Decoding User Engagement

E-news Express Project and Business Statistics

Robert P. Ludwig IV

04/11/2024

Contents / Agenda

- Executive Summary
- Business Problem Overview and Solution Approach
- EDA Results
- Hypotheses Tested and Results
- Appendix

Executive Summary

Key Findings:

- Introduction of the new landing page significantly bolstered user engagement and conversions.
- Language preference does not influence conversion rates, suggesting effective linguistic inclusivity.
- Similar time spent on the new page across language groups indicates a universally engaging design.

Recommendations:

- Adopt the new landing page design across the platform to leverage its effectiveness.
- Continue supporting the existing range of languages, monitoring for any shifts in user preferences.
- Regularly iterate on design elements through A/B testing to maintain a high user engagement level.

Business Impact:

- Expect sustained growth in user interaction and conversion rates with the new landing page.
- Maintain language diversity to nurture user trust and market expansion.
- Embed data-driven design optimizations in the business strategy for ongoing improvement.

Business Problem Overview

Business Problem:

- The challenge at E-news Express is to reverse the trend of declining new subscriber rates, believed to be caused by an inadequately designed webpage that fails to sufficiently engage visitors.

Objective:

- To assess if the redesigned landing page can better capture user interest and increase subscription conversions.

Key Questions Addressed:

- Does the new landing page retain users for longer durations compared to the old version?
- Is there an improvement in conversion rates with the new landing page?
- How does language preference influence conversion rates and user engagement on the new page?

Solution Approach

Solution Approach:

- Implementation of an A/B testing framework to empirically evaluate the performance of the old vs. new landing page designs based on user interaction data.

Insights for Action:

- Statistical analysis at a 5% significance level to guide data-driven decision-making on the implementation of the new landing page.

Methodology:

- An experimental setup involving 100 randomly chosen users, split into control and treatment groups, to compare user engagement metrics and conversion rates across the two landing page versions.

EDA Results

Data Overview:

- Analyzed a dataset comprising 100 entries across 6 columns, including user ID, group assignment (control or treatment), landing page type (old or new), time spent on the page, conversion status, and language preference.
- Users' time spent on the page averaged 5.38 minutes, with individual times ranging from a few seconds to over 10 minutes.
- User IDs varied from 546443 to 546592, suggesting a representative sample from the database.

Data Quality and Integrity:

- Validation checks confirmed no missing values or duplicate records, reinforcing data reliability for further analysis.

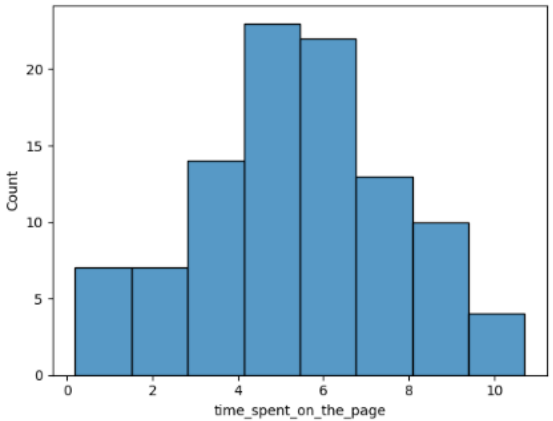
Key Insights:

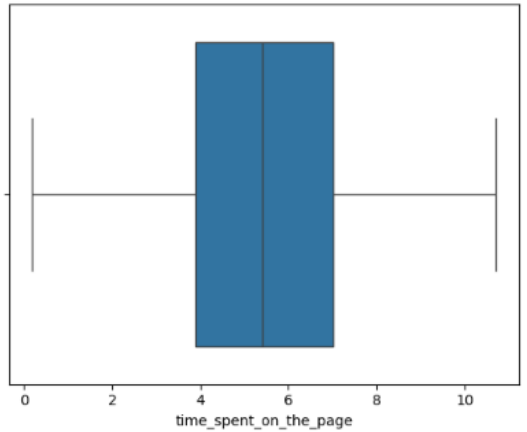
- Observed notable differences in user engagement between the new and existing landing pages, with users spending more time on the new page.
- Language preference showed no significant influence on the likelihood of user conversion, indicating equitable engagement across different language groups.

