

Stochastic mass action switch summary

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1 Bistable

The model consists of asymmetric parameters for gene expression and repression. We search for the parameter space that makes this model tristable. Example phase plots of the resulting tristable switches are shown below. 1000 particles were used in these simulations.

Table 1: priors of bistable switches

parameter	range
geA	0-10
repA	0-10
rep_r	0-10
dim	7-15
dim_r	0-10
deg	0-10
deg_dim	0-1
geB	0-10
repB	0-10
aut_1	0-10
aut_2	0-10
aut_3	0-10

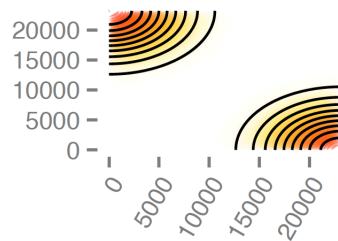


Figure 1: Phase plot of the tristable switch.

The posterior distributions of the two switches:

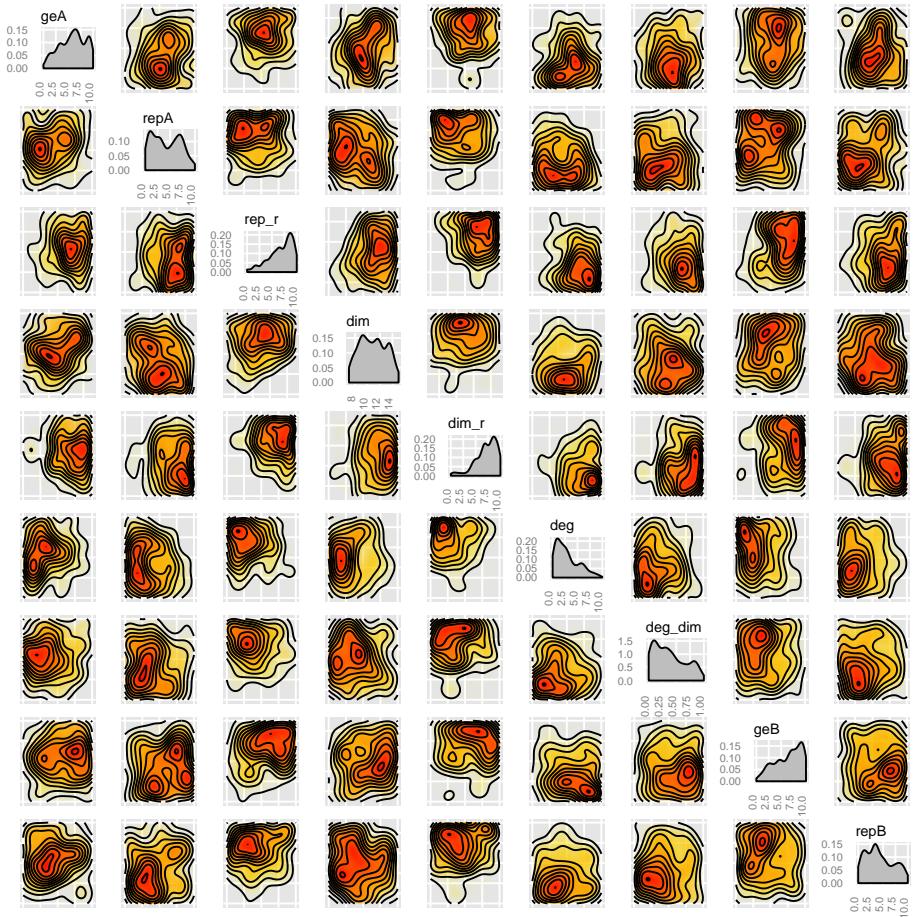


Figure 2: Posterior of simple switch

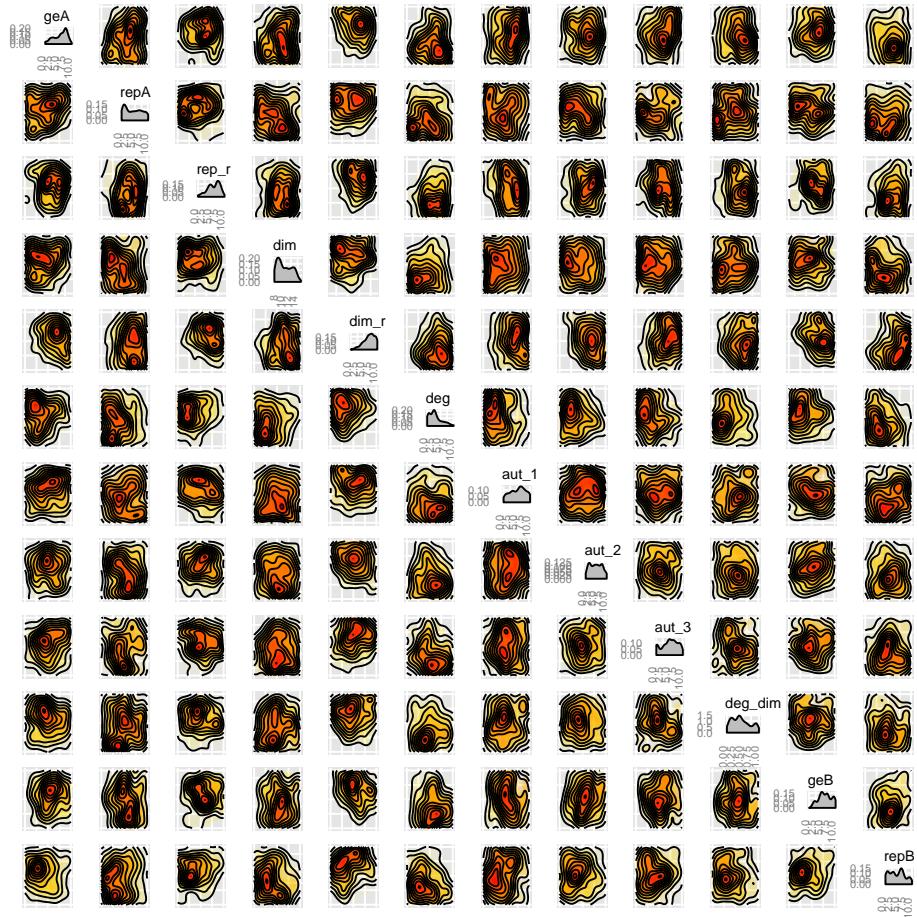


