RED BERRY COGNITIVE PERFORMANCE ANALYSIS

Self-Taught Data Project

Using SQL, Excel & Tableau

Prepared by
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Personal note:

Without any formal experience in SQL, Excel, or Tableau, this project was finished entirely through self-directed learning. By working through technical difficulties on my own and utilising industry-standard techniques used in actual data analysis, I taught myself how to create a complete data pipeline and analytical workflow. The actual research I conducted for my Internal Assessment in Mathematics Standard Level (International Baccalaureate) served as the basis for the experiment. I eventually developed it into a comprehensive project with dashboards and visualisations.

What the experiment is about?:

This experiment entails using various milliliters of an energy drink to measure how various consumptions of it affected a students concentration level, this study was carried out through participants performing a cognitive score before and after the consumption of the energy drink Red Berry Boost. Prior to consuming the red berry boost, participants were given time to write down specific words out of ten that were called out just once. This cognitive exercise involves memory retention. Five minutes after consuming a red berry boost, the cognitive activity would take place to observe any possible impacts on memory retention and cognitive function.

The purpose of the study:

This study looked into the effects of energy drink use on students' focus and cognitive function. Energy drinks are a common technique for students to stay focused, stay awake, and perform better academically. I sought to determine the optimal intake level by conducting a cognitive test both before and after consuming various dosages of the energy drink Red Berry Boost. In accordance with the results, drinking about 200 millilitres resulted in the greatest increase in cognitive function. Anything more than this, particularly 300 millilitres, led to worse cognitive scores and less focus. This investigation showed that excessive intake actually lowers concentration levels rather than raising them, despite the widely held misconception that drinking more will improve focus.

Research question:

What is the ideal dosage of Red Berry Boost, and does it enhance or diminish students' cognitive performance?

Hypothesis:

Students' cognitive test results will increase more if they take a moderate amount of Red Berry Boost (around 200 ml) than if they take larger amounts, like 300 ml. Overconsumption will cause overstimulation and decreasing returns, which will lower performance.

Overview of the Process (SQL → Excel → Tableau):

The dataset was cleaned, score change was calculated, outliers were found, and correlations were measured using SQL.Prior to visualisation, SQL outputs were checked for accuracy using Excel.A multi-visual dashboard that clearly displays the results was created using Tableau.

Data set:

Participants: 30

Variables collected: before score, after score, millitres consumed, score change

Consumption levels: 0 ml, 100 ml, 200 ml, 300 ml

The Dataset's Objective is to determine whether consuming more enhances focus or whether consuming too much impairs performance.

SQL Work:

When I first started working on my Red Berry Boost project , I mirrored numerous complications due to DBeaver not showing any of my tables and my queries were simply returning the database name. After looking into it, I discovered that the problem was that I wasn't connected to the right datasource for my project and had several open PostgreSQL connections. I discovered that I was in the incorrect database when I used SELECT current_database(); to verify this. After that, I changed my session to the redberry_project database and updated the schema. All of my tables displayed once the connection was made correctly, allowing me to finish the SQL analysis both accurately and effectively.

