

STANFORD UNIVERSITY  
DEPARTMENT OF STATISTICS  
DEPARTMENTAL SEMINAR

4:15 p.m., Tuesday, February 6, 2001  
Sequoia Hall Rm. 200  
(Cookies at 3:45 in 1st Floor Lounge)

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**The Randomness Recycler:  
A New Technique for Generating Perfect Samples from High Dimensional Distributions**

For many probability distributions of interest, it is quite difficult to obtain samples efficiently. Often, Markov chains are employed to obtain approximately random samples from these distributions. The primary drawback to traditional Markov chain methods is that the mixing time of the chain is usually unknown, making it impossible to determine how close the samples are to the target distribution. Here we present a new protocol, the randomness recycler (RR), that overcomes this difficulty. Unlike classical Markov chain approaches, an RR-based algorithm creates samples drawn exactly from the desired distribution. Other perfect sampling methods such as coupling from the past use existing Markov chains, but RR does away with the traditional Markov chain in favor of a dual chain with absorbing states that are reached with probability equal to the desired distribution. While by no means universally useful, RR does apply to a wide variety of problems. In restricted instances of certain problems, it gives the first expected linear time algorithms for generating samples. RR applies to such diverse problems as self-organizing lists, two sided interval permutations, random independent sets, random colorings, and the random cluster model.