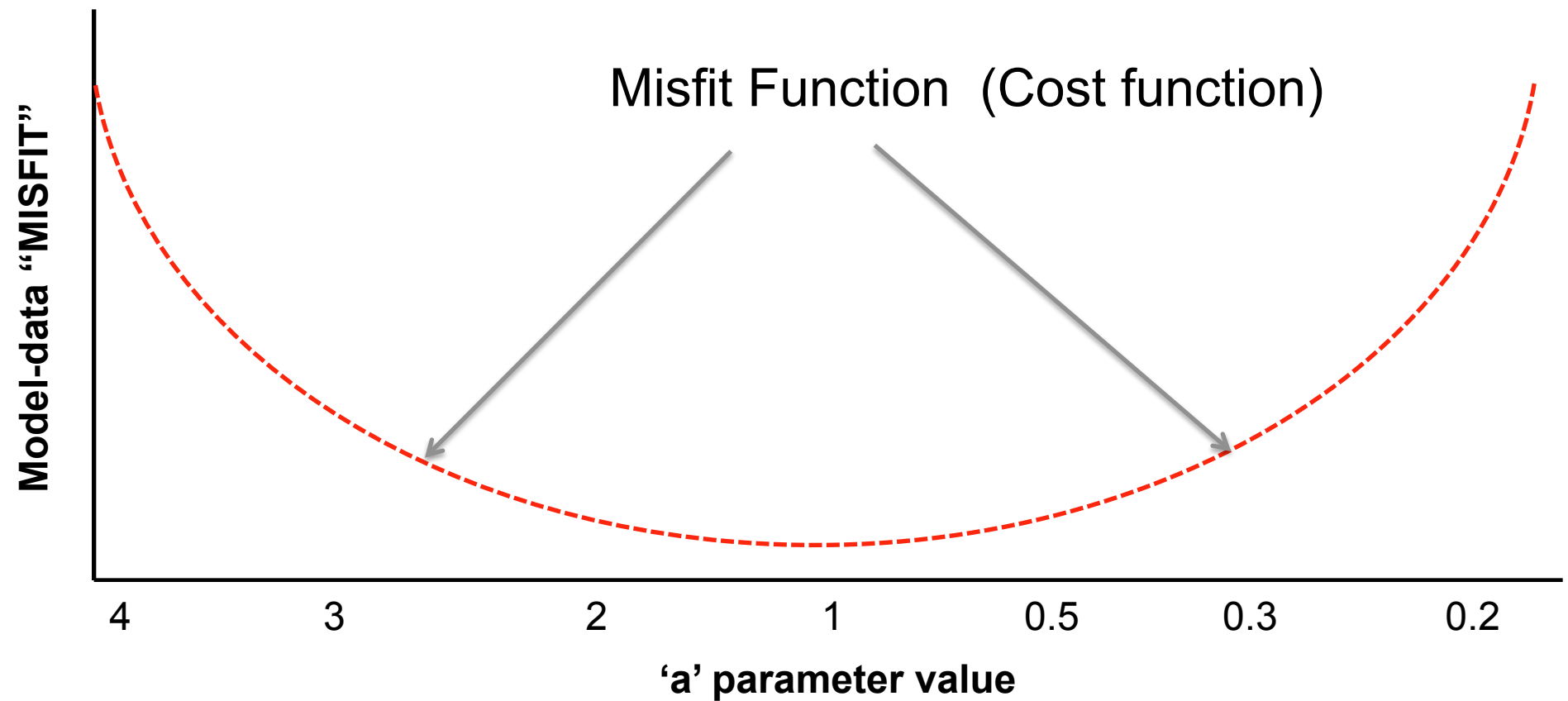
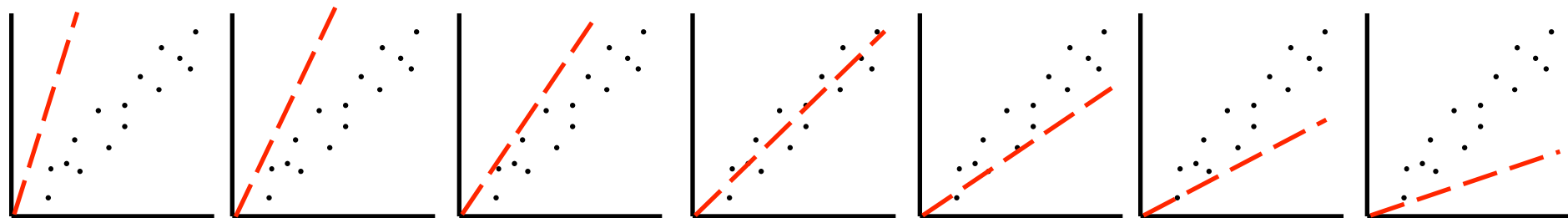