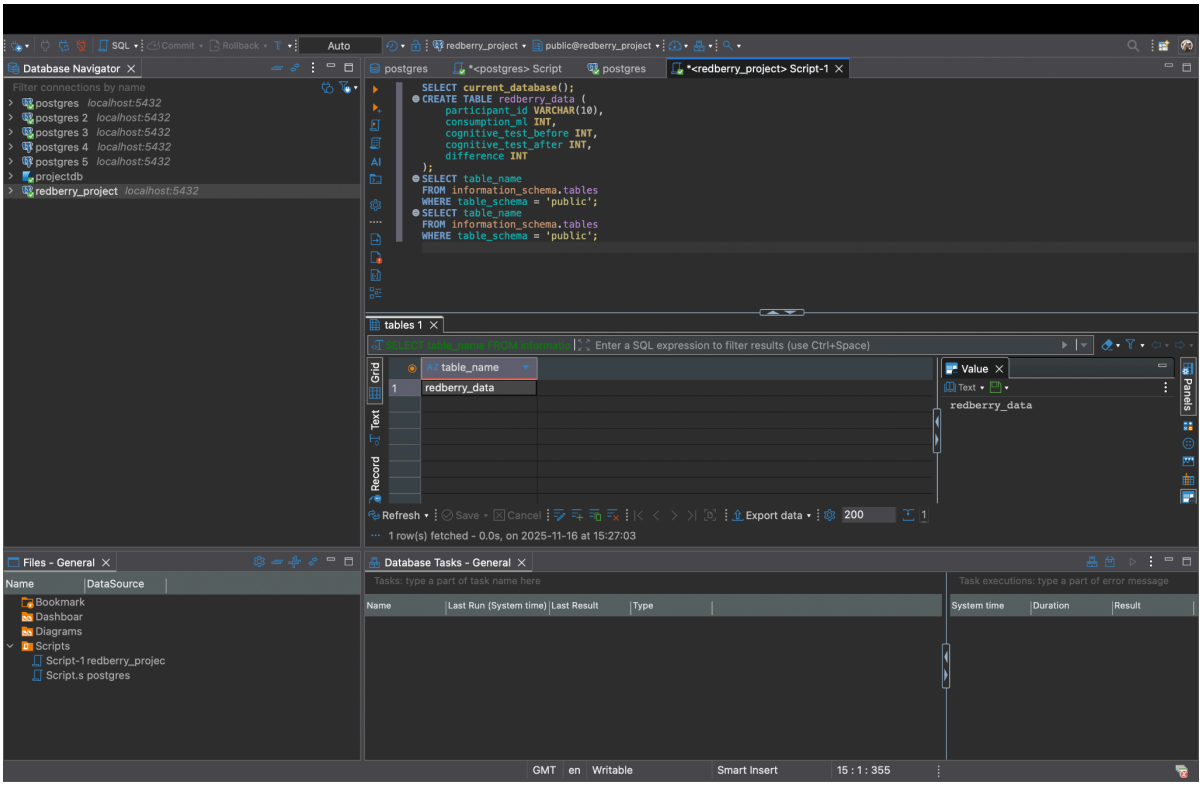

Figure 1: SELECT current_database() is used to confirm the active database and find the wrong connection.

Furthemore, another problem I encountered was that my SQL queries were generating inaccurate or blank results prior to finishing my research. After reviewing my code, I discovered that the SQL editor was linked to the incorrect datasource rather than the logic. The query was executing on a database that didn't actually include my tables, and I had multiple PostgreSQL connections open. This indicated that the queries failed discreetly because my CTEs were referring to columns that weren't present in that window.

