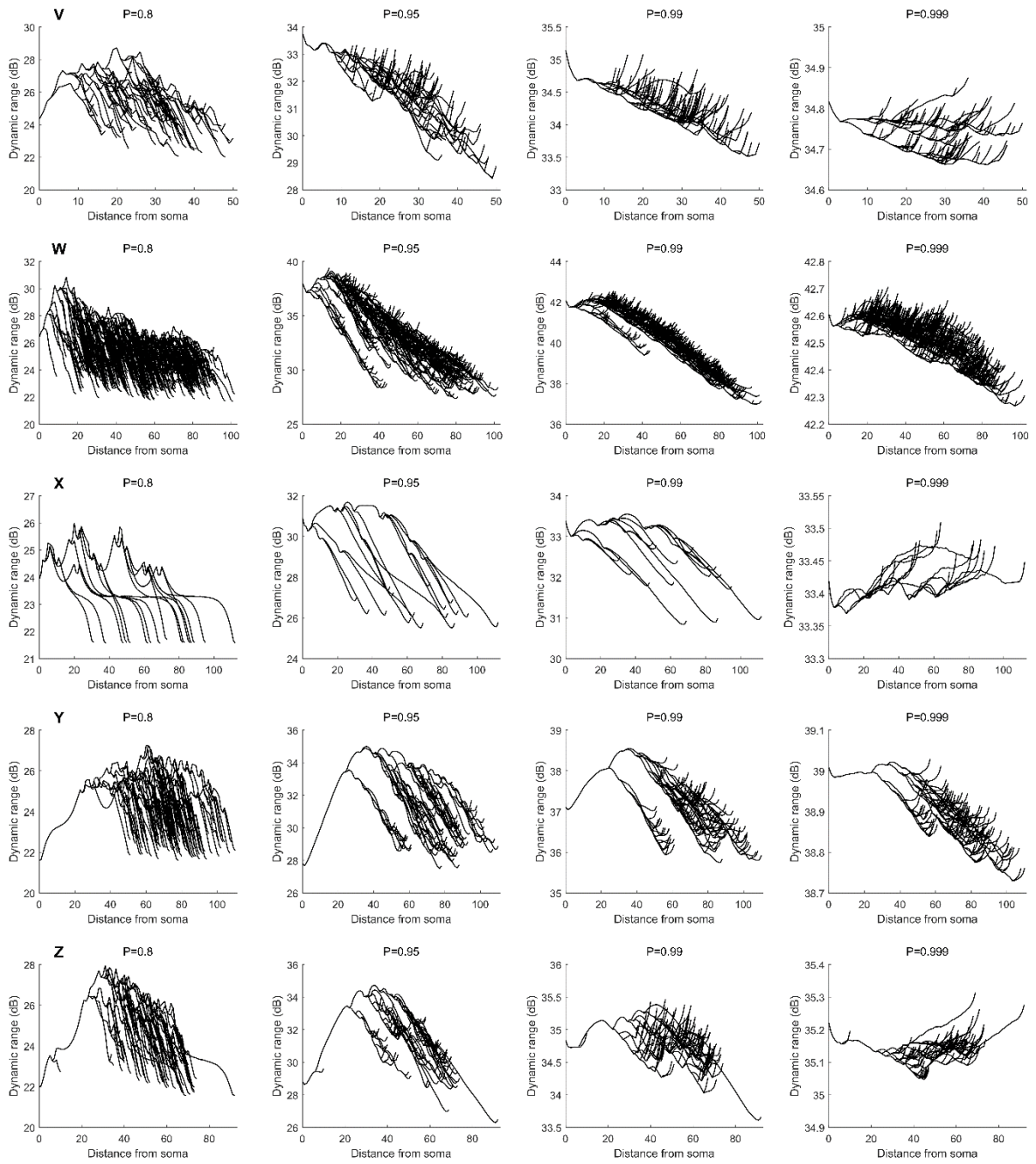
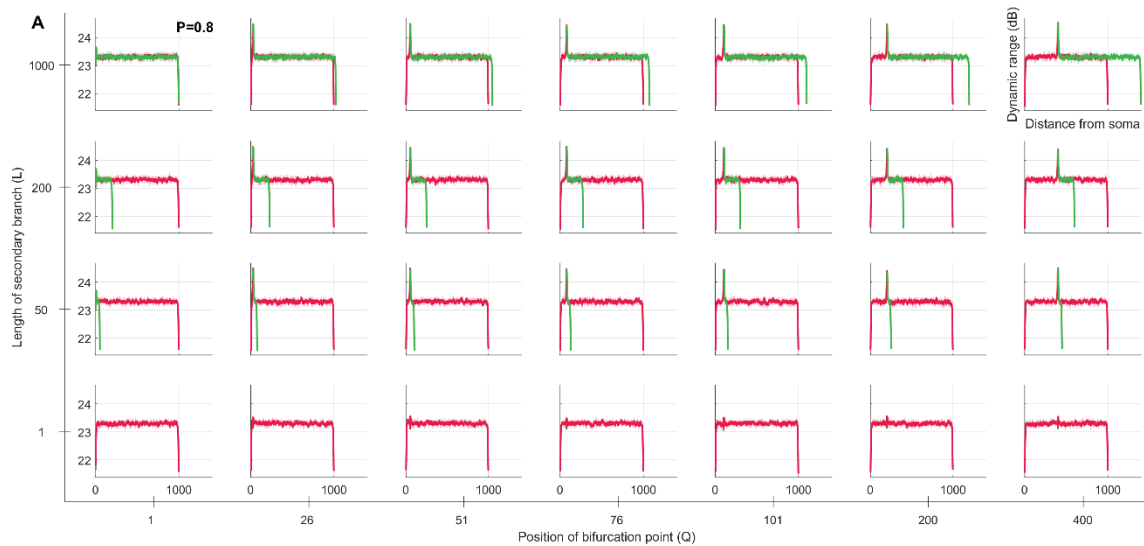


Figure S5. Additional dynamics of benchmark neurites. The main branch consists of $N = 1000$ compartments. The value of P is constant for each collection of sub-plots, and plots are arranged according to the position (Q) and length (L) of the secondary branch. In each small sub-plot, the compartmental dynamic range (y axis, in dB) is plotted against the distance