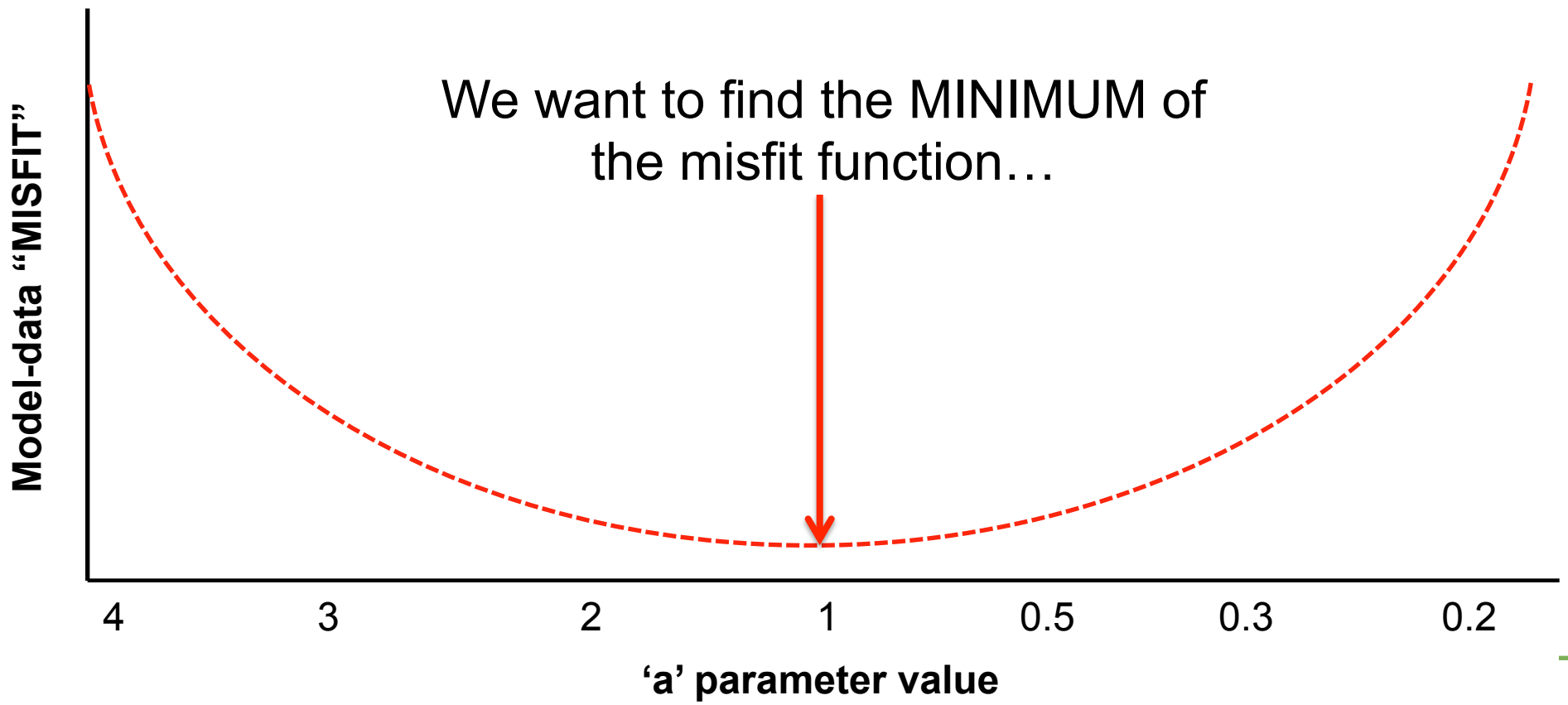
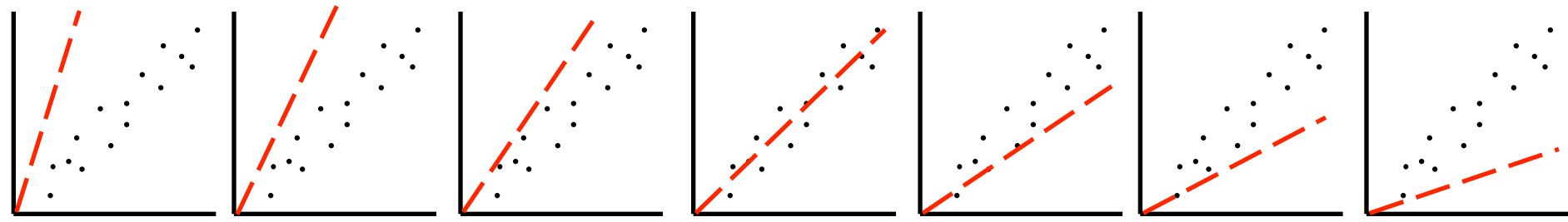