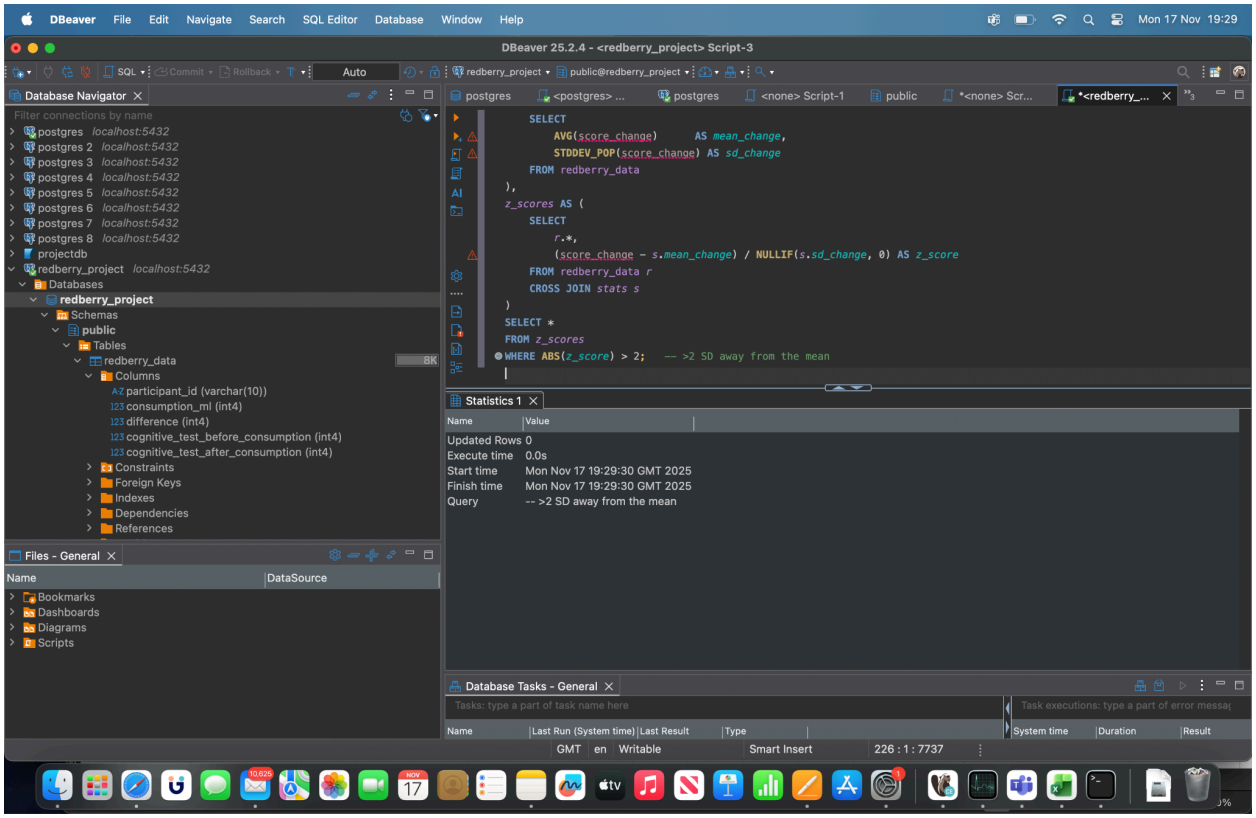

Figure 2: The screenshot provided showcases how my SQL editor is returning blank results because it was connected to the wrong PostgreSQL datasource, which didn't contain any of my project tables

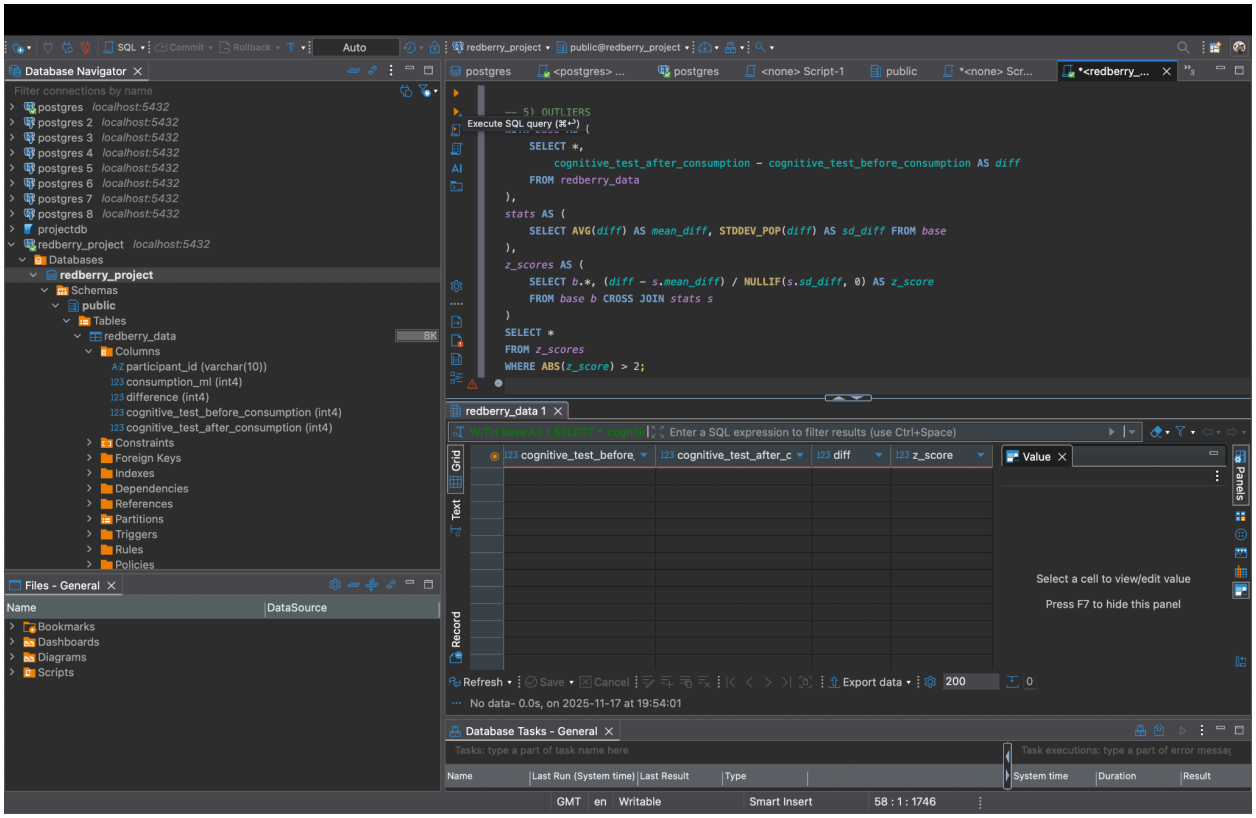

Figure 3: After changing to the correct PostgreSQL datasource and modifying the schema, the screenshot now displays all of my tables and accurate query results.

