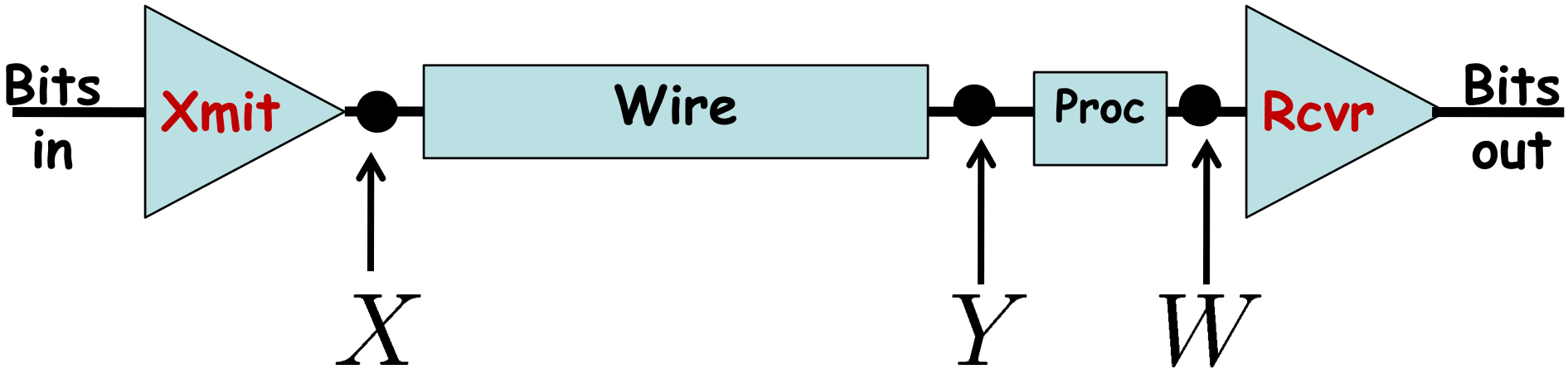
6.02 Lecture 6 – Decision Fdbk Equalization

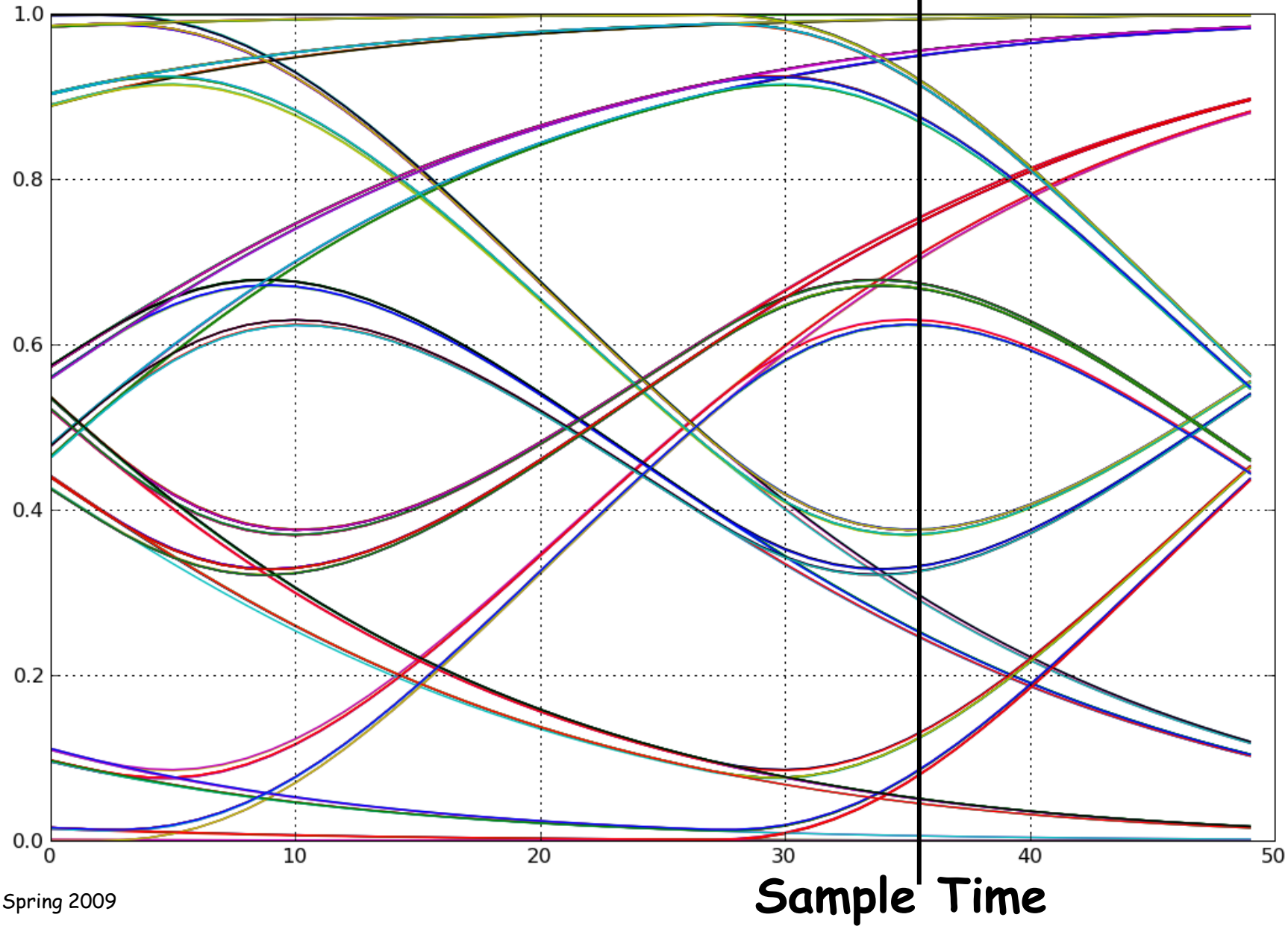
- Eye Reminder
  - Eye diagram and Sample point
  - Noisy Eye
- Improving the Wire
  - Why deconvolution su…uhm does not work
  - Decision Feedback Equalization Idea
  - Using previous bit-based pulse response
- Error Estimation
  - Probabilistic Analysis

Can Signal Processing Help?