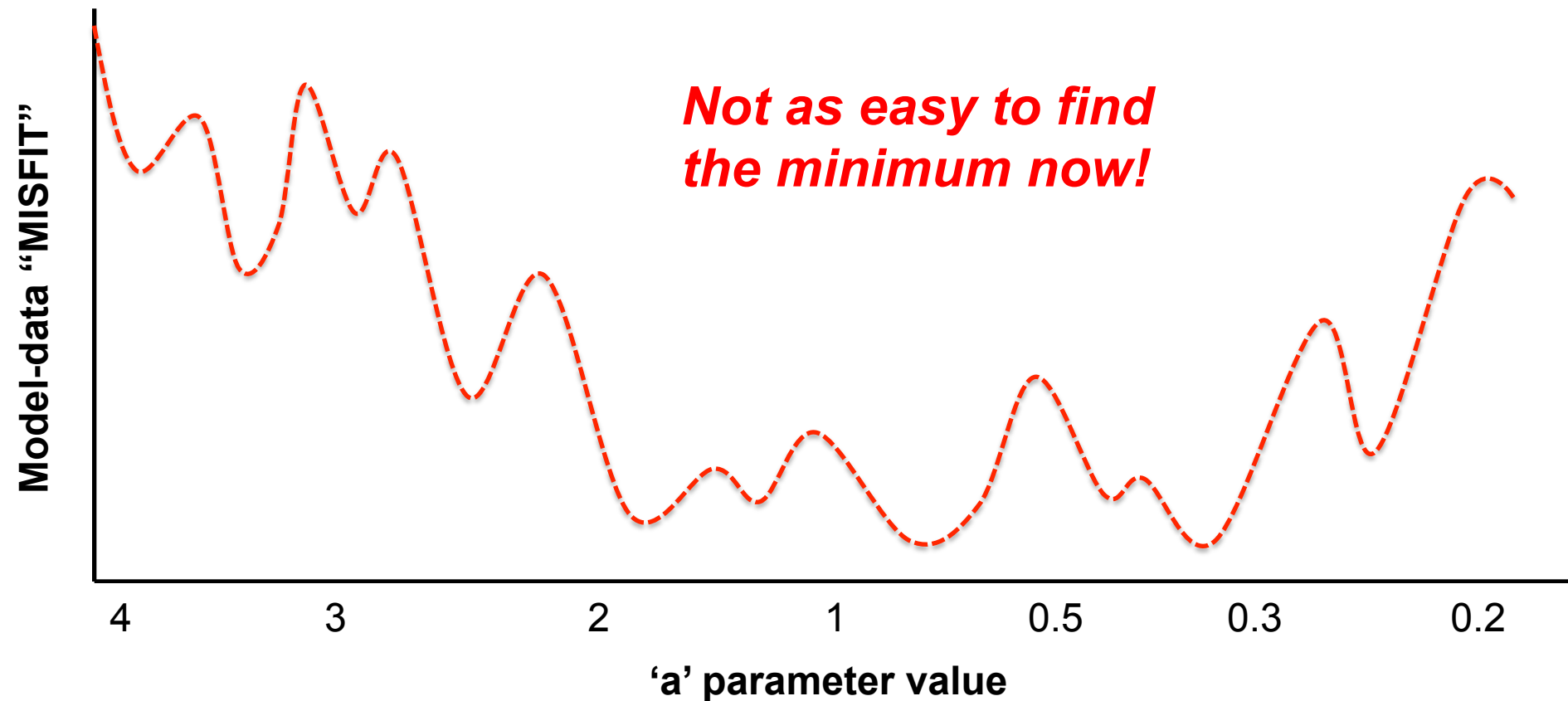
Very simple case: $y = ax$ → Try to estimate parameter 'a'