Figure 3: Posterior of switch with double positive autoregulation

The robustness of the two switches was compared and no difference was found between the two:

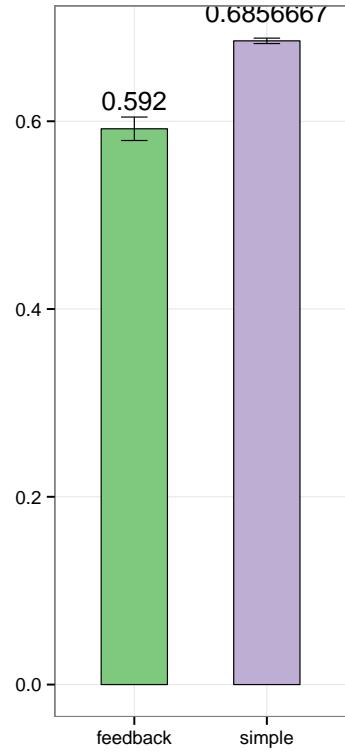


Figure 4: Robustness comparison of the tristable switches. There is no significant difference between the two.

2 Tristable

The model consists of asymmetric parameters for gene expression and repression. We search for the parameter space that makes this model tristable. Example phase plots of the resulting tristable switches are shown below. 1000 particles were used in these simulations.

Table 2: priors of tristable switches

parameter	range
geA	0-10
repA	0-10
rep_r	0-10
dim	0-3
dim_r	0-10
deg	0-10
deg_dim	0-1
geB	0-10
repB	0-10
aut_1	0-10
aut_2	0-10
aut_3	0-10

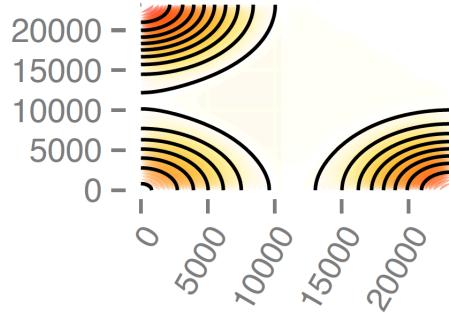


Figure 5: Phase plot of the tristable switch.

