**Science Fair 2024 Logbook**

**Thursday, October 12**

topics/areas that interest me:

* psychology
  + how does the brain react to different situations?
  + how does the brain react with different people?
* chemistry
* biology
* robotics

project ideas:

* research project about AIs and robots
* experiment with plant growth
  + does music affect plant growth
  + do perfumes/body mists/scented candles/surrounding scents affect plant growth
  + does sugar help plants grow

→ have to buy seeds

* testing skincare products or makeup brands

→ have to buy products

* placebo effect
  + during this summer it was super hot and people posted videos of fans to cool people down and I didn’t think it would work but I actually felt the air → people in the comments were saying it was the “placebo effect”
  + <https://classroom.synonym.com/science-projects-using-placebo-effect-8267628.html>

**Wednesday, November 29**

* AIs and robots are a hot topic but most people seem to be doing projects about those
* all my plant growth experiment ideas have been done too many times; I wouldn’t be bringing new data
* I don’t have enough money to buy skincare products and makeup
* **going to carry out placebo effect project**

research notes:

* placebo effect: phenomena where patient’s symptoms are treated but the cure isn’t real; the patient believes it will treat them
* placebos are most commonly pills used to treat patients except they’re not real cures
* patients report feeling better after taking placebos, even after being told it’s a placebo
* how do placebos work?
  + not exactly known how the placebo effect works but theories include:
  + conditions resolve by themselves and the placebos being present is a coincidence
  + placebo encourages people to take better care of themselves and improve their diet, sleep schedule, and workout routines
  + placebos might alter people’s perception of their problems, eg. a pain that was previously interpreted as a sharp stab can be interpreted as a slight tingling sensation after the placebo was taken
  + patients expect to feel better after taking the placebo so it may reduce anxiety and stress levels which makes them feel better
  + placebos can affect brain chemicals and trigger endorphin releases
  + research has shown that people’s brains respond to imagined scenes the same way as real visualized scenes so placebos can help the brain remember the times before the problems so the brain forgets the symptoms
  + confirmation bias → expecting to get better, people might be focusing more on signs that they’re getting better and dismissing signs that they’re getting worse
  + often when taking pills, you feel better, and it’s possible for your brain to recreate that memory when taking a placebo
* other factors that affect placebos:
  + patient’s attitude
  + realism of placebo → the more realistic it looks the more the patient is likely to believe in it
  + doctor-patient relationship → patient is more likely to believe in the placebo if they trust their doctor and have a personal relationship with them
* placebos are also used to help test the effectiveness of new medicines or treatments
  + one group takes actual medication and the other group takes the placebo
  + in some cases the researchers don’t know which group took which (that’s called a double-blind test)
* about ⅓ of people taking placebos report having their symptoms cured
* placebo effect doesn’t work on “imaginary” sicknesses
  + “[*as the mind can contribute to a physical disorder, it can also contribute to its cure*](https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/placebo-effect)”
* placebos can cause unwanted side effects including nausea, drowsiness, and allergic reactions like skin rashes
* nocebo effect
  + negative outcomes because patients were expecting negative effects
  + can be caused when person taking the treatment is told the risks and negative side effects
* open-label placebos
  + when patients knowingly take placebos → sometimes used in clinical studies
  + placebo effect can still occur; patients have still reported feeling better
    - can be due to physical pill taking actions like opening a pill bottle or swallowing a pill
    - can be due to natural changes in symptoms (symptoms coincidentally decreasing when pill is taken)

questions I have:

* I have chronic migraines - the pills I take sometimes work after an hour, but other times take the whole night. Sometimes I don’t take pills because I’m not allowed to take them too frequently, and the migraines still go away. Are the pills actually helping me? If I knowingly take a placebo but try to gaslight myself into thinking it’s a real pill, will my migraines go away?

sources:

* <https://classroom.synonym.com/science-projects-using-placebo-effect-8267628.html>
* <https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/placebo-effect>
* <https://www.vox.com/science-and-health/2017/7/7/15792188/placebo-effect-explained>

**Sunday, December 3**

Trial Outline:

Trial 1: Give participants water to drink and have them take test

Trial 2: Give participants placebo “energy drink” but tell them it’s an actual energy drink. (Tell them I’m testing the power of energy drinks) + wait 10min after giving them drink → real energy drinks take ~10min to kick in

Typing Tests:

<https://www.typing.com/student/typing-test/1-minute>

* (arguably) easy-to-read font, 1 min. typing test, includes full sentences and punctuation

<https://www.typingtest.com/test.html?minutes=1&textfile=mediumText.txt&mode=sent&result_url=certificate.html&bt=0&gt=pro>

* small on the screen, Normal Mode 1 min. test, full sentences and punctuation

<https://www.livechat.com/typing-speed-test/#/>

* random words, no punctuation (arguably easier), 1 min. test

→ I’m going to use the first one because the font (in my opinion) is easier to read than the other ones and its use of full sentences and punctuation makes for a more realistic approach to real typing.

Plan for ppt layout

Title of project, experimental project, by Felicia 9-1

Intro? - beginning/basic info abt placebo effect → check your research notes

Problem/testable question: Will participants be able to type faster if they drink what they think is an energy drink?

Hypothesis: *If* participants think they are drinking an energy drink, *then* I think they will be able to type faster, *because* the expectation that they should be able to type faster will strengthen their mentality, pushing them to get a higher WPM

Materials: computer or laptop (device with keyboard), container to hold placebo energy drink, measuring cup, teaspoon, tap water (¼ cup per person) ~15°C, granulated sugar (¼ teaspoon per person), food coloring (1 drop per person)

Procedure:

Pre-Trials (Creating the “energy drink”) - Per participant (single portion)

1. ¼ cup of tap water into container.
2. ¼ of a teaspoon of sugar + stir until sugar is fully dissolved.
3. 1 drop of food coloring + stir until food coloring is uniformly mixed.

Trial 1:

1. For the first trial, ask participants which computer keyboard they are most used to typing on (this gives participants an equitable chance of performing at their best on the keyboards).
2. Tell them to do [this](https://www.typing.com/student/typing-test/1-minute) typing test whenever they are ready.
3. Record their score.

Trial 2:

1. Give participants Placebo energy drink and convince them it’s a real energy drink. Wait 10 minutes before continuing to the next step (real energy drinks take ~10 minutes to kick in).
2. Allow participants to do [this](https://www.typing.com/student/typing-test/1-minute) 1-minute typing test again on the same keyboard as in Trial 1.
3. Record their WPM score.
4. Compare it to their score from the first trial.

Variables:

Manipulated: whether participants think they’re drinking an energy drink or not

Responding: typing score (WPM) before and after taking the fake sports drink

Controlled: same typing test for each person, same “energy drink” they are taking, same thing being told to each participant: the second time they take the test, they will be given an energy drink, same amount of “energy drink” participants must consume

Data/Observations:

Table to record data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Biological Gender** | **Age** | **Trial 1 WPM** | **Trial 2 WPM** |
|  |  |  |  |  |

* “Number” column is for referral purposes + to keep participants anonymous
* “Biological Gender” → possible physical advantages
* “Age” → possible physical advantages

remember to put results into a graph\*

Analysis:

* importance of data + how it could be used in real life situations
* if I did the experiment again, what would I change?
* possible sources of error?
* why do I think the placebo worked/didn’t work

Conclusion:

* was my hypothesis correct or incorrect and why?
* why do I think the placebo worked/didn’t work

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Creating Placebo energy drink:

* ¼ cup per person to drink is enough
* 1 tsp of sugar was too sweet → half was still a bit sweet → ¼ tsp/person is good
* 1 drop of food coloring is enough
* ratio: ¼ cup : ¼ tsp : 1 drop of food coloring

**Tuesday, December 6 (winter break)**

Tests Today:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Biological Gender** | **Age** | **Trial 1 WPM** | **Trial 2 WPM** |
| 1 | Female | 15 | 42 | 50 |
| 2 | Female | 44 | 61 | 67 |
| 3 | Male | 50 | 60 | 62 |

Observations:

* placebo effect is working so far; all of their scores improved after they thought they drank an energy drink (qualitative observation)
* person 1 seemed suspicious of energy drink when she took it - later told me it was tasteless
  + (qualitative observation)
* person 2 also seemed suspicious of the energy drink → i might add a bit of vanilla
  + (qualitative observation)

**Thursday, December 8 (winter break)**

* I tried adding a drop of vanilla to a single-person portion of the energy drink but it didn’t taste like an energy drink; flavors don’t coincide well

→ I’ll keep the energy drink the same

**Thursday, January 4 (winter break)**

Tests today:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Biological Gender** | **Age** | **Trial 1 WPM** | **Trial 2 WPM** |
| 4 | Male | 50 | 27 | 28 |
| 5 | Female | 42 | 15 | 22 |
| 6 | Male | 12 | 40 | 41 |

Observations:

* person 5 was suspicious of energy drink (all the females who’ve participated so far were suspicious of the energy drink) → I’m going to change the ¼ tsp of sugar per person to ½ tsp of sugar per person

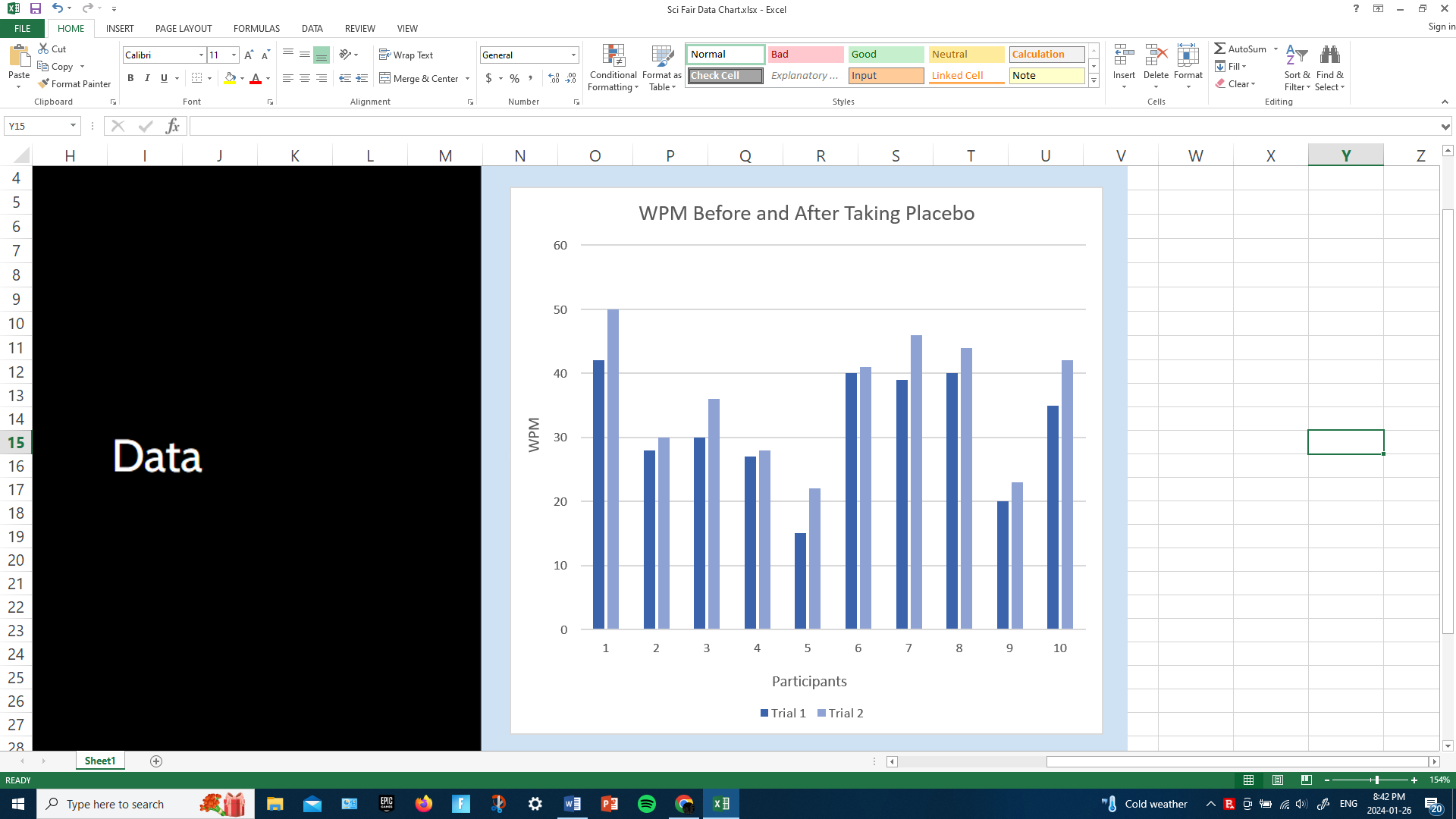
**Saturday, January 20**

Final tests:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Biological Gender** | **Age** | **Trial 1 WPM** | **Trial 2 WPM** |
| 7 | Female | 14 | 28 | 40 |
| 8 | Male | 12 | 50 | 58 |
| 9 | Male | 52 | 60 | 69 |
| 10 | Female | 47 | 40 | 55 |

Observations:

* no one seemed suspicious of the energy drink (qualitative observation)

 made w/ microsoft excel

Analysis:

* importance of data + how it could be used in real life situations
  + This data shows that the placebo effect can be applied in situations other than pill treatments, to push people to perform at their best. This also shows that people are guided by their beliefs and if they believe in something, their subconsciousness will guide them towards it.
* if I did the experiment again, what would I change?
  + I would do a double-blind version of this experiment where for the second trial, I’d have a bottle of a placebo energy drink and another bottle of a real energy drink and I’d ask participants to drink from 1 of them when I turn around, but the participants don’t know which is which. After they drink from one of the bottles and do the typing test, I’d ask them to point out which bottle they drank from so I could compare results from both groups (the people who drank the placebo vs. the people who drank the real energy drink).
