

## General Definitions for *structure* Demonstration

**Burn-In:** The term burn-in, as used in this lecture, is associated with the practice of throwing away some iterations at the beginning of a Markov Chain Monte Carlo (MCMC) run. The burn-in concept indicates that one starts at some defined place, say at  $x$ , then you run the Markov chain for  $n$  steps, from which you throw away all the data (no output). This is defined as the *burn-in* period. After the burn-in, the program is run normally, using each iterate in the MCMC calculations.

**Cluster:** A natural subgroup of a population, used for statistical sampling or analysis.

**Degrees of Freedom:** Degrees of freedom are used to estimate variability and are a function of both the number of observations and the number of variables in one's model. In very basic terms, the degrees of freedom measure the amount of information available in the data that can be used to estimate the square of the standard deviation. Another fundamental way of thinking of degrees of freedom is that the value is equal to the number of measurements minus one. Generally speaking, as the number of degrees of freedom increases, the more confidence can be placed in the measurements obtained.

**Markov Chain Monte Carlo Method:** Markov chain Monte Carlo (MCMC) methods attempt to simulate direct draws (conceptually consistent with casting of a die) from complex distributions of interest. MCMC approaches are named thusly because one uses the previous sample values to randomly generate the next sample value, generating a Markov chain (since the transition probabilities between sample values are only a function of the most recent sample value). MCMC is considered to be a general purpose technique for generating fair samples from a probability in high-dimensional space using random numbers drawn from uniform probability in a certain range. The bottom line is that the fair samples generated by MCMC are considered to show what states are typical of the underlying system.