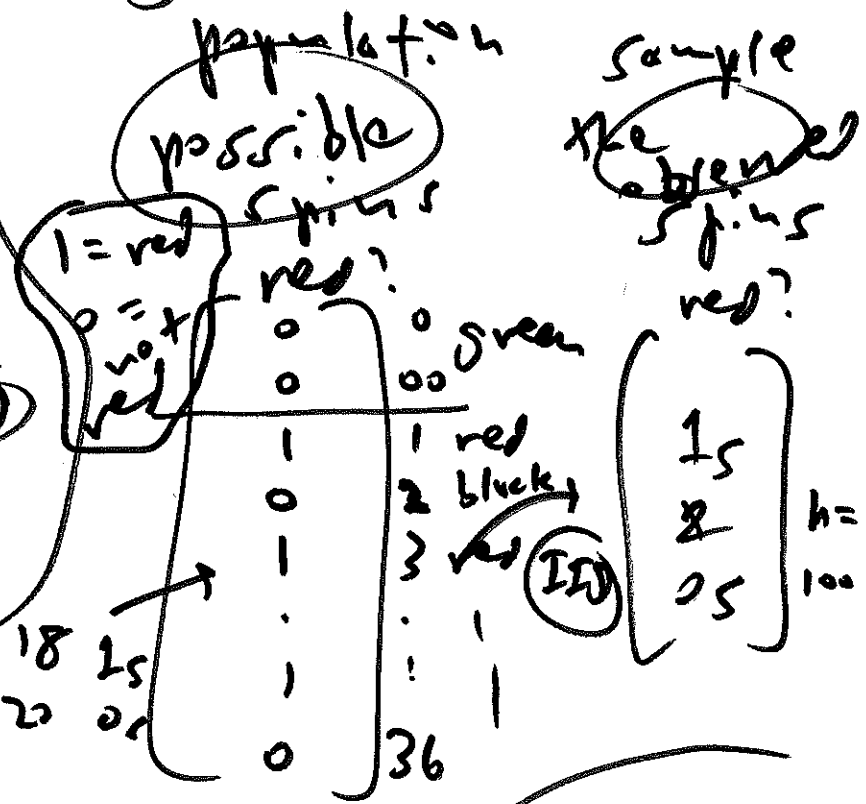


Discussion
Section 1

office hours,
starting tomorrow.

AMS 131
30 Jul 19

- M 2-3 (WZ)
- Tu 10.30 - noon (DD)
- W 1-2 (WZ)
- Th 10.30 - noon (DD)
- F noon - 1p (WZ)



$P(\text{red on any single spin}) = \frac{18}{36} = 0.473$

FLM?
yes by IID

$P(3 \text{ on any single roll of pair of dice}) = \frac{2}{36} = 5.6\%$

experiment + rolling 2 dice fairly

(2)

1st die

	1	2	3	4	5	6
1	(1,1)	(1,2)				
2						
3			.			
4				.		
5						
6						

sample space S
 $= \{ \underline{(1,1)}, \dots, \underline{(6,6)} \}$

$|S| = \# \text{ elements}$
 (cardinality)
 $= 36$

fair \rightarrow ELM \checkmark

random variable

$X(1,1) = 1+1 = 2$

\bar{X}

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

$P(7 \text{ on any single dice pair roll}) = \frac{6}{36} = 16.7\%$

deterministic

vs.

probabilistic

(physics)

③

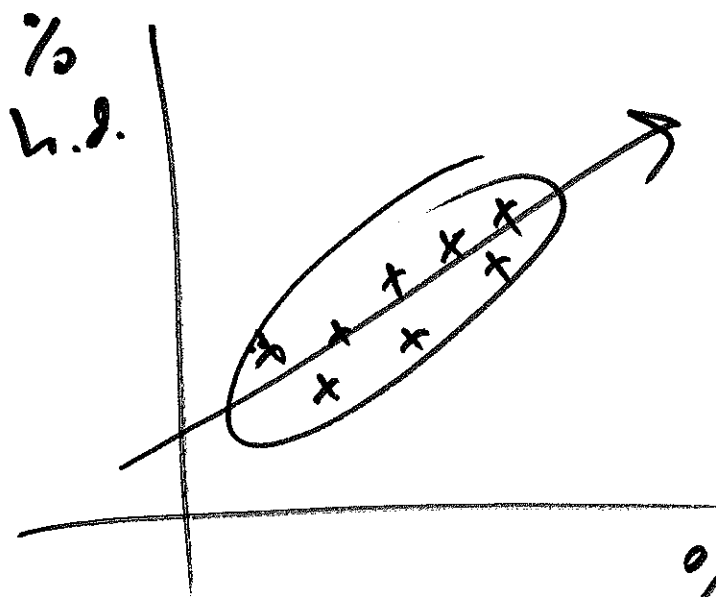
causality

Boyle (1750)

if X happens, Y always
happens as a ^{direct} result of X

if smoke
a lot, $p(\text{heart disease}) \uparrow$

as amount
of smoking \uparrow $p(\) \uparrow$



% adults had heart disease (h.d.)

% adults smokers
1 row for each country

Richard Doll (1958)

(Y) h.d.?	(X) smoke?
1's	1's
4	4
0's	0's

% smoke
1 row for each adult

confounders

(Z)

$$= 25\% = \frac{1}{4}$$

suppose Fisher right

$P(\text{both smokers die first of lung cancer})$

$$= P(HH) = P(\text{fair coin})$$

$\begin{matrix} H & & H \\ \text{on 1st} & \text{or} & \text{on 2nd} \\ \text{1st} & & \text{2nd} \end{matrix}$

1st toss

2nd toss

	H	T
H	HH	HT
T	TH	TT

ELM?

(5)

yes

fair = IID

under
⊗

$P(\text{all 9 smokes vs i.e. first . of h.o.}) =$

$$P(HH \dots H) = \frac{1}{2^9} = \frac{1}{512}$$

$\approx 0.2\%$

if Fisher right,

data extremely unlikely;

therefore Fisher probably wrong