* possible sources of error?
  + most of the participants did better in the second trial but that might’ve been because they were more warmed up after the first trial and knew what to expect, versus in the first trial, where they might’ve been unsure about how the test was going to work.
  + the participants might’ve thought of the first trial as a warm-up and pushed themselves to do better in the second trial, which would have nothing to do with the placebo. that would be a result of their own mentality. This possible source of error could’ve been avoided if I’d switched the order of the trials which would have the participants take the placebo for the first trial, and do the second trial without taking the placebo, to see if they just had a stronger mentality for the second round.

Conclusion:

* was my hypothesis correct or incorrect and why?
  + My hypothesis was partly correct, in the fact that almost everyone’s WPM improved after taking the placebo. For the other part of my hypothesis, I can’t be 100% sure if that’s why their WPMs improved, but I think the placebo worked because everyone expected to be able to type faster because energy drinks have been proven to increase your focus and energy, so unknowingly, they became more focused and were able to type faster.

Sources:

icons (slides 1, 2, 4, 5, 12, 15) - <https://slidesgo.com/>

project idea and info - <https://classroom.synonym.com/science-projects-using-placebo-effect-8267628.html>

info - <https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/placebo-effect>

typing test - <https://www.typing.com/student/typing-test/1-minute>

photo (slide 13) - <https://uk.style.yahoo.com/placebo-effect-why-believe-ansh-202344722.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAEz2LqKg5eb81YV0zmwEKb5RPlVu6Uu9Lp_HprcaBIOnYExZ9GKc6w1s7KD1aBVbXflOkg89XeLwKUA12fc2ciDnREE-r6COWsId23I9JLoS7jEOsPNiI7Aaal0ybQaMDtSTtYLeLgTeaa1Ge19rZm3vaD5yCSzz9ZuFZHZRexSZ>

info - <https://www.vox.com/science-and-health/2017/7/7/15792188/placebo-effect-explained>

info - <https://www.cysf.org/>

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Sinclair, Miranda. “Science Fair Projects Using the Placebo Effect - Synonym.” *Classroom*, <https://classroom.synonym.com/science-projects-using-placebo-effect-8267628.html> . Accessed 26 January 2024.