from the soma (x axis), with shadings indicating ± 1 standard deviation from the mean over 10 trials. Each trial was run for 10^5 time steps (ms). As P increases, the amplitude and extent of the spike in dynamic range at the bifurcation point increases. However, for large P , short secondary branches do not have a significant effect on the dynamic range.



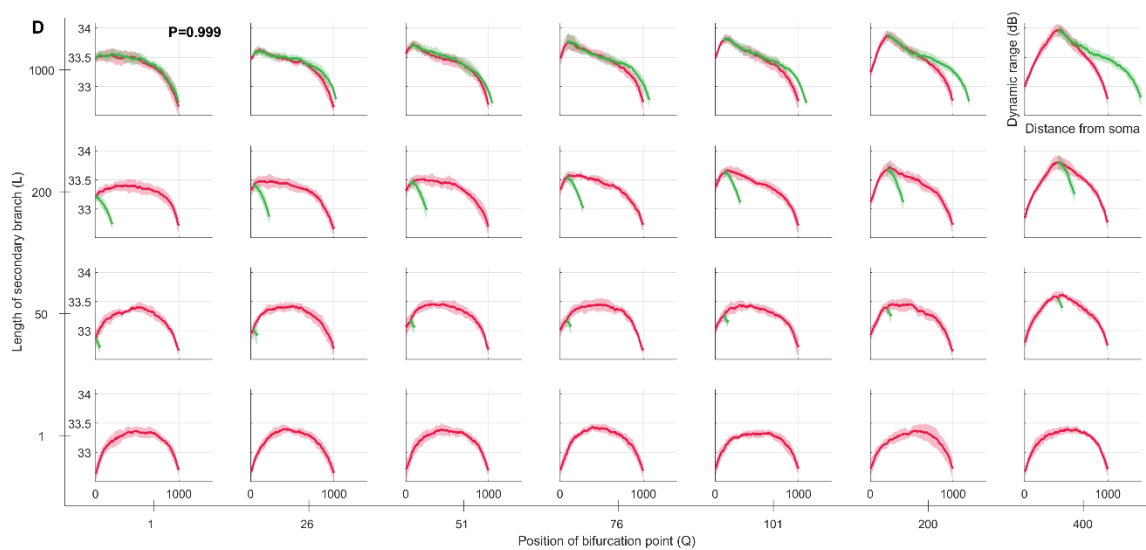
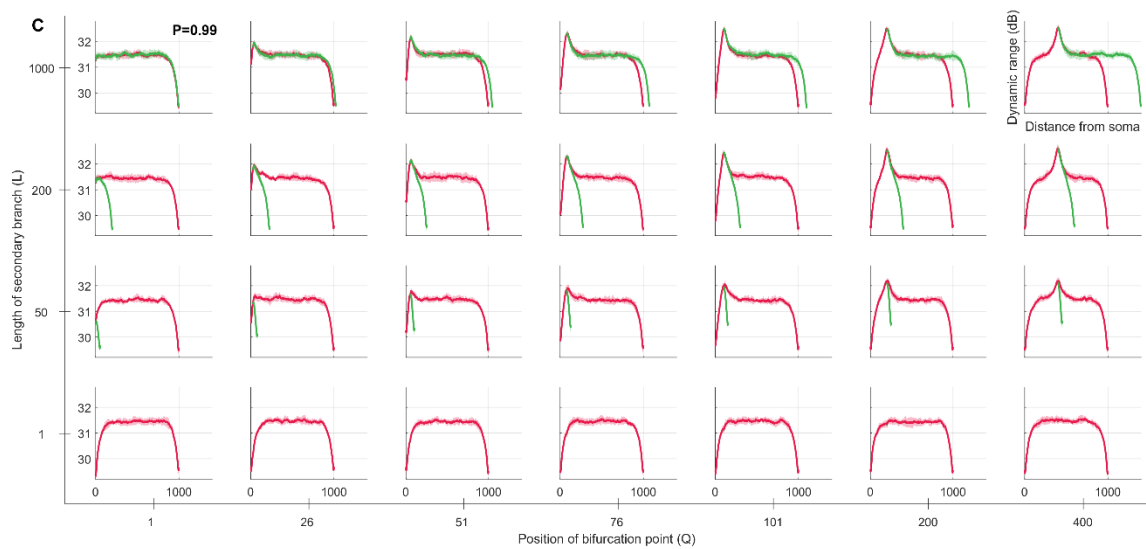
