I asked about appearance of fields – Will thinks it is like the Albert Lee appearance of fields with depolarization. I asked if there are head movements associated with the “entering” cells like the virtual-trial-and-error in Monaco and Knierim.

Most of these comments are from the pre-defense, but there are some new comments between the &&& symbols.

In the defense, we discussed the term “drift” and whether it implies entropy or a specific important coding role. In the defense, we shifted from using “drift” to using the term dynamism or dynamics from the Ziv et al., 2013 paper (which also uses “updating”). I don’t think you need to change the term in the thesis, but I would recommend using the term “dynamics” in publications.

Page x – I agree with the problems of using verbal terms to describe complex neural functions.

Page 3 – temporammonic = temporoammonic.

Page 5 – “unmitigated” – odd use of the term

Page 7 – Comparator function was also explicitly modeled in Hasselmo And Wyble, 1997, Eichenbaum Buckingham,

&&&

\*\*Page 9 – “first discovered by Jeff Taube” – Actually Jim Ranck first discovered head direction cells and published them in an abstract in 1984. Then Taube did the first paper with him.

Page 11 – “to inform previously…” – Use of the word “inform” is confusing here.

Page 12 – “from postrhinal and piriform” – my understanding was that piriform primarily projects to lateral entorhinal cortex, not medial entorhinal.

Page 12 – “mostly pyramidal” – this is not supported by more recent studies.

Page 13 – “not required for hippocampal place cells.” – also Brandon et al. 2014

Paeg 13 – “approximately 80%” – in which nucleus??

Page 14 – In addition to the paper by Herry… Luthi, I think you could also mention the unit recording studies by Blair in the LeDoux lab (Moita et al., Johansson et al.)

Page 16 – Ziv citation – But this paper also showed more changes than expected over days.

Page 18 – “MacDonald et al… “ Could also cite Kraus et al., 2013 here.

Page 20 – “temporal windows for plasticity” – this was also proposed in Jensen and Lisman 1995; 2005.

Figure S2.2 – Example time cell with place co-occurring place field. (should first “place” be removed??

&&&

Page 94 – “placed between grids” what does this mean?? Say wall inserts next to floor grid.

Page 96 – doesn’t four together feel different for the mice versus 3 or 2 together?? Maybe make clear they are in separate boxes.

Page 99 – maybe define CFC again?

Page 99 - and two subsequently extinction (EXT) sessions – “subsequent”

Figure S3.1

Is EXT-Recall vs. IS-Recall label. Change which label appears on top versus bottom.

Figure 3.1g – correlation of freezing and overlap is dramatic.

(Did Will do ALL the experiments? Probably focused on the imaging?)

Figure 3.2g – the correlation starts out pretty low (0.25?) This differs from place cell correlations in same environment?

Correlation value is dependent on the time bin you are averaging over – This was from 30 second time bins. 2 minute time bins end up with higher correlations. Calcium transients are very sparse. Would expect lower than unit recordings. Might look at unit recordings to see how they compare?

Page 132 – focuses = topics (focuses sounds like a verb, rather than a plural noun)

Page 134 – description of task A>B>C – You said transitive inference, but you described the task for transitivity.

Page 142

regions might employ common mechanisms for representing or orthogonalizing events.

How is this possible given the very strongly different connectivity properties of these regions?? Could discuss and contrast the sources of orthogonalization based on synaptic divergence versus the influence of excitability on overlap (somewhat contrast to orthogongalization).

Page 143

Grosmark Buzsaki 2016 – rigid and plastic cells

Interestingly, plastic cells had overall high spatial selectivity and firing rate gains during ripples, suggesting that spatial field precision and excitability may have been important criteria for inclusion in the sequence

(what do you mean by firing rate gains here?) say: firing rate “increases” instead of “gains”

Page 144

But what mechanisms could inform the hippocampus as to which synapses are “worth” potentiating? One possibility is a neurochemical signal for novelty.

You talk about dopamine but this novelty signal could be acetylcholine

Moreover, there have been numerous reports of phase precession in non-spatial responses (Lenck-Santini et al., 2008; Robinson et al., 2017; Terada et al., 2017).

Your answer in the pre-defense was sufficient. No need to modify.