Very simple case: $y = ax \rightarrow$ Try to estimate parameter 'a'



- We want to find the MINIMUM of the misfit function...
- BUT! Your misfit function may look like this...!!
- How do we find the minimum numerically?



➤ “Gradient-descent” methods

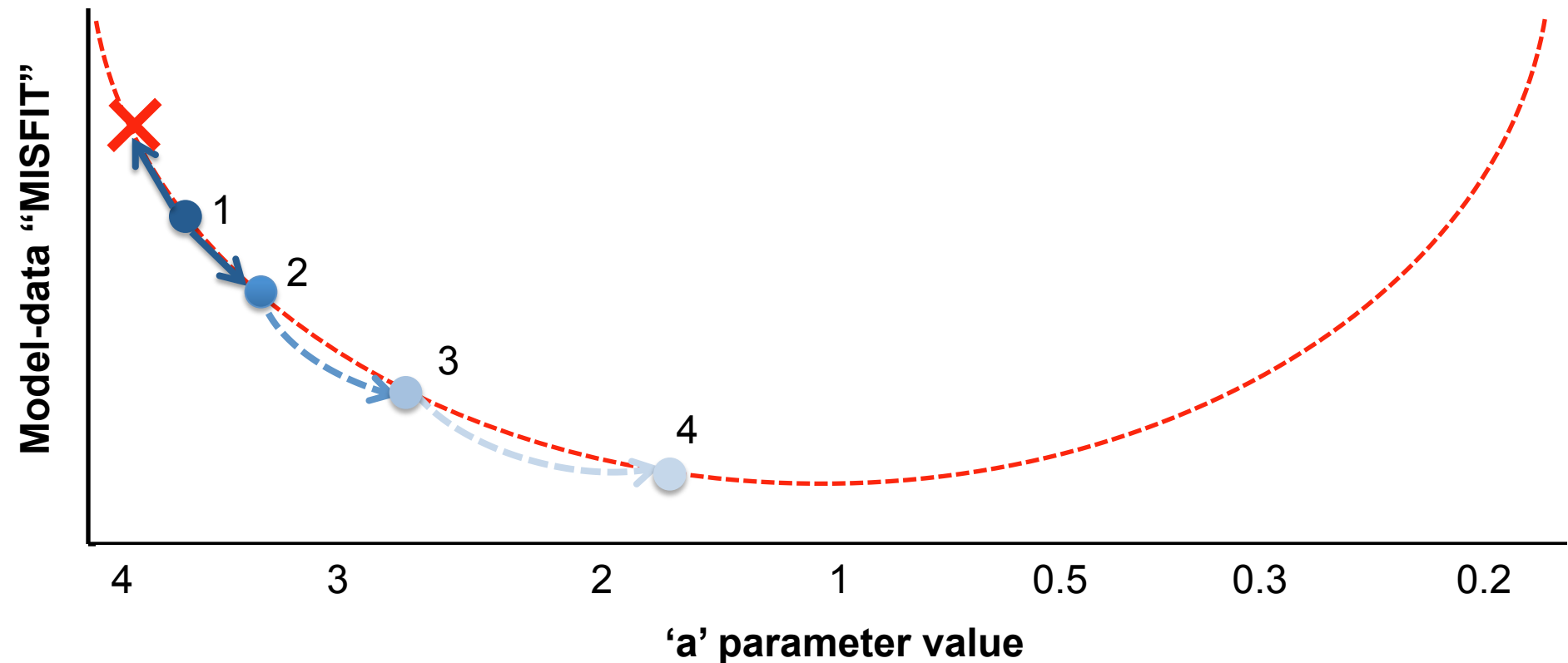
➤ Describe a “cost function”:

$$J(x) = \underbrace{\frac{1}{2}(\mathbf{H} \cdot \mathbf{x} - \mathbf{y})^T \mathbf{R}^{-1} (\mathbf{H} \cdot \mathbf{x} - \mathbf{y})}_{\text{Misfit between obs. and model (with given parameter value)}} + \underbrace{\frac{1}{2}(\mathbf{x} - \mathbf{x}_b)^T \mathbf{B}^{-1} (\mathbf{x} - \mathbf{x}_b)}_{\text{Misfit between parameter value and its prior}}$$

