A/B Test Report

Impact of Website Background Color on User Conversion

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1 Executive Summary

This report details the findings of an A/B test conducted to evaluate the impact of changing the retail website's background color from white to black. The results show conclusively that the black background design is a powerful driver of user conversion.

- **Key Finding:** The treatment group (black background) achieved a conversion rate of **14.51%**, a significant lift over the control group's (white background) rate of **5.72%**.
- **Business Impact:** The effect is statistically significant ($p < 0.0001$). Logistic regression analysis indicates that users exposed to the **black background are 2.87 times more likely to convert** than those who saw the white background. This finding remains robust after controlling for user device and location.
- **Recommendation:** We strongly recommend implementing the black background design as the new standard across the website to capitalize on this substantial opportunity to increase overall conversions.

2 Introduction & Background

As part of our ongoing initiative to optimize the website for user engagement and drive key business metrics, an A/B test was designed to investigate the impact of a significant design change: the website's background color.

The central hypothesis for this test was: **A change from the standard white background to a modern black background will lead to a statistically significant increase in the user conversion rate.**

To test this, users were randomly segmented into two groups:

- **Group A (Control):** Users who viewed the website with the standard white background.
- **Group B (Treatment):** Users who viewed the website with the new black background.

The primary success metric for this test was the **Conversion Rate**, defined as the percentage of users in each group who completed a desired action (e.g., making a purchase).

3 Methodology

The analysis is based on data collected from 5,000 users who visited the website during the test period. Users were randomly and evenly assigned to either the control or treatment group.

To analyze the results, we employed several statistical methods to ensure the findings are robust and reliable:

1. **Descriptive Statistics** to summarize the data.
2. **Proportion Z-Test & Chi-Squared Test** to determine if the difference in conversion rates between the two groups was statistically significant.
3. **Logistic Regression Modelling** to quantify the magnitude of the impact and to perform a robustness check by controlling for potential confounding variables such as user device and location.

4 Detailed Results & Analysis

The results of the test showed a clear and significant performance lift for the treatment group.

4.1 Overall Conversion Rates

The treatment group (black background) outperformed the control group by a wide margin.

Table 1: Conversion Rates by Group

Group	Background	Users	Conversions	Conversion Rate
A	White	2,519	144	**5.72%**
B	Black	2,481	360	**14.51%**

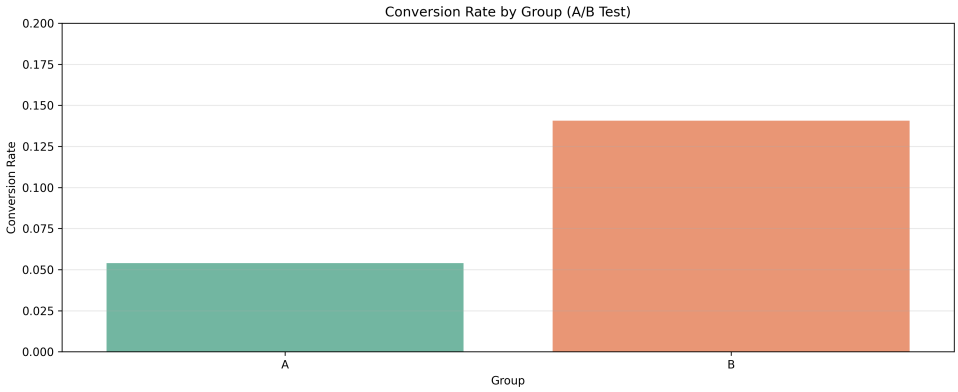

Figure 1: This chart would visually compare the conversion rates of 5.72% for Group A and 14.51% for Group B.

4.2 Statistical Significance

Both the Proportion Z-Test and the Chi-Squared Test of Independence yielded a **p-value of < 0.0001**. In business terms, this means there is a less than 0.01% probability that this dramatic difference in conversion rates occurred by random chance. We can reject the null hypothesis and confidently conclude that the change in background color was the cause of the observed lift.

4.3 Magnitude of the Effect

To quantify the impact, a logistic regression model was used. The model's coefficient for Group B was **+1.05**, representing a strong positive effect on the log-odds of conversion. For easier interpretation, this translates to an **odds ratio of 2.87**. This means that, holding all else constant, a user who sees the black background is **nearly three times more likely to convert** than a user who sees the white one.

