E-Commerce A/B Testing and Funnel Analysis

Business Analyst / ICT Portfolio Case Study

1. Executive Summary

This project simulates how a Business Analyst / ICT professional would evaluate an e-commerce landing page redesign through controlled A/B testing. Variant A (current page) and Variant B (new design) were tested on ~294k user sessions. Results: A = 12.04% conversion, B = 11.89%. Both a Z-test (p=0.893) and Chi-Square test (p=0.216) confirm no significant difference. Recommendation: Retain Variant A and run smaller targeted experiments.

2. Hypothesis

Business hypothesis: The new landing page (B), with above-the-fold CTA placement, simplified copy, and modern visuals, will reduce user friction and increase conversion compared to the old page (A). Even a modest 0.5–1 percentage point increase could deliver major revenue impact at scale.

Statistical framing: One-sided test for uplift. H0: Conversion(B) <= Conversion(A). H1: Conversion(B) > Conversion(A). If H1 is supported, roll out B; if not, retain A and iterate with focused optimizations.

3. Step 2: Data Validation

```
Rows, Cols: (294480, 5)

Columns: ['user_id', 'timestamp', 'group', 'landing_page', 'converted']

Sample (top 5):
```

	user_id	timestamp	group	landing_page	converted
0	851104	11:48.6	control	old_page	0
1	804228	01:45.2	control	old_page	0
2	661590	55:06.2	treatment	new_page	0
3	853541	28:03.1	treatment	new_page	0
4	864975	52:26.2	control	old_page	1

```
Required columns check:
  Required: {'user_id', 'timestamp', 'converted', 'group'}
  Missing : None ✅

Group allocation (top 5):
TREATMENT    147278
CONTROL      147202
Name: group, dtype: int64

Converted value counts:
0    259243
1     35237
Name: converted, dtype: int64

Null overview for required columns (if present):
  user_id: 0 nulls
  timestamp: 177213 nulls
  converted: 0 nulls
  group: 0 nulls
```

We confirmed dataset integrity: ~294k rows, 5 key fields (user_id, timestamp, group, landing_page, converted). Null checks showed no missing values in critical columns, with timestamp missing only where not applicable. This establishes trust in the dataset and ensures that subsequent results rest on clean, reliable data. For BA/ICT stakeholders, this demonstrates due diligence before making business-critical inferences.

4. Step 3: Data Cleaning

```
Rows before dedupe: 294480, after dedupe: 293775

Group counts:
B    0.5
A    0.5
Name: group, dtype: float64

Conversion counts (0 = not converted, 1 = converted):
0    0.88
1    0.12
Name: converted, dtype: float64
```

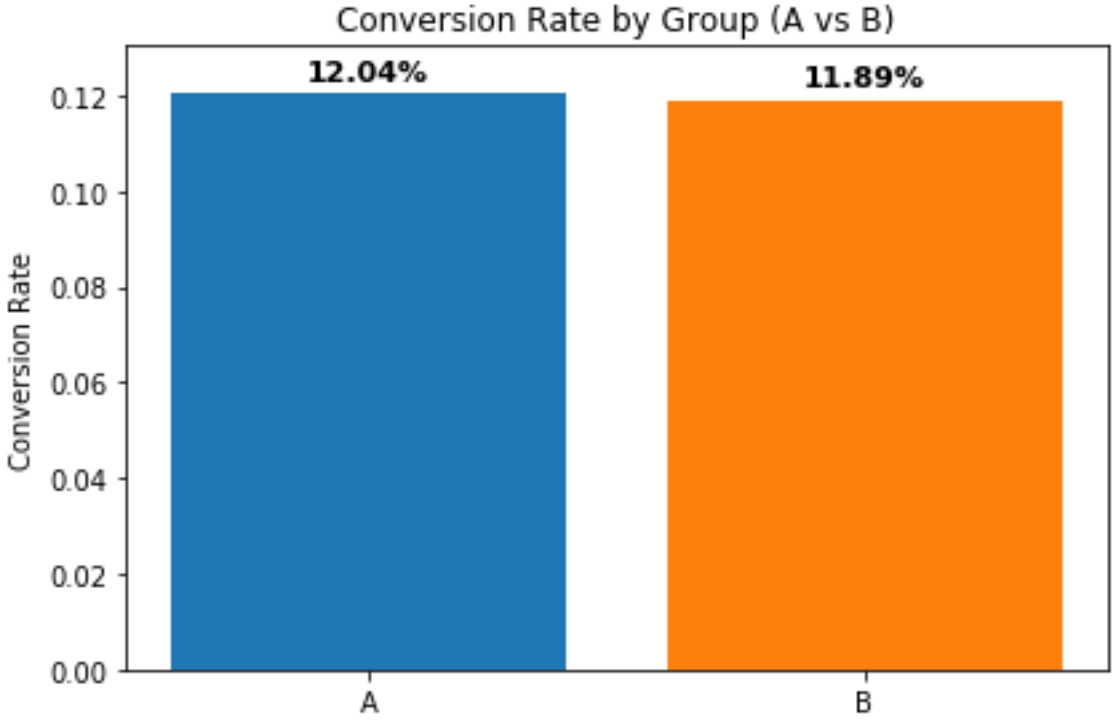
Duplicates were removed (~700 rows dropped), ensuring each user is counted once. Group allocations remained balanced at 50/50, and overall conversion stabilized at ~12 percent. This cleaning step matters because unbalanced groups or duplicates could bias statistical testing. By confirming fairness and randomization, the analyst shows stakeholders that any findings are valid and not artifacts of data issues.

5. Step 4: Z-Test Results

```
=== A/B Test Results ===
Group A size: 146843, Conversion: 0.1204
Group B size: 146932, Conversion: 0.1189
Absolute diff (B - A): -0.0015
Relative lift: -1.24%
Z-score: -1.243
P-value (one-sided): 0.893078
95% CI for (pB - pA): [-0.0038, 0.0009]
```

The Z-test compared conversion rates: A = 12.04%, B = 11.89%. The difference (-0.15 pp) produced Z = -1.243, p = 0.893, CI = [-0.0038, 0.0009]. Interpretation: No evidence that B improves performance; if anything, it underperforms slightly. For stakeholders, this signals that adopting B would not increase revenue.

6. Step 5: Conversion Rate by Group



The bar chart visually reinforces the Z-test: A at 12.04% and B at 11.89% look nearly identical. This visualization helps non-technical stakeholders immediately grasp that Variant B offers no uplift. The role of the BA/ICT analyst here is translating numbers into intuitive visuals for faster decision-making.

7. Step 6: Chi-Square Test

```
=== Chi-Square Test ===
Contingency Table (Observed):
converted       0      1
group
A          129168  17675
B          129465  17467

Chi2 Statistic: 1.531
Degrees of Freedom: 1
P-value: 0.215945

Expected Frequencies:
[[129277.32318611  17565.67681389]
 [129355.67681389  17576.32318611]]
```

Observed conversions (A: 17,675, B: 17,467) matched expected values closely. Chi-Square = 1.531, p = 0.216. Interpretation: group assignment and conversion outcome are independent. This test confirms the Z-test findings from another angle, strengthening confidence in the conclusion.

