Success is in the Cards
JMP Discovery 2021
Portfolio/Product Optimization

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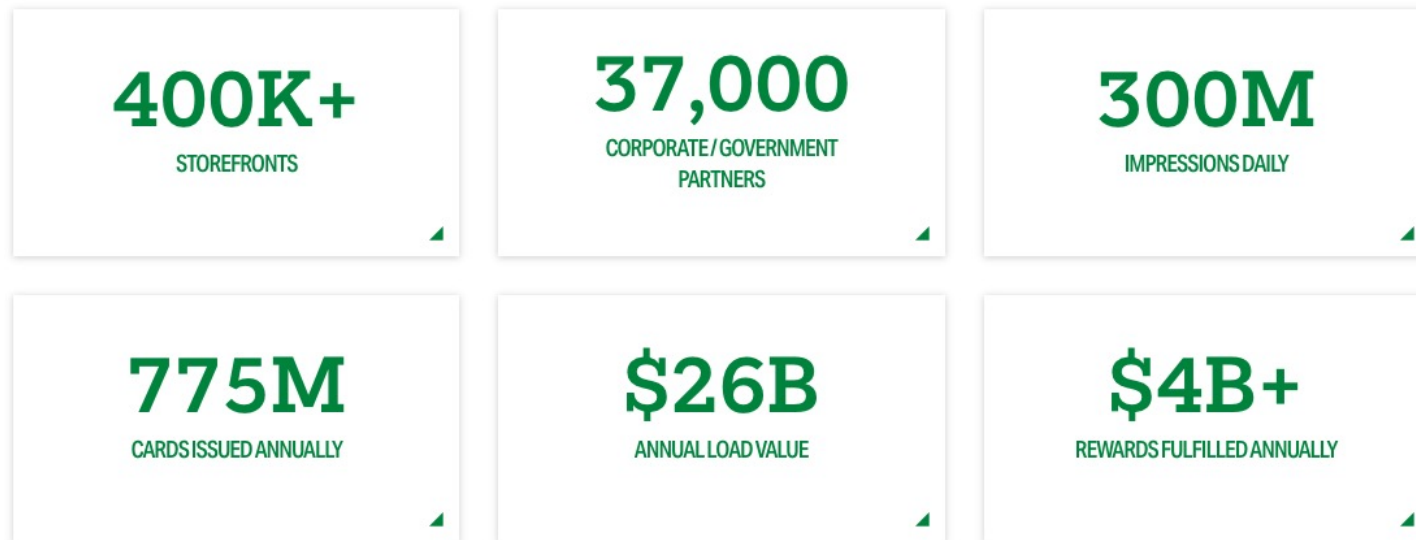# Portfolio/Product Optimization

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Blackhawk Network

Blackhawk Network Holdings Inc. is a privately held company that operates in the prepaid, gift card and payments industries. Blackhawk sells branded physical and digital gift, phone, prepaid debit, and incentives cards online and through a **network** of global retailers.

400K+ STOREFRONTS	**37,000** CORPORATE / GOVERNMENT PARTNERS	**300M** IMPRESSIONS DAILY
775M CARDS ISSUED ANNUALLY	**$26B** ANNUAL LOAD VALUE	**$4B+** REWARDS FULFILLED ANNUALLY

Blackhawk's Business Challenge

What's the fewest number of cards that appeal to the most customers and generate the most profit?

In the late fall of 2020, Isometric Solutions recommended Blackhawk Network harvest Gift Card market intelligence using a series of staged consumer preference studies among 6,000 respondents. The work was accomplished in three phases:

- **Existing Card Preference:** Maximum Difference Scaling studies were designed to accommodate the top 36 cards conducted leveraging 5 Max Diff tournament-tyle scaling experiments to understand Blackhawk's **existing** gift card preferences.

- **Optimal Card Design:** This was followed by a two-phased exploration of **potential** gift card constructs. A Discrete Choice study was conducted with 9 Max Diff experiments (one per category) to understand the relative preference of card attributes. Respondents were then engaged in a "free- will" Dream Gift Card Design exercise to understand what combination of card attributes consumers desired.

- **Dream Card Designer:** A custom simulation exercise was created to study the "free will" choices across all card combinations to understand the conditional probabilities of brand combinations (within category, across category and unrestricted).

Try - vs - Test

For decades Blackhawk Network has enjoyed a profitable history designing and marketing a vast spectrum of gift cards through a broad set of distribution channels including grocery stores, convenience stores, big-box retail merchants, and now, our online store *GiftCards.com*.

- **A Try:** Our typical process has had us reviewing card financial performance at two sale season intervals and drop card that underperform.

- **A Test:** designed to control for and eliminate unobservable factors that could confound elicit preference and allow us to establish causality and then with confidence, preemptively eliminate the production and distribution of cards that do not show relative appeal.

Consumer Card Preference Approach

Background

As of Fall 2020, BHN maintained well over 100 different cards organized by a spectrum of themes. Gift cards in some cases, sponsor just one partner, in other cases up to six or more.

Challenge

The key challenge was to determine what subset of existing card offerings is optimal such that it preserves consumer utility, drives sponsor traffic, satisfies channel volume requirements and boosts BHN's profitability.

Solution: Max Diff Study

Test consumer presences for the top 36 Blackhawk gift cards. Create and field a tournament-stye design of maximum difference experiments in two waves. 4 waves of preliminary testing of 9 cards @ n = 1,500 + 1 final round of the top 21 cards n = 1,500.