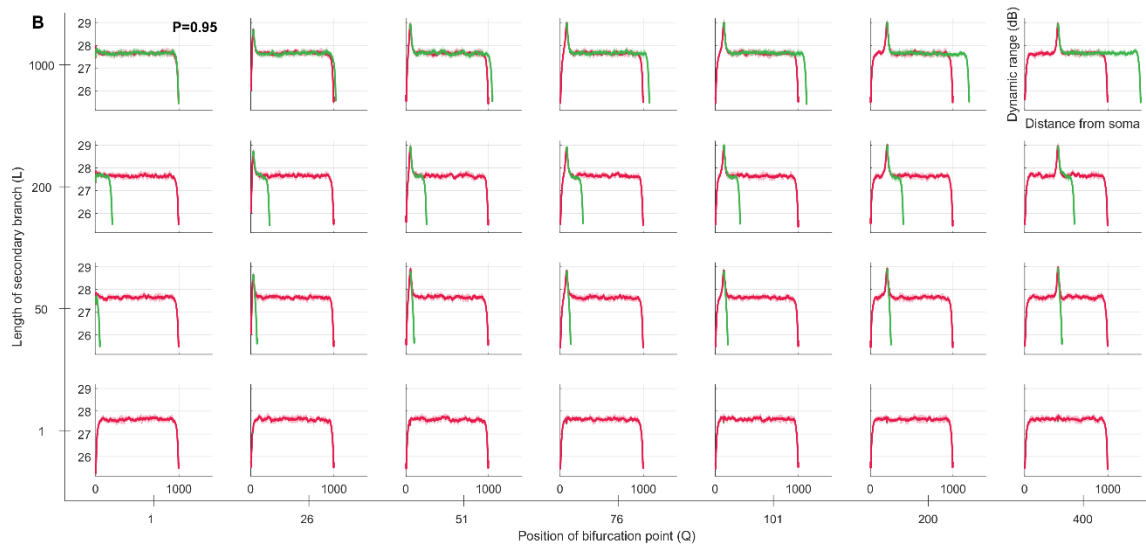
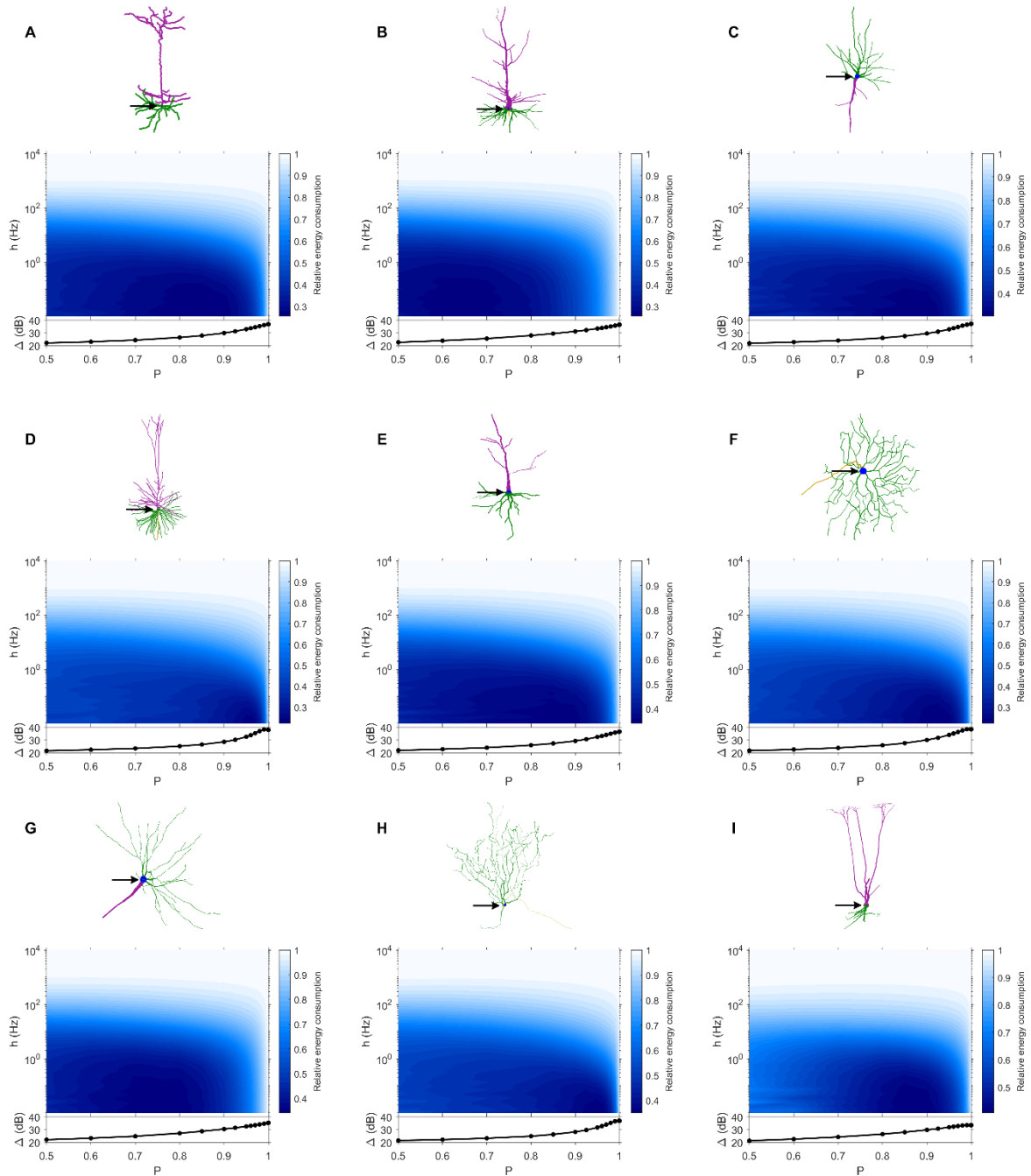
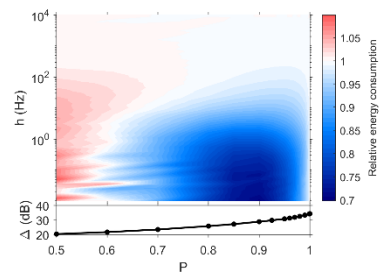
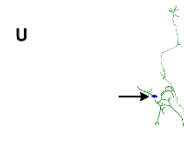
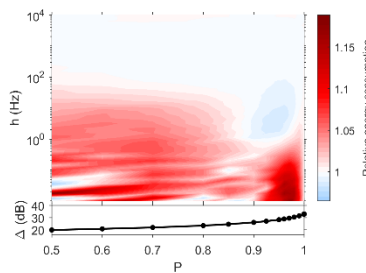
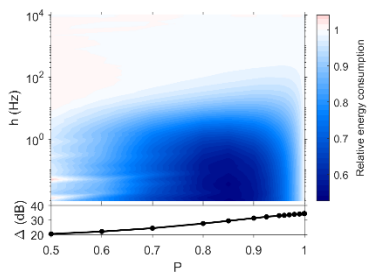
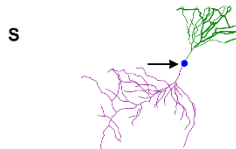
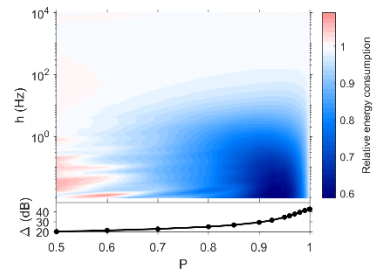
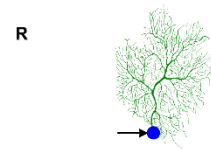
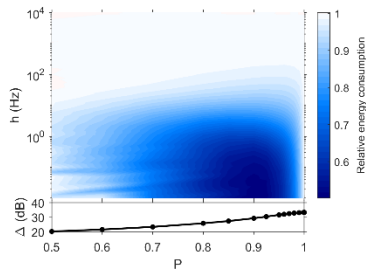
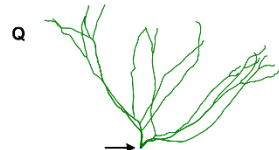
