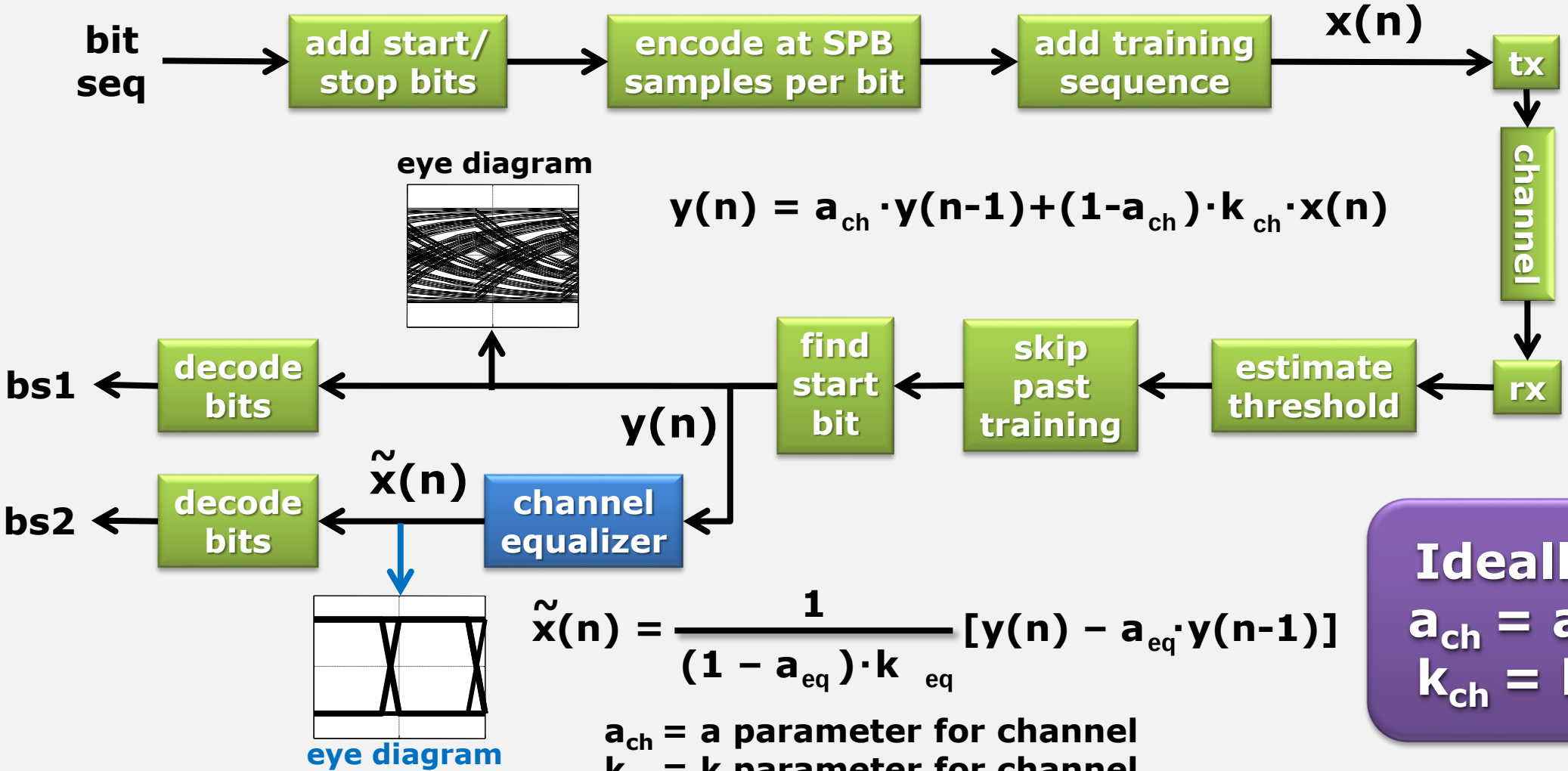
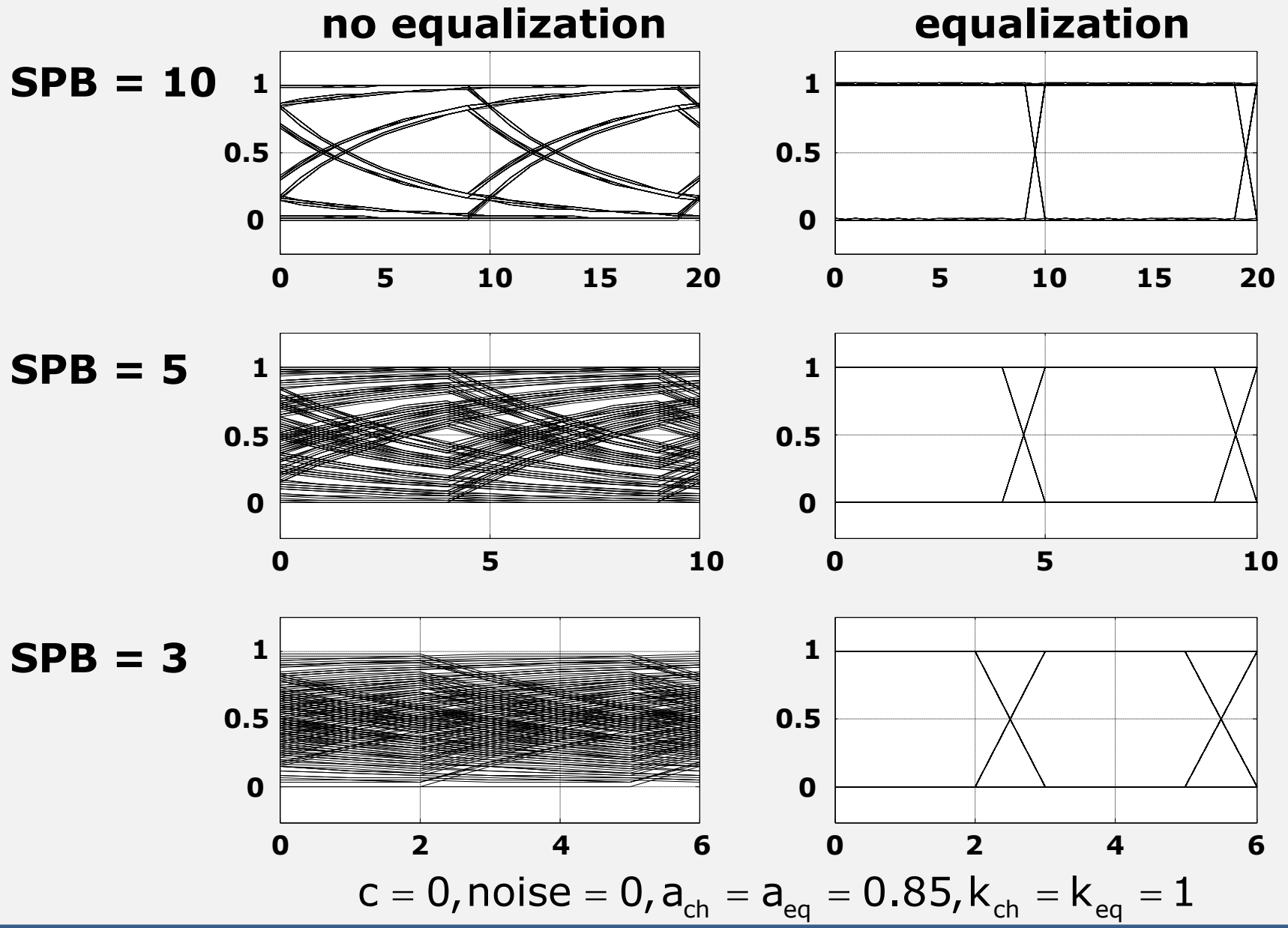
Effect of Equalization on the Eye Diagram