Studies were fielded to Gen Pop representation of USA Known Gift Card buyers

Analytics used Balanced Incomplete Block Experimental Designs – best for consumer research purposes because it produces a sufficient design assuring all items in a list are compared against all other items in a list.

Web interview of 9-12 Minutes

Includes Unlimited Open Ends

Unlimited Reportal Banners

Deployed in English

Programming dynamic choice functionality
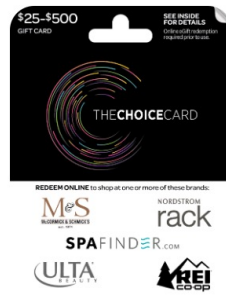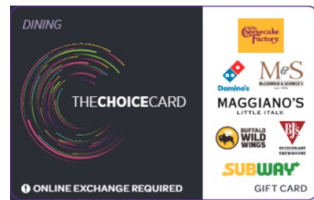
Timing 6 weeks

Cards...

More Cards...

And More Cards…

Conventional Approach – Not Good

Without sophisticated survey analytics most solve this question with a rating scale.

Here all items are evaluated independently.

Fatigue and response bias plague survey data sets as item test set get larger.

Rating Issues

Please consider each issue below and indicate it's importance on the scale with 10 being most important to you and 1 being least important to you.

	Not At All Important 0	1	2	3	4	5	6	7	8	9	Extremely Important 10
Term Limits	○	○	○	○	○	○	○	◉	○	○	○
Privacy / Surveillance	○	○	○	○	○	○	◉	○	○	○	○
Unemployment	○	○	○	○	○	○	◉	○	○	○	○
Student Loans	○	○	○	○	○	○	○	◉	○	○	○
Homelessness	○	○	○	○	○	◉	○	○	○	○	○
Marijuana / War on Drugs	○	○	○	○	◉	○	○	○	○	○	○
Animal Rights	○	○	○	○	○	○	○	○	○	○	◉
Minimum Wage	○	○	○	○	◉	○	○	○	○	○	○
Equal Pay	○	○	○	○	○	○	◉	○	○	○	○
Tax Reform	○	○	○	○	○	○	◉	○	○	○	○

Conventional Approach – Not Better

A somewhat better approach ranks items.

Here items are evaluated interdependently, but fatigue from cumulative cognitive burden is <u>exacerbating</u> causing response bias that plagues survey data sets as item test set get larger.

Ranking Issues

Please consider each issue below and indicate it's relative importance by indicating your most important issue with a "1", second most important with a "2" and continue...

☐	Term Limits
1	Privacy / Surveillance
3	Unemployment
☐	Student Loans
☐	Homelessness
☐	Marijuana / War on Drugs
2	Animal Rights
☐	Minimum Wage

Maximum Difference Scaling - Best

MaxDiff, also known as *best-worst scaling* (BWS), is a choice-based measurement method developed by Louviere in 1987 at the University of Alberta. Rather than asking a respondent to report one favorite choice among several alternative profiles, MaxDiff asks a respondent to report both a *best* and a *worst* choice.

JMP has adapted the MaxDiff platform with an analysis using the framework of random utility theory. A choice is assumed to have an underlying value, or *utility*, to respondents. The MaxDiff platform estimates these utilities. The MaxDiff platform also estimates the probabilities that a choice is preferred over other choices.
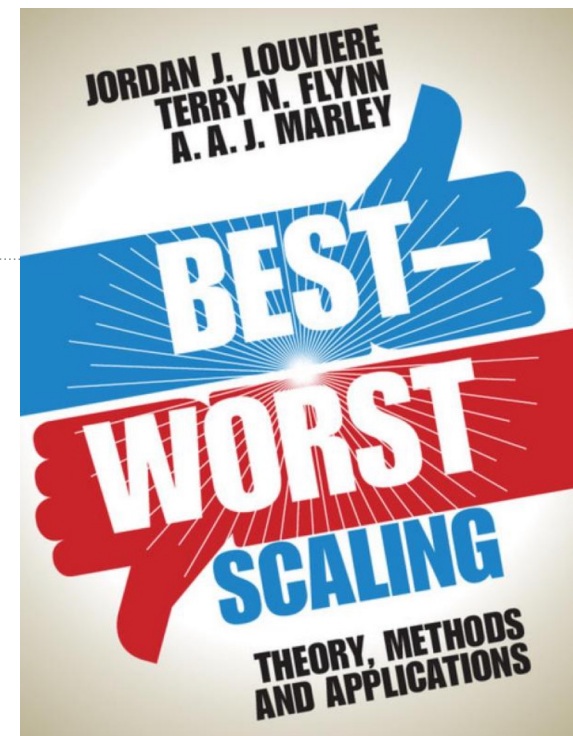
Card Test Set

