1) The structures that supply the feedforward input is the retina. The retina is the only input into the LGN that does not respond to how the input reacts once it enters the LGN. On the other hand, the feedback structures are the ones that do respond to how the input reacts in circuit and in the LGN those structures are layer VI of the visual cortex and the brainstem. Layer VI projects top down information to the LGN and the brainstem projects non visual inputs into the LGN such as attention, arousal, and oculomotor signals. These edit the LGN’s output with respect to EPSP’s or IPSP’s. The recurrent input structure is the extrinsic inhibitory neurons of the thalamic reticular nucleus that supplement the inhibitory interneurons of the LGN.

2) The efficacy of the retinogeniculate is defined by the ratio between LGN spikes and retinal spikes and increases with alertness. The efficacy of the retinogeniculate depends on the animal’s sleep/arousal state because when you are awake, your efficacy is increased by arousal and attention as opposed to when the retinal spikes are not as successful in driving LGN spikes when the animal is anesthetized. It is almost never 100% because if it were, the LGN would essentially be useless. It would go straight from the retina to cortex without going through the LGN, or in other words, the LGN would become the retina. This shows us that the LGN is important and that it is doing something important.

3) I think that the LGN can provide more visual information than the retina, even though the retina is the driving input for visual information purely based on physicality. But in terms of visual information, we have to depend more on contextual information in which we get from cortex and other non-visual stimuli that we get from the brainstem which both circuit through the LGN. Since information load is cumulative as it goes further down into processing, it would only make sense that the LGN can provide more information than the retina.

4) It’s important for the LGN to provide efficient access to selective populations of retinal groups because these groups encode different features from the input given by the retina. For example, the M cells in owl monkeys encode spatial information while the P cells encode color information. This is a small scale example of what happens in the human LGN and its importance in directing input through different pathways.