Questions for the Hua et al. paper:

1. Explain in detail what is being shown in Figure 1a: (what is being measured, what instruments and reagents they use, what do the curves mean, what is represented in each axis, what can you see in the photograph, etc…).

2. Explain in detail why Kir2.1 is used in the experiment, what does it do to the cells expressing it, and why do they use also Kirm. Explain step by step what will happen to a neuron when they are forced to express Kir2.1. In particular, explain how it will affect the neurons when they receive excitatory synaptic input from its dendrites. (As an rough example, follow this logic: …another cell will release neurotransmitter, which will do X to the dendrites of the cell expressing Kir, in the normal situation the receiving cell would do X, but in a Kir expressing cell it will do Y, in a normal cell then A would happened, and B will travel down the axon, but because of Kir D happens, etc….) In particular, make sure that you explain the cascade of electrical events disrupted by Kir.

3. Explain in detail why VAMPm is used in the experiment, and what does it do to the cells expressing it. Explain step by step what will happen to a neuron when they are forced to express VAMPm. In particular, explain how it will affect the neurons when they receive excitatory synaptic input from its dendrites. Follow the same logic as in the previous question. In particular, make sure that you explain the cascade of molecular interactions disrupted by Vamp.

4. Explain in detail what is being shown in figures 2 a and 2 b. (what is being measured, what instruments and reagents they use, what do the curves mean, what is represented in each axis, what can you see in the photograph, etc…).

5. What are the main different effects that Kir, VAMP, and TTX will produce on neurons? Explain as they relates to this paper

6. Explain the logic of the experiment described in Figure 3.

7. What do you think are the mechanisms that account for the disruption of axon growth produced by Kir and VAMPm?

8. According to the paper, the axons that fire more often win the competition. However, if this all it takes, you could end up with axons that would do the wrong thing: for instance, an axon from the eye will take over a large part of the visual brain, and the rest of the retina will be mute. How does the embryo prevent this?

9. Similarly, an axon that is hyperexcitable will have an advantage over a normal axon, but the hyper axon will activate the brain even if the eye is not perceiving any visual information. How does the brain ensure that axons will be wired in a way that is useful for the behavior ?