36 cards
78 unique brands
240 brand instances across the cards

Balanced Incomplete Block Design

Consumer Card Preference Deployment

A custom user experience was designed to simulate a shopping experience by offering respondents gift card choices. This can be tested live here → Card Sort Quick Test
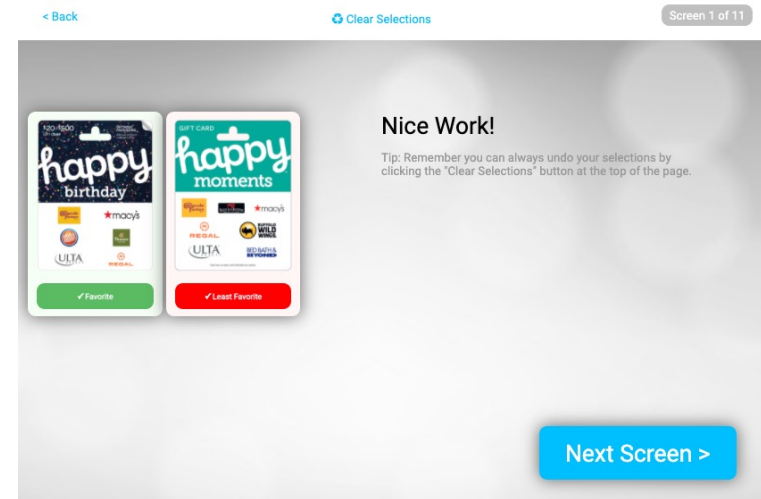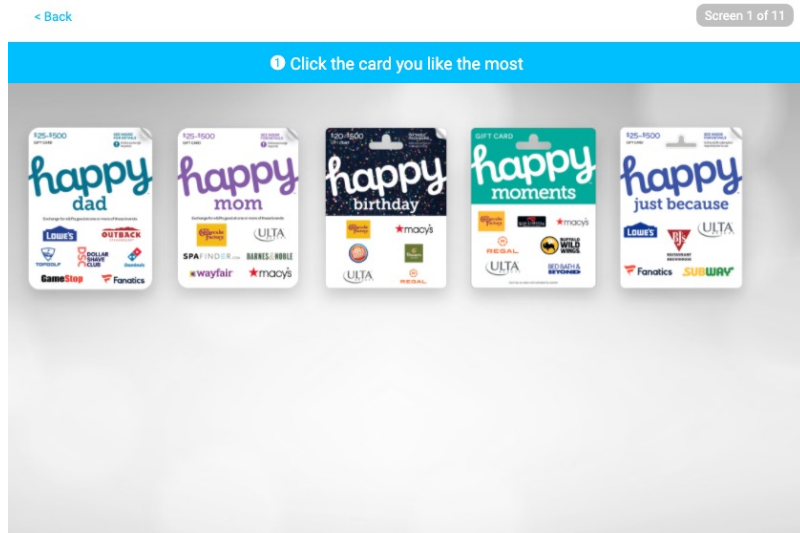
Conditional Logit Analysis

Conditional logit analysis of qualitative choice behavior

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A fundamental concern of economics is understanding human choice behavior. Models or hypotheses are formed on the nature of decision processes, and are evaluated in the light of observed behavior. This task is complicated

Marginal Utilities
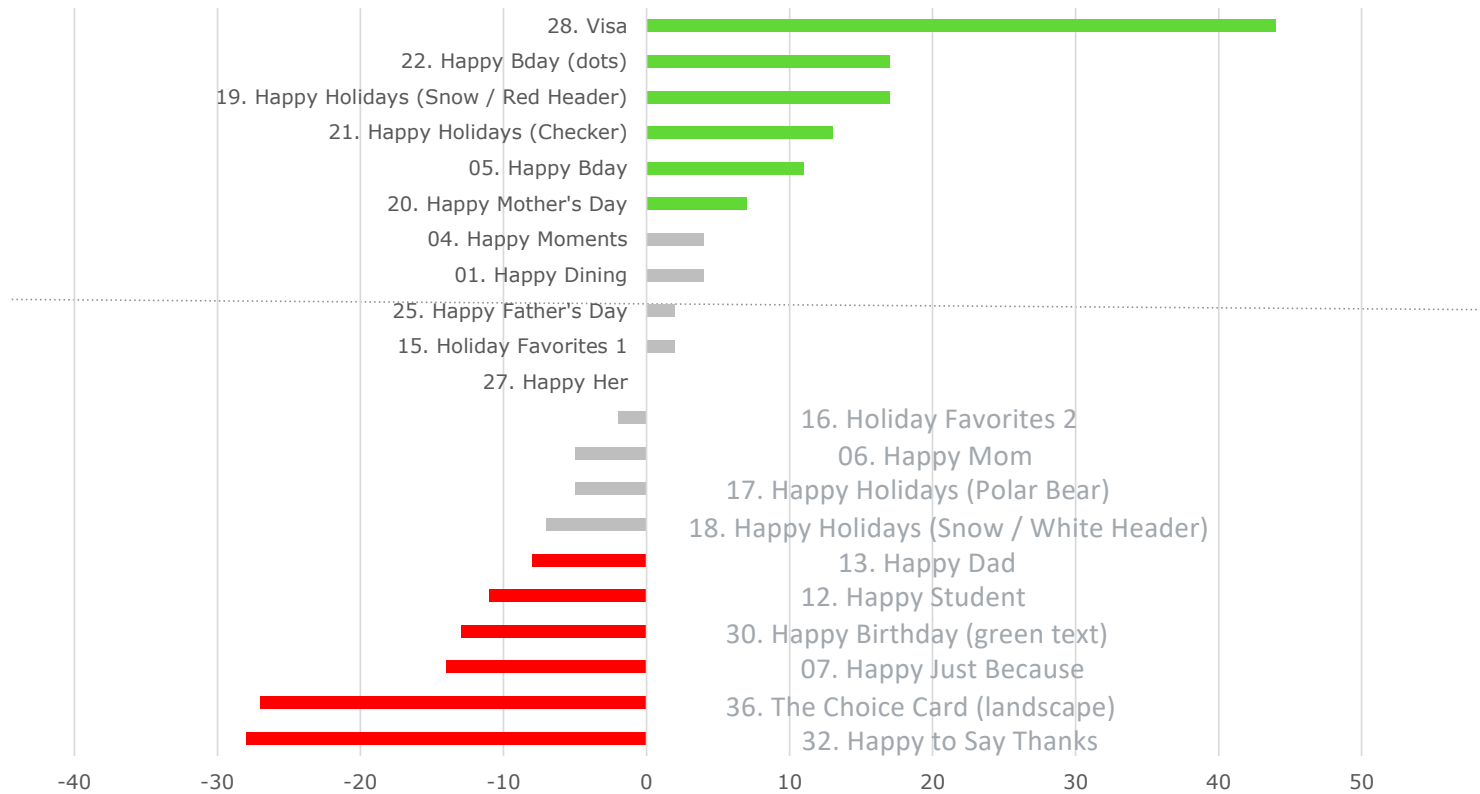
Green bars represent those cards that had statistically significant <u>more</u> wins when compared to all other cards.
Red bars represent cards that had statistically significant fewer wins compared to all other cards.
Results with gray bars are <u>not</u> statistically significant.