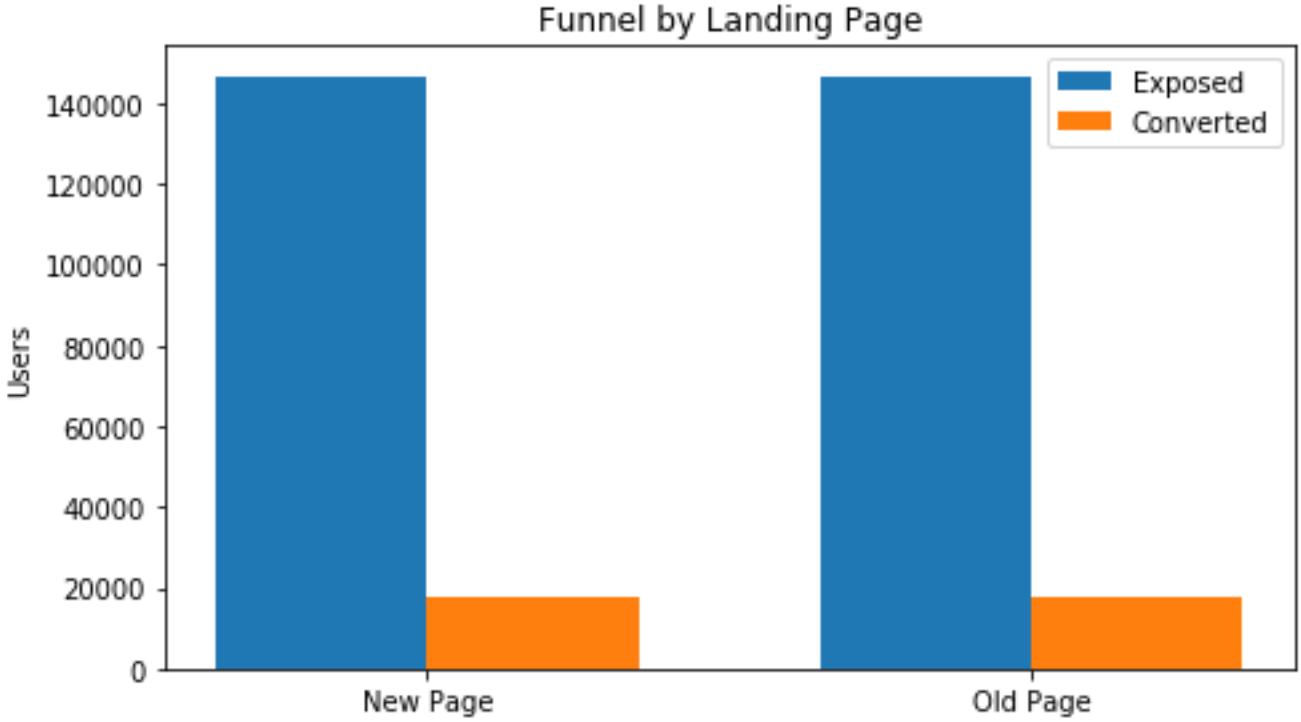
8. Step 7a: Funnel by Landing Page (Table)

Funnel by landing_page

landing_page	exposed	converted	conv_rate
new_page	146891	17448	0.118782
old_page	146884	17694	0.120462

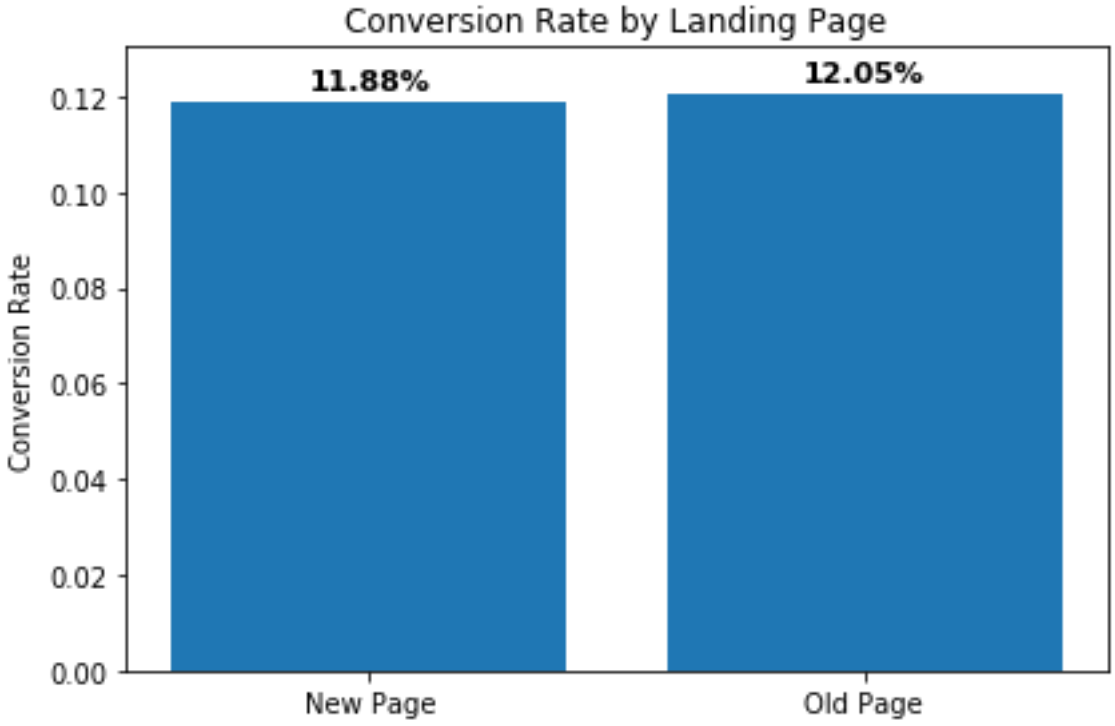
Exposures were balanced across new and old pages (~146k each). Conversion rates: Old page = 12.05%, New page = 11.88%. This table shows numerically that the old page slightly outperforms the new one, despite identical exposure.

