

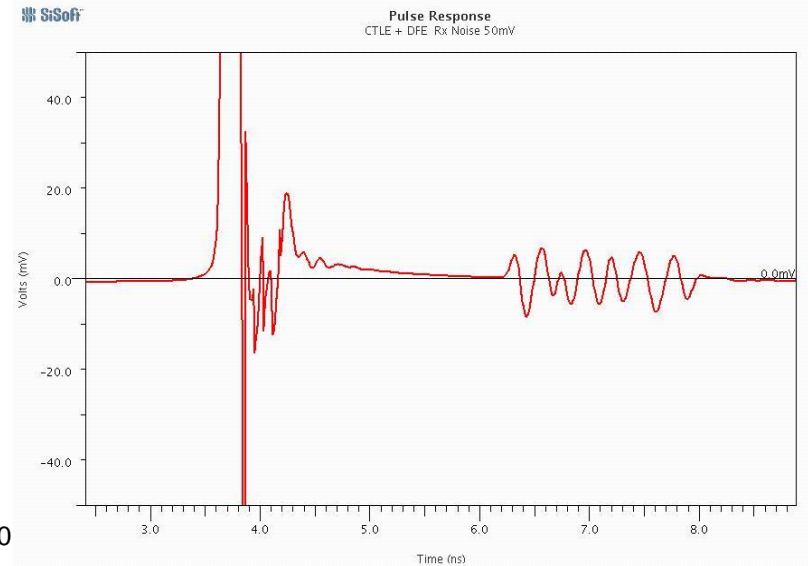
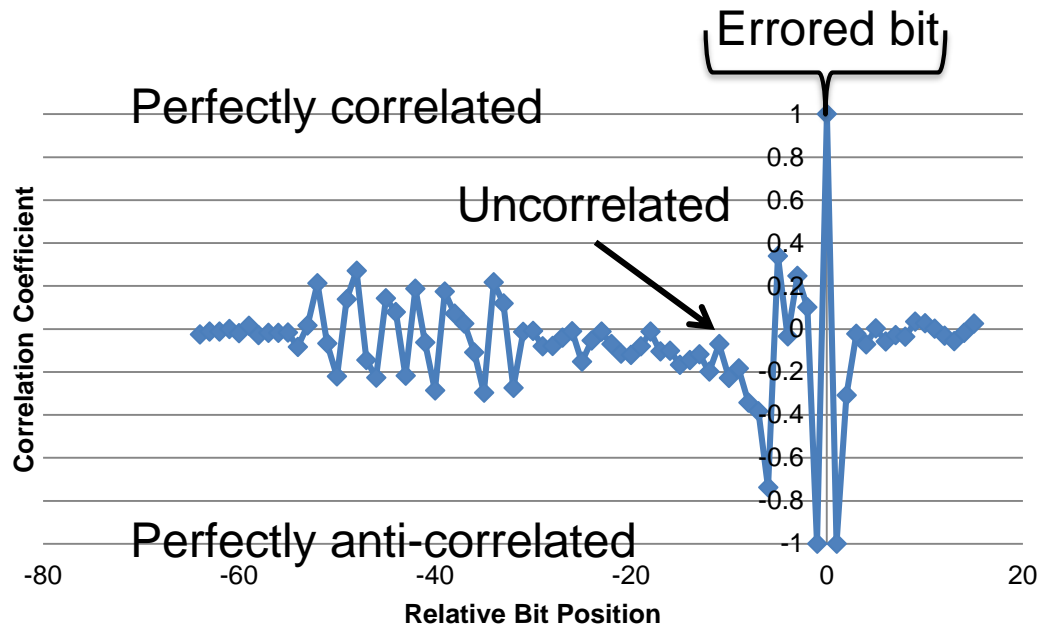
# FEC Performance Estimation for High Speed Serial Channels

Mike Steinberger

*It's all about the intersymbol interference.*

# Pattern Correlation

Q: To what extent were the bits adjacent to the errored bit correlated with the errored bit?

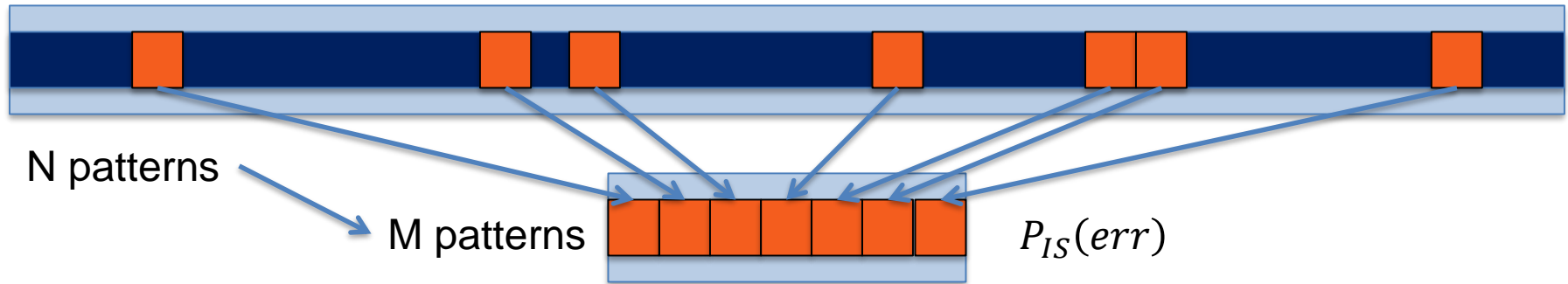


# Error Correlation *Determines* FEC Performance.

- Intersymbol interference causes error correlation.
  - There exist “killer data patterns” that cause FEC errors.  
*Bhavesh Patel and team at Juniper*
  - Killer data patterns also occur in crosstalk.
  - *Nothing to do with DFE error propagation.*
- Base FEC performance estimation on killer data patterns.
  - Extend PDA to predict killer data patterns.
- Design error correcting codes to prevent killer data patterns.
  - Choose code words or interleaving to avoid peaks in correlation.
  - Choose code words or interleaving to take advantage of peaks in anti-correlation.

# Importance Sampling

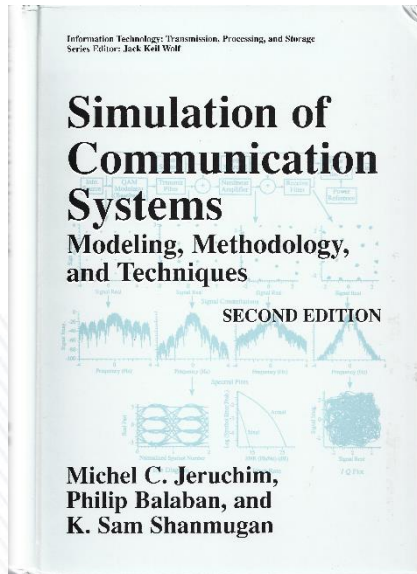
What if you already knew which data patterns (events) were likely to cause errors?  
Those are the only ones you'd bother to simulate.



$$P(err) = \frac{M}{N} P_{IS}(err)$$

***\* If you choose the wrong data patterns, your results are going to be worthless.***

# FEC Performance Estimation for High Speed Serial Channels



chapters 11.2.5, 11.2.6

Early reference::

Steinberger, Shanmugam and Balaban, "On the effect of uplink noise on a nonlinear digital satellite channel", ICC '81, pg. 20.2.1-20.2.5

- Base FEC performance estimation on killer data patterns.
- Design error correcting codes to prevent killer data patterns.