A/B Testing Projects Aligned with Book "Trustworthy Online Controlled Experiments - Ron Kohavi"

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1. Introduction: The Foundation of Data-Driven Decision Making

- **Importance of Controlled A/B Testing Experiments**
  - Establishes causality by randomly assigning users to control and treatment groups.
  - Scientifically validates product changes, ensuring they lead to measurable business improvements.
  - Prevents costly decisions based on spurious correlations, fostering a culture of trustworthy experimentation.
- **Projects Overview: A Portfolio of Practical Experience**
  - Outlines a series of projects from beginner to expert difficulty.
  - Demonstrates a full understanding of the A/B testing lifecycle, from design to analysis.
  - Serves as a tangible portfolio showcasing skills in applying experimentation to real business problems.
- **Technical Implementation of Statistical Modeling for A/B Testing**
  - Applies a diverse set of statistical tests based on data type (e.g., Z-tests, t-tests, Chi-square).
  - Utilizes advanced models like Poisson Regression, Mixed Effects, and Logistic Regression.
  - Incorporates modern methods such as Bootstrap tests and Bayesian A/B approaches for robust analysis.
- **Impact and Outcome for a Long-term Professional Goal**
  - Showcases hands-on experience and a strong grasp of both theory and practice.
  - Demonstrates the ability to design, execute, and communicate the results of trustworthy experiments.
  - Positions the individual as a valuable asset for data-driven organizations by showcasing skills in statistical analysis and critical thinking.

2. Project List with Statistical Methods

ID	Project Name	Statistical Method	Data Type	Control Group	Treatment Group	Time (Hours)	Difficulty
1	Email Newsletter Signup Optimization	Z-test	Binary	Original signup button	New CTA button design	2-3	Beginner
2	Mobile App Install Button Test	Fisher's Exact	Binary	Current install button	Redesigned button	2-3	Beginner
3	E-commerce Average Order Value	Welch's t-test	Continuous	Standard checkout	Optimized checkout flow	2-3	Beginner
4	Video Streaming Session Duration	Mann-Whitney U	Continuous	Current UI	New interface design	2-3	Beginner
5	Social Media Post Engagement Rate	Poisson Regression	Count	Algorithm A	Algorithm B	3-4	Beginner
6	Landing Page Layout Comparison	One-way ANOVA	Continuous	Original layout	3 new variants	3-4	Intermediate
7	Food Delivery App Rating Test	Kruskal-Wallis	Ordinal	Standard experience	Enhanced experience	3-4	Intermediate
8	Payment Method Preference Analysis	Chi-Square	Categorical	Current options	New payment methods	2-3	Intermediate
9	SaaS Pricing Strategy Revenue Impact	Bootstrap Test	Continuous	Current pricing	New pricing tiers	4-5	Advanced
10	Real-time Ad Campaign Monitoring	Sequential Testing	Binary	Campaign A	Campaign B	5-6	Advanced
11	Educational App Learning Outcomes	Mixed Effects	Continuous	Traditional method	Gamified approach	6-8	Advanced
12	Customer Churn Prevention Feature	Logistic Regression	Binary	No intervention	New retention feature	4-5	Advanced
13	Subscription Service Conversion	Bayesian A/B	Binary	Current flow	Optimized signup	5-6	Advanced
14	News Article Recommendation	Multi-armed Bandit	Continuous	Algorithm A	Multiple algorithms	6-7	Advanced
15	Loyalty Program Impact Analysis	Propensity Score	Continuous	No program	Loyalty program	6-8	Expert

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ID	Project Name	Statistical Method	Data Type	Control Group	Treatment Group	Time (Hours)	Difficulty
16	Store Redesign Sales Performance	Causal Impact	Continuous	Old store design	New store layout	6-8	Expert
17	A/B Testing Framework Development	Framework Design	Mixed	Manual testing	Automated system	5-6	Expert
18	E-commerce Conversion with Guardrails	Guardrail Metrics	Binary	Safe optimization	Risky optimization	4-5	Expert
19	Push Notification Timing Test	ANOVA	Binary	No notifications	Morning/Evening push	3-4	Intermediate
20	Personalized vs Generic Email Campaigns	t-test	Continuous	Generic emails	Personalized content	3-4	Intermediate
21	Freemium vs Premium Feature Access	Chi-Square	Categorical	Limited access	Full feature access	3-4	Intermediate
22	Long-term Subscription Model Impact	Time Series	Continuous	Old model	New subscription tiers	6-8	Expert

Summary Statistics

Category	Projects	Total Hours
Beginner	5	12–17
Intermediate	6	17–23
Advanced	6	30–37
Expert	5	30–39
TOTAL	**22**	**89–116**

3. Book Concepts Coverage

Book Chapter/Concept	Covered in Projects
Part I: Introductory Topics for Everyone	
Introduction & Motivation	Business impact measurement Project Numbers: 1, 3, 9, 15, 16, 22
Running & Analyzing Experiments	Basic A/B test execution Project Numbers: 1, 2, 3, 4, 5
Twyman's Law & Experimentation Trustworthiness	Trustworthiness validation, bias detection & prevention Project Numbers: 9, 17, 18
Experimentation Platform	Infrastructure design, culture & business Project Numbers: 16, 17, 18, 22
Part II: Selected Topics for Everyone	
Speed Matters	Sequential testing & early stopping Project Numbers: 10, 13, 17
Organizational Metrics	Business KPI selection, guardrail metrics Project Numbers: 8, 18, 20, 22
Institutional Memory & Meta-Analysis	Documentation framework Project Numbers: 17, 18
Part III: Complementary and Alternative Techniques	
Complementary Techniques	Observational studies, quasi-experiments Project Numbers: 15, 16
Part IV: Advanced Topics for Experimentation Platforms	
Randomization	Proper control/treatment setup Project Numbers: All projects
The A/A Test	System validation Project Numbers: 17, 18
Leakage and Interference	Network effects handling Project Numbers: 14, 19, 20
Part V: Advanced Topics for Analyzing Experiments	

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Book Chapter/Concept	Covered in Projects
Statistical Tests Selection	Appropriate test choice Project Numbers: All projects
Multiple Testing & Corrections	Family-wise error control Project Numbers: 6, 7, 19, 21
Statistical Power	Power analysis, sample size calculations Project Numbers: 2, 7, 10, 11
Variance Reduction	CUPED, stratification Project Numbers: 11, 12, 15
Heterogeneous Treatment Effects	Subgroup analysis Project Numbers: 12, 20, 21
Measuring Long-term Treatment Effects	Temporal analysis Project Numbers: 16, 22
Other Advanced Topics	
Bayesian Methods	Credible intervals Project Numbers: 13, 14
Multi-armed Bandits	Online learning Project Numbers: 14
Quasi-experiments	Natural experiments Project Numbers: 15, 16