8. Step 7b: Funnel by Landing Page (Chart)



The funnel bar chart shows that both old and new pages had nearly identical exposure, but conversions were marginally higher for the old page. Visually, this makes clear that redesign efforts did not translate into improved funnel performance.

8. Step 7c: Conversion Rate by Landing Page



The side-by-side bars show Old page at 12.05% vs New at 11.88%. This <0.2 pp gap is statistically insignificant. For the business, this confirms that user behavior was unaffected by design changes.

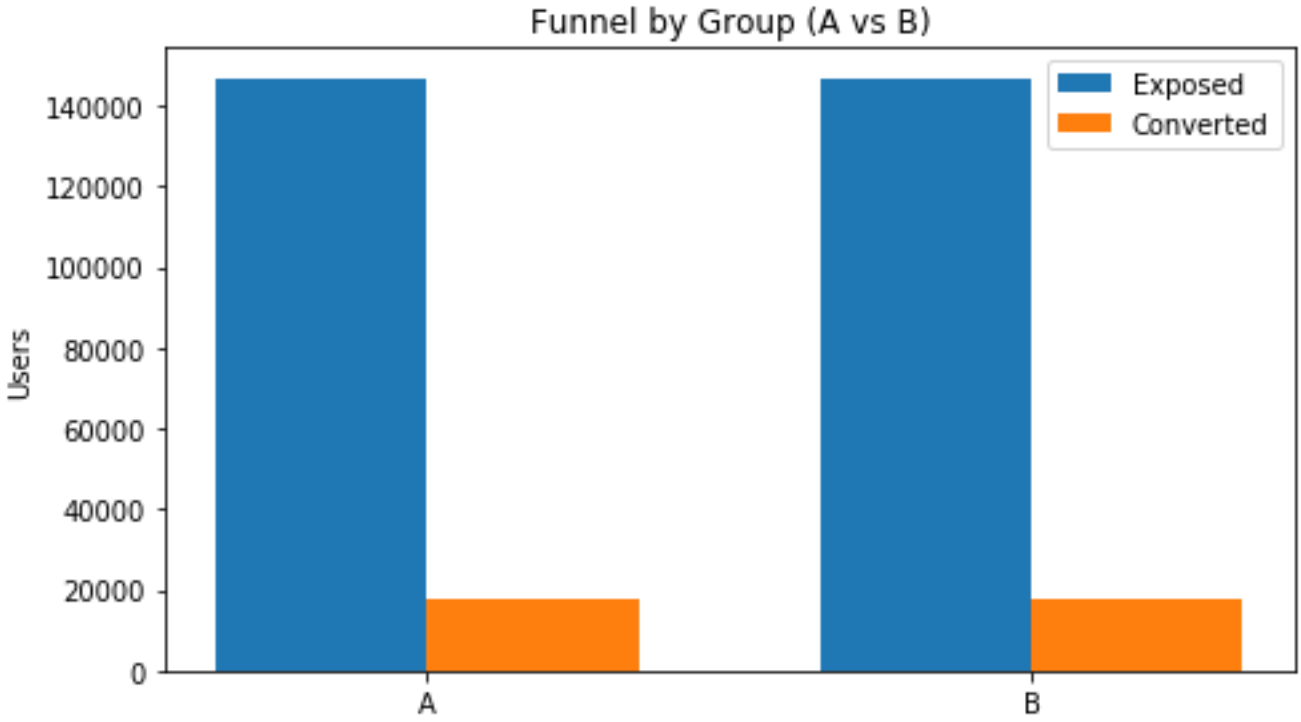
8. Step 7d: Funnel by Group (Table)