The posterior distributions of the two switches:



Figure 6: Posterior of simple switch



Figure 7: Posterior of switch with double positive autoregulation

The robustness of the two switches was compared and no difference was found between the two:

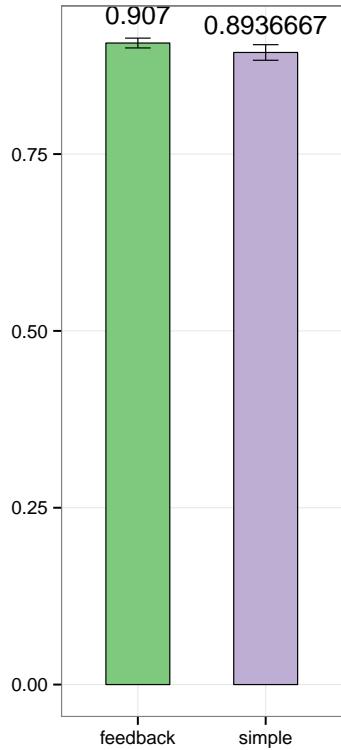


Figure 8: Robustness comparison of the tristable switches. There is no significant difference between the two.

3 FACS fixation

Overnight cultures of pKDL071 and OBX20_PUC were tested for effects of formalin fixation of the detection of GDP fluorescence on the FACS. pKDL071 cultures were induced with aTc overnight to make them produce GFP. Half of them were further induced with IPTG in the morning to lower the levels of GFP and test the effects of formalin in very low detection environments. Prior to FACS, two samples of 200ul were taken from each culture and spun down. One sample from each culture was resuspended in PBS. The other sample from each culture was resuspended in PBS + 3% formalin. All samples were analysed in FACS. Results are shown below:

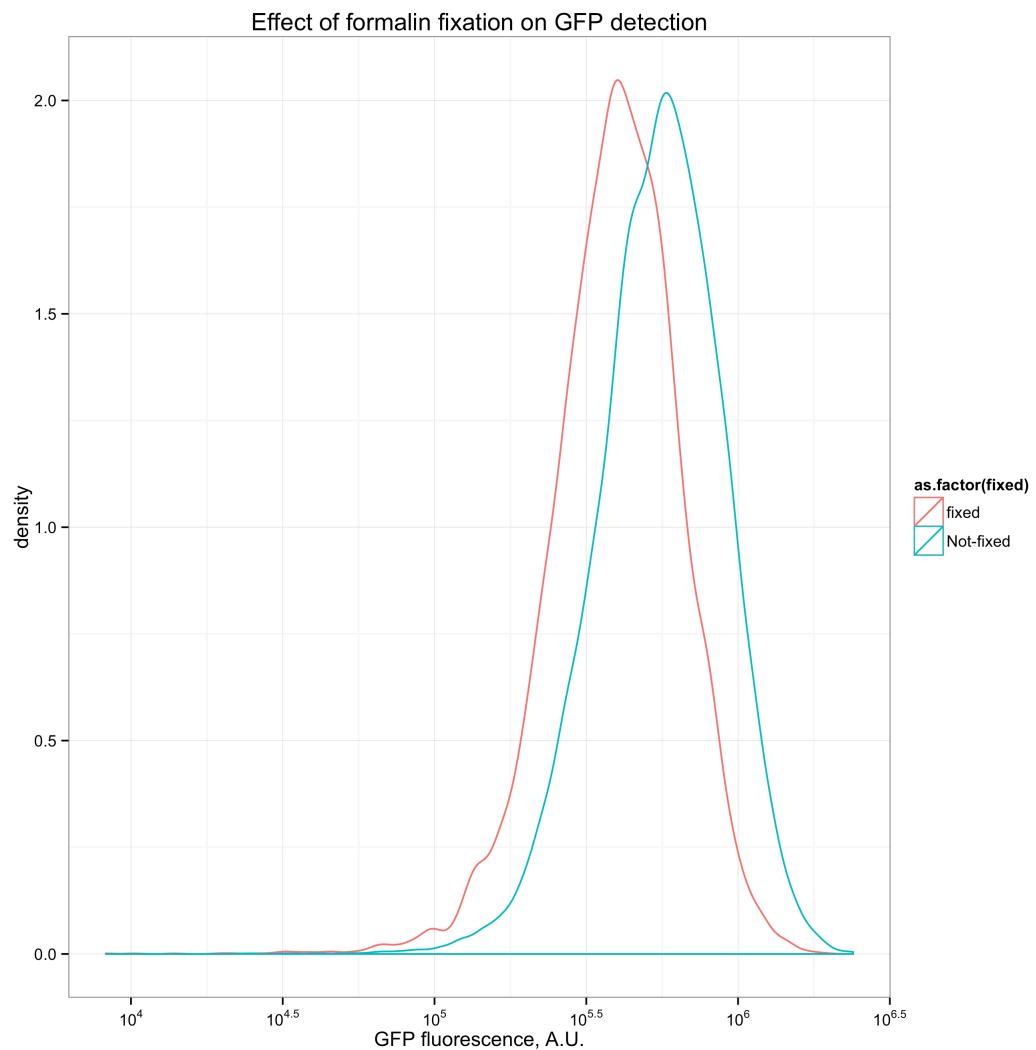


Figure 9: Effects of formalin fixation on GFP detection on OBX20_PUC cells.

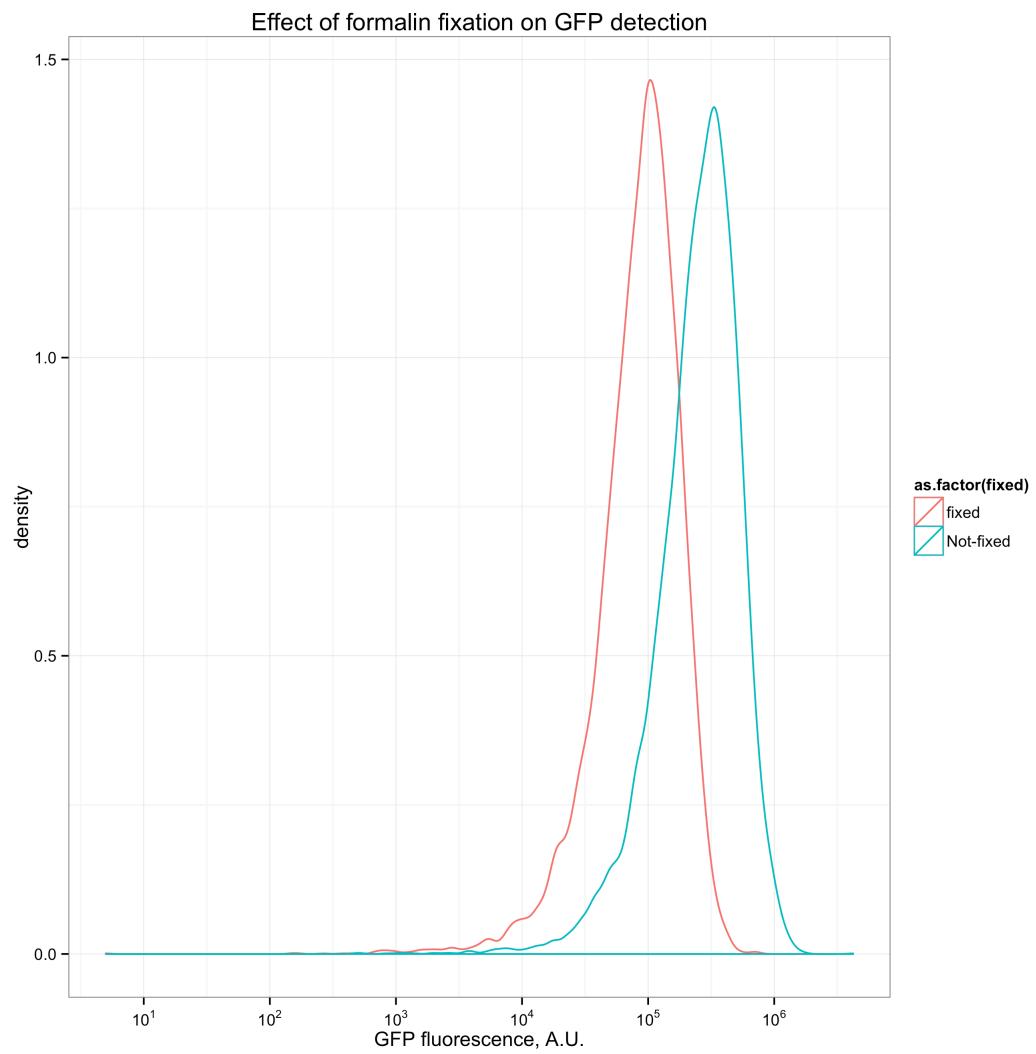


Figure 10: Effects of formalin fixation on GFP detection on pKDL071 cells induced with aTc.

