Supporting Information for:

Cooperativity to increase Turing pattern space for synthetic biology.

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Supplementary figures

$$f(a,h) = \frac{a^n}{(1+(h/k_h)^m)(1+(a/k_a)^n)}$$

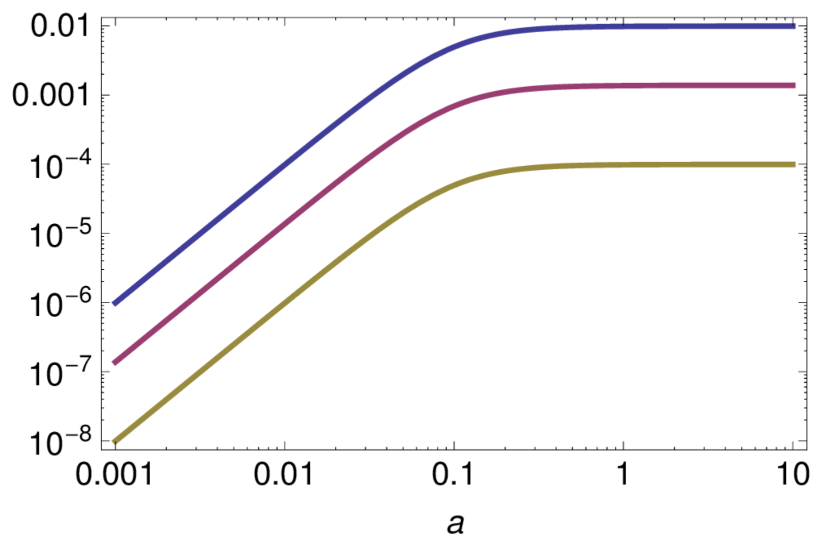

Fig S1: Alternative regulatory function. The plots shows the behaviours of an alternative regulatory function, where the inhibitor blocks the activation pathway, decreasing the effective production rates, for three different concentrations of inhibitor h: 0.01 (blue), 0.25 (red), 1.0 (brown). $n = 2$, $k_a = k_h = 0.1$.

```
input[x_] := 0.01 * Exp[- (x - 50) ^2 / 0.5];
funx5 = 0.9060676820636298; funy5 = 1.1325846025795372;
(* funx5 and funy5 were obtained by solving:
NSolve[{x^n+y^n-cai x^(n-1)==-1,y==chi x/(cai ui)},{x,y},Reals],
with n=6;chi=6;cai=6.;ui=.8; and taking the first solution *)
ui = 0.8; di = 0.75; cai = 6; chi = 6; n = 6;
cur15 = NDSolve[{
    D[u[t, x], t] == di D[u[t, x], x, x] +
      cai u[t, x] ^n / (1 + u[t, x] ^n + v[t, x] ^n) - u[t, x], D[v[t, x], t] ==
     D[v[t, x], x, x] + chi u[t, x] ^n / (1 + u[t, x] ^n + v[t, x] ^n) - ui v[t, x],
    u[0, x] == funx5 + input[x], v[0, x] == funy5, u[t, 0] == u[t, 100],
    v[t, 0] == v[t, 100]}, {u, v}, {t, 0, 50}, {x, 0, 100}, MaxStepSize → 0.005];
Plot3D[Evaluate[u[t, x] /. cur15[[1, 1]]], {t, 0, 50}, {x, 0, 100},
 MaxRecursion → 5, AxesLabel → {Style["Time", FontFamily → "Helvetica", Italic, 22],
   Style[Rotate["Space", 60 Degree], FontFamily → "Helvetica", Italic, 22],
   Style["a", FontFamily → "Times", Italic, 22]}, BoxStyle → Thickness[0.0025],
 PlotStyle → Directive[Specularity[Yellow, 30], Opacity[0.9], Orange],
 PlotRange → All, LabelStyle → Directive[FontFamily → "Helvetica", 16],
 PlotPoints → 40, ImageSize → 600, Mesh → None]
```

Code Mathematica code and values of parameters used to obtain the 3D surface displayed in Fig. 8B. You will need a Wolfram Mathematica kernel to run the code (http://www.wolfram.com/mathematica/).