Adding the Equalizer

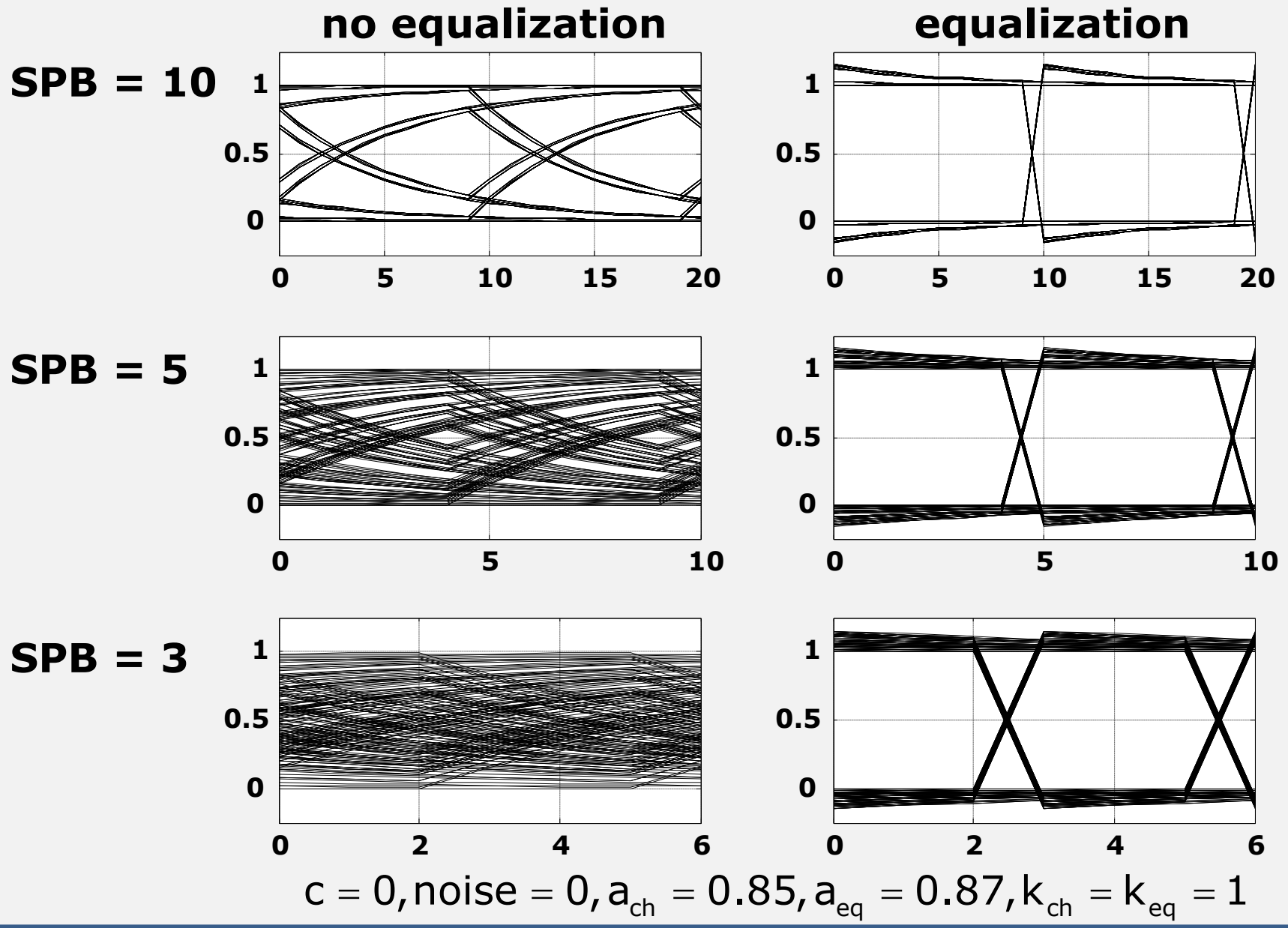


Equalization (no noise, $a_{eq} = a_{ch}$)



