inference for comparing two small sample means

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PLAYING A COMPUTER GAME DURING LUNCH AFFECTS FULLNESS, MEMORY FOR LUNCH, AND LATER SNACK INTAKE

distraction and recall of food consumed and snacking

sample: 44 patients: 22 men and 22 women

study design:

- randomized into two groups:

(1) play solitaire while eating - “win as many games as possible”

(2) eat lunch without distractions

- both groups provided same amount of lunch
- offered biscuits to snack on after lunch

biscuit intake	$\bar{x}$	s	n
solitaire	52.1 g	45.1 g	22
no distraction	27.1 g	26.4 g	22

Study reference: Oldham-Cooper, Rose E., et al. "Playing a computer game during lunch affects fullness, memory for lunch, and later snack intake." The American journal of clinical nutrition 93.2 (2011): 308-313.

comparing means based on small samples

confidence interval

point estimate ± margin of error

$$(\bar{x}_1 - \bar{x}_2) \pm t^\star_{df} SE_{(\bar{x}_1 - \bar{x}_2)}$$

$$SE = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

hypothesis test

$$T_{df} = \frac{obs - null}{SE}$$

$$T_{df} = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{SE_{(\bar{x}_1 - \bar{x}_2)}}$$

DF for t statistic for inference on difference of two means

$$df = min(n_1 - 1, n_2 - 1)$$

practice

Do these data provide convincing evidence of a difference between the average post-meal snack consumption between those who eat with and without distractions?

biscuit intake	$\bar{x}$	s	n
solitaire	52.1 g	45.1 g	22
no distraction	27.1 g	26.4 g	22

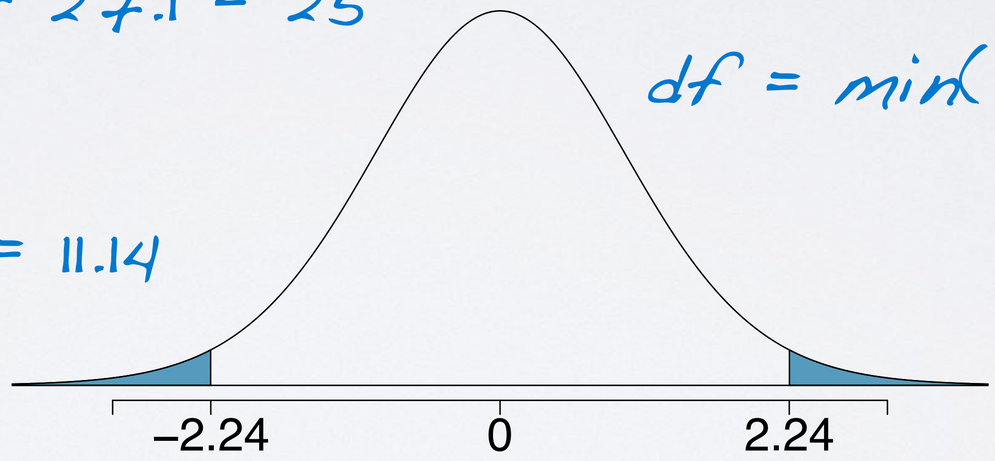
$H_0: \mu_{wd} - \mu_{wod} = 0$ $H_A: \mu_{wd} - \mu_{wod} \neq 0$

$(\bar{x}_{wd} - \bar{x}_{wod}) = 52.1 - 27.1 = 25$

$SE = \sqrt{\frac{45.1^2}{22} + \frac{26.4^2}{22}} = 11.14$

$T = \frac{25 - 0}{11.14} = 2.24$

$df = \min(22 - 1, 22 - 1) = 21$



practice

Estimate the difference between the average post-meal snack consumption between those who eat with and without distractions?

biscuit intake	$\bar{x}$	s	n
solitaire	52.1 g	45.1 g	22
no distraction	27.1 g	26.4 g	22

$$\bar{x}_{wd} - \bar{x}_{wod} = 25$$

$$SE = 11.14$$

$(\bar{x}_{wd} - \bar{x}_{wod}) \pm t^* \, SE = 25 \pm 2.08 \times 11.14$

$= 25 \pm 23.17$

$= (1.83, 48.17)$

recap

biscuit intake	$\bar{x}$	s	n
solitaire	52.1 g	45.1 g	22
no distraction	27.1 g	26.4 g	22

95% confidence interval: (1.83g, 48.17g)

$$H_0 : \mu_{wd} - \mu_{wod} = 0$$

$$H_A : \mu_{wd} - \mu_{wod} \neq 0$$

p-value ≈ 0.04