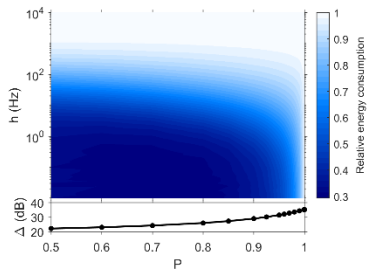
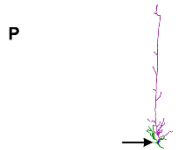
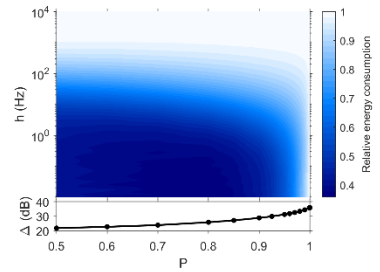
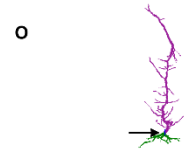
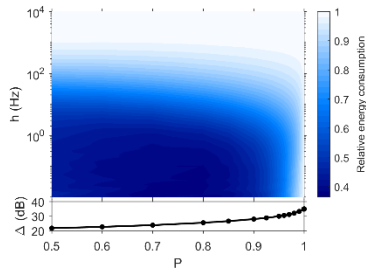
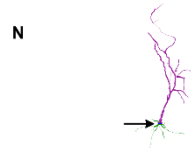
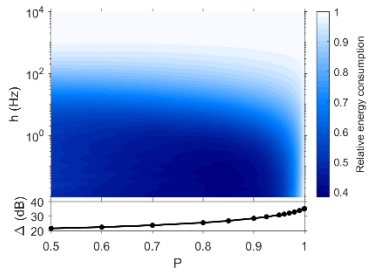
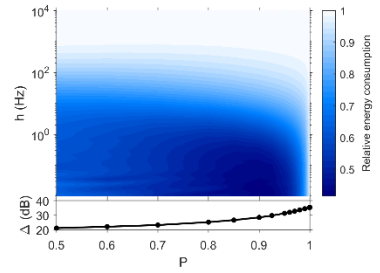
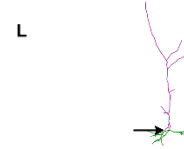
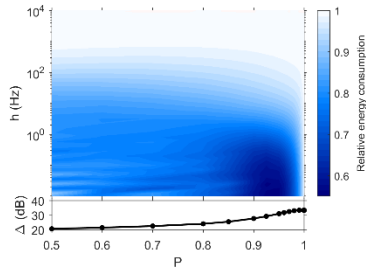
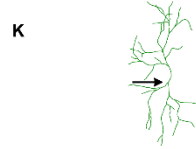
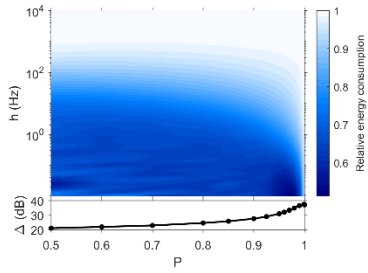
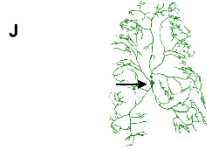


Figure S6. Relative energy consumption plots of all neurons. The energy consumption is a measure of how often each dendritic spike fires per somatic spike (see Methods). There are several distinct behaviors, which we attribute to the number of branches connected to the soma, and the relative centrality of the soma. Note the different color bars.





