**Do you have ESP abilities?**

Extrasensory Perception (ESP) is a collective term for various hypothetical mental abilities. These abilities include *telepathy*, *clairvoyance*, *precognition*, *retrocognition*, *mediumship*, and *psychometry*.

In this activity, we’ll be testing whether someone in your group has *telepathy*, the ability to read another person’s thoughts. We’ll be doing this by having the alleged telepath, a person capable of reading the thoughts of others around them, try to guess the suit of playing cards.

A standard deck of playing cards consists of 52 cards in 4 different suits (spades, diamonds, hearts, and clubs). There are exactly 13 cards of each suit. The suits are shown below.

|  |  |
| --- | --- |
| Spades | Hearts |
| Diamonds | Clubs |

Begin by forming a group of at least 3 and assign the following roles:

1. **The Telepath** - The person who will be guessing the suit of the playing card.
2. **The Telepath’s Assistant** - The person who will be holding the playing card who will be thinking about the suit of the card.
3. **The Data Recorder** - The person who will record whether the telepath was correct on incorrect.

**Research Question:** Does the Telepath possess telepathic abilities?

**TASK**

Read **all of the directions below** before starting the study.

* Shuffle the deck multiple times.
* For this study, you will repeat the following steps for the **first 26 cards**.
  + The Telepath’s Assistant draws a card and concentrates on the suit of the card.
  + The Telepath guesses the suit.
  + The Data Recorder marks in the table below whether the Telepath was correct (marking the cell with an **x** for that guess) or incorrect (leaving the cell blank for that guess).
  + Discard the playing card face down.
* Make sure to not tell the Telepath whether or not they were correct or what the suit of the card was until all the data are collected.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

**Discuss the Following Questions.**

If the Telepath does not do better than chance, we would expect they would guess correctly 25% of the time.

We would like to test the following hypotheses:

H0: p = 0.25

Ha: p > 0.25

1. Explain why a one-tailed test makes more sense than a two-tailed test.

**CONFIDENCE INTERVAL**

We want to find a *range of plausible values* for this statistic with *95% confidence*.

1. What proportion of time was your group’s Telepath correct, ?
2. Calculate the standard error, *SE,* for the confidence interval.
3. What value of *z* should you use to have *95% confidence*?
4. Calculate the 95% confidence interval.
5. Interpret, in context, the 95% confidence interval.
6. Is it plausible that your Telepath does have telepathic abilities? Explain.
7. Was it appropriate to use the normal distribution to construct a confidence interval? In other words, did we meet our assumptions? Explain.

**HYPOTHESIS TESTING**

We would like to formally test whether your group’s Telepath possesses telepathy.

1. Do we meet the assumptions to use the normal distribution to test our sample statistic? Answer this question by completing the table below and assume we used all 52 playing cards, not just the 26 cards.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Given that Ho is true, is the expected number of times the Telepath … | Sample Size | Value of H0 | Calculate their product | Was the  product ≥ 10? (Yes/No) |
| **Correctly** guesses the suit of the card ≥ 10? | n = 52 | = | = |  |
| I**ncorrectly** guessed the suit of the card ≥ 10? | n = 52 | = | = |  |

1. Based on the final column in the table above, can we use the normal distribution to approximate the sampling distribution when the H0 is true? Explain.
2. Calculate the standard error for the hypothesis test for a proportion.
3. Calculate the standardized test statistic by working through the following pieces:
   1. What is the sample statistic?
   2. What is the value of H0?
   3. What is the standard error, *SE*?
   4. What is the value of the standardized test statistic, z?
4. Using *StatKey*, select the appropriate Theoretical Distribution and find the *p*-value, using your standardized test statistic from Question 12.
5. Based on the *p*-value, what kind of evidence do you have for Ha? Provide your answer in context.
6. Suppose you were going to tweet about your group’s findings on Twitter. Write at most a 280-character tweet synthesizing the information you gleaned from the results you found.