4.4 Robustness and Heterogeneous Effects

To ensure the effect was not skewed by user demographics, we introduced Device (Mobile vs. Desktop) and Location into our model. The coefficient plot below (Figure 2) visualizes the effect of each variable on the log-odds of conversion.

- **Main Effect is Robust:** The positive effect of the black background (Group B) remains strong and statistically significant even after controlling for these variables. As seen in the plot, its coefficient is significantly positive and its confidence interval does not cross the red zero line.
- **Location-Specific Insight:** The multivariate analysis revealed that users in **Northern Ireland have a statistically significant lower conversion rate** compared to users in England (the

reference group). This is visible in the plot as its confidence interval is entirely to the left of the zero line.

- **No Significant Interaction:** Further analysis revealed no significant interaction effects between the background color and the user's device or location. The plot visually confirms that the effects for Mobile, Scotland, and Wales are not statistically significant, as their confidence intervals overlap with zero. This is a positive outcome, suggesting the benefits of the black background are consistent across different user segments.

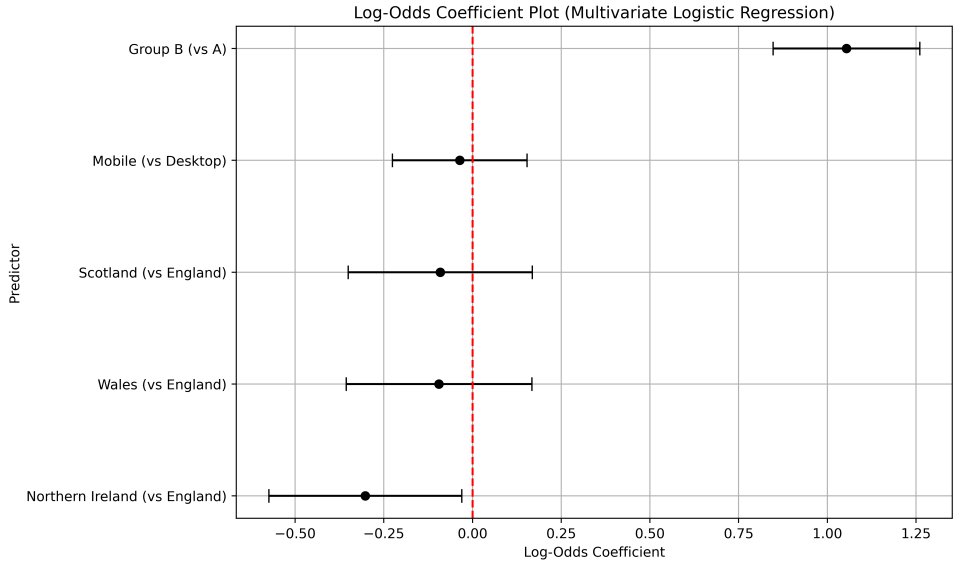

Figure 2: Log-Odds coefficients from the multivariate logistic regression. The points show the estimated effect size, and the horizontal bars represent the 95% confidence intervals. Effects are statistically significant if their interval does not cross the red dashed line (zero).

5 Discussion

The substantial increase in conversion associated with the black background suggests a strong positive user response to the new aesthetic. While the data shows *what* happened, we can hypothesize on *why*:

- **Enhanced Visual Appeal:** A darker theme may be perceived as more modern, premium, and sophisticated, aligning better with the brand's positioning.
- **Improved Product Focus:** A black background can make product images and key visual elements "pop," drawing the user's eye more effectively to the items for sale.
- **Reduced Eye Strain:** For some users, a dark mode can be more comfortable for browsing, potentially leading to longer and more engaged sessions.

6 Conclusion & Recommendations

The A/B test has yielded a clear and statistically significant result: the black background design dramatically increases the user conversion rate. The effect is substantial and holds true across different user devices and locations.

Based on this conclusive evidence, we make the following recommendations:

1. **Primary Recommendation: Implement the black background design as the new standard across the entire website.** This single change is projected to provide a significant and immediate lift to our primary business metric.

2. **Secondary Recommendation:** Upon full rollout, continue to monitor the overall site conversion rate to confirm that the positive lift is sustained.

3. **Future Consideration:** Use this insight to inform future design choices. Consider A/B testing other elements, such as button colors and typography, that would best complement the new dark theme.

Appendix: Detailed statistical outputs and regression tables are available upon request.