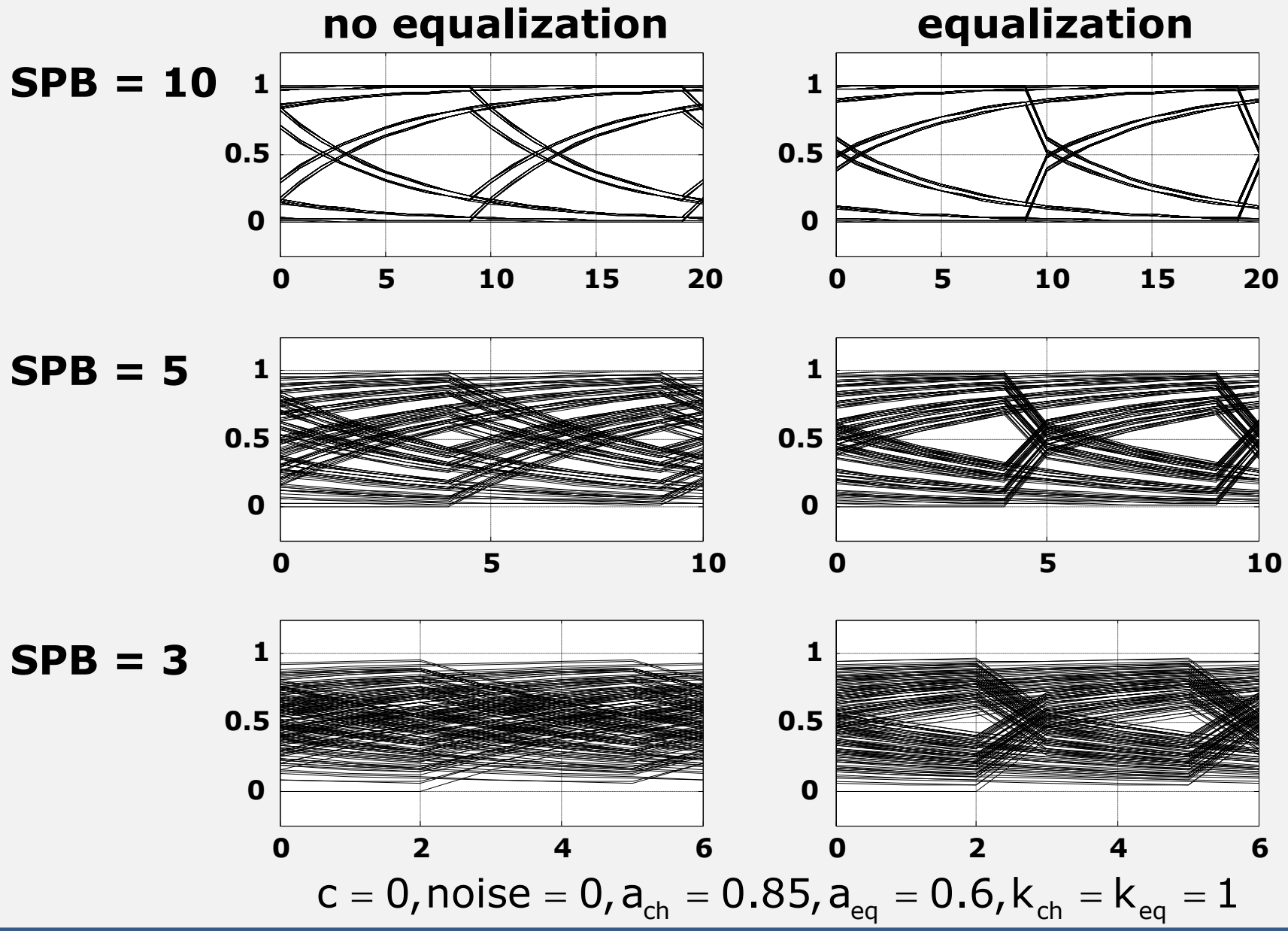
$$c = 0, noise = 0, a_{ch} = a_{eq} = 0.85, k_{ch} = k_{eq} = 1$$

Equalization (no noise, $a_{eq} > a_{ch}$)