Excel work:

After finishing the SQL analysis, I mostly used Excel to validate and organise the dataset during the Excel phase of my research. I verified that the calculated fields, the score change column and the before/after test scores were accurate and matched the outputs from SQL by importing the cleaned CSV produced from SQL into Excel. I was able to quickly search the dataset using Excel for formatting problems or inconsistencies, including duplicate rows or text-formatted numbers, which can happen when exporting CSV files. I verified that every column was appropriately marked and in line with the planned structure by checking the dataset's PDF export.

	A	B	C	D	E	F	G	H
1	participant_id	consumption_ml	cognitive_test_before_consumption	cognitive_test_after_consumption	difference	consumption_level		avg_consumption_ml
2	P1	300	20	17	-3	HIGH		180
3	P2	200	12	27	15	LOW		180
4	P3	300	10	8	-2	MODERATE		180
5	P4	200	20	30	10	LOW		180
6	P5	300	6	3	-3	MODERATE		180
7	P6	300	17	11	-6	HIGH		180
8	P7	200	10	19	9	MODERATE		180
9	P8	100	12	19	7	LOW		180
10	P9	200	10	18	8	HIGH		180
11	P10	100	8	14	6	LOW		180
12	P11	200	12	26	14	MODERATE		180
13	P12	100	7	16	9	LOW		180
14	P13	200	15	30	15	MODERATE		180
15	P14	0	12	18	6	NONE		180
16	P15	100	10	18	8	LOW		180
17	P16	300	19	14	-5	HIGH		180
18	P17	300	10	2	-8	HIGH		180
19	P18	0	11	19	8	NONE		180
20	P19	200	17	29	12	MODERATE		180
21	P20	100	16	24	8	LOW		180
22	P21	300	10	6	-4	HIGH		180
23	P22	100	5	16	11	LOW		180
24	P23	300	17	13	-4	HIGH		180
25	P24	200	5	14	9	MODERATE		180
26	P25	200	16	29	13	MODERATE		180
27	P26	100	17	29	12	LOW		180
28	P27	300	18	11	-7	HIGH		180
29	P28	0	16	23	7	NONE		180
30	P29	100	5	16	11	LOW		180
31	P30	100	15	25	10	LOW		180

Figure 4: Before being imported into Tableau, the final processed dataset displayed validated columns.

Tableau Dashboard:

I imported the finished cleaned dataset into Tableau and made all the visualisations I needed for my research, such as a scatter plot, bar chart, before-and-after comparison chart, and histogram. I put these visuals together into a single dashboard that makes the connection between consumption levels and cognitive function very evident. Building the charts and styling the dashboard in Tableau was a seamless procedure with no technical problems. Once the layout was finished, I made the interactive dashboard available via a shareable link by publishing it to Tableau Public.