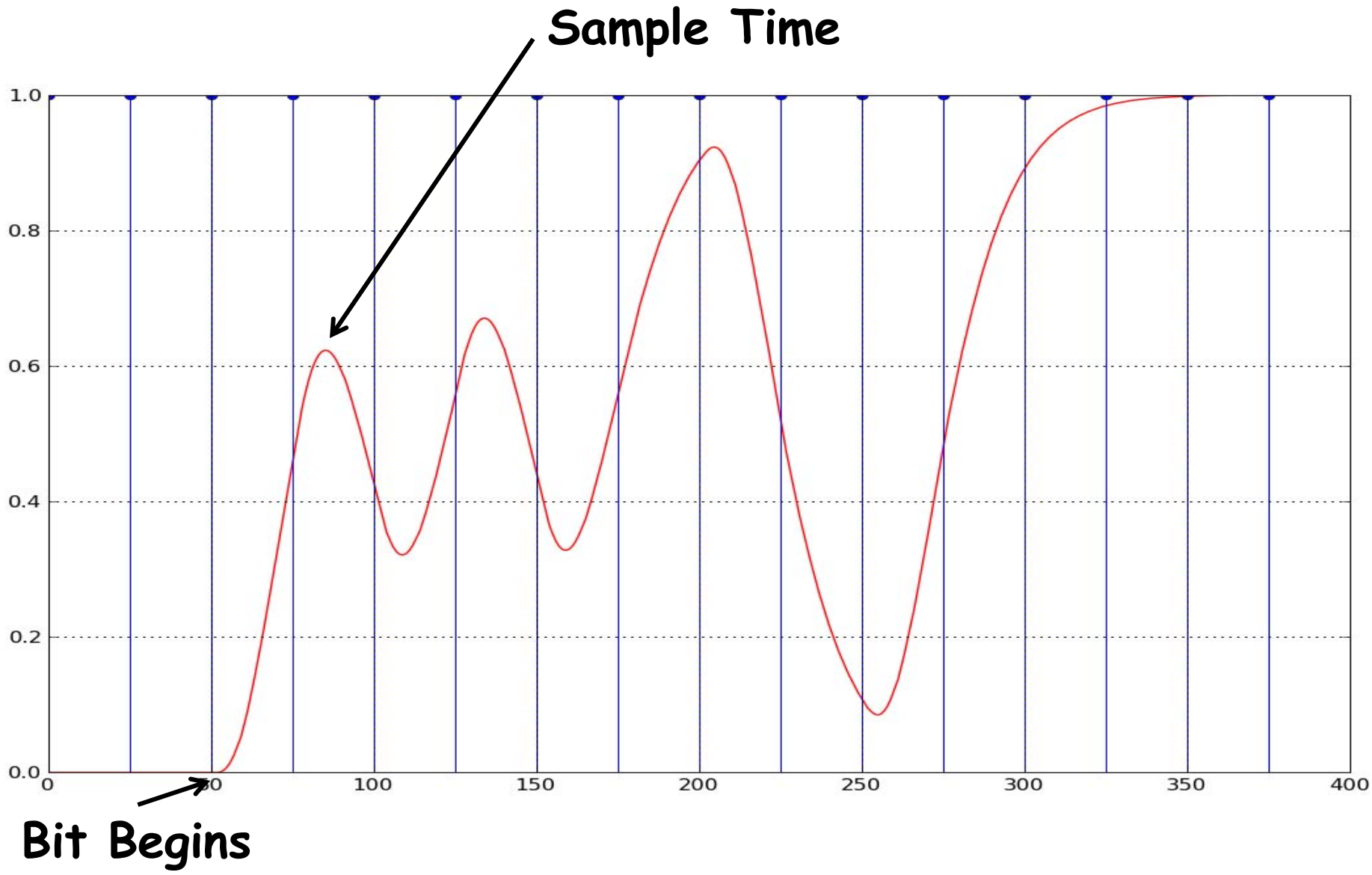


Model Wire as Causal and Linear Time-Invariant

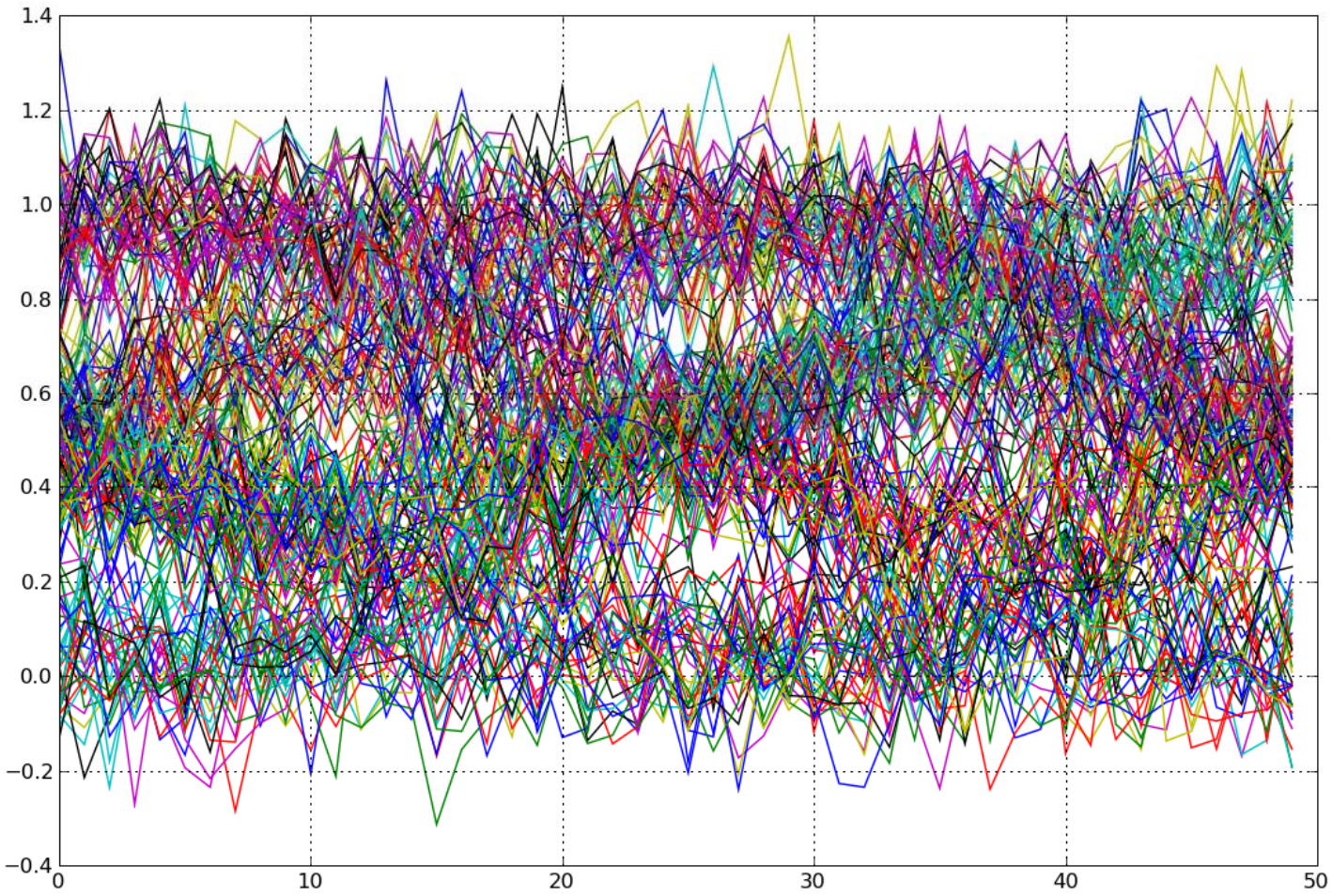
Eye Diagram, Slow Wire, 25 Samples/Bit



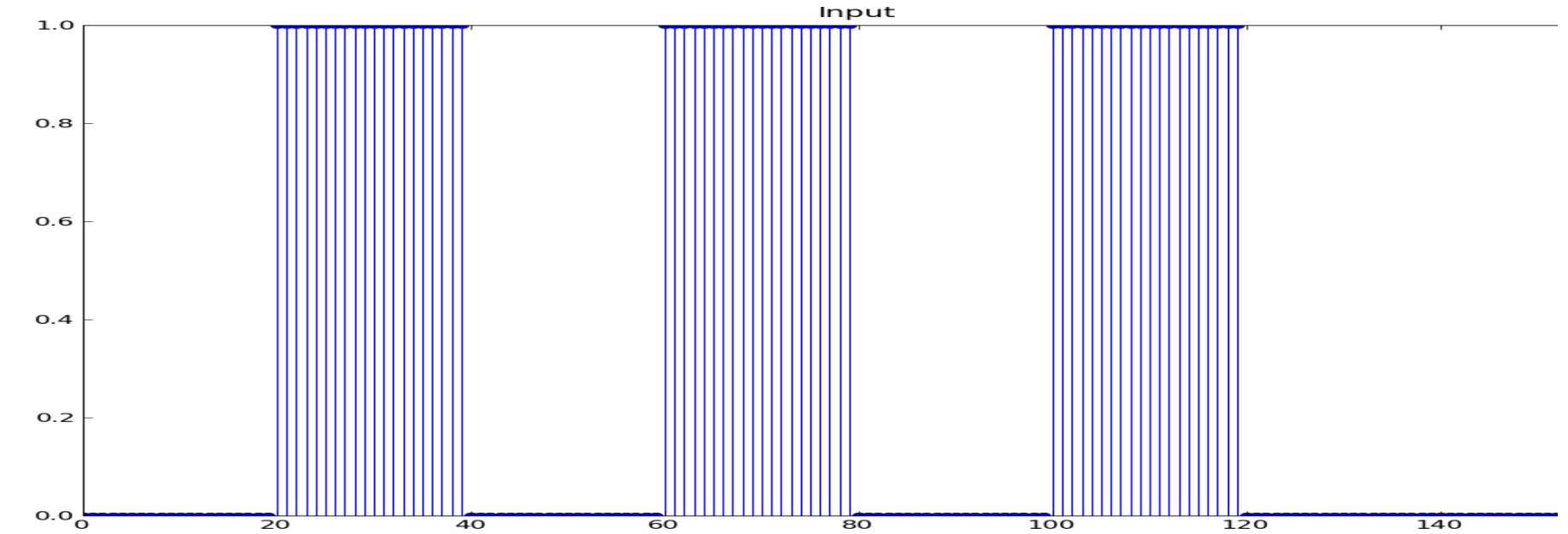
Wire Output, 25 Samples/Bit



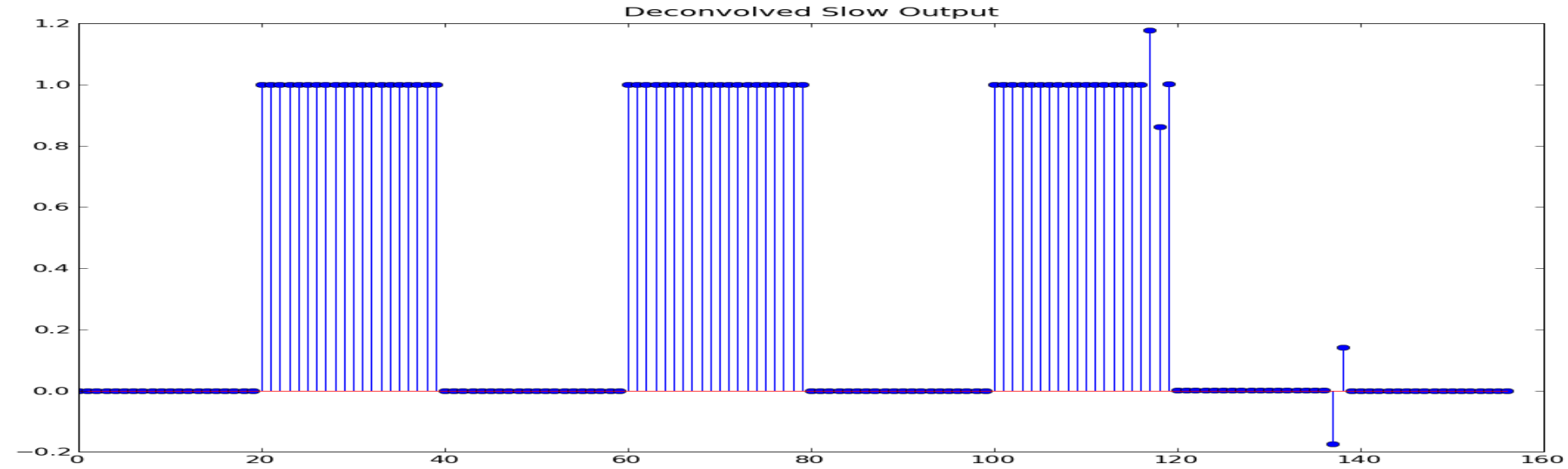
Eye Diagram with Noise (st.dev.=0.1)