Link to Appendix slide on data background check

Univariate Analysis – Time Spent on the Page

- The distribution of time spent on the page was fairly normal with a slight right skew, suggesting most users spent a moderate amount of time on the page, with some outliers spending significantly longer.
- The median time spent on the page was approximately 5.4 minutes, which can be considered a central tendency in user engagement.

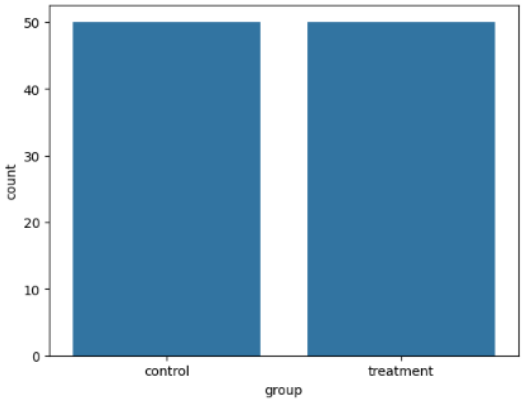




Link to Appendix slide on data background check

Univariate Analysis of the Group

- **Equal Distribution in Groups:** The dataset contains an equal distribution of users in both control and treatment groups, each with 50 participants.
- **Balanced Design:** This balanced design ensures that any effects observed can be attributed to the intervention rather than differences in group sizes.
- **Basis for Comparison:** The equal group sizes provide a strong basis for comparing the performance of the new page against the old one.
- **Implications for Analysis:** The balanced nature of the dataset supports the reliability of subsequent statistical tests and their conclusions.

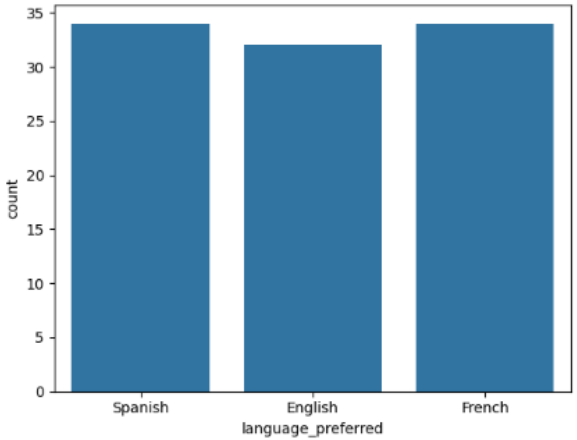


Link to Appendix slide on data background check

Univariate Analysis of the Language Prefered

Language Preference Analysis:

- **Distribution Insight**: The data shows a well-distributed language preference among users, with Spanish and French slightly more preferred than English.
- **Equal Representation**: Each language group is almost equally represented, eliminating bias towards a particular language in the subsequent analysis.
- **Implication for Content**: The diverse language preferences indicate the need for multilingual content to cater to the audience effectively.

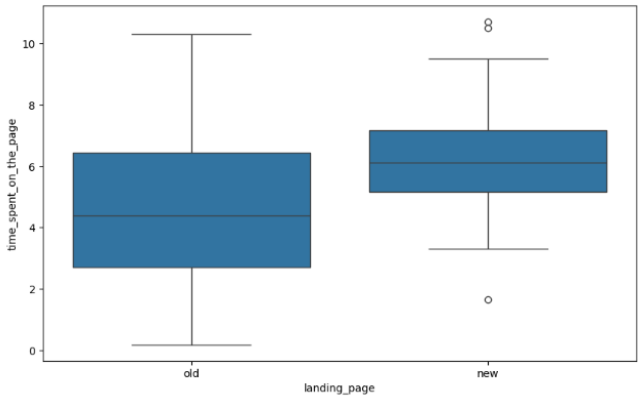


Link to Appendix slide on data background check

Bivariate Analysis- Landing Page vs Time Spent on the Page

Landing Page Impact on User Engagement:

- **Visual Comparison**: The boxplot illustrates a comparative analysis between the time spent on old and new landing pages.
- **Central Tendency**: There's a noticeable difference in the median time spent on each page, suggesting a variation in user engagement.
- **Spread and Outliers**: The interquartile range and potential outliers, especially on the new landing page, indicate variability in user interaction times.
- **Insights for Optimization**: These insights can inform decisions on page design and content placement to optimize user engagement.