$c = 0, noise = 0, a_{ch} = 0.85, a_{eq} = 0.87, k_{ch} = k_{eq} = 1$

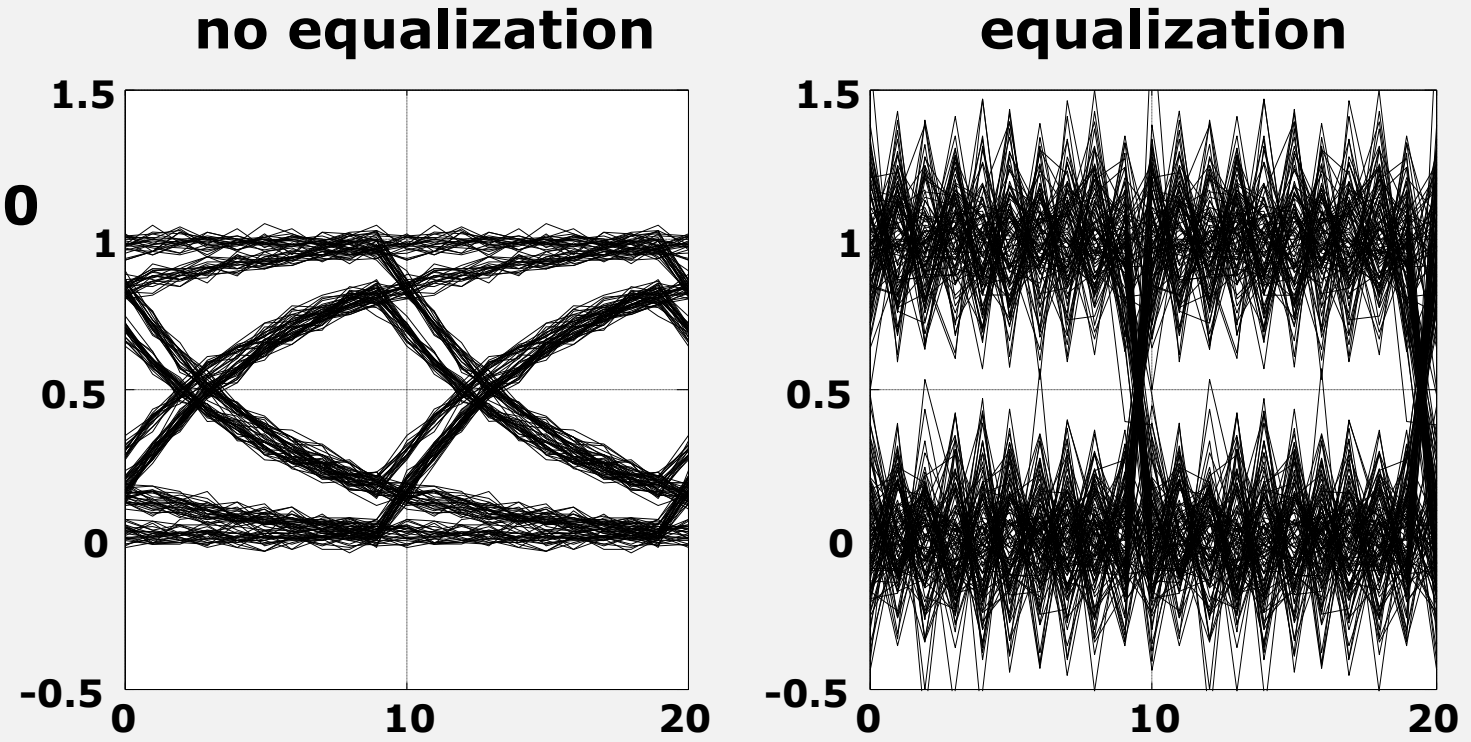
Equalization (no noise, $a_{eq} < a_{ch}$)



$c = 0, noise = 0, a_{ch} = 0.85, a_{eq} = 0.6, k_{ch} = k_{eq} = 1$

Equalization (noise, $a_{eq} = a_{ch}$)

SPB = 10



$$c = 0, \text{noise} \neq 0, a_{ch} = a_{eq} = 0.87, k_{ch} = k_{eq} = 1$$

- Although equalization has "opened" the eye width, it has also increased the size of the noise, "closing" the eye height. Thus, with noise, we need to be careful.

Summary

- Using a model of the relationship between the channel input and the channel output, we have developed an equalizer that "undoes" the effect of the channel.
- This "opens" the eye, which "closes" due to intersymbol interference.
- The equalizer is robust (still works) even if the parameters of the channel are not correctly estimated.
- However, it may magnify the effect of noise.