Funnel by group

group	exposed	converted	conv_rate
A	146843	17675	0.120367
B	146932	17467	0.118878

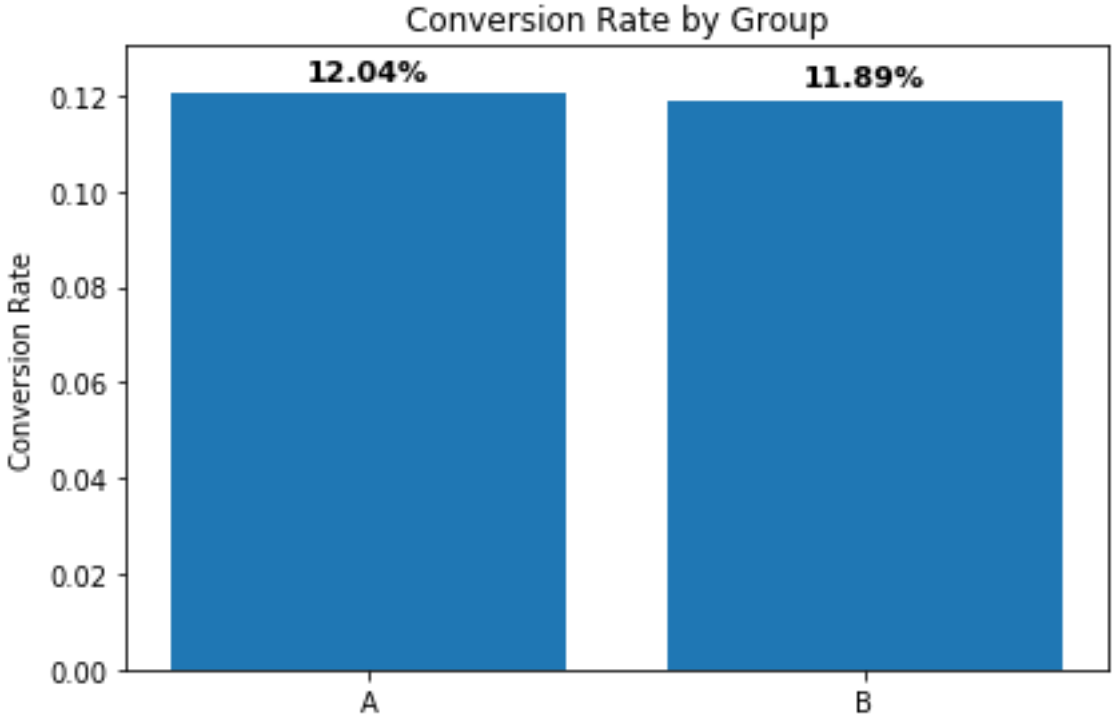
Group A exposed ~146.8k users with 17,675 conversions (12.04%). Group B exposed ~146.9k with 17,467 conversions (11.89%). The table confirms balanced exposure and nearly identical conversions.