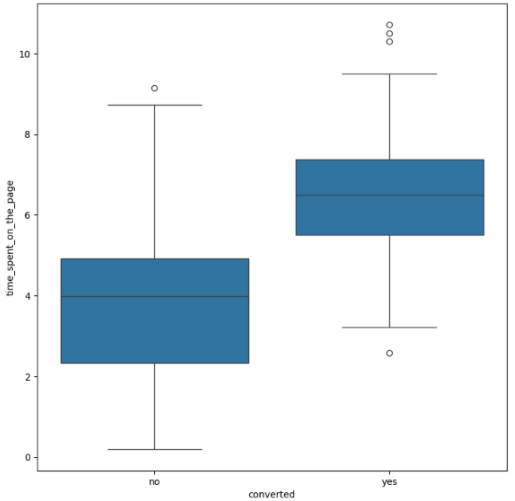


Link to Appendix slide on data background check

Bivariate Analysis-Conversion Status vs Time Spent on the Page

Conversion Impact on User Time Investment:

- **Higher Engagement for Conversions**: The data suggests that users who converted typically spent a longer duration on the page.
- **Non-converters' Interaction**: Those who did not convert show a more compact range of time spent, hinting at potentially less engagement or quicker decision-making.
- **Outliers and Engagement**: Noticeable outliers among converted users could indicate extremely high engagement for certain users, worth investigating further.
- **Strategic Insights**: This analysis can inform content optimization to increase user engagement time, potentially leading to higher conversion rates.

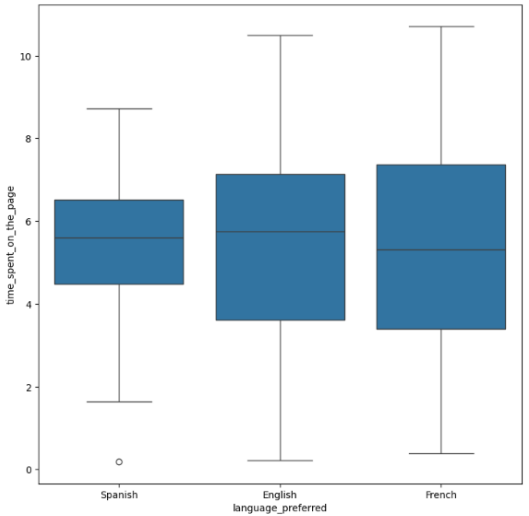


Link to Appendix slide on data background check

Bivariate Analysis-Language preferred vs Time spent on the Page

Language and Engagement - A Comparative View:

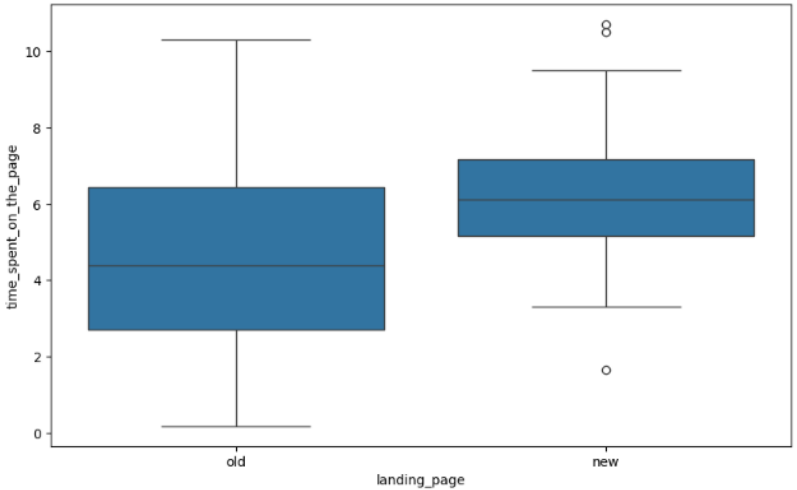
- **Engagement Across Languages**: All language groups show a similar median time on the page, indicating consistent engagement levels irrespective of language preference.
- **Range of Interaction**: The interquartile range for Spanish and French users is slightly wider than for English, suggesting more variability in time spent among these users.
- **Outliers and Language Preference**: Few outliers, especially in the Spanish group, may indicate instances of particularly high or low engagement, warranting further qualitative analysis.
- **Cultural Nuances and Content Resonance**: These insights could be pivotal in tailoring content to cultural preferences that might affect engagement time.



