

$P(A|B) = \text{Prob of } A \text{ given } B \dots$

$$P(R|Late) = \frac{P(\text{Rain} \cap Late)}{P(Late)}$$

$\frac{1}{4} \cdot \frac{2}{3}$

$\frac{1}{4} \cdot \frac{2}{3} + \frac{1}{5} \cdot \frac{3}{4}$

**R**

Late  $\frac{2}{3}$

not  $\frac{1}{3}$

Late  $\frac{1}{5}$

not  $\frac{4}{5}$

rain

no rain

already all aB already

$$P(Late) = P(\underbrace{Late \cap Rain}_A \cup \underbrace{Late \cap No\ rain}_B)$$

$\downarrow$   
 $= P(A) + P(B)$  mutually exclusive

$$\frac{1}{4} \cdot \frac{2}{3} + \frac{1}{5} \cdot \frac{3}{4}$$

$$P(\text{puppies}) = P(\text{puppies} \cap \text{legs}) \cup \text{puppies} \cap \text{no arms}$$

$$P(\text{all men}) = P(\text{married} \cup \text{bachelors})$$

$$P(A \cap B) = P(A) - P(B)$$

← independent

$$P(A \cap B) = 0$$

← mutually exclusive

mutually  
exclusive: if A happens, B can't