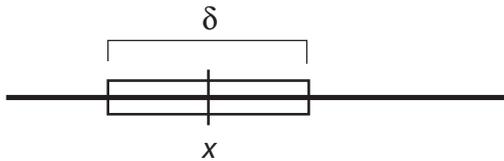


The most common proposal types used by MrBayes 3

**Sliding Window Proposal**



New values are picked uniformly from a sliding window of size  $\delta$  centered on  $x$ .

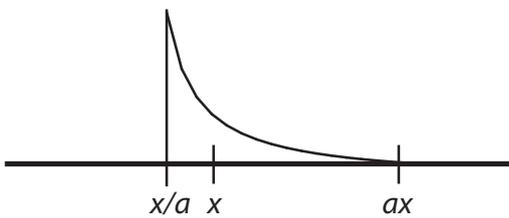
Tuning parameter:  $\delta$

Bolder proposals: increase  $\delta$

More modest proposals: decrease  $\delta$

*Works best when the effect on the probability of the data is similar throughout the parameter range*

**Multiplier Proposal**



New values are picked from the equivalent of a sliding window on the log-transformed  $x$  axis.

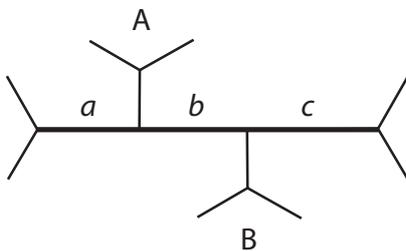
Tuning parameter:  $\lambda = 2 \ln a$

Bolder proposals: increase  $\lambda$

More modest proposals: decrease  $\lambda$

*Works well when changes in small values of  $x$  have a larger effect on the probability of data than changes in large values of  $x$ . Example: branch lengths.*

**LOCAL**



Three internal branches -  $a$ ,  $b$ , and  $c$  - are chosen at random. Their total length is changed using a multiplier with tuning parameter  $\lambda$ .

One of the subtrees A or B is picked at random.

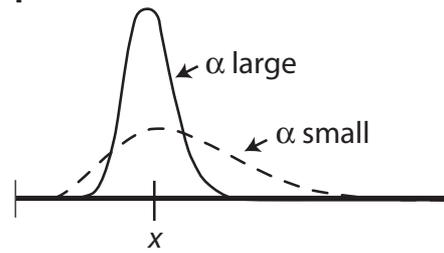
It is randomly reinserted on  $a + b + c$  according to a uniform distribution

Bolder proposals: increase  $\lambda$

More modest proposals: decrease  $\lambda$

Changing  $\lambda$  has little effect on the boldness of the proposal

**Dirichlet proposal**



New values are picked from a Dirichlet (or Beta) distribution centered on  $x$ .

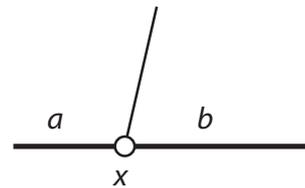
Tuning parameter:  $\alpha$

Bolder proposals: decrease  $\alpha$

More modest proposals: increase  $\alpha$

*Works well for proportions, such as revmat and statefreqs.*

**Node Slider**



Two adjacent branches  $a$  and  $b$  are chosen at random. The length of  $a + b$  is changed using a multiplier with tuning parameter  $\lambda$ .

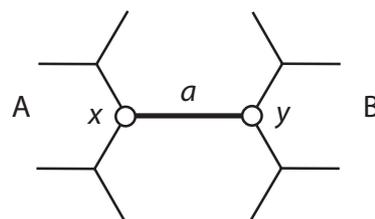
The node  $x$  is randomly inserted on  $a + b$  according to a uniform distribution

Bolder proposals: increase  $\lambda$

More modest proposals: decrease  $\lambda$

The boldness of the proposal depends heavily on the uniform reinsertion of  $x$ , so changing  $\lambda$  may have limited effect

**Extending TBR**



An internal branch  $a$  is chosen at random

The length of  $a$  is changed using a multiplier with tuning parameter  $\lambda$

The node  $x$  is moved, with one of the adjacent branches, in subtree A, one node at a time, each time the probability of moving one more branch is  $p$  (the extension probability).

The node  $y$  is moved similarly in subtree B.

Bolder proposals: increase  $p$

More modest proposals: decrease  $p$

Changing  $\lambda$  has little effect on the boldness of the proposal.