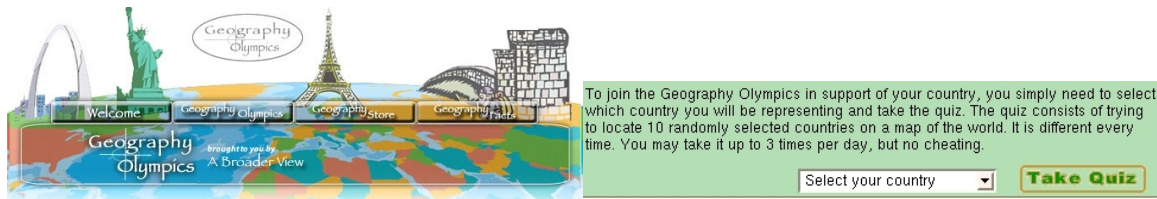


# Geography Awareness



*“People from around the world can test their knowledge of geography by correctly placing 10 randomly selected countries on the map, at the web site <http://www.geographyolympics.com/>.*

*So in honor of Geography Awareness Week I decided to see if the Global Puzzle really could teach me the world. Figuring I need a baseline for comparison I start with the Geography Olympics web site. When it asks me what country I’m from I consider lying. I don’t want to lower the US average any more than its current value.*

*My first try I’m asked to identify Argentina, Botswana, Slovenia, Turkey, Norway, Benin, Jamaica, Niger, Ireland, and South Korea. I get Turkey right. On my second try I’m asked to find Panama, Mongolia, Mozambique, Guinea, Libya, Malaysia, Zambia, Netherlands, Vanuatu and Honduras. I get Panama, Mongolia and Honduras right. On my third try I draw Kuwait, Switzerland, Peru, Solomon Islands, Zimbabwe, Comoros, Greece, Vietnam, Nauru and Botswana. I guess Greece correctly.*

*I start working on the global puzzle, spending almost two complete days on it! Then I take the test again. This time I get 2, 4, 6 correct out of 10 on my three trials.”*

*Source: Mary Challenger, Des Moines Register, Nov 20, 2004.*

Fill in the data table:

Group 1			Group 2		
Try 1	Try 2	Try 3	Try 1	Try 2	Try 3
1	3	1	2	4	6

Calculate the statistics:

$$\bar{y}_1 = 1.67 \quad s_1 = 1.15 \quad n_1 = 3$$

$$\bar{y}_2 = 4 \quad s_2 = 2 \quad n_2 = 3$$

We’re going to test if the geography puzzle the author used between test taking helped her do better, which corresponds to  $H_o : \mu_1 = \mu_2$  vs  $H_A : \mu_1 < \mu_2$ .

Calculate the test statistic:

$$\begin{aligned} t &= \frac{\bar{y}_1 - \bar{y}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \\ &= \frac{1.67 - 4}{\sqrt{\frac{1.15^2}{3} + \frac{2^2}{3}}} \\ &= -1.75 \end{aligned}$$

Find the P-value for the test statistic.

$P(t < -1.75) > P(t < -1.89) = 0.01$  so the p-value is larger than 0.1.

Are the assumptions for the hypothesis test satisfied?

*Assumptions are:*

*Random sample:* There are many countries on the globe, and each time the computer selects 10 countries at random for the quiz. For a small number of re-takes these could probably considered to be random samples.

*Independent samples:* The two samples are from the same person prior to studying and after studying. This is clearly not strictly independent. But in terms of the tests, the computer is selecting samples of countries randomly, and independently of the previous tests. So this is probably ok also.

*Normal population:* The population is not normal. The possibilities for each country delivered is either correct or incorrect which does not follow a normal distribution.

What is your conclusion?

Based on the p-value we would not reject the null hypothesis, hence we would conclude that the globe puzzle doesn't help improve geography knowledge. But the normality assumption is not satisfied so we really cannot say anything about the problem based on our calculations. With a larger sample size the CLT could be used to assure normality of the sample means.