One-Dimensional Dynamics of Attention and Decision Making in LIP

Surya Gangli et al., Neuron 2008
presented by Vicente Malave
The graphs show the relationship between the natural logarithm of the visual response (Ln(vis. resp.)) and the natural logarithm of the delay response (Ln(delay resp.)) against the decay rate constant (s^{-1}).

- **Graph A**: Monkey B, $R^2 = 0.15$
- **Graph B**: Monkey I, $R^2 = 0.21$
- **Graph C**: Monkey B, $R^2 = 0.45$
- **Graph D**: Monkey I, $R^2 = 0.09$
Average responses to distractor (red) and target (blue) trials. Mean of blue is D, peak of red is V and decay rate is k.
The puzzle

variability in V, D, k per neuron, but
\[ \ln(V_i/D_i) \sim = tc \ ki \]
within each monkey, tc is within 30 ms for all neurons
How can things be so precisely tuned?
Why this is a big deal

V, D, \( k \) are very heterogeneous
\( t_c \) is very close to attentional switching time
it would take very precise tuning of a neuron's dynamics to get
this property, but the parameters vary widely
not likely due to coupling between neurons (different receptive
fields)
( all the action is in supplemental information, so we'll write the math out on the board)