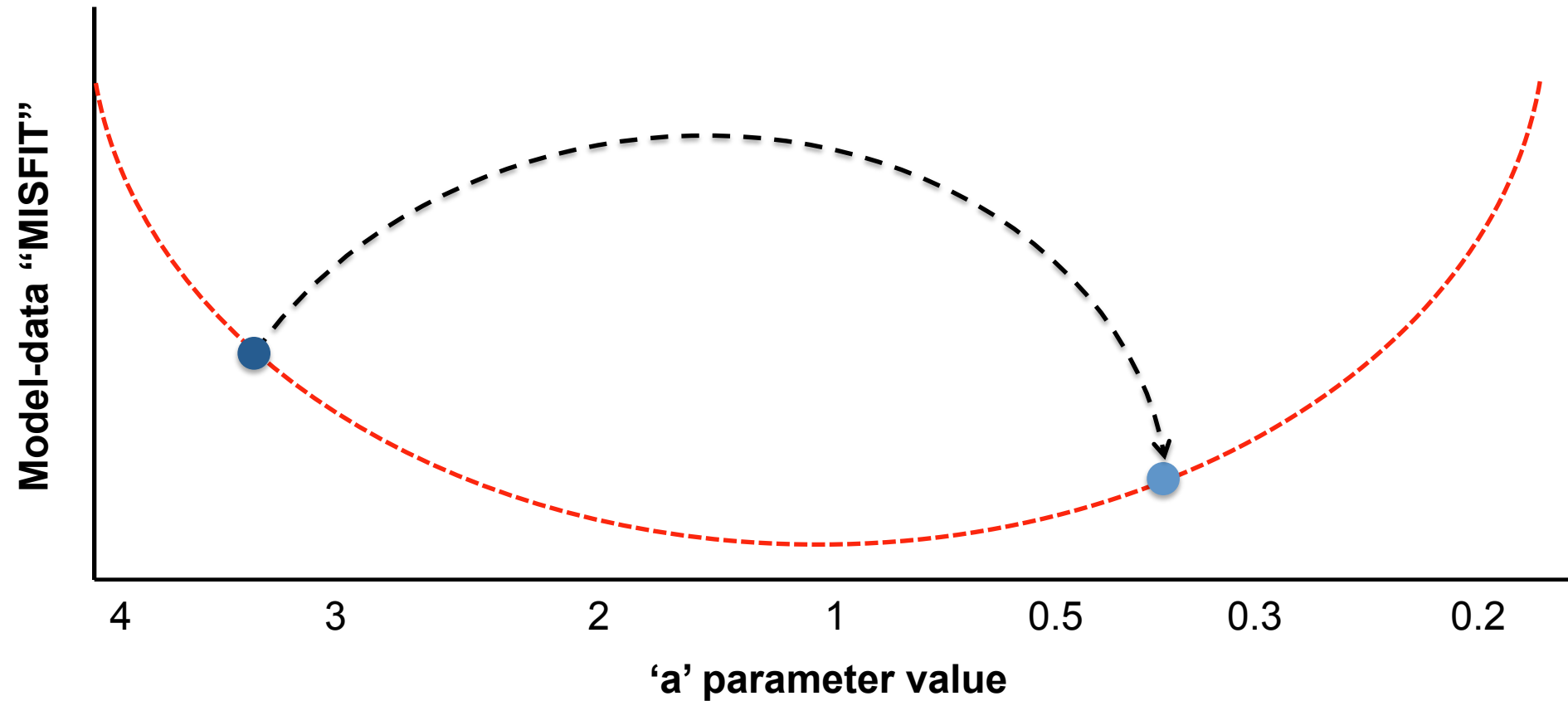
Misfit between obs. and model (with given parameter value)

Misfit between parameter value and its prior

➤ Calculate the first derivative of the cost function in order to calculate the gradient...



- “Global search” methods (Genetic algorithm, Metropolis Hastings MCMC etc)
- Search parameter space...
- At each iteration calculate the misfit and accept or reject parameter



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