

**Undergraduate Math Club
Fall 2005
2nd floor Nesbitt Common Room
Nov. 3, 4:10-5:00pm
(free pizza and pop, as always)**

**The occasionally
dishonest casino
Professor D. Burns**

Abstract

The dice table at a certain casino is “occasionally dishonest”: they roll a loaded die, but only every so often. How does one tell when the die was loaded? One cannot, of course, if the house’s roller is clever enough in how he switches the die between rolls, but with good probability you can figure this out. This uses Hidden Markov Models, a very useful technique based on Bayes Theorem in probability. The technique was first applied to automated speech recognition, so this talk might alternatively have been titled “Big Brother IS Listening”! One of the biggest applications of these ideas nowadays outside snooping is to molecular biology. Hidden Markov Models are the most widely used method for detecting family features of proteins from genome data: *Nature* is the dishonest casino! We will go over some of this, too.

Alas, we can only predict the past. We still won’t be able to say whether the next roll of the die *in the future* will be fair or loaded!