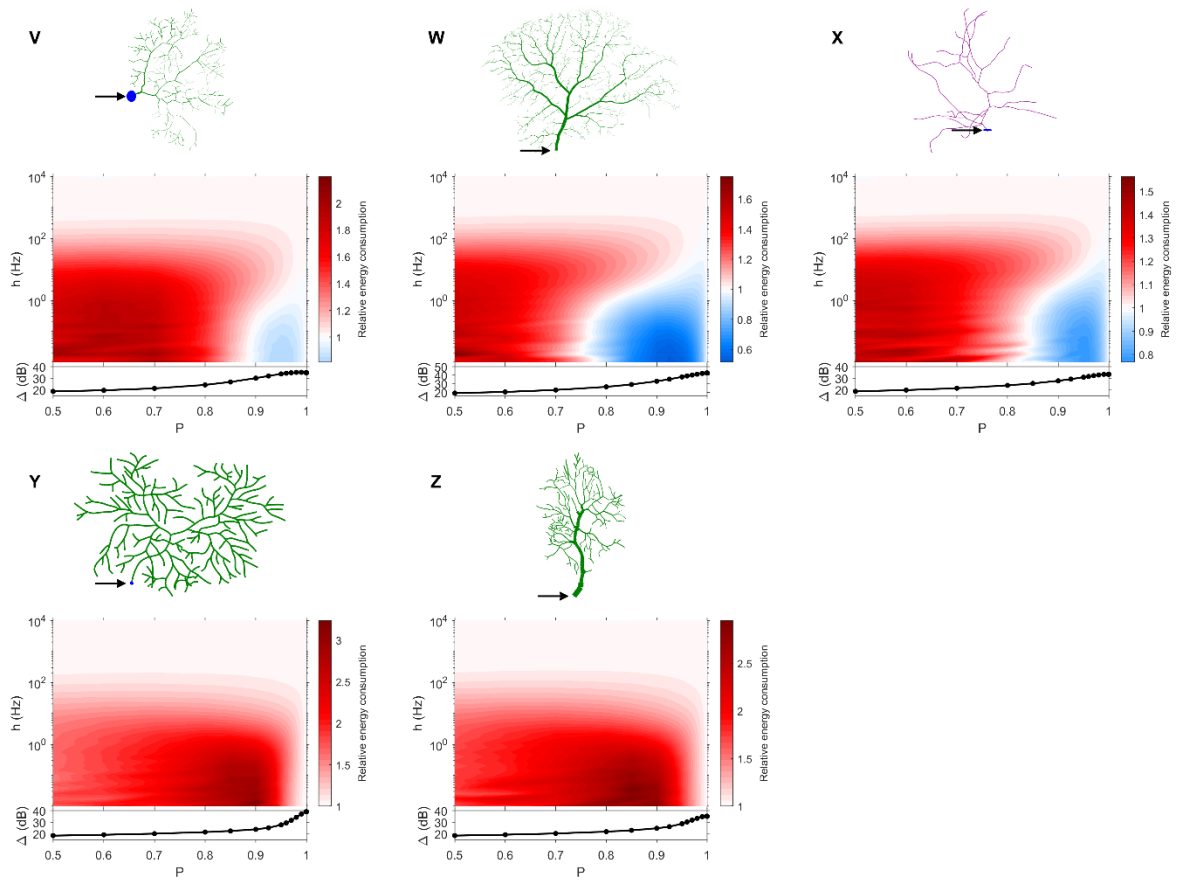
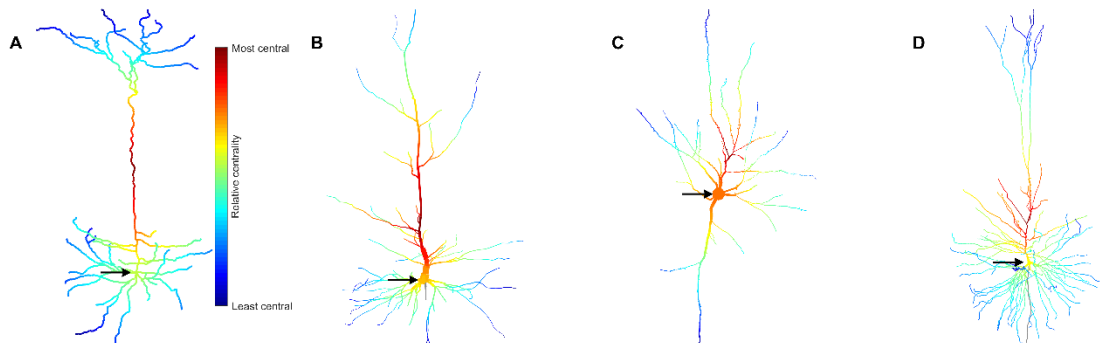
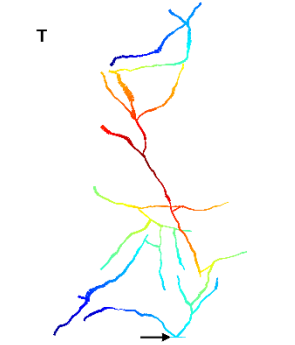
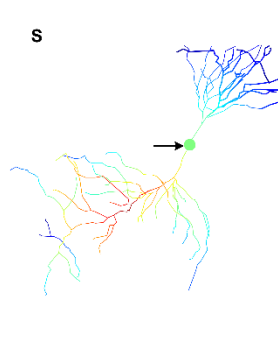
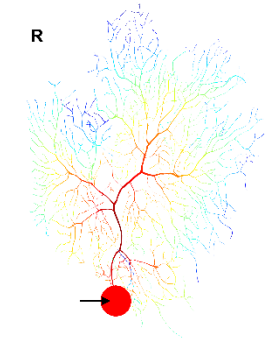
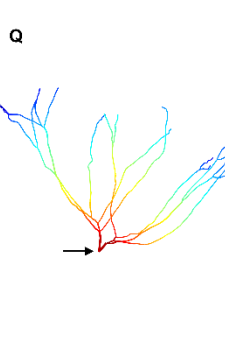
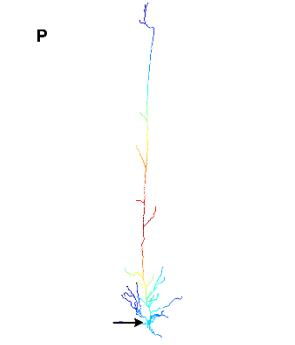
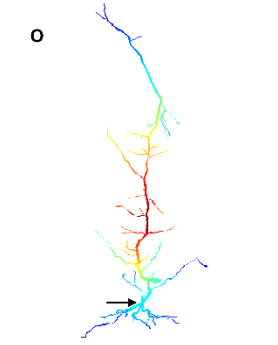
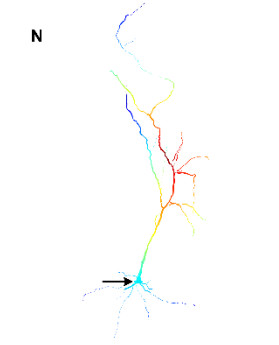
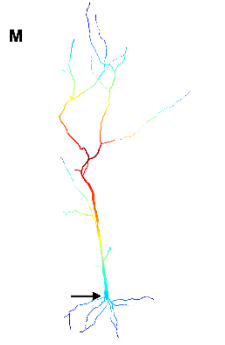
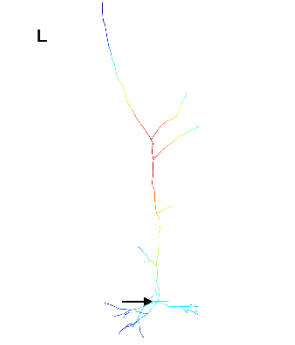
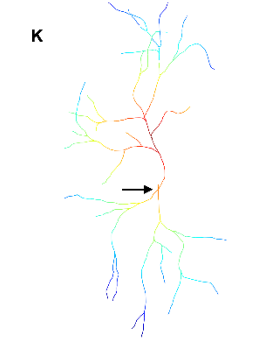
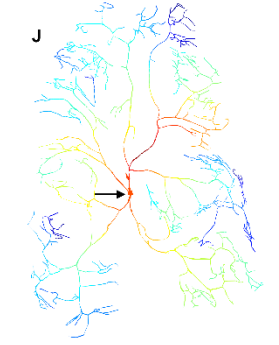
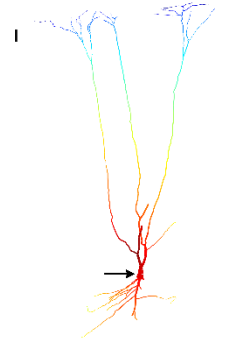
