More Math = Better Marketing

RIT SMI Conference 2016
CAUSE + EFFECT Strategy and Marketing is a strategic marketing & analytics firm that leverages proven and innovative marketing principles with data insight to accomplish client goals.
John Loury
President CESM

Introduction
Topics We’ll Be Addressing Today

• **Introduction – John Loury**
  – My math struggles and an Infographic about who uses data and math to leverage it in marketing today. Also, an explanation of the single most important marketing math formula, ROI (return on investment).

• **Part 1 Math in Direct Mail – Michael Sutton**
  – Ever get a piece of junk mail asking you to donate to a cause or attend a college? Some people throw them away and some actually respond. Formulas determine success or failure of these campaigns.

• **Part 2 Applications for Relational Algebra & Logic in Marketing – Laura Calloway**
  – