A/B Testing Analysis of Landing Page Design in E-News Express

Project: Business Statistics - E-News Express

Sanjana Addanki
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AGENDA

- Business Problem Overview & Solution Approach
- Data Overview
- Exploratory Data Analysis
- Hypothesis Tested & Results
- Executive Summary (Conclusions & Recommendations)
- Appendix

Business Problem Overview

- There is a decline in new subscribers
  - Current landing page is not engaging enough to get desired results in terms of subscriptions.
- We need to test if a new landing page actually improves engagement and subscriptions in a notable way.

Solution Approach

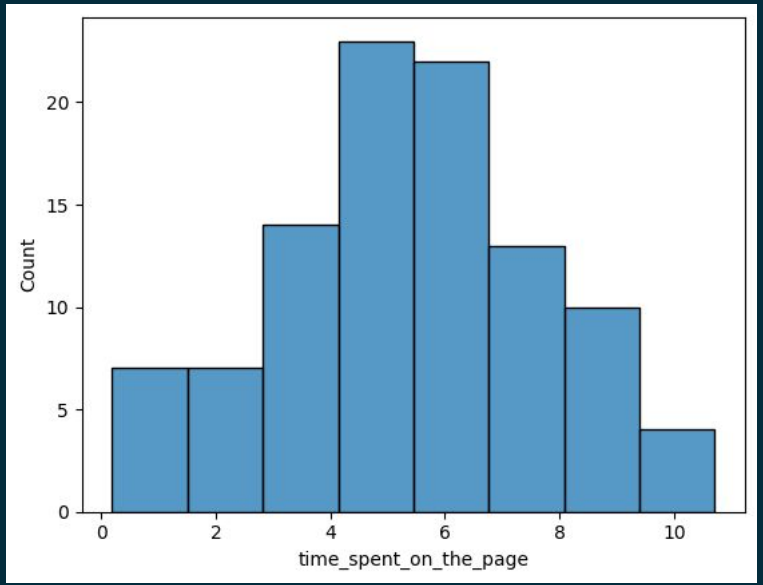
- Perform EDA (both Univariate and Multivariate) to explore user engagement trends on the old vs. new landing page
- Recognize which landing page performs better
  - In terms of time spent and conversion rate
- Examine the relationship between language preference and both conversion status and time spent on page
- Provide recommendations for improving subscribe growth and overall engagement for the business.

Data Overview

- There are 100 rows and 6 columns.
- There are mixed data types, which includes both categorical and numerical variables.
- There are no missing values.
- There are no duplicates either.