Card Metrics

Thinking through three lenses to understand which cards to keep and which to shed based on consumer feedback:

Affinity Index

Likelihood of Purchase

Adjusted Value
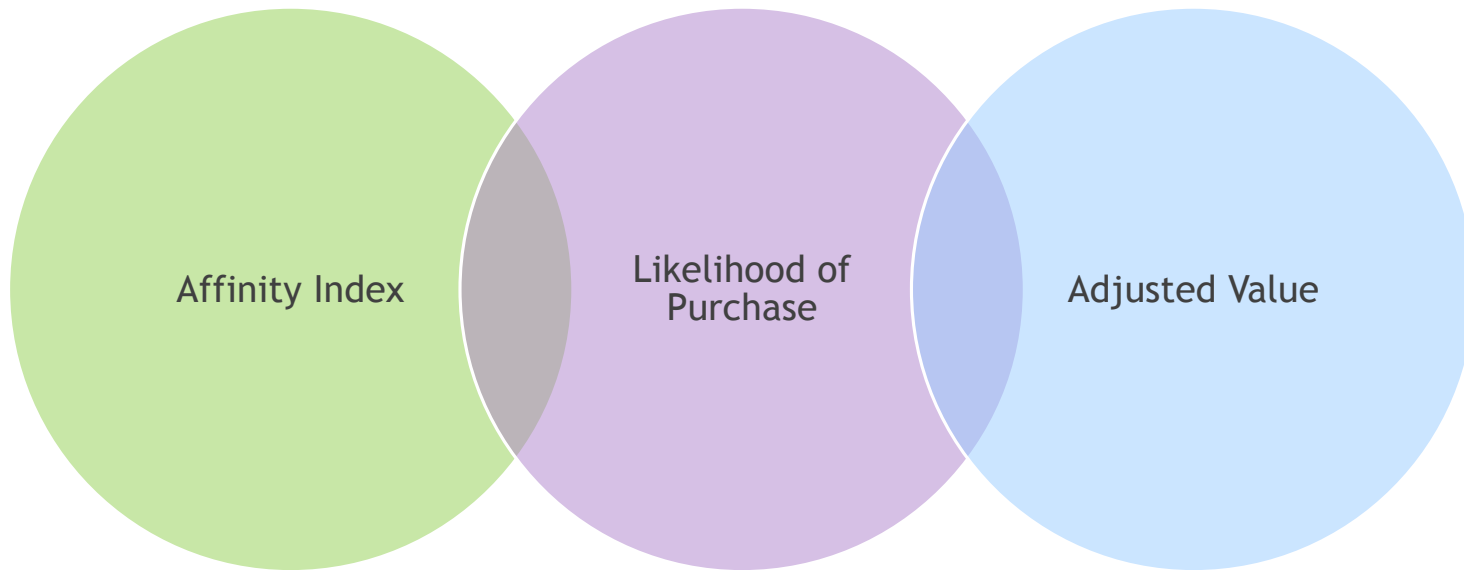
Consumer Card Preference Deliverables