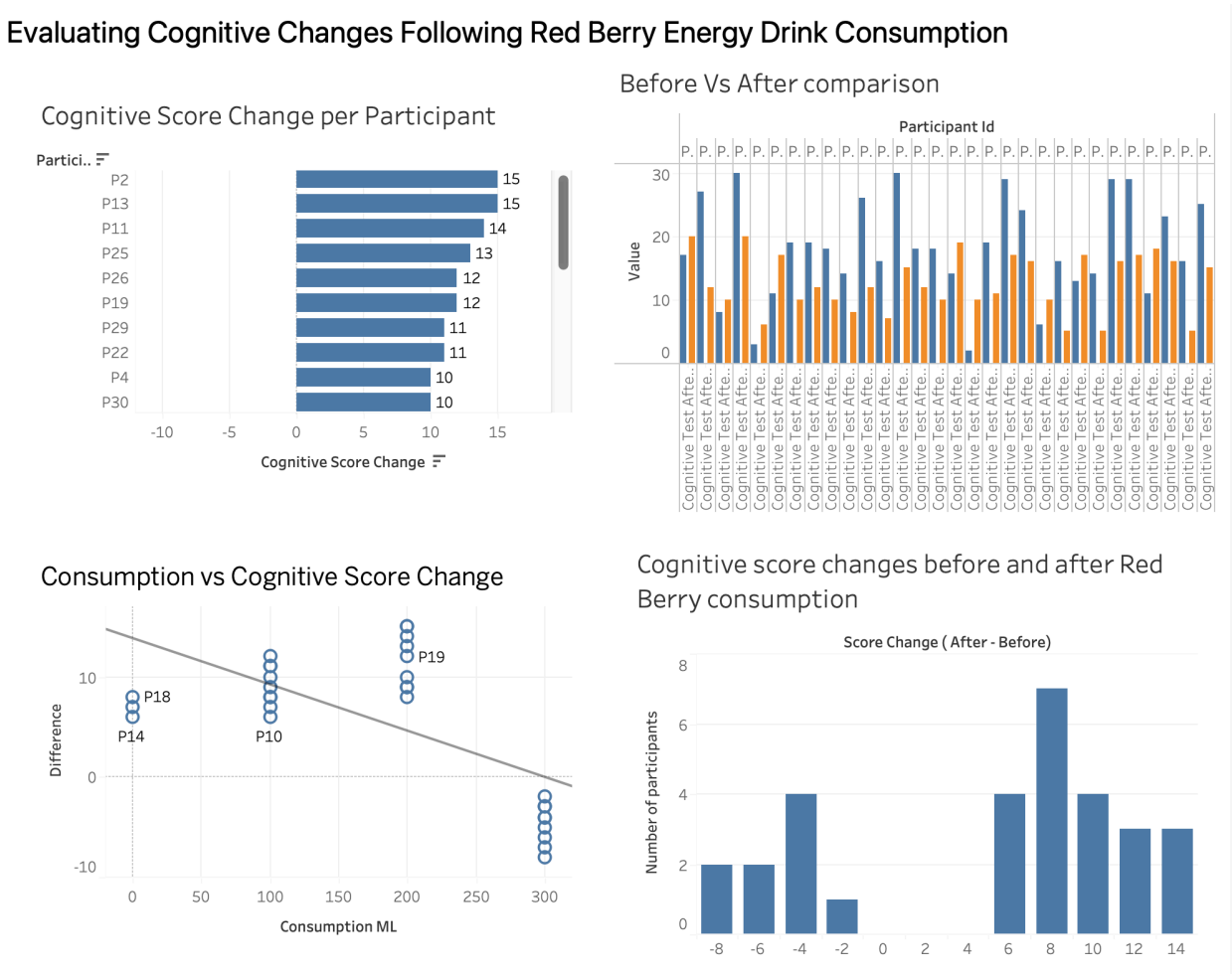

Figure 5: Tableau dashboard displaying trends in cognitive performance.

The complete interactive Tableau dashboard made for my Red Berry Boost research may be accessed by clicking this link:
https://public.tableau.com/views/CognitivechangesfollowingRedBerryBoostconsumption/Dashboard1?:language=en-GB&publish=yes&:sid=&:redirect=auth&:display_count=n&:origin=viz_share_link

Insights:

My investigation revealed a distinct pattern in the effects of varying millilitres of Red Berry Boost on cognitive function. The majority of subjects consistently improved their cognitive test results at 200 ml, which was the most improvement. However, performance started to deteriorate as the quantity reached 300 ml, with a number of people receiving worse scores than before. The scatter plot and score change distribution, which showed a negative connection between increased consumption and improvement, both confirmed this pattern. Overall, the data showed

that while excessive consumption decreased focus and cognitive function, moderate intake offered the most benefits.

Conclusion:

The experiment's findings indicate that 200 millilitres of Red Berry Boost is the ideal dosage for enhancing cognitive function. Although students frequently take energy drinks to improve their focus, this study found that higher consumption does not turn into improved outcomes. Rather, overstimulation and declining encouragement caused performance to decline at greater consumption levels. After examining the dataset using SQL, Excel, and Tableau, it is evident that while excessive consumption impairs performance, moderate, controlled intake promotes superior cognitive outcomes.

Changes and improvements for future references:

I would broaden this research in the future by taking into account more variables that can affect a person's cognitive function and memory retention. To determine whether baseline ability influences participants' reaction to energy drink use, one enhancement would be to evaluate participants' academic backgrounds and separate those who generally perform at a high level from those who perform at a lesser level. The length of sleep is another crucial consideration. It would be possible to determine whether people who slept more than six hours performed differently from those who slept less by keeping track of how many hours each participant slept the night before the test. The study would be improved and a more thorough understanding of the factors influencing cognitive function would result from the inclusion of these variables.