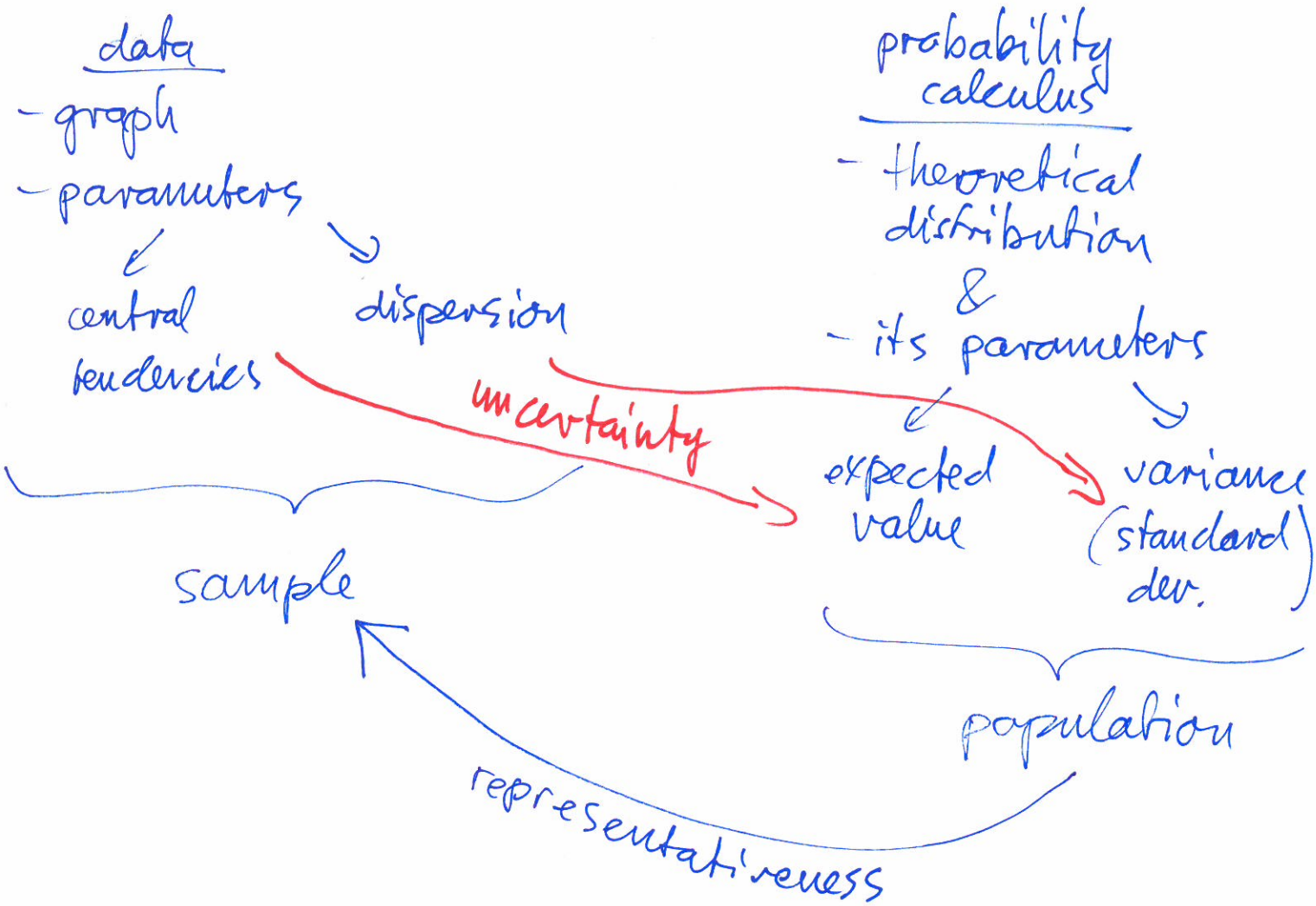
Estimation
Confidence
p-value



Estimation

Lecture?

point

~ 45 min

never exactly true!

interval

somewhere between 43 – 47 min

probability confidence

point est.:

theory:	empirical
probability	relative frequency

$$p_{Heads} \approx \frac{k_{Heads}}{n}$$

if $n \to \infty$

then $\frac{k_{Heads}}{n} \to p_{Heads}$ Consistency

Repeated experiments: 20 flips:

$\frac{8}{20}$ $\frac{10}{20}$ $\frac{11}{20}$ $\frac{13}{20}$ .....

↓

Big mean p_{Heads}

Unbiasedness

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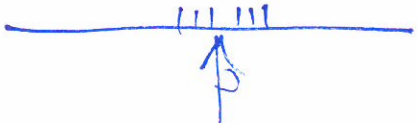
method #1

empirical

theor. value

method #2 ✓



theor. value

Efficiency

point est. #2

expected value — mean (UNBIASED)

theory — empirical

How good is the mean? as an estimator

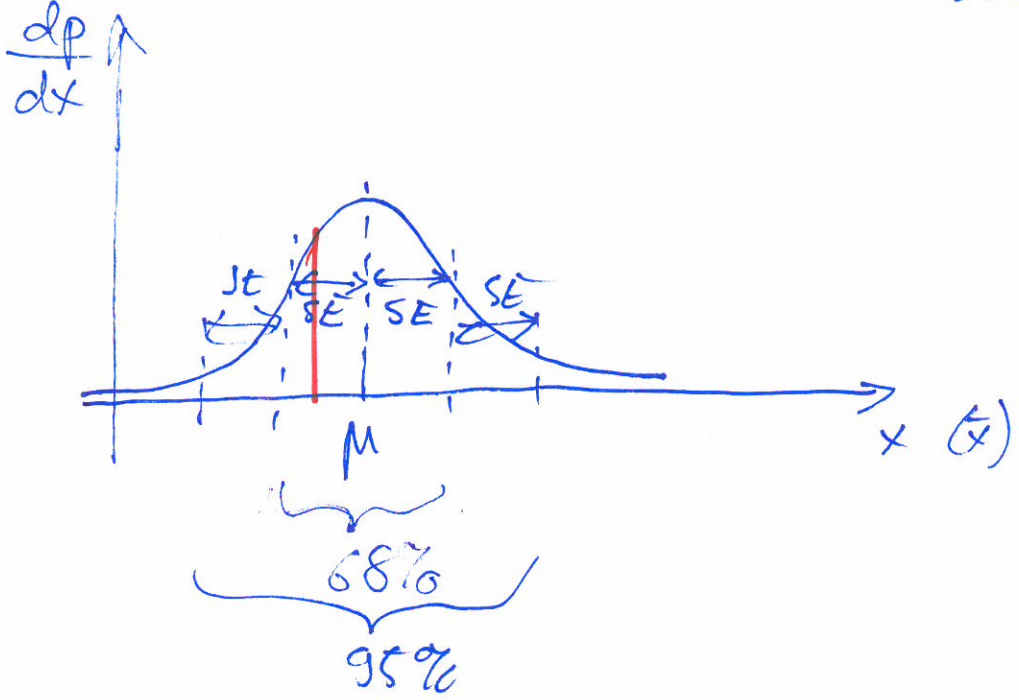
if lower scattering → better estimator

measure the standard deviation of means

standard error

$SE = \frac{s}{\sqrt{n}}$

sample size



theory — empirical

standard deviation — empirical st. dev

$$\sigma = \sqrt{\sum p_i (x_i - \mu)^2}$$

$$s = \sqrt{\frac{\sum n_i (x_i - \mu)^2}{n}}$$ not known!

$$\sqrt{\frac{\sum n_i (x_i - \bar{x})^2}{n-1}}$$

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p-value

Non-small-cell lung cancer stadium IV

50% dies ~~aff~~ 5 months after diagn.

20 people → 4 dies within 5 months

decrease due to...

... treatment

... random/sampling error