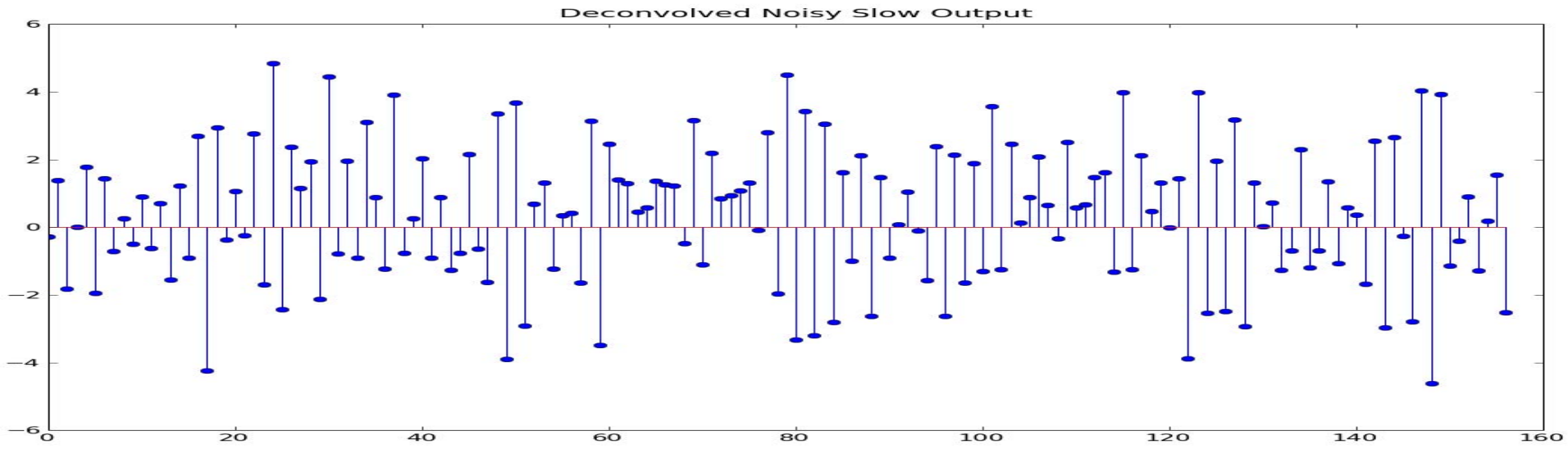


Slow Wire and 20 Samples per bit

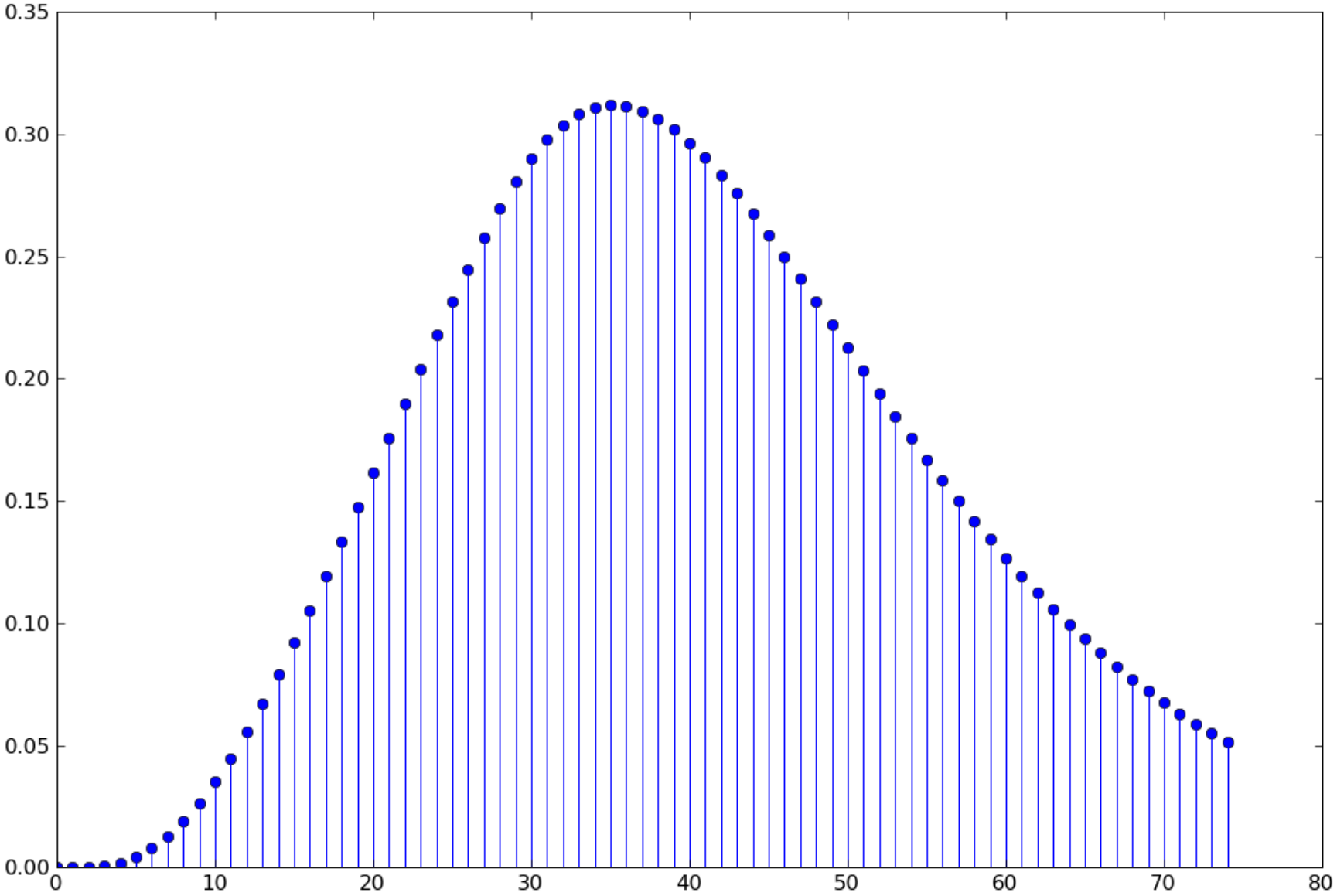


Deconvolution Great Unless There's Noise

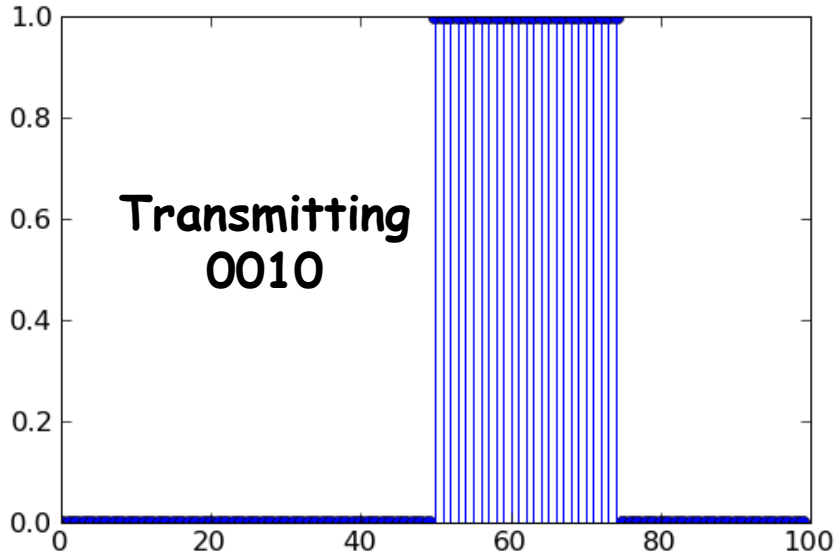


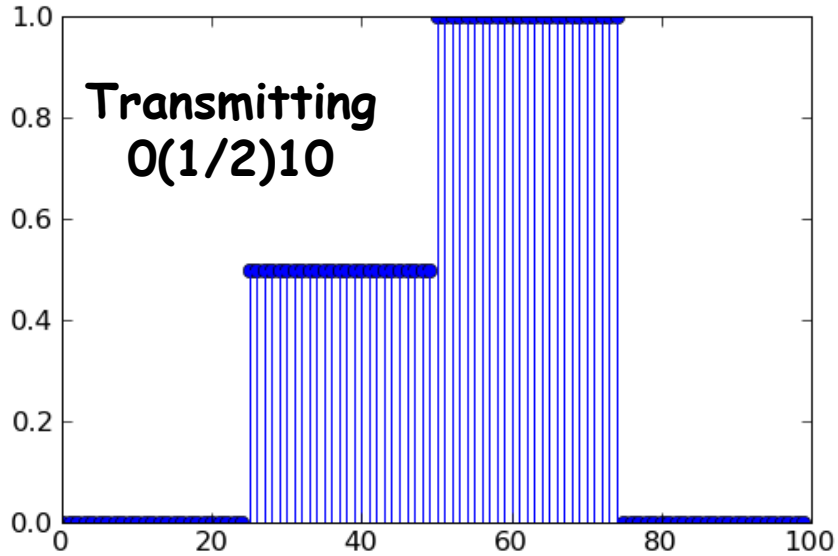


0.5 high 25 Sample Pulse Response

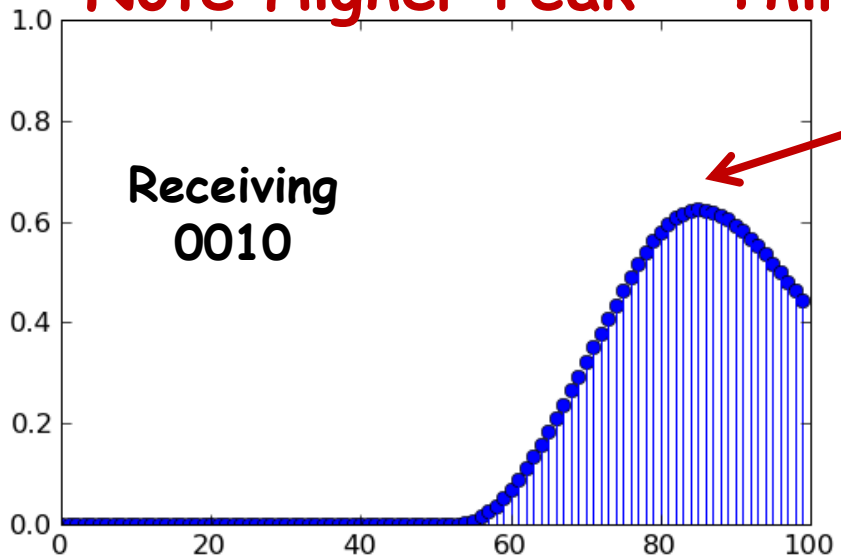


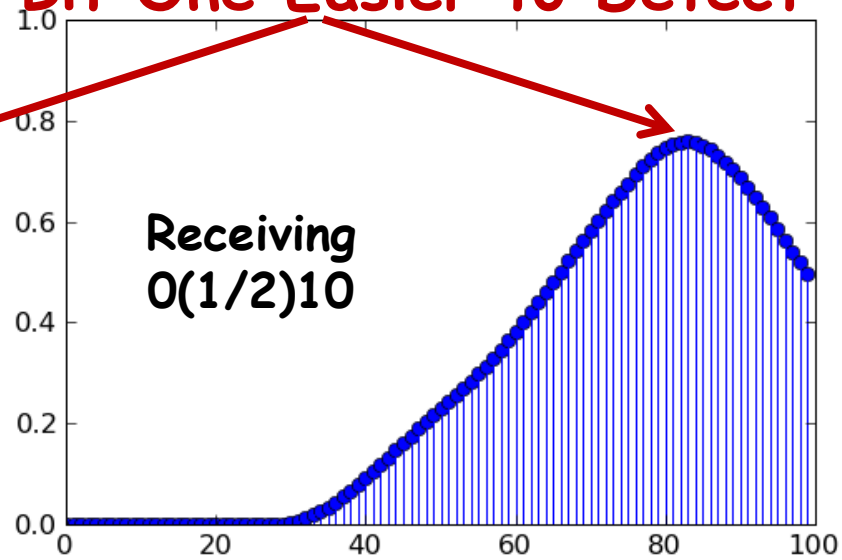
3rd Bit easier to Detect if 2nd Bit = 1/2



