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.

**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**

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.

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.