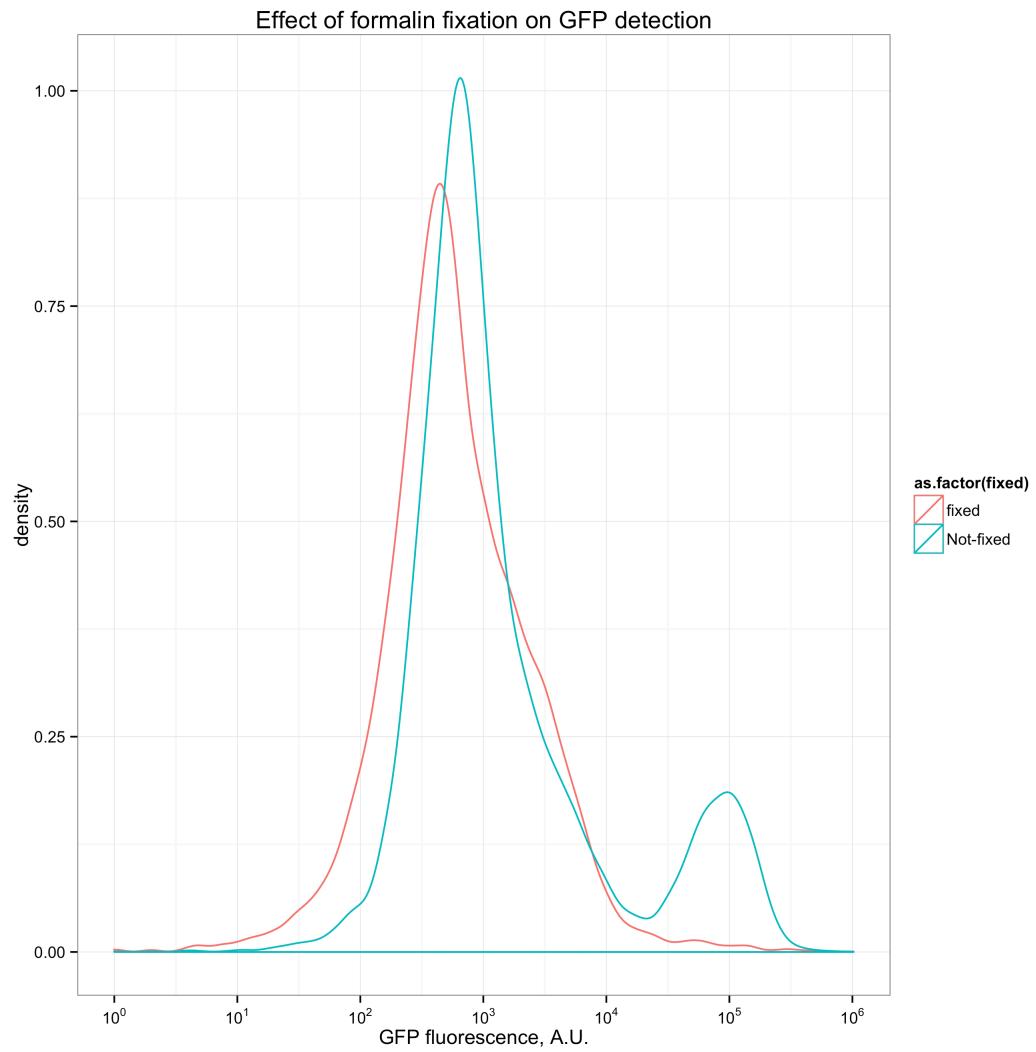


Figure 11: Effects of formalin fixation on GFP detection on pKDL071 cells induced with IPTG.