EDA - Univariate Analysis

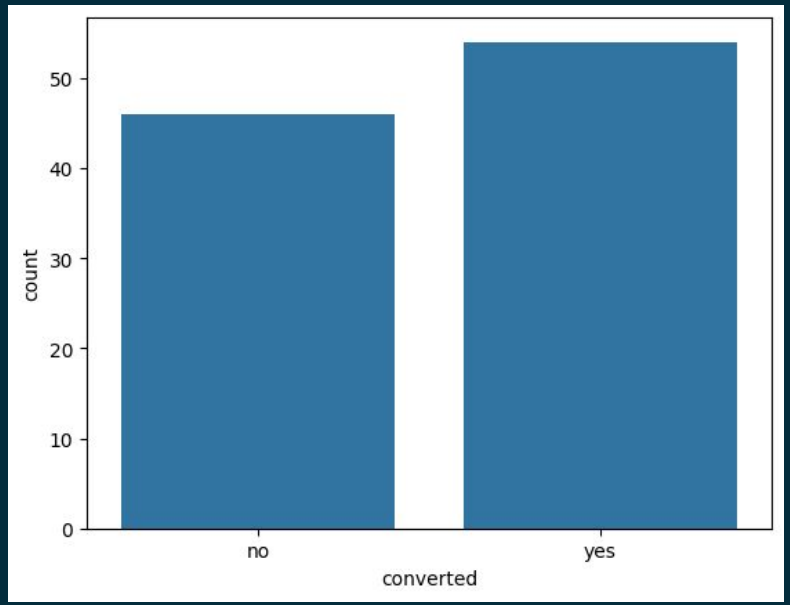
Histograms



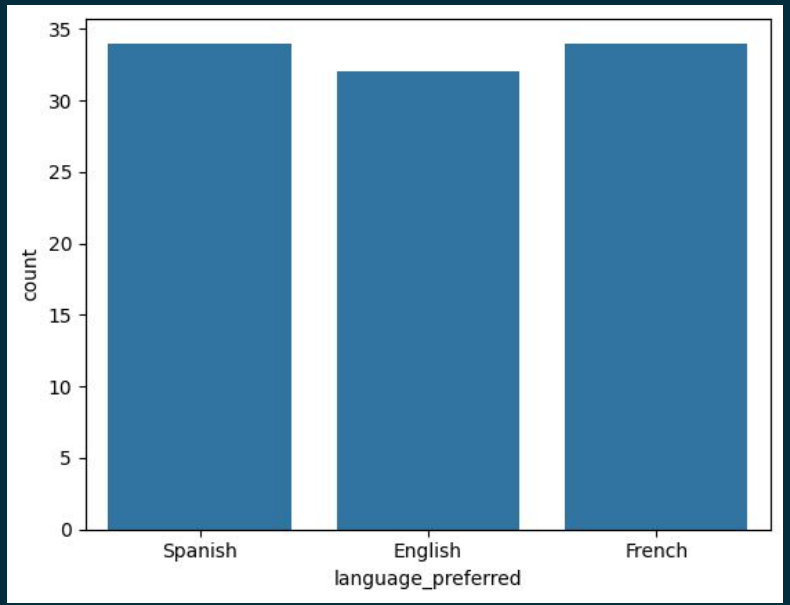
This shows a fairly normal distribution. It shows that the amount of time that users spend on the page/engagement is more evenly spread out.

EDA - Univariate Analysis

Box Plots



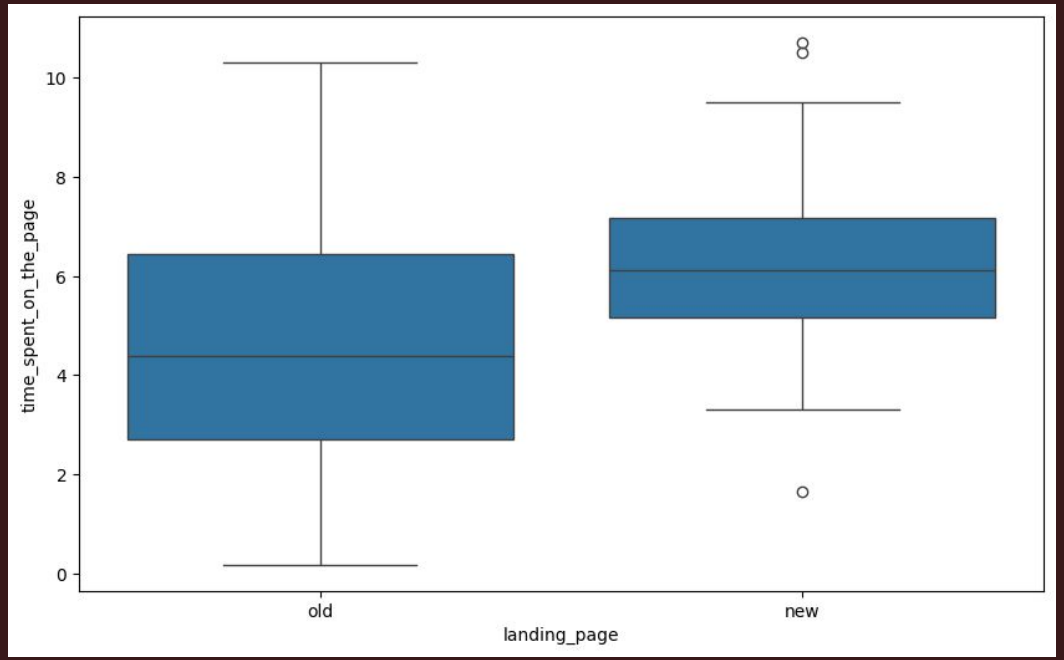
Basic breakdown of how many users took the desired action.



Shows counts for each language group among users.

EDA - Bivariate Analysis

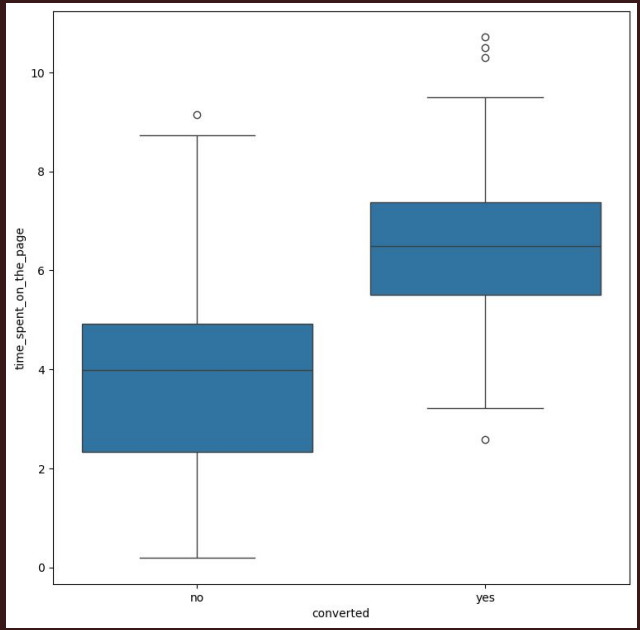
Landing Page vs. Time Spent on Page



This demonstrates that the new landing page had higher medians and range in terms of time spent on the page. This plot is necessary in accessing if the new page is noticeably better.

EDA - Bivariate Analysis

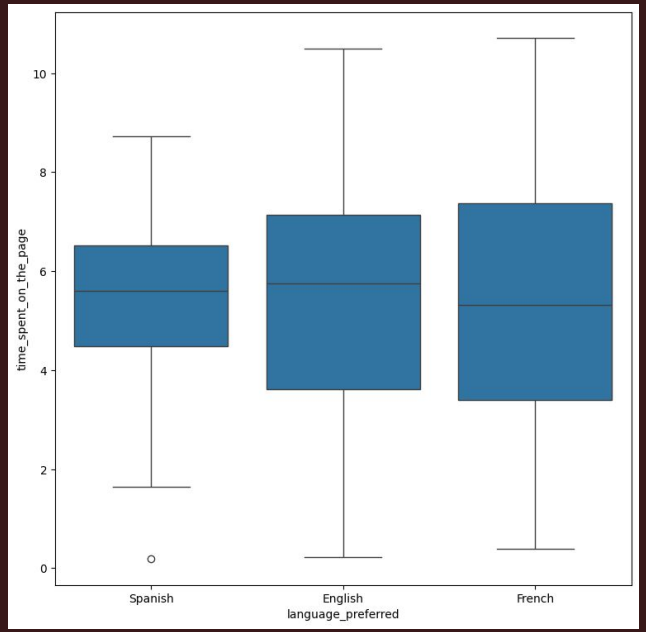
Conversion Status Vs. Time Spent on the Page



The median and range overall in how much time was spent on the page is higher for those who were converted. This could show possible correlation between engagement on the page and successful conversion.

EDA - Bivariate Analysis

Language Preferred vs. Time Spent on the Page



This plot compares the distribution of time spent on the page among users of different language preferences. This could help us understand if certain linguistic user segments interact differently. That would eventually inform us in terms of UX Adjustments or even localization. No major differences in time spent is shown.

Hypothesis Test & Results

Time on Page

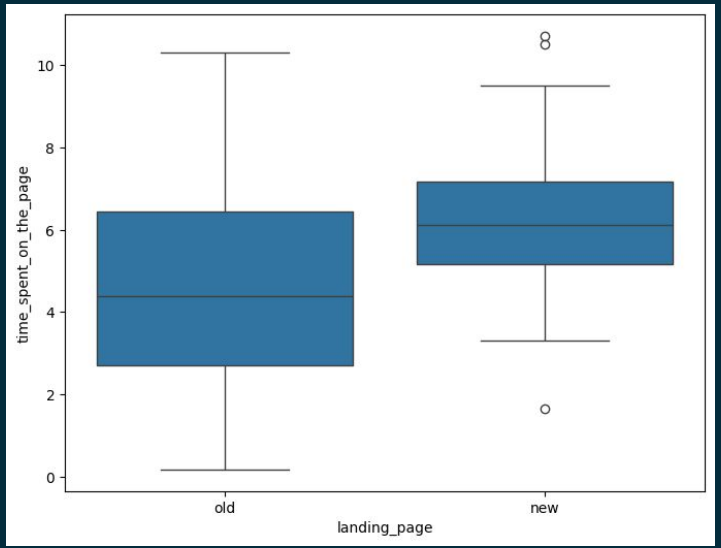
$\alpha = 0.05$

Ho: μ_new ≤ μ_old
Ha: μ_new > μ_old

- ★ Sample SD of time spent on new page is 1.82
- ★ Sample SD of time spent on old page is 2.58

Test: Two-sample T-Test (Welch's T Test))

Inference: As the p-value of ~0.000139 is less than alpha = 0.05, we have enough evidence to reject the null hypothesis and conclude that the mean time spent on new landing page is greater than the mean on the old landing page



Hypothesis Test & Results

$\alpha = 0.05$

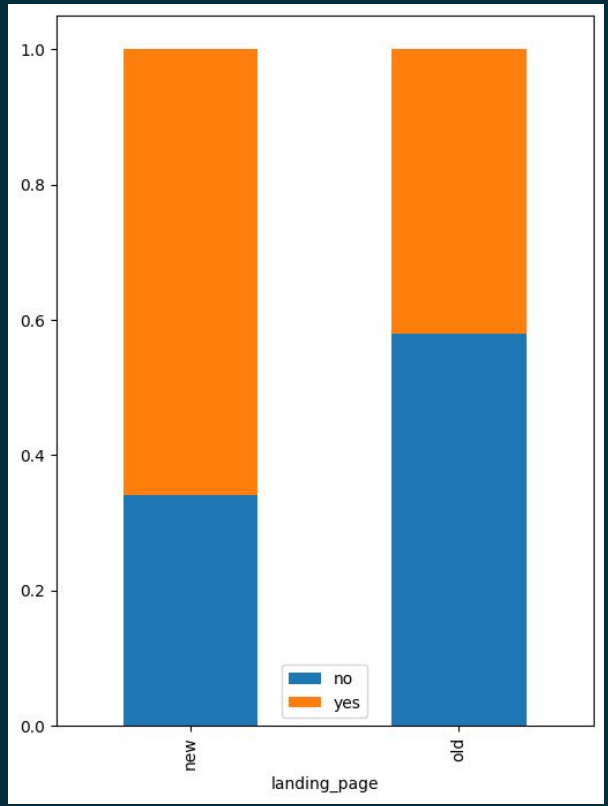
Conversion Rate

Ho: p_new ≤ p_old
Ha: p_new > p_old

★ The numbers of users served the new and old pages are 50 and 50

Test: Two-Proportion Z-Test (one-tailed)

Inference: As the p-value of ~0.0080 is less than alpha = 0.05, we have enough evidence to reject the null hypothesis and conclude that the conversion rate for the new landing page is greater than the conversion rate for the old landing page.



Hypothesis Test & Results

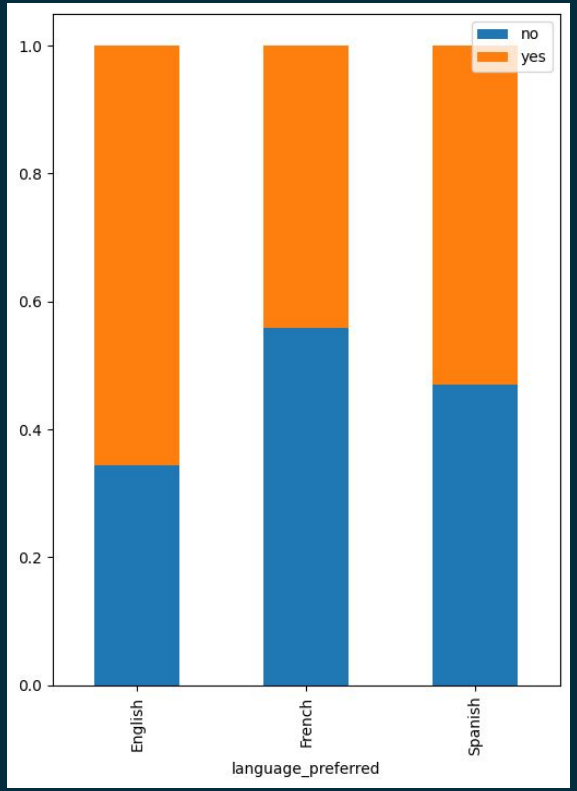
$\alpha = 0.05$

Conversion vs Language

Ho: p_english = p_french = p_spanish
Ha: at least one p is different

converted	no	yes
language_preferred		
English	11	21
French	19	15
Spanish	16	18

Test:
Chi-Square Test of Independence



Inference: As the p-value of 0.21299 is greater than alpha = 0.05, we do not have enough evidence to reject the null hypothesis, essentially saying that conversion does not depend on the language.

Hypothesis Test & Results

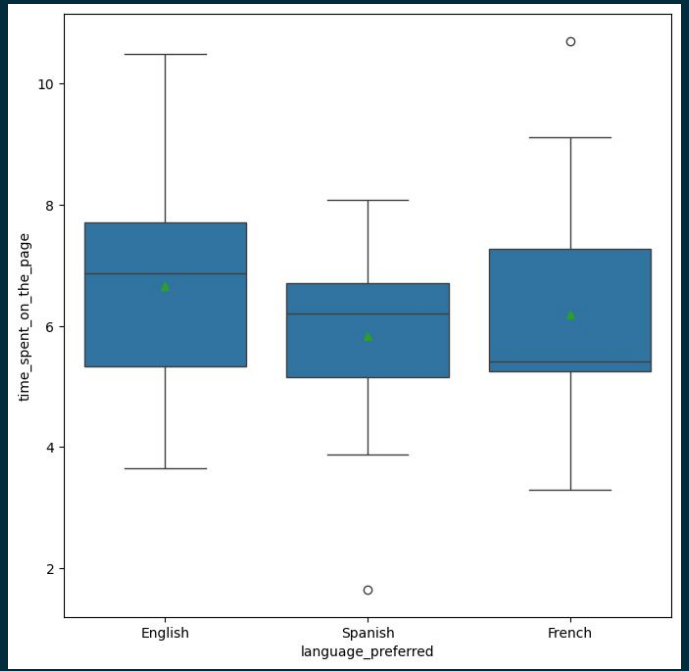
Time vs Language

$\alpha = 0.05$

Ho: μ_english = μ_french = μ_spanish
Ha: at least one μ is different

language_preferred	
English	6.663750
French	6.196471
Spanish	5.835294

Test:
One-Way ANOVA test



Inference: As the p-value of 0.43204 is greater than alpha = 0.05, we do not have enough evidence to reject the null hypothesis, meaning that the mean time spent on the new page is fairly the same across all language groups.

Executive Summary

Overall Conclusions

- New landing page keeps users engaged longer.
- New landing page leads to higher subscription conversions.
- Language preference seems to have little to no impact on engagement or conversion.

Executive Summary

Recommendations

- Roll out and commit to the new landing page
  - Use as default
- Don’t devote too much focus on curating landing pages specifically by language
  - Time spent on page didn’t differ much when it came to language
- Optimize designs even further with targeted A/B tests
  - Could be personalization features or subscription offers
- Monitor engagement & subscriptions continuously

Thank you