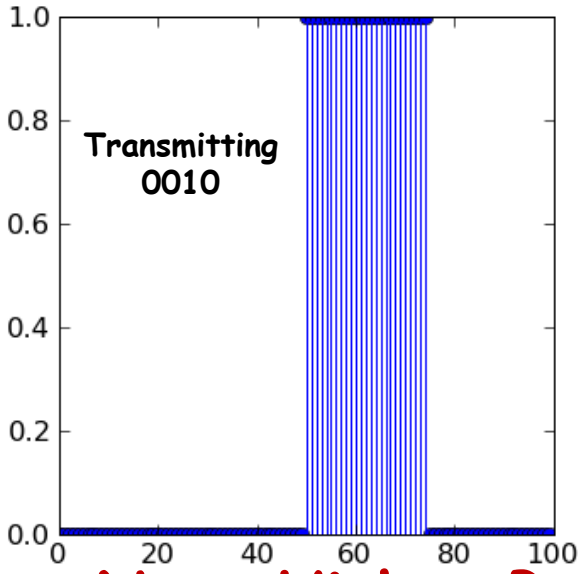


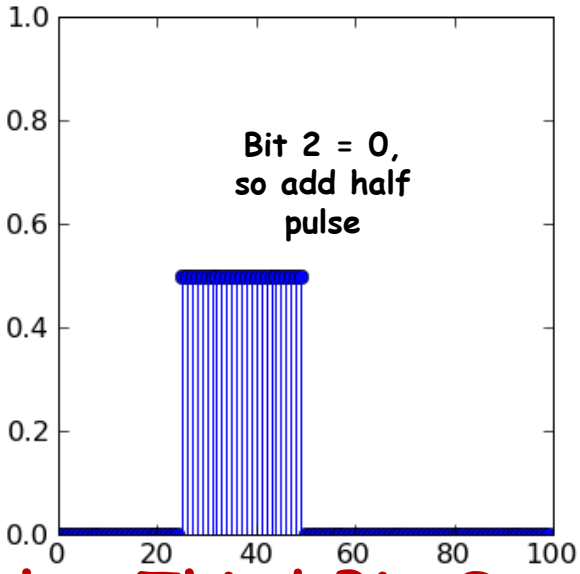
Note Higher Peak – Third Bit One Easier to Detect