Link to Appendix slide on data background check

Hypotheses Testing - Landing Page Engagement

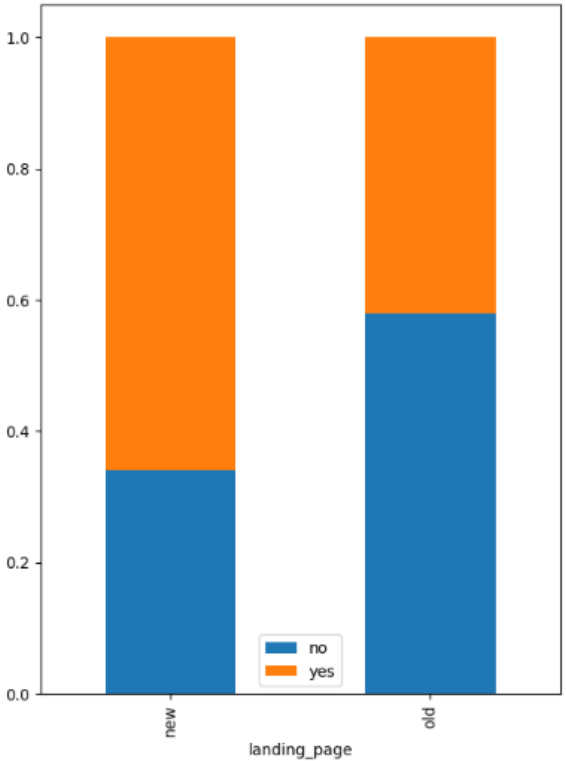
- **H0**: No difference in median time spent on the new vs. existing page.
- **Ha**: There is a significant difference in median time spent on the new page.
- **Standard Deviation**: The time spent on the new page has a lower standard deviation (1.82 minutes) compared to the old page (2.58 minutes), which suggests that user engagement time is more consistent on the new page.
- **Result**: p-value < 0.05 (exact p-value: 0.0013).
- **Interpretation**: Since our p-value is less than the significance level of 0.05, we reject the null hypothesis. This means that there is a statistically significant difference in the time users spend on the new landing page compared to the old one, with users spending more time on the new page.



Link to Appendix slide on details of the test performed

Hypotheses Testing - Conversion Rates

- **Equal Distribution of Users**: The study design ensured an equal number of users in each group, with 50 users served the new landing page and 50 users served the old landing page, providing a balanced comparison between the two groups.
- **H0**: Conversion rates are equal or lower on the new page.
- **Ha**: Higher conversion rates on the new page.
- **Result**: p-value = 0.0286 (rounded from 0.028623682840245278).
- **Interpretation**: With a p-value less than the significance level of 0.05, we reject the null hypothesis, suggesting that the new page is associated with higher conversion rates.
- **Context**: This significant result indicates that the new landing page design may be more effective at converting users than the old version. Given the equal distribution of users across both pages, this finding is unlikely to be influenced by sample size discrepancies and can be attributed to the changes made in the new landing page design.



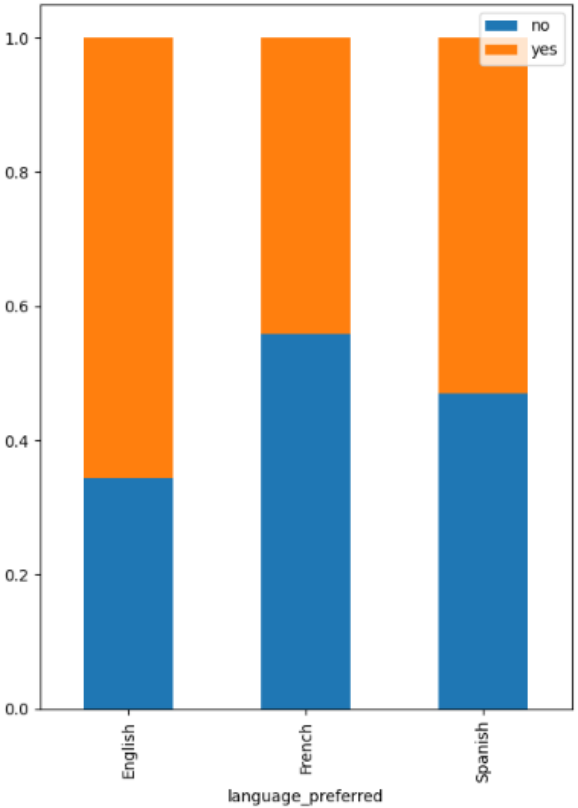
Link to Appendix slide on details of the test performed