Max Diff preference statistics are published live in reportal for online interrogations. Illustrations below show card statistics and relative quadrant rankings.
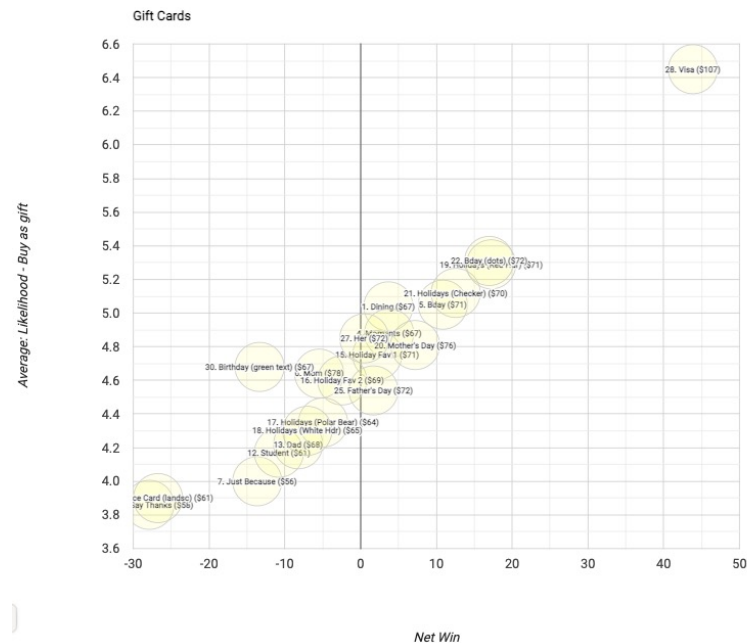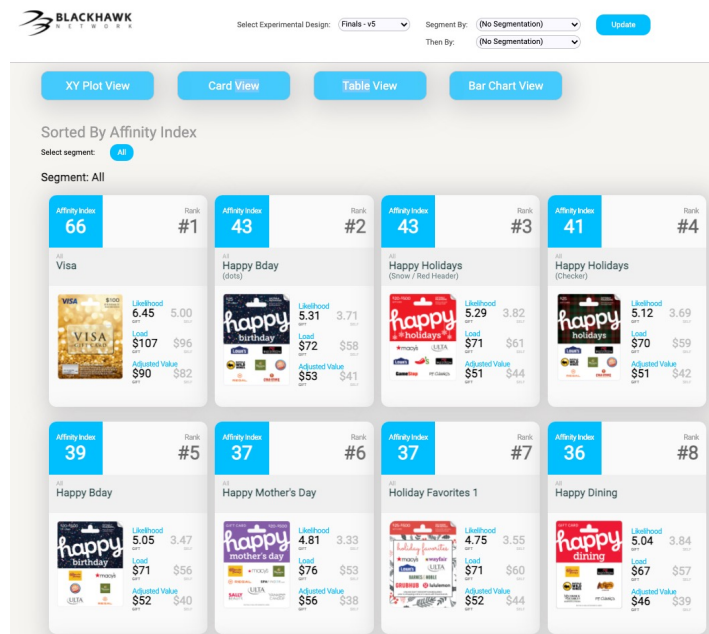
Anatomy of a Gift Card

Gift Card constructs differ in many important ways...

Card Conditions

Card Load

Card Personalization

Card Theme

Card Brands
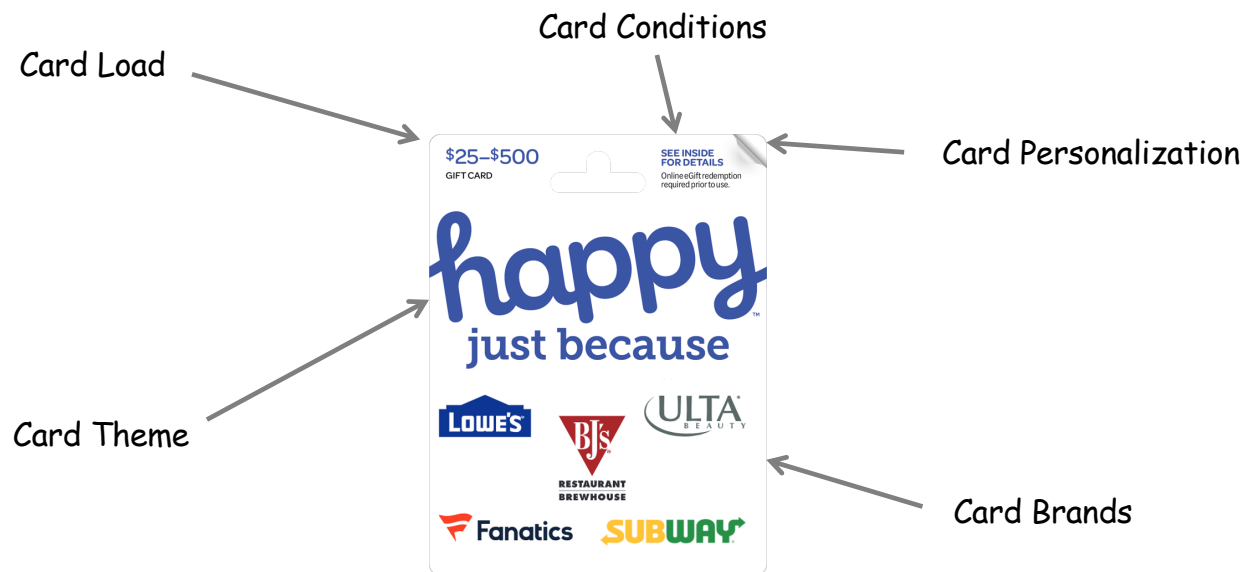
Product Optimization Approach

Background

BHN markets gift cards with essentially limitless combinations of themes, denominations, personalization options, restrictions, and sponsors.   Some card constructions sell very well – other do not.

Challenge

The key challenge is to determine scientifically, in a controlled experiment, what gift card components are most attractive consumers.

BHN Sponsor Discrete Choice Preference Experiment

Comparison up to 243,000 different BHN card combinations

N = 2,000

Gen Pop representation of USA

50% Buyers of Gift Cards

50% Recipients of Gift Cards

Discrete Choice Experimental Design

Web interview of 9-12 Minutes

Includes Unlimited Open Ends

Unlimited Reportal Banners

Deployed in English

Programming dynamic choice functionality

Deliverables: Exec Summary + Reportal + Simulator(s)

Timing 6 weeks

Product Optimization Deployment

A custom experimental design interface, shown below, was created to examine preferences for various gift card constructions across four card attributes: Theme, Recipient, Conditions for Use, and Brand Category

Gift Card Scenarios

On each of the following 18 screens, you will be shown examples of three of Gift Cards - Option #1, Option #2, and Option #3. Each card presents a different combination of the categories shown below. Your task on each screen is two fold:

First

Examine each of the three options and choose the one you consider to be the best based on your "gifting" interests. Some of the screens may appear with an entire row faded. In these instances we simply removed that attribute to make your choice simpler because the choices across the row are the same.

