# Section 2.3: Conditional Probability and Independence

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8:54 AM

Conditional probability:

$P(B \mid A)$ — the probability of B happening if A has happened

↑ "if"

example: let F = flossing regularly
C = getting cavities

then $P(C \mid F)$ is the probability of getting cavities if you floss regularly

→ in this case, it's likely that

$P(C \mid F) < P(C)$, no?

then $P(F \mid C)$ is the probability of flossing regularly if you get cavities

note: correlation does not imply causation! just because two things are linked does not mean that one causes another

so, how do you calculate conditional probabilities?

$$P(C \mid F) = \frac{P(CF)}{P(F)} = \frac{n(CF)}{n(F)}$$

this is often written as:

$$P(CF) = P(C \mid F)\,P(F)$$

independent vs. dependent events:

consider two events A and B

- if A is just as likely when you look at the entire population as when you look only at subpopulation B, then we say the events are <u>independent</u>

  if $P(A \mid B) = P(A)$, then independent

- if the probability of A happening depends on whether or not B has happened, then events are dependent.

but recall that correlation does not imply causation!

can also check:

if $P(B \mid A) = P(B)$, then still independent