1. Introduction
   1. MCMC
   2. Visualizing convergence problems
      1. LnL plots, why they’re not informative
         1. In space with multiple optima, LnLs may look like convergence when in fact you’re stuck on a local optimum
         2. Even if you have a single optimum, accurate posteriors require getting a decent sampling of the set of all plausible trees. More taxa = more trees adjacent to the optimum, which means more samples needed to get the same proportion of trees adjacent to the optimum. Ergo convergence can take a while even in simple treespaces with a large number of taxa.
      2. Posterior plots
         1. Cumulative
            1. Actually visualize the quantity of interest, i.e., topology.
            2. May take significantly longer to level off, but that is a GOOD thing.
            3. Sample plot of LnL vs. cumulative?
         2. Sliding window
            1. Useful for visualizing whether the chain is mixing well
            2. Cool plot
      3. TreeSetViz style plotting
         1. Collapses treespace to two dimensions, looks at chain behavior over time
         2. Useful for visualizing burnin, exploration of treespace, and differences between chains
         3. Cool plot
      4. Compare N plots
         1. Compare posteriors for clades from two or more runs
         2. Useful for visualizing agreement/disagreement between chains
         3. When applied to multiple chains on the same data, useful for highlighting problems with convergences
         4. When applied to chains from different data, useful for highlighting differences in the support for different clades
         5. Cool plot
   3. Tree ESS
      1. Autocorrelation in MCMC chain can lead to non-independence of trees/parameters
      2. Programs exist to look at ESS of parameters but not topology
      3. RWTY implements a new method for approximating ESS on tree topology
      4. Cool plot
2. RWTY
   1. Data types
      1. Trees, .p files detected automatically when available. Basically anything ape can handle.
   2. Interface
      1. Primary user interface is through function analyse.rwty
         1. Single chain with no p file outputs cumulative, sliding window, Tree ESS, and TreeSetViz
            1. If a p file is found, LnL plot is returned as well
         2. If multiple chains are sent in a list, analyse.rwty automatically does Compare N analysis and multiple chain TreeSetViz
   3. Return value
      1. RWTY object containing tables, plots, and summary statistics