Human Kissing Analysis

It is frequent in nature that animals express certain asymmetries in their behaviour patterns. It has been suggested that this might be nature's way of "breaking gridlocks" that might occur if we were to act purely rationally (think: why does a beetle decide to move one way over another when put in a featureless bowl?). An interesting observational study, undertaken by a European researcher in 2003 examined the head tilting preferences of humans when kissing.

The data was collected by observing kissing couples of ages ranging from 13 to 70 in public places (mostly airports and train stations) in the United States, Germany, and Turkey. The observational data found that of 124 kissing pairs, 80 turned their heads to the right and 44 turned their heads to the left.

The task is to analyse this data to see if there is an inbuilt preference in humans for the direction of head tilt when kissing.

1) Calculate an estimate of the preference for humans turning their heads to the right when kissing using the above data and provide an approximate 95% confidence interval for this estimate.

Question-3

(1.) The estimate of preference for humans turning their heads to the right when kissing:

$$\rightarrow \hat{\theta}_{RK} = \frac{80}{124} = \boxed{0.6451}$$

$\Rightarrow$ confidence interval: [95%]

$$= \left(\hat{\theta}_{RK} \pm \sqrt{\frac{\hat{\theta}_{RK}(1-\hat{\theta}_{RK})}{n_{RK}}} \times z_{\frac{0.05}{2}} \right)$$

, $(\because n_{RK} = 124)$

$$= \left(0.6451 - \sqrt{\frac{0.6451 \times 0.3549}{124}} \times 1.96 \right.,$$

$$\left. 0.6451 + \sqrt{\frac{0.6451 \times 0.3549}{124}} \times 1.96 \right)$$

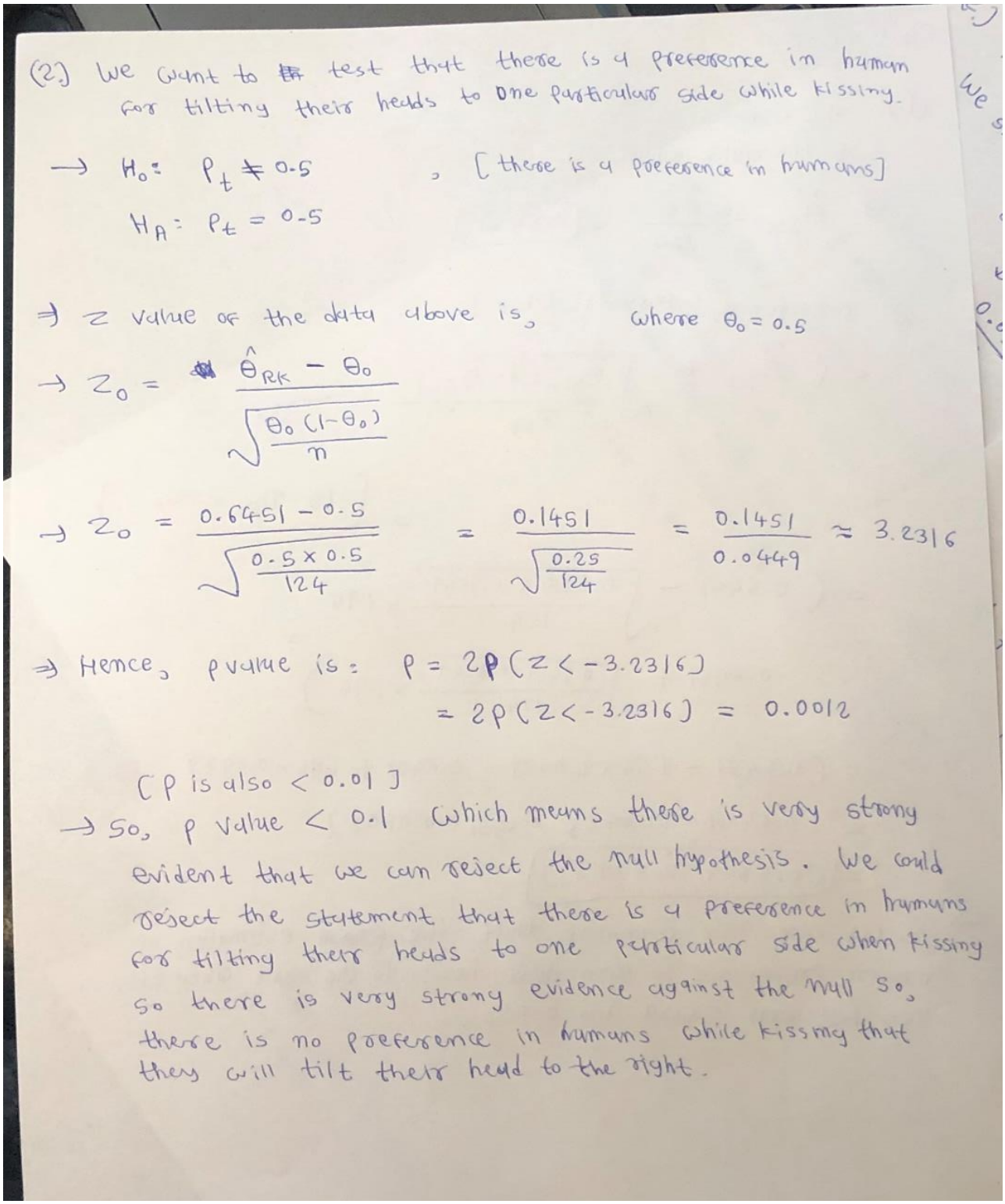
$$= (0.6451 - 1.96 \times 0.0429, 0.6451 + 1.96 \times 0.0429)$$

$$= (0.6451 - 0.0842, 0.6451 + 0.0842)$$

$$= \boxed{(0.5609, 0.7293)}$$

$\rightarrow$ So, we are 95% confident that the ~~preference~~ estimation of human preference to turn their heads to the right when kissing lies between 0.5609 and 0.7293.

2) Test the hypothesis that there is a preference in humans for tilting their head to one particular side when kissing. Write down explicitly the hypothesis you are testing, and then calculate a p-value using the approximate approach for testing a Bernoulli population. What does this p-value suggest?



(2.) We want to test that there is a preference in human for tilting their heads to one particular side while kissing.

→ $H_0: p_t \neq 0.5$, [there is a preference in humans]

$H_A: p_t = 0.5$

⇒ z value of the data above is, where $\theta_0 = 0.5$

→ $Z_0 = \dfrac{\hat{\theta}_{RK} - \theta_0}{\sqrt{\dfrac{\theta_0(1-\theta_0)}{n}}}$

→ $Z_0 = \dfrac{0.6451 - 0.5}{\sqrt{\dfrac{0.5 \times 0.5}{124}}} = \dfrac{0.1451}{\sqrt{\dfrac{0.25}{124}}} = \dfrac{0.1451}{0.0449} \approx 3.2316$

⇒ Hence, pvalue is: $p = 2p(z < -3.2316)$

$= 2p(z < -3.2316) = 0.0012$

[p is also < 0.01]

→ So, p value < 0.1 which means there is very strong evident that we can reject the null hypothesis. We could reject the statement that there is a preference in humans for tilting their heads to one particular side when kissing so there is very strong evidence against the null so, there is no preference in humans while kissing that they will tilt their head to the right.

3)

Calculate an exact p-value to test the above hypothesis.

Binom.test(80,124,1/2)

And the p value gotten is 0.001565 which is even more accurate.

4) It is entirely possible that any preference for head turning to the right/left could be simply a product of right/left-handedness. To test this, we obtain handedness of a sample of different people. It was found that 83 people were right-handed and 17 were left-handed. Using the approximate hypothesis testing procedure for testing two Bernoulli populations from Lecture 5, test the hypothesis that the rate of right-handedness in the population is the same as the preference for turning heads to the right when kissing this data.

(4.)

→ the rate of human preference to tilt their head to right is: $\hat{\theta}_1 = \frac{80}{124} = \boxed{0.6451}$

→ The rate of right-handness in the population:

$\hat{\theta}_2 = \frac{83}{100} = \boxed{0.8300}$

* We want to test if the rate of right handness is same as the rate of tilting human preferring to ~~to~~ turn right their head.

⇒ $H_0 : \theta_1 = \theta_2$

$H_A : \theta_1 \neq \theta_2$

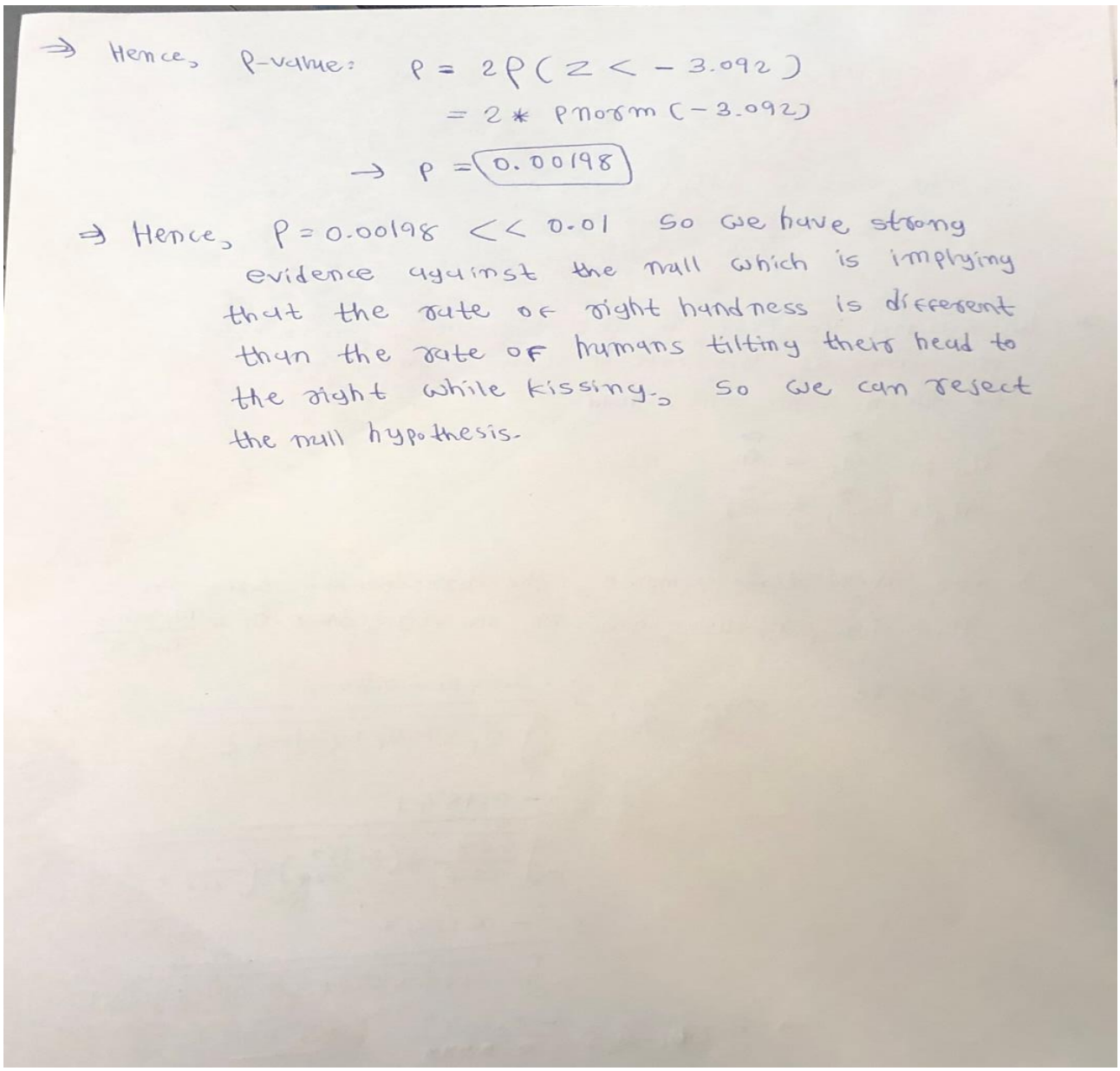
⇒ For these two samples, the corresponding sizes are, $n_1 = 124$, $n_2 = 100$, $m_1 = 80$, $m_2 = 83$, while $\hat{\theta}_p = \frac{m_1 + m_2}{n_1 + n_2}$

* Z-score, $Z_{(\hat{\theta}_1 - \hat{\theta}_2)} = \frac{0.6451 - 0.8300}{\sqrt{\hat{\theta}_p (1 - \hat{\theta}_p)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$

$= \frac{-0.1849}{\sqrt{\frac{163}{224} \times \left(1 - \frac{163}{224}\right) \times \left(\frac{1}{100} + \frac{1}{124}\right)}}$

$\simeq \frac{-0.1849}{\sqrt{0.7277 \times 0.2723 \times (0.01 + 0.0081)}}$

→ $Z_{(\hat{\theta}_1 - \hat{\theta}_2)} = \frac{-0.1849}{0.0598} = \boxed{3.092}$



5) Can you identify any possible problems with your conclusions based on the way in which the data was collected? Could there be alternative reasons for preference/lack of preference?

I think that the hemispherical dominance that causes right - or left handedness is the cause. The same cause is believed to decide whether one chooses the right/left side when they enter a room.

That said, some characters are pan-brain - involving both hemispheres. In that case there will be more ambivalence with regards to the choice of direction. This can be the human behavior causing to go opposite side.

The orientation is an inherent asymmetry in your body, and it is instinctive.
Even those who can write with both hands have a natural preference, when they are not choosing consciously.