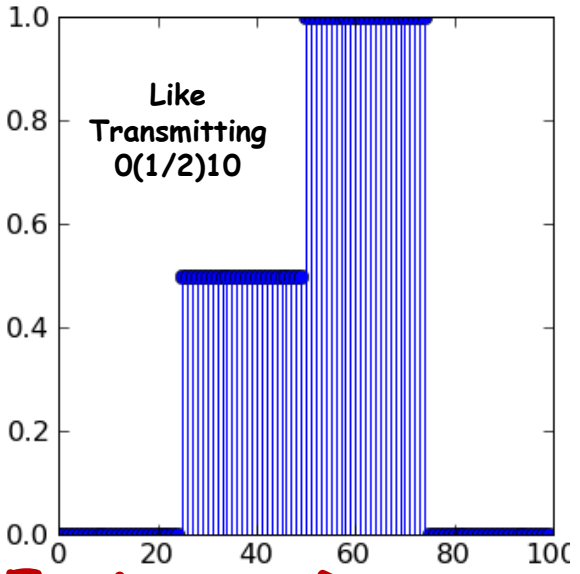




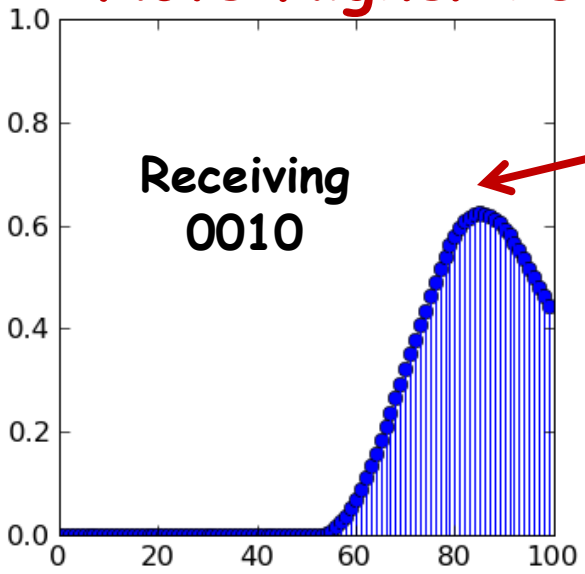
Bit 2 is known (0), can add pulse

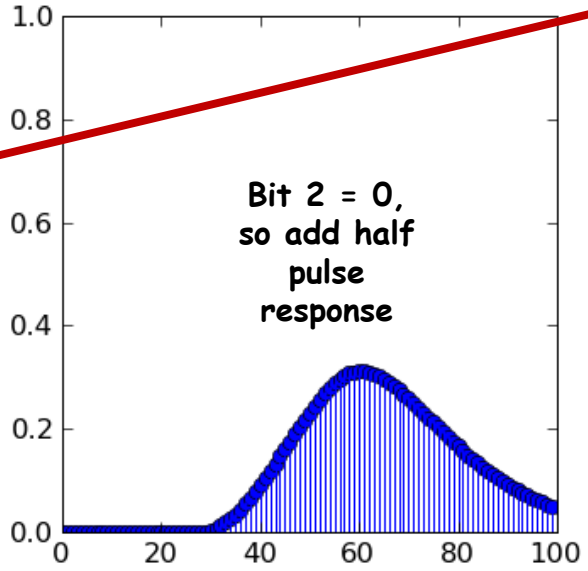


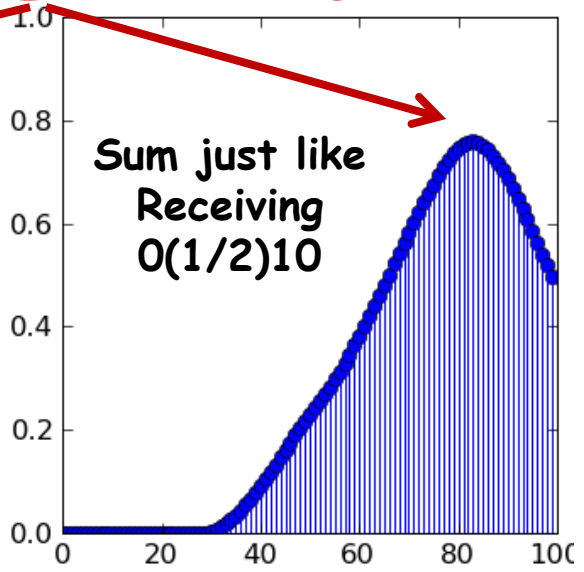