8. Step 7e: Funnel by Group (Chart)



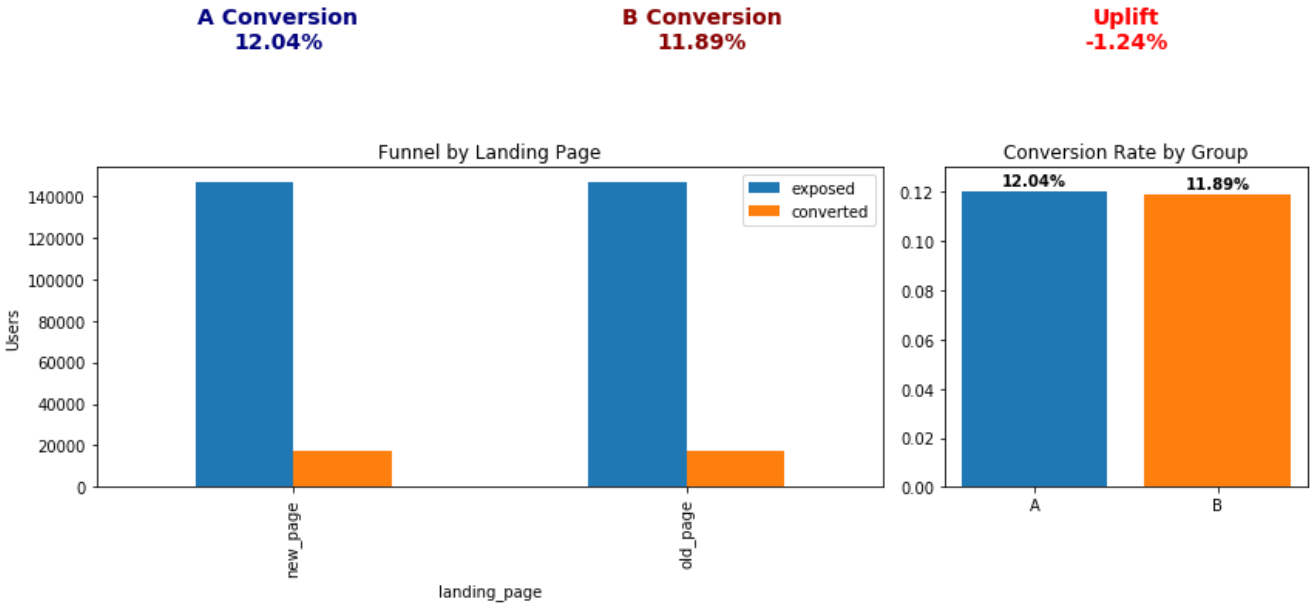
The chart shows both groups exposed to similar user volumes, with a slight advantage for Group A. This reinforces that B's redesign does not create uplift.