Next

Evaluate your selection by indicating: 1) the likelihood of purchase, 2) the investment you'd make to load the gift card.

Each gift card shown is a combination of these four characteristics:

1. A Gift Card Theme {Occasions, Charity, or Select Choices}
2. The recipient for whom you'd buy the gift card
3. A set of sponsors where the card can be redeemed
4. A card condition of use {must me registered on line, has an expiration date, or must be redeemed online}

Choice set 1 of 18

Consider each of the three Gift Cards shown below. Choose the Gift Card most attractive relative to the other two shown. Remember you can simply ignore any blank rows that may appear.
Clicking on your favorite will turn your selection yellow. Once it does, then consider the three questions about your selection below.

Gift Card Characteristics	Gift Card Option 1	Gift Card Option 2	Gift Card Option 3
Gift Card Theme	**Giving Good Cards** - carry added meaning because their gift benefits a charitable organization	**Select Cards** - provide a premium, cool, ascendant gift of discerning brands	**Happy Cards** - designed to recognize a variety of special occasions
Recipient	Significant Other	Friend	Acquaintance | Colleague | Co-worker
Card Sponsors	home + beauty	casual dining	apparel + accessories
Card Condition of Use	Card must be redeemed online	Card has an expiration date	Card must be registered before use

Product Optimization Deliverables

BHN Discrete Choice analytics presented ranked in the model below left, derives the relative strength of attributes and attribute level simulation below right.

Likelihood Ratio Tests			
	L-R		
Source	ChiSquare	DF	Prob>ChiSq
Theme	1.362	2	0.5061
Recipient	164.169	5	<.0001*
Sponsor	240.447	8	<.0001*
Condition	15.377	2	0.0005*

The answer comes from the likelihood ratio test's Chi Square statistics. These index the <u>relative strength</u> of the attributes' effect on stated card preference.
- Sponsor @ 240 accounts for 57% effect on choice
- Recipient @ 164 has 39% effect on choice
- Condition @ 15 has just a 4% effect on choice
- Theme @ 1.3 has no measurable effect on choice
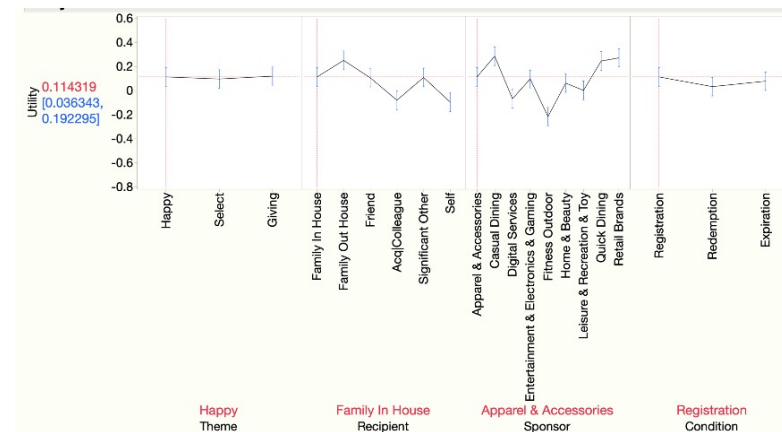
Designed Experiment
− vs −
Designed Exercise

The Dream Card Designer

A custom user experience was designed to simulate dream card creation. This can be tested live here → [Dream Card Designer Quick Test](#)
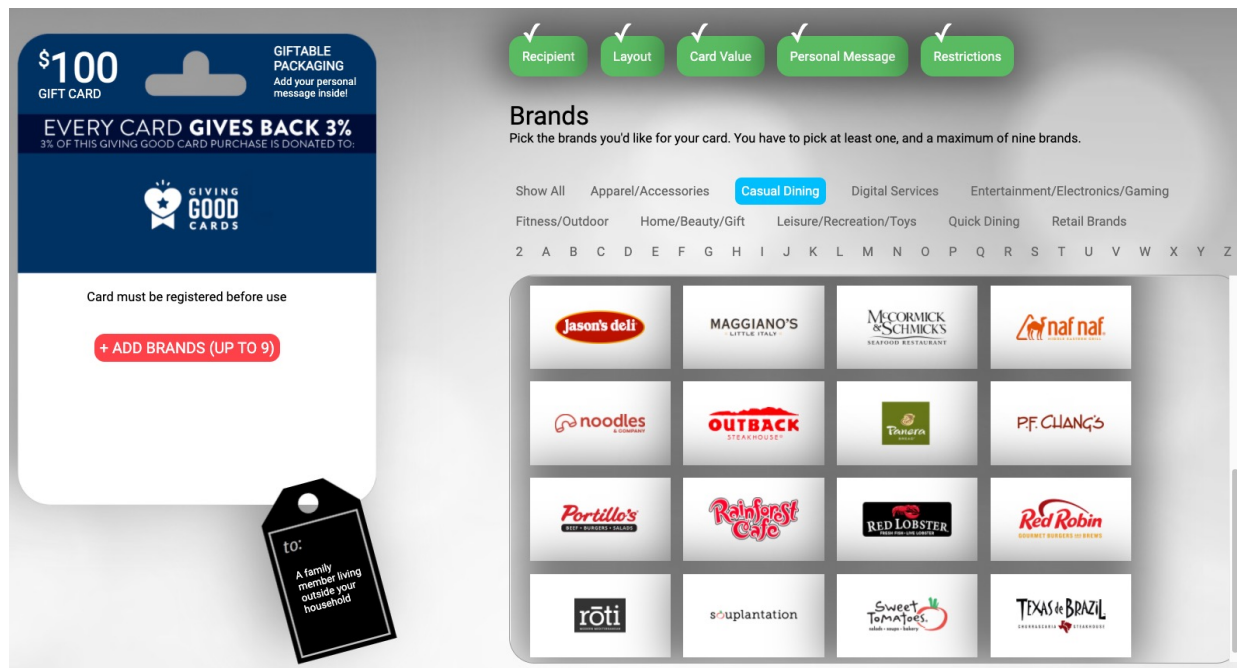
Market Basket Analysis