Hypotheses Testing - Language and Conversion

Contingency Table:
English: 11 converted, 21 not converted
French: 19 converted, 15 not converted
Spanish: 16 converted, 18 not converted

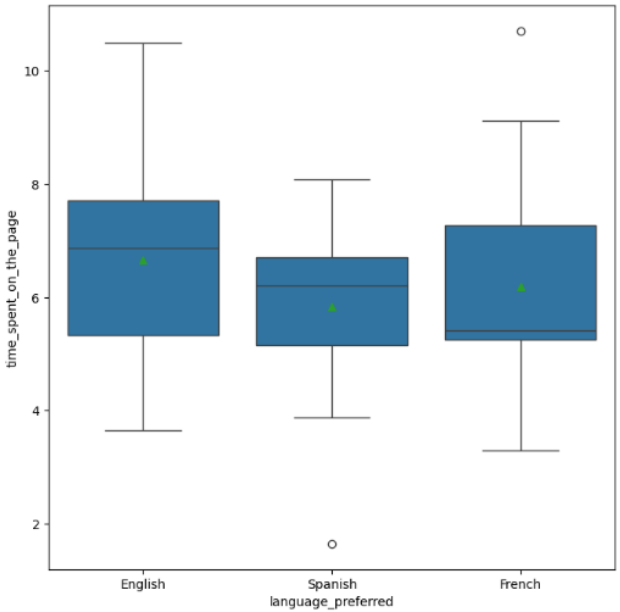
- **H0**: Language preference and conversion status are independent.
- **Ha**: Language preference affects conversion status.
- **Result**: p-value = 0.213 (rounded from 0.2129888748754345).
- **Interpretation**: With a p-value greater than the significance level of 0.05, we fail to reject the null hypothesis. This suggests there is no evidence of association between language preference and conversion status among the users.
- **Context**: This result indicates that the preferred language of a user does not significantly influence their likelihood to convert on the landing page. It suggests that regardless of the language preference, the conversion rates are similar, implying that the website's language adaptation is effectively neutral in influencing user conversion.

Link to Appendix slide on details of the test performed



Hypotheses Testing - Language and Engagement

- **Hypothesis**: We investigated whether the time spent on the new page varied based on user language preference.
- **Mean Times**: The average times spent by language were 6.66 minutes (English), 6.19 minutes (French), and 5.85 minutes (Spanish).
- **P-value**: With a p-value of 0.4324, we find no significant difference in engagement across languages.
- **Implication**: The results suggest that the new page design consistently engages users, regardless of their language preference.



Link to Appendix slide on details of the test performed

Conclusion and Business Recommendations

- Implement the new landing page to leverage increased engagement and conversion rates.
- Continue offering language options without change, as no direct impact on conversions was found.
- Monitor user behavior and business metrics to ensure sustained performance.
- Employ qualitative feedback to enhance the user experience beyond quantitative measures.
- Consider iterative improvements and personalized content to maximize landing page effectiveness.

APPENDIX

Data Background and Contents

Python Notebook for Data Analysis:

- Title: ENews Express Data Analysis Notebook
- Description: This Jupyter notebook contains the comprehensive data analysis workflow, including data preprocessing, exploratory data analysis, and statistical analysis conducted to evaluate the performance of the new landing page.

Dataset Used in Analysis:

- Title: ENews Express Landing Page Data
- File Name: abtest.csv
- Description: The dataset comprises information on user interactions with the old and new landing pages, capturing metrics such as time spent on the page and conversion status, segmented by language preference.

Great Learning

Happy Learning !