PROBABILITIES & PROPERTIES

P(at least 2 same)

SAMPLE

objects that are collected for study

each member possesses properties, which may be quantitative discrete

(*e.g.*, savannah elephants gender, weight, teeth)

PROBABILITY THEORY 1

$P(j) = n_j / n$

n_j enumerates members that are known to exhibit property j

n enumerates members in sample

(*e.g.*, savannah elephants with 6 teeth)

INFORMATION

conditions probabilities

can enable absolute P(j)s to be used (*i.e.*, if information is complete)

(*e.g.*, biased flipping coin)

PROPERTIES 1

Mutually Exclusive

j, k: no member can possess both

$P(j \text{ or } k) = n_{j \text{ or } k} / n = P(j) + P(k)$

$P(\sim j) = n_{\sim j} / n = 1 - P(j)$

PROBABILITY THEORY 2

Normalised

$P(0) + P(1) + P(2) + \ldots = \Sigma P(j) = 1$

if $P(j) \propto f(j)$, then normalisation can be achieved

$P(j) = c\, f(j)$

$c = 1 / \Sigma f(j)$

PROPERTIES 2

Correlated

j, k: knowledge about one affects probability distribution for the other

Uncorrelated (Independent)

P(j) = c f(j) whatever value k is known to exhibit

	TEETH		
	2	4	6
AGE	P(2)		
10	$P_{10 \text{ and } 2}$	$P_{10 \text{ and } 4}$	$P_{10 \text{ and } 6}$
20	$P_{20 \text{ and } 2}$	$P_{20 \text{ and } 4}$	$P_{20 \text{ and } 6}$
30	$P_{30 \text{ and } 2}$	$P_{30 \text{ and } 4}$	$P_{30 \text{ and } 6}$
40	$P_{40 \text{ and } 2}$	$P_{40 \text{ and } 4}$	$P_{40 \text{ and } 6}$
50	$P_{50 \text{ and } 2}$	$P_{50 \text{ and } 4}$	$P_{50 \text{ and } 6}$

PROBABILITY THEORY 3

Joint, Reducing Probability

$P(j \text{ and } k) = n_{j \text{ and } k} / n$ high order

$P(j) = \Sigma P(j \text{ and } k)$, sum over k low order

$P(k) = \Sigma P(j \text{ and } k)$, sum over j low order

PROPERTIES & PROBABILITIES

Independent

$P(j) = n_j / n = n_{j \text{ and } k} / n_k$

$P(j \text{ and } k) = P(j)\, P(k)$