Three iterations of conditional probabilities show the next best paring for a brand within category, across categories and unrestricted. Comparison up to any combination of up to 250 brands (3 were never picked).

$$C(n, r) = \binom{n}{r} = \frac{n!}{(r!(n - r)!)} = ?$$

The Combinations Calculator will find the number of possible combinations that can be obtained by taking a sample of items from a larger set. Basically, it shows how many different possible subsets can be made from the larger set. For this calculator, the order of the items chosen in the subset does not matter.

n choose r

n *(objects)* = 250

r *(sample)* = 9

$C(n,r)=?C(n,r)=?$
$C(n,r)=C(250,9)C(n,r)=C(250,9)$
$=250!(9!(250-9)!)=250!(9!(250-9)!)$
$=250!9!\times241!=250!9!\times241!$
$=9.087357513E+15=9.087357513E+15$
= 9,087,357,513,984,750

Possible combinations

Market Basket Deliverables

Three iterations of conditional probabilities show the next best paring for a brand within category, across categories and unrestricted.

Optimal Brand Pairings Across Brand Categories

brand1	brand2	brand3	brand4	brand5	brand6	brand7	brand8	brand9
24 Hour Fitness								
Adidas	Google	Nike	Netflix	Amazon				
Aerie	ASOS	American Eagle	Bononos	Burberry	Bloomingdale's	Banana Republic	Aeropostale	Claire's
Aeropostale	American Eagle	Bononos	Banana Republic	Bloomingdale's	Aerie	Burberry	Coach	Claire's
Alamo Drafthouse Cinemas								
Albertsons								
Amazon	Barnes & Noble	Home Depot	Costco	Ebay	Best Buy	Lowe's	Walmart	Target
Amazon Prime	Spotify	Apple TV	Apple	Disney+	Netflix	Google	iTunes	Hulu
AMC Theatres								
American Eagle	Banana Republic	Aerie	Aeropostale	ASOS	Bloomingdale's	Burberry	Coach	
Anytime Fitness								
Apple	Samsung	Apple TV	Disney+	iTunes	Google	Nike	Amazon Prime	Hulu
Apple TV	Disney+	HBO Max	Hulu	Apple	Amazon Prime	Google	Netflix	
ASOS	Aerie	American Eagle	Bononos	Banana Republic	Bloomingdale's	Claire's		