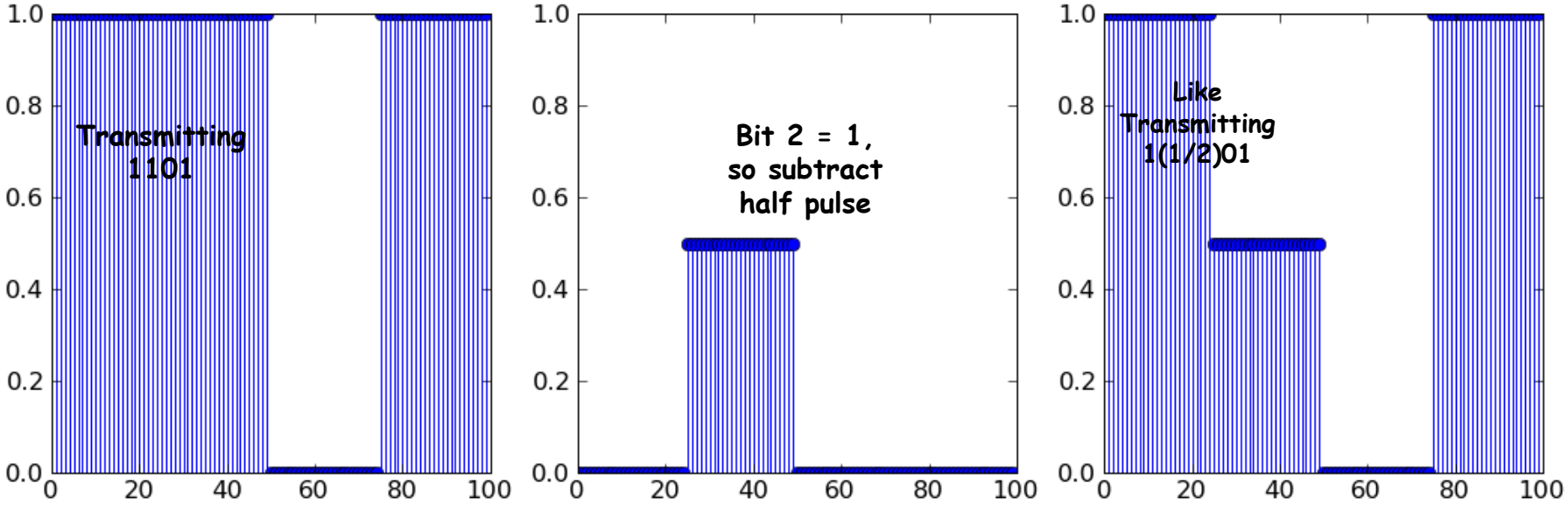
Note Higher Peak – Third Bit One Easier to Detect



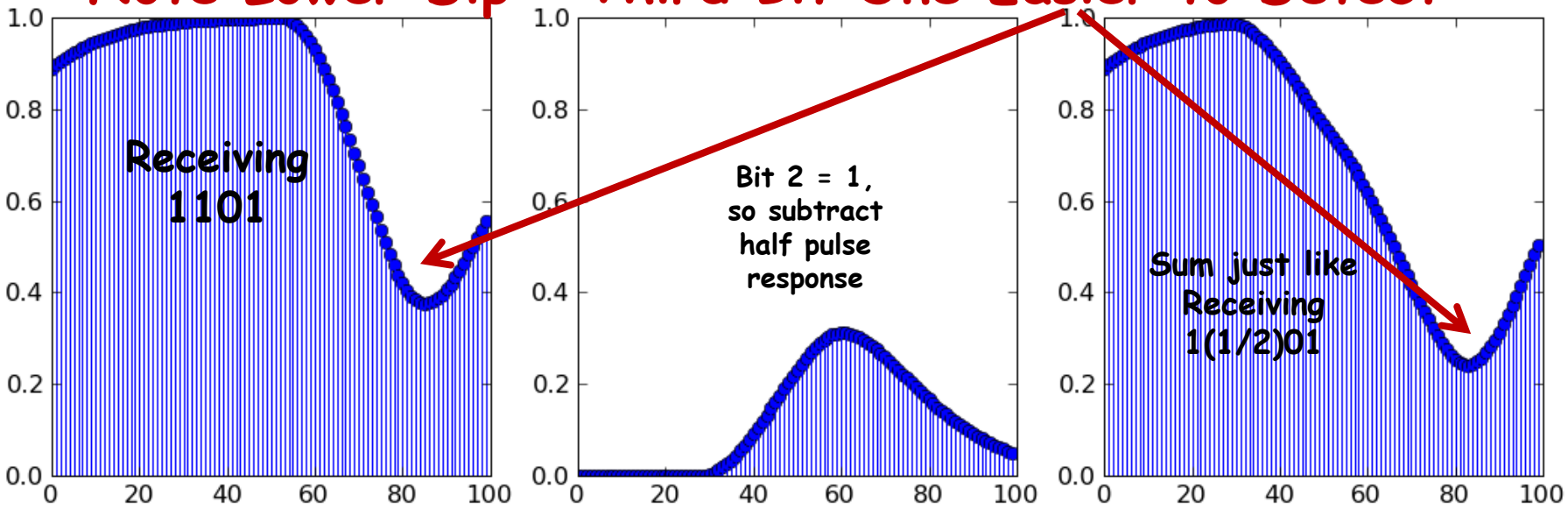




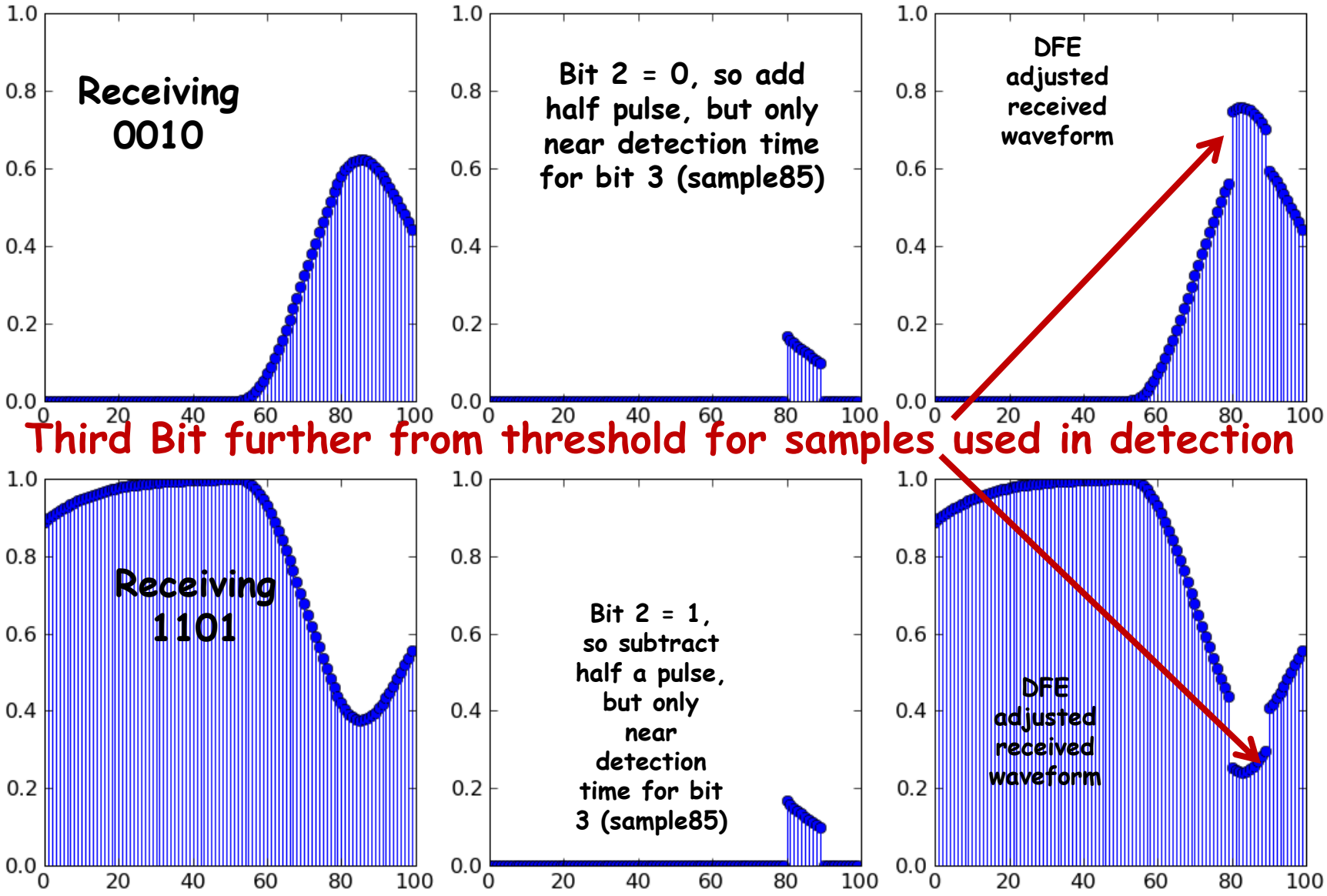
2nd Case: Bit 2 is known (1), subtract pulse



