**ACCUMULATOR VS THRESHOLD**

STEP1) Revisit email thread and see where I was.

STEP2) Code wrapper to gustav’s model to investigate different radii & starting positions, with multiple runs for each so there’s a distribution.

Gustav has supplied fits from modelling straight lane keeping. So why don’t we use straight lane keeping as the task for a first stab at testing the Accum vs Threshold hypothesis.

We could have the driver returning the wheel at centre, then road edges would pop up around them, at certain splay angles. I suppose that the same thing will happen with bends as this essentially changes the angle declination.

**Gustav’s email 04/06/17**

1. Plot amplitude of first movement.
2. Plot noise & multiple runs.

Rationale: given the same parameterisation, the timing of the first action will usually be radius-dependent for the accumulator model, apart from if the threshold is very small – then an accumulator becomes a threshold model until the point where the first perceptual error (i.e. accumulated unit) is below threshold. However, the Threshold model also predicts radius-dependence on first timings for errors which are initially below the threshold. Therefore, given a single signal (participant), it would be hard to discriminate between these two models on timing for first action.

However, there is a prediction relationship between *timing of first action* and amplitude. The threshold model predicts that after the radius-dependence stage is reached for large bends (i.e. initial perceptual error < threshold), amplitude of the correction would flat-line because the perceptual error which the correction is based on is the *same*. The accumulator model, however, would predict that the amplitude movement corrections continue decreasing because the accumulator model would react to a smaller perceptual error than earlier radii (due to the accumulation of evidence!).

Another way of getting at the phenomenon of the system responding to constant error vs. system responding to accumulated error is a satisficing lane-keeping error. For a constant ‘P’, we would expect the phenomenon described above. But we would also expect that the relationship described above would be constant – but change in parameters – across varying levels of P.

So, the questions are:

1. What selection of radii do we want?
2. How many trials of each do we need? And what is the balance with straight-road?
3. What duration of time should the road be presented for? And how long should elapsed between each roads?
4. How many road widths will we need? And what should they be?

What analysis will we need? (Simple model fitting should do? But what should the model-fitting be?).

1. *We want a mix between ‘sharp’ radii and gradual radii, and straight.* Sharp: 50; 150; 250. Medium: 900; 1100; 1300. Large: 2500; 3000; 3500. Straight (double trials). 10 conditions.
2. *We want a large amount of trials to reduce noise, because the effect we are looking at might be small. BUT we have no idea what the size of the effect is, so I’d rather errr on the side of more trials than less trials. (10?). 20 for straight road so the trials are nicely interpolated. Cannot have >2 conditions in a row.*
3. *3 seconds appearance, you want long enough for there to be a first steering action on the really gradual bends. The ‘disappearance’ should be long enough for the steering wheel to return to centre (1 second random delay after the wheel is centred?)*
4. *The road widths should be centreline, narrow (2m?), wide (4m?)*
5. *Analysis. Which model fits better with predictions?*

3 seconds appearance.

Average 2 seconds disappearance. (but check for central steering wheel centring).

10 trials (20 for straight).

10 radii conditions inc straight.

3 road widths.

= 30 conditions \* 10 +10 (straight) = 310 trials; \*5 = 1550secs = 25.83mins.