Checkerboard

Last up, targeting consumers based on brand cluster conditional probabilities.
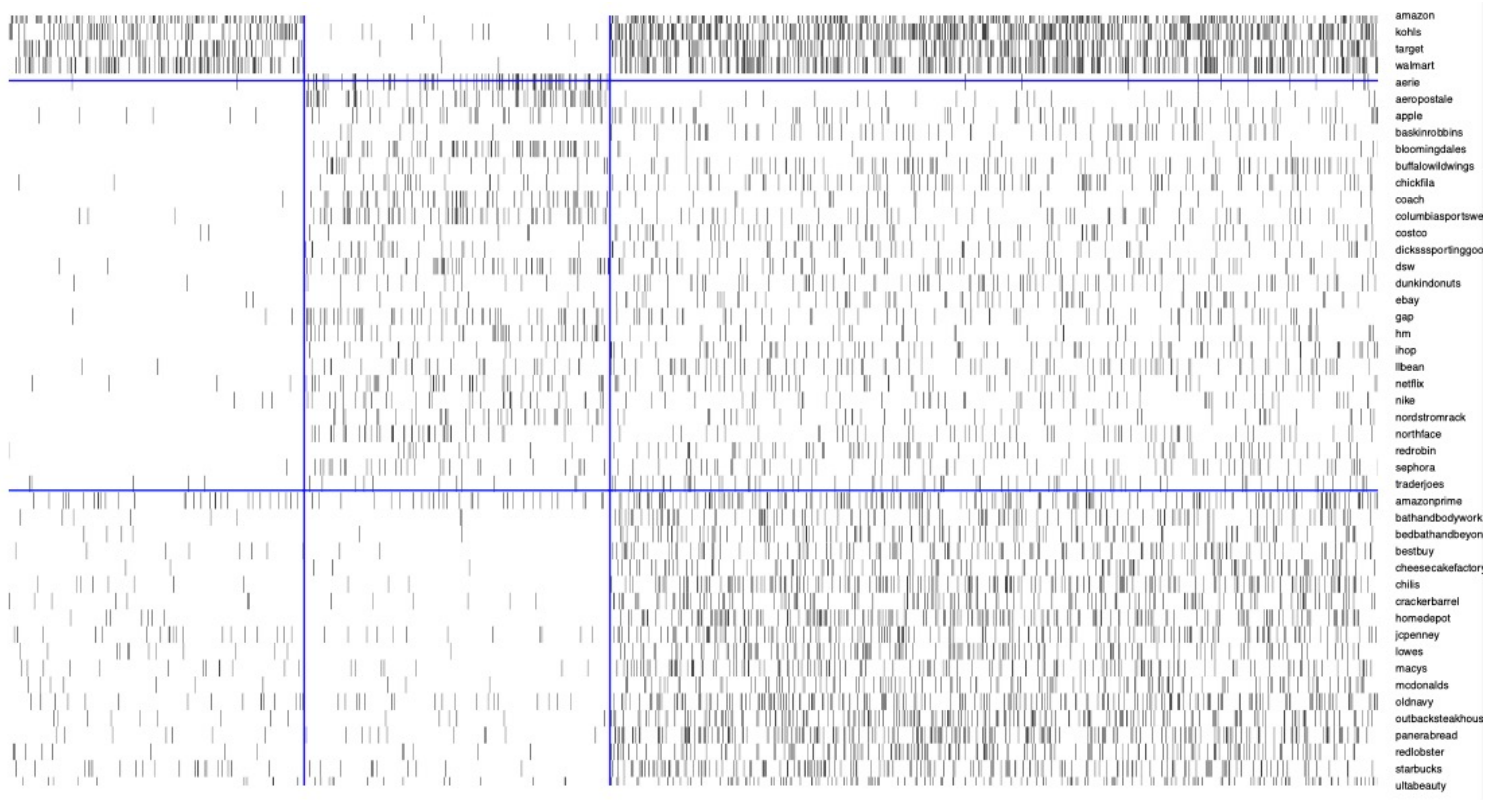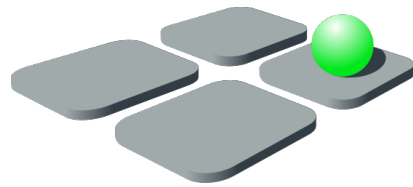
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BLACKHAWK NETWORK

Success Is in The Cards

How a three-phase research and analytics initiative identified the best performing gift cards, the best performing card attributes, and the best imaginable cards for Blackhawk Network and their customers.

The gift card market is distinctively competitive. Some of the world's most sophisticated gift card marketers battle for limited peg space to optimally feature their $3^{3/8''}$ x $2^{1/8''}$ rectangle in hopes that it will be chosen over all other gift cards.

Gift card marketers also need to make the best possible use of time. While the insights gained over 18 months in the marketplace are valuable, they come at a high cost, especially if others can react more deftly, using tests which took weeks.

Given these pressures, Blackhawk engaged Isometric to ensure they were following the best possible path to success in their decision-making process.

One of the challenges, ironically, was that Blackhawk was led by industry veterans who knew this space. Decisions could easily be made on instinct. But when that experience was married to solid research and analytic methods, the results were formidable.

A related danger—and a challenge in all human affairs—is the desire to support particular insights. It is also highly tempting to 'go with the decision-makers'. Especially when the target audience is middle American, this can distort decisions.

Conjoint Analysis and Discrete Choice Experiments for Quality Improvement

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MARK ALBRECHT

National Marrow Donor

Conjoint analysis and discrete choice experiments in economics, are useful for understanding the ... Unfortunately, these methods have received ... we provide some guidelines for the use of ... what they are, why they are useful methods ... experiment can be carried out. We demonstrate ... improvement in detail. We then introduce ... robust for a class of possible models. We ... the main-effects only models is shown to ... whereas the proposed robust designs perform ... with a summary of key points and direction ...

Key Words: Bayesian Design; Market Segmentation; Design; Quality Function Deployment.

1. Introduction

THE VOICE of the customer (VOC) has long been considered a key component of any quality system. Indeed, the very definition of quality is given in terms of customer satisfaction. The American National Standards Institute (ANSI) and the American Society for Quality (ASQ) (1978) ...

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Journal of Quality Technology

Assessing the Efficiencies of "Optimal" Discrete Choice Experiments in the Presence of Respondent Fatigue

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Abstract

Discrete choice experiments are an increasingly popular form of marketing research due to the accessibility of on-line respondents. While statistically optimal experimental designs have been developed for use in discrete choice experiments, recent research has suggested that efficient designs often fatigue or burden the respondent to the point that decreased response rates and/or decreased response precision are observed. Our study was motivated by high early-termination rates for one such optimally-designed study. In this paper, we examine the design of discrete choice experiments in the presence of respondent fatigue and/or burden. To do so, we propose a model that links the respondent's utility error variance to a function that accommodate respondent fatigue and burden. Based on estimates of fatigue and burden effects from our own work and published studies, we study the impact of these factors on the realized efficiencies of commonly-used D-optimal choice designs. The trade-offs between the number of surveys, the number of choice sets per survey, and the number of profiles per choice set are delineated.

KEY WORDS: Stated Choice Experiments; Discrete Choice Experiments; Fatigue; Multinomial Logistic Model; Heteroscedastic Multinomial Logistic Model; D-optimality; Conjoint.

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