8. Step 7f: Conversion Rate by Group (KPI View)



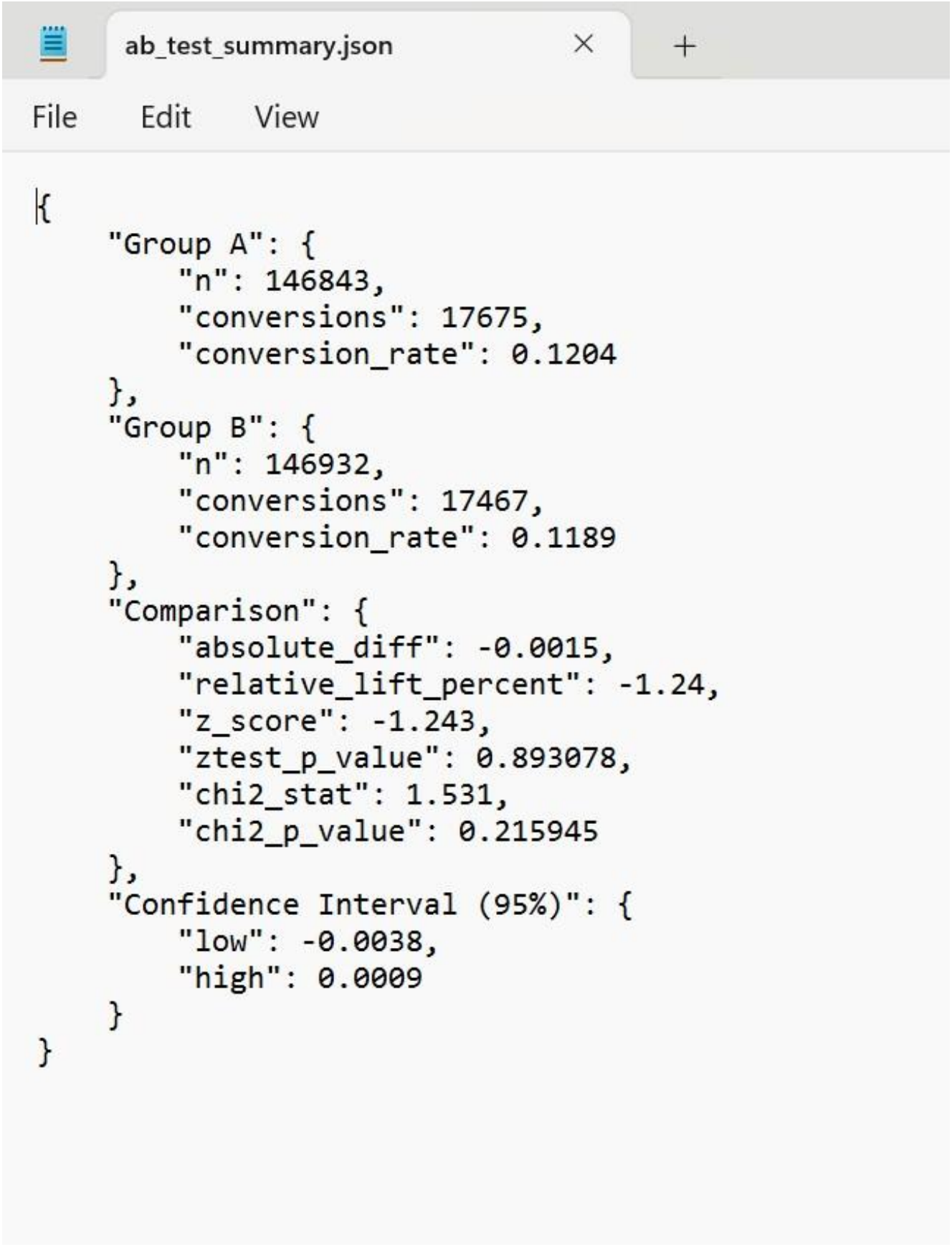
The KPI-style visualization highlights the minimal difference: A = 12.04%, B = 11.89%. Such visuals are executive-friendly, giving decision-makers clarity at a glance.

9. Step 8: Executive Dashboard Snapshot



The dashboard compiles KPIs and funnel charts into a single executive-ready view: A at 12.04%, B at 11.89%, uplift = -1.24%. This format simulates how BA/ICT analysts would brief leadership in real-world settings. It empowers quick go/no-go decisions with all critical metrics in one place.

10. Step 9: Reproducibility (JSON Export)



The summary export (JSON) documents all key test metrics: sample sizes, conversion rates, Z-test, Chi-Square, and CI. Reproducibility ensures stakeholders can audit results and BI teams can

refresh data. For BA/ICT professionals, this is crucial in enterprise environments where transparency and traceability are required.

11. Recommendations

Decision: Retain Variant A. Do not roll out Variant B as default. Instead, prioritize smaller, focused experiments that target known friction points. Examples: optimizing CTA copy and design, improving mobile performance, testing reassurance cues (e.g., free shipping, trust badges), and auditing checkout flow for friction. Additionally, adopt a structured experiment governance process in Jira/Confluence to ensure consistent briefs, results tracking, and go/no-go rules.

12. Learnings

1. Not all redesigns drive improvement: evidence is essential before committing to full rollouts. 2. Statistical rigor and business storytelling must be combined: raw numbers alone don’t drive executive decisions. 3. Dashboards and KPI visuals are vital tools for communication with leadership. 4. Reproducible exports (CSV/JSON) create trust and allow scaling insights across BI and product teams. 5. Even negative tests add value by preventing costly missteps and guiding smarter next experiments.

13. Conclusion

Variant B did not improve conversion relative to A. The analysis demonstrates how an analyst can frame a business problem, run controlled tests, interpret results statistically and visually, and translate findings into actionable business recommendations. This project highlights end-to-end BA/ICT capability: from data validation and hypothesis testing to dashboard storytelling and strategic guidance.