Contents

Data Analysis

* Spike train (ISI's) show ⊕ correlation : Why?
  → Drift in spike rate?
    Even w/ drift, drift may not be random

  → ⊛ ~~⊛~~ Correlation compares to global mean.
    Look at other ways of characterizing ISI not
      tied to global mean.

[?) When we
eamen+ reccurence
map, pattern
eeans to retain
s how to
quantify this?]
* Recurrence map   (but note quantile measurement.
    (s still done globally)

Ⓐ | In our case (?), events
  | occurring at shorter τ
  | are causing ⊕ SRC

* Shuffling
  • SRC seems to drop more "quickly"
    Heil: ISI train needs to be shuffled fully before SRC goes to 0.
      Likely due to deviation in spike rate that occurs over.
      long time scale (𝟴: what's that time scale approx?)

* Mutant Data :
  • creates hockey stick ISI distribution?
  • what does reccurence map tell us?

* Mechanism for ⊕ SRC : Door Model
    Idea: Need Ca^{2+} channel (groups of) to open before release.
       & thus spike can occur ⇒ What's needed to get ⊕
                                    correlation?

  This causes "drift" in spike rate (s
  Note: drift may be occurring at
  shorter timescale Q: how do
  we quantify this ?

  [t_{open} has to be long
       enough
  [t_{close} has to be even
       a lot longer.
  [Prel << 1 for single
  channel & [need summation]
  [So for Heil fan has to be
       "large"

  (Need to normalize)

* Auditory (Heil) : synaptic depletion effects are key to describing ISI data .

This does not explain ours:

(⊙) When we do data ~~fitting~~ to two ~~step~~ II model Excitation model :
- auditory : mixt of exp & gamma .
- LL : gamma does not work
  - mixt of two exponentials .

(•) Why is SD not as important in our case?
→ could be because there are multiple hair cells innervating AFN
→ or; sts of ribbon synapse? may be denser in LL .
  (look for evidence in Lit)

(•) Recurrence & SRC .   Long, Short .
auditory : SRC < 0 , LS and SL
  • Use simulation of Heil model to show this .
  • With 4 connections, still getting SRC < 0 .
    Q : how many is needed to disrupt this ?

LL : SRC > 0 , LL & SS .
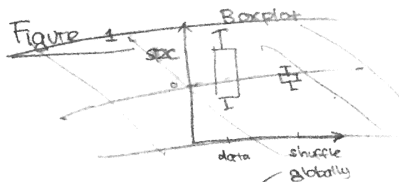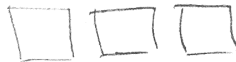
RESULTS :

Figure 1

Figure 1 : ✓ (Paulina's)

Figure 2 = Shuffle window vs SRC figure.

Recurrence Map segments

show pattern is preserve over shorter time scale
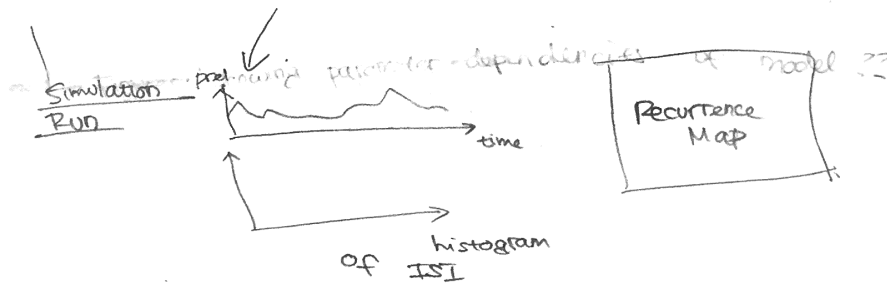
Figure 3 = Visualization of door model.

Figure 4 = Parameter Depencies of model (?)

Figure 5 & 6 comparisons w/ auditory (?)

Thursday Meeting Notes Prof Tania

<u>Q</u>: Are we getting SRC > 0 because of spike drift?
    (rate)

NOTE:
Heil: SRC comp are done only on ttain w/ ≥ 500 spikes.
    (12.5 − 52.5 sec)
Ours: ~2000 spikes (85 − 287 sec)

* Segment each recording into 4 segments:
    (roughly should get 400 − 500 ISI per segment)

  • Look at SRC
       how many $\oplus$, $\ominus$, uncorrelated?

  • Shuffling experiment again (Heil)

* <u>Recurrence Map?</u>

4×4 matrix

$\begin{bmatrix} A_{data} & \rightarrow 1 \text{ segment of } WT\# 26 \\ \rightarrow \text{Avg Recurrence Map} \end{bmatrix}$

$A = \dfrac{1}{\#data} \sum A_{data}$
        ↑
       104

* no segment
* Break into
    2 segment ~1000 ISI
    4 segment ~500 ISI
    8 segment ~250 ISI