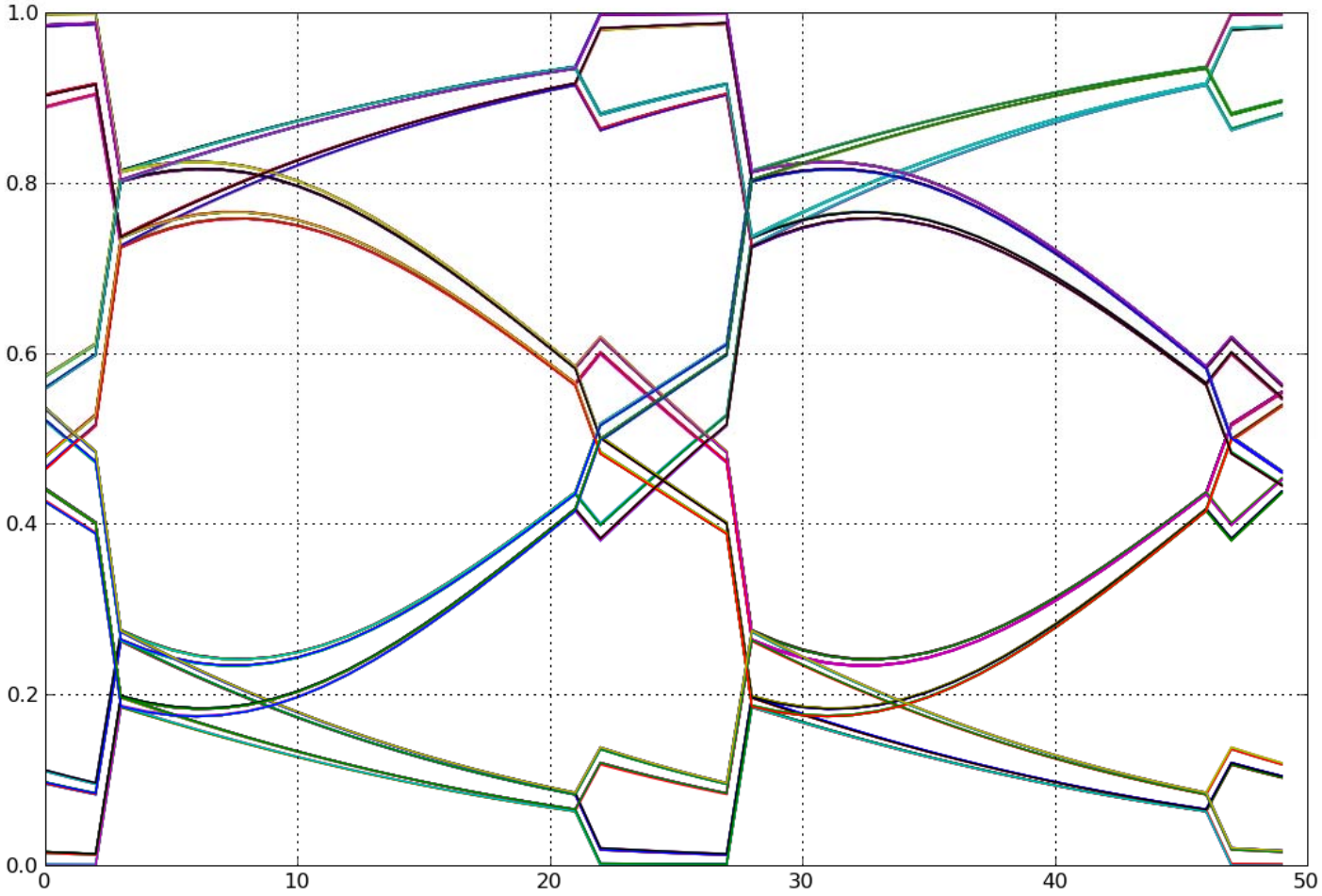
Note Lower Dip – Third Bit One Easier to Detect



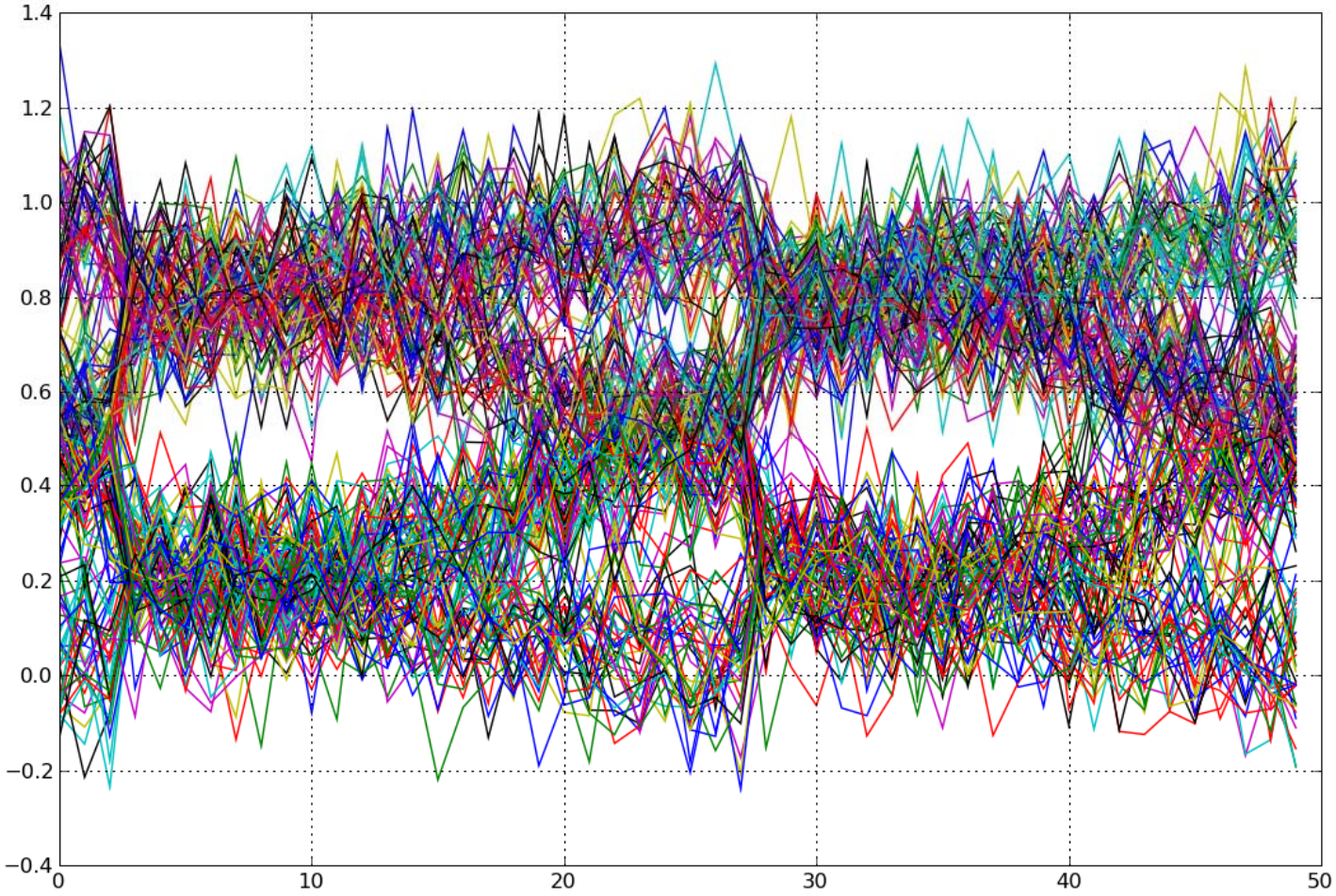
Only need to adjust near detection sample



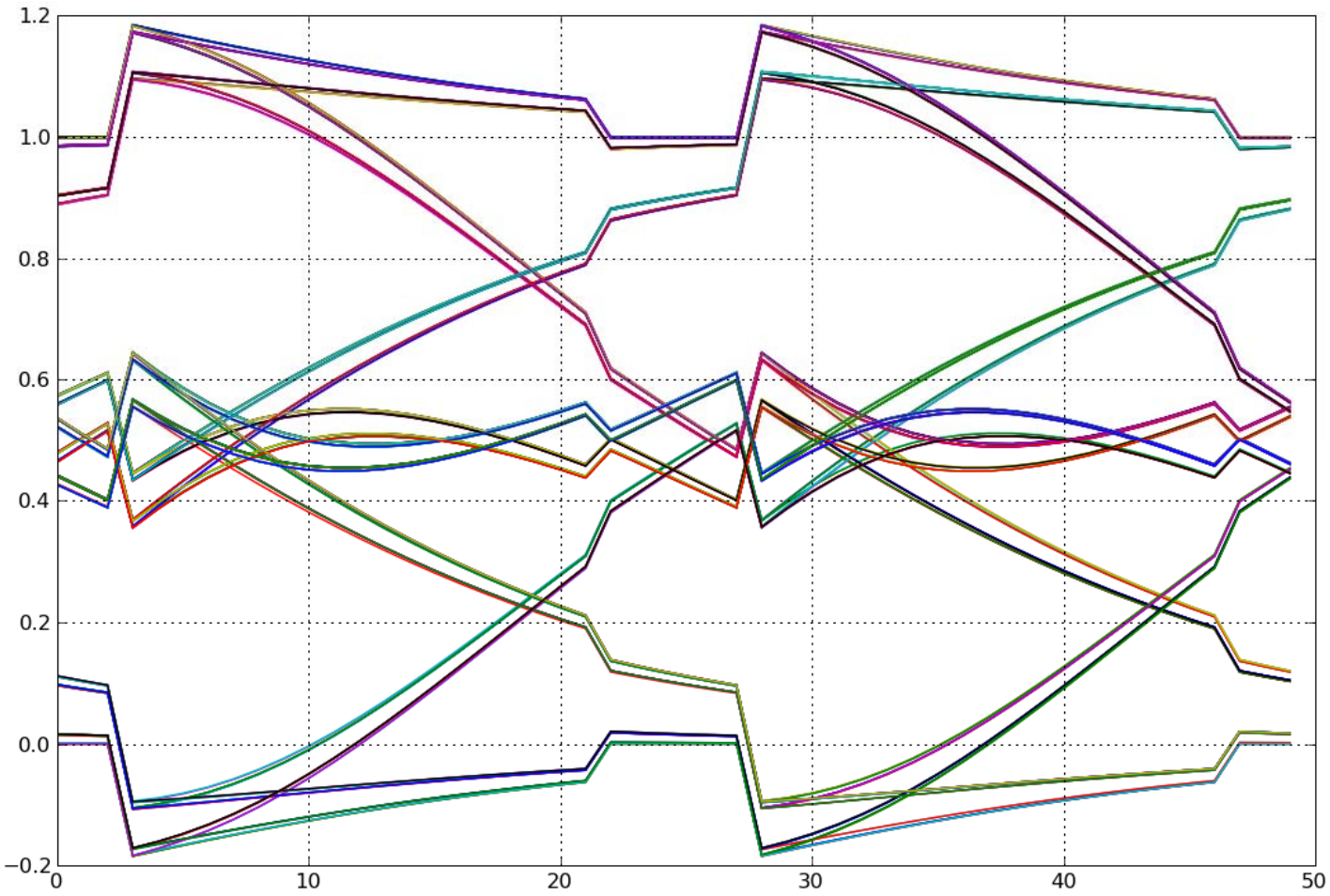
Eye Diagram with Ideal DFE (from 3-22)



Eye Diagram with DFE and Noise

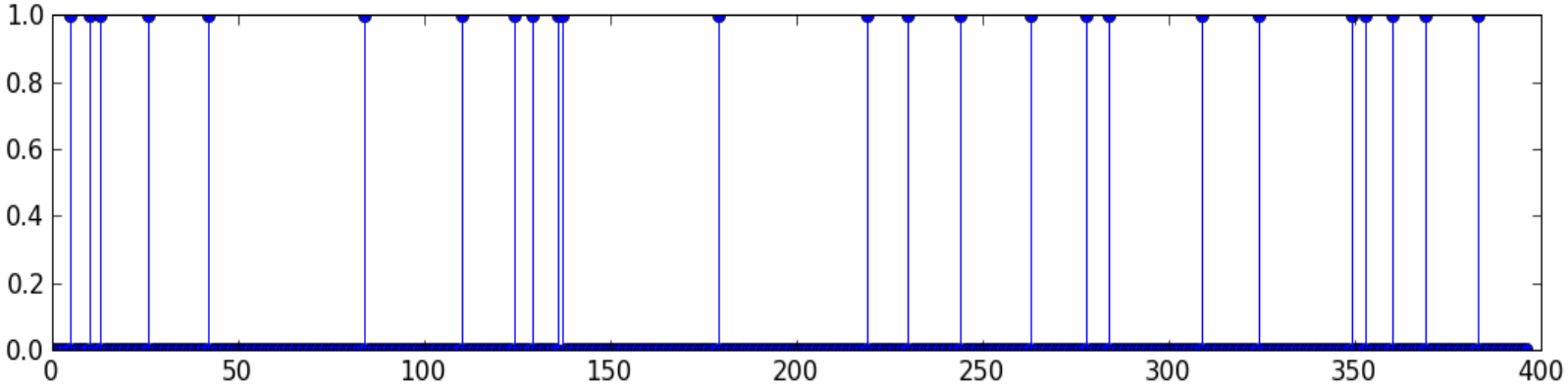


Eye Diagram with Incorrect DFE

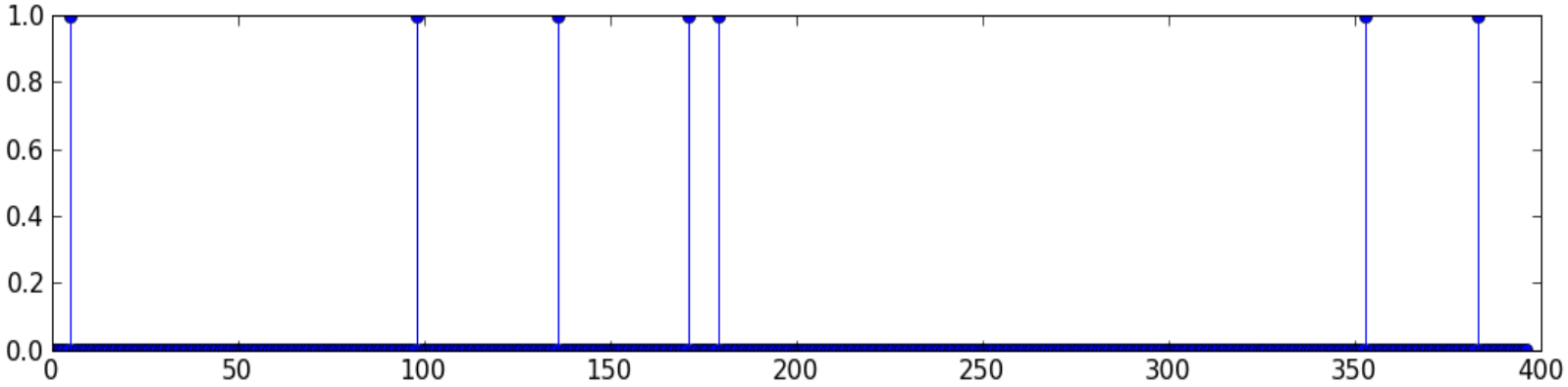


Eye Diagram with DFE and Noise

No DFE



Ideal DFE



Real DFE