

## Uncertainty and Reasoning

$P(A|B)$  - probability that A occurs given B

Bayes rule (usefull as it allows us to reverse the cause and effect)

### Difficulties with Uncertainty Reasoning

Using just probabilities means that sample size effects get ignored such as both hospitals have a sex ratio of 1:1 but because one has 45 birth per day and the other 15 its more likely for the one with 15 births per a day to have 60% of the babies to be boys as only 9 ish not 7 ish have to be boys.

NOT SURE IF THATS THE CASE OR IF THERE BOTH EQUALLY LIKELY TO

$P(A|B)$  relies on how similar A and B are. i.e. How they are linked

### Bayesian Networks

Nodes are variables, linked with causes  
i.e. Cloudy -> Rain

Formally node is not affected by things that do not descend from it

Build up a table for each node based on its parents

Nice way to store probabilities

## Representing Uncertain Knowledge

top-down (semantic) theory i.e. semantic networks

bottom-up (perceptual) evidence i.e. Prolog ???

### Deduction

Take things away till left with answer  
Not assuming anything

### Induction

As all the beans in your hand are white and from the bag you make a logical guess / estimate that all the beans in the bag are white  
Assuming all in the group have the same properties

### Abduction

As all the beans in the bag are white and so are all the ones in your hand your guessing they could be from the bag  
Assuming they belong to the same group as they have the same properties

### Verification of different consequences

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### Verification of improbable consequences

Multiple things point to one normally improbably but due to the evidence

probable conclusion.

Conflicting / confounding conjectures

Multiple causes of an outcome no obvious one

Learning In AI

state-orientated -- fixed states and methods

learning and development --