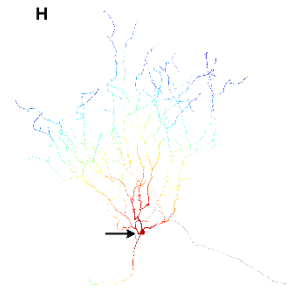
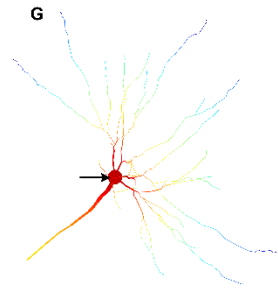
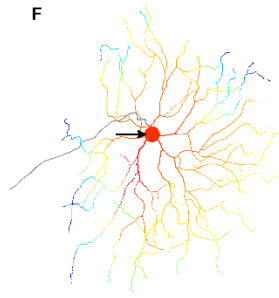
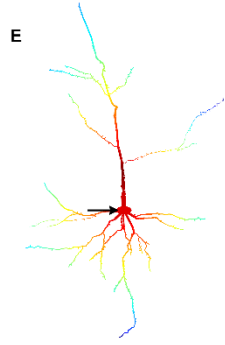


Figure S7. Relative centrality heat maps for all neurons. Red corresponds to the most central compartments ($C = 1$), while blue corresponds to the least central ones ($C = 0$). See Methods for details. The location of the soma is indicated by the arrow.





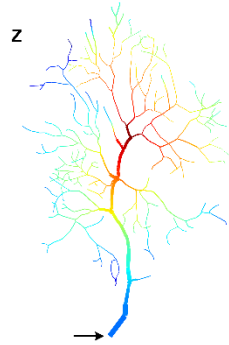
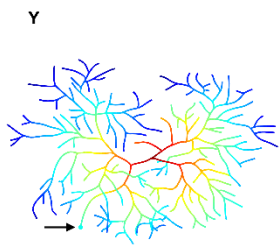
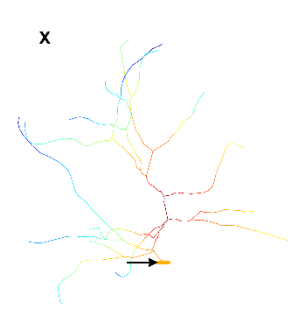
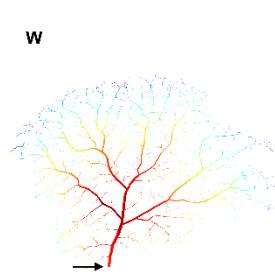
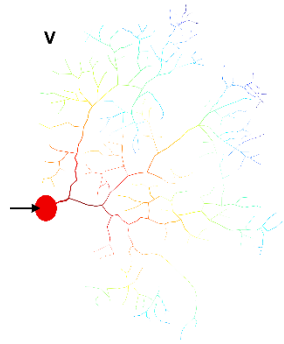
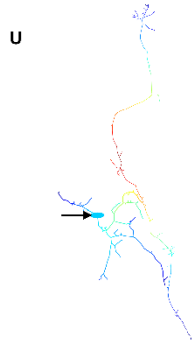


Figure S8. Correlation between centrality and dynamic range. Scatter plot of relative compartmental centrality (see Methods) vs relative compartmental dynamic range for all compartments in all neurons A-Z (total number of compartments is $N = 47411$). The relative dynamic range is $\Delta_{rel} = 1$ if a compartment has the largest dynamic range in the neuron, and $\Delta_{rel} = 0$ if it has the lowest. The soma of each neuron is marked in red.

