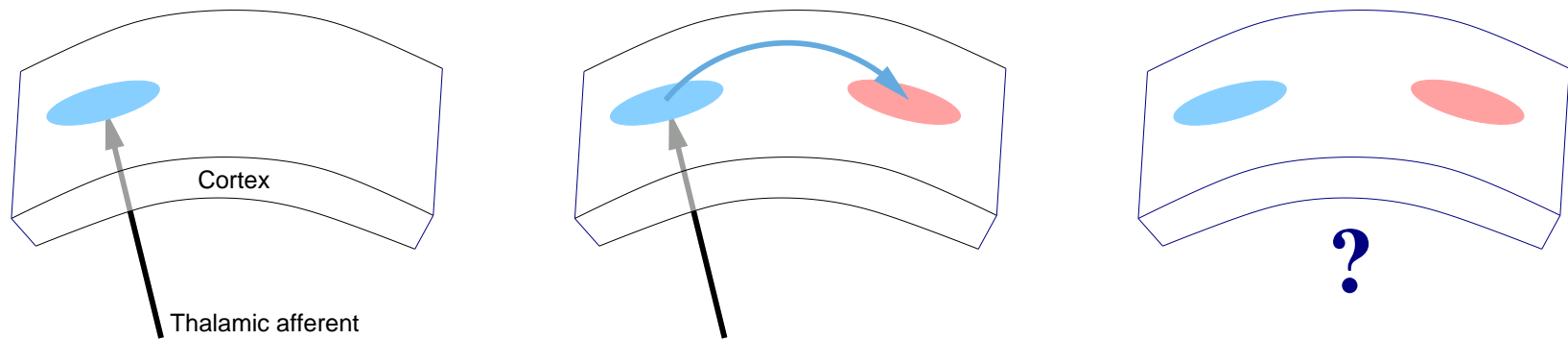


Role of the Thalamic Reticular Nucleus in Selective Propagation of the Results of Cortical Computation

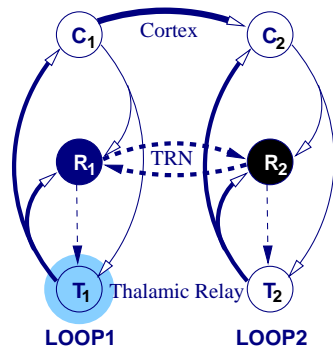
Yoonsuck Choe and Yingwei Yu, Texas A&M University



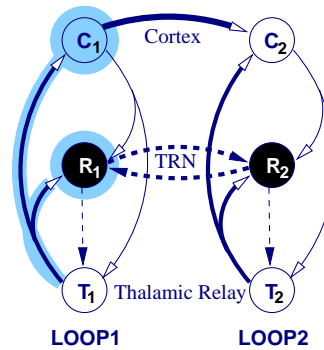
Research Question and Potential Answer:

- **Q:** How does the brain distinguish between the **input** and the **output** representations in its cortex?
- **A:** (1) Suppress input-driven activity. (2) Promote cortically induced activity.
 - Corticothalamic feedback and TRN may play a key role.

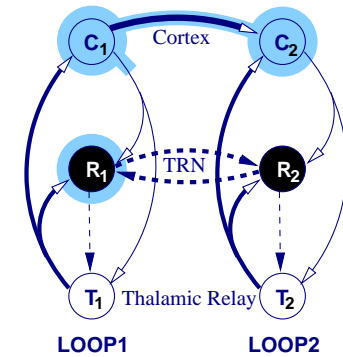
Methods



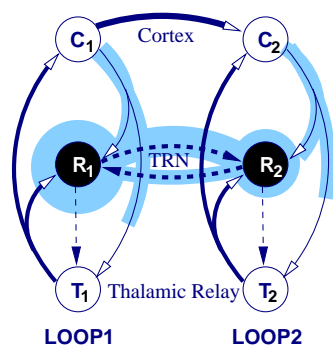
(a) Input



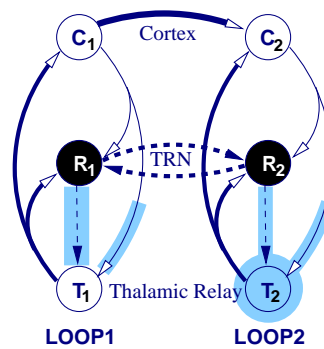
(b) Input-driven C_1 activity



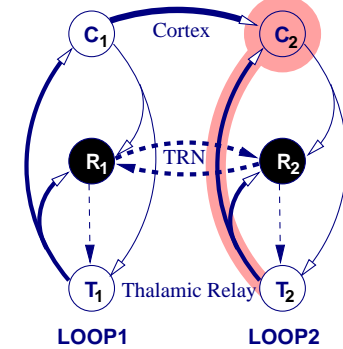
(c) Cortex-driven C_2 activity



(d) Corticothalamic feedback



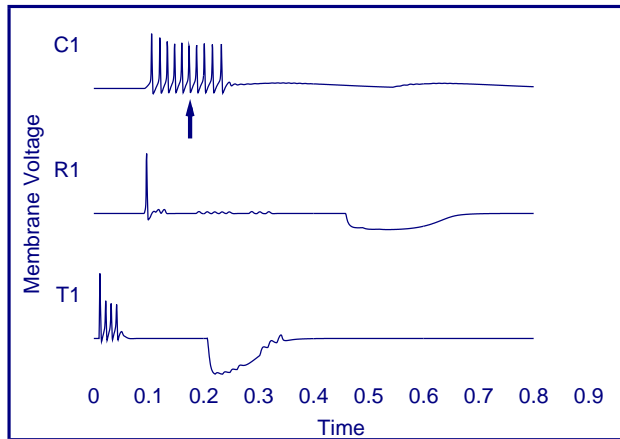
(e) Filtering at TRN



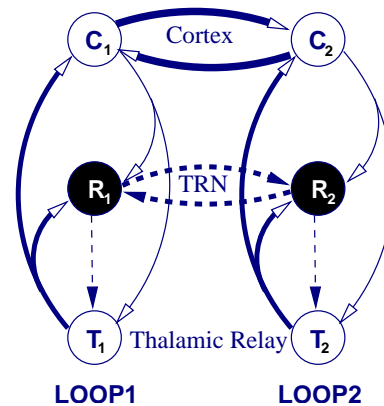
(f) Reactivation of C_2 only

- Simulate a network of integrate-and-fire (using XPPAUT) and Hodgkin-Huxley neurons (using GENESIS).
- Specific timing constraints based on known neurophysiology.

Main Results



(a) Thalamus-driven



(b) Cortically Induced

- **Model behavior:** Specific timing allows **reactivation** of cortex only for **cortically induced** corticothalamic feedback (Fig. *b*).
- **Key requirements:** Slow layer 6 to thalamus feedback and slow TRN dynamics.
- **Conclusion:** Thalamus and TRN may play a critical role in moment-to-moment disambiguation of input–output representations.