Lect #23 Math 291. A. Kapelner

Review Part is skipped. Sorry.

Human Gender experiment with more data...

$n = 4247000$ // In 2008: every baby born.

$\alpha = 0.5$

$$RR = \left[0.5 \pm 2\sqrt{\frac{0.5(1-0.5)}{4247000}}\right] = [0.459, 0.500]$$

Run experiment: 2173000 male

$$\hat{p} = \frac{2173000}{4247000} = 0.51165 \notin RR.$$ We accept H_0 therefore.

Refer to "Types of Error"

$H_0: p = 0.5$	$H_0 = 0.50001 = p$
$H_a: p \neq 0.5$	$H_a = p \neq 0.50001$
$\alpha = 5\%$	$\alpha = 5\%$
$n = 395$	$n = 395$
$\hat{p} = 0.48$	$\hat{p} = 0.48$
$\Rightarrow$ Retain H_0	$\Rightarrow$ Retain H_0

Aliens:

H_0: UFO's and aliens don't exist	H_0: UFO's & aliens DNE
H_a: UFO's & aliens do exist	H_a: UFO's & aliens do exist
α: low	α = high
⇓ Skeptical	⇓ Gullible
H_0 ↗	H_0 ↗
H_a ↘	H_a ↘
α low	α = high
You won't convince him that aliens don't exist.	You can convince this guy that aliens don't exist.

UBER case:

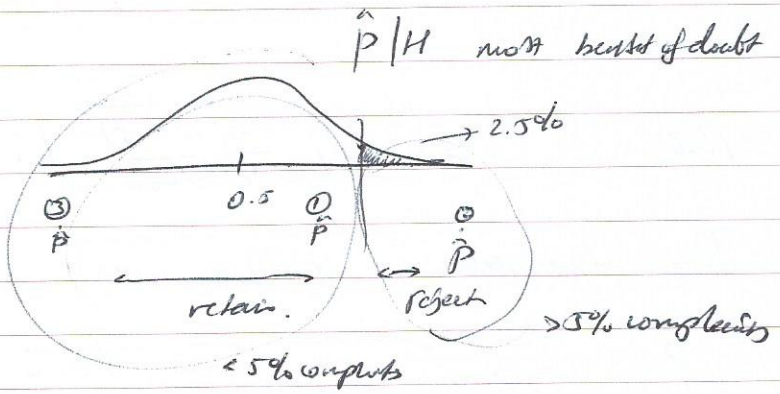
Uber fires if 5%+ complaints out of 1000 rides.

$\hat{p}$: p(complain)

H_0: Good driver = $p \leq 5\%$

H_a: Bad driver = $p > 5\%$

$\alpha = 2.5\%$



$p(z > 2) = 1 - 2.5\%$

If two sided	z
5%	2
1%	2.84

If one sided	z
2.5%	2
0.5%	2.84

α = p(reject)

$1 - \alpha$ = p(retain)

$= p(z < z_\alpha)$

$= p\left(\sqrt{\frac{p(1-p)}{n}} < z_\alpha \sqrt{\frac{p(1-p)}{n}}\right) = p\left(p + \sqrt{\frac{p(1-p)}{n}} < p + z_\alpha \sqrt{\frac{p(1-p)}{n}}\right)$

$1 - \alpha = p\left(\hat{p} < p + z_\alpha \sqrt{\frac{p(1-p)}{n}}\right)$

Please note that sometimes Uber may not fire drivers with 5.001% or 5.1% complaints because the driver may have been unlucky however what if the number is 6% or 6.5%, etc, the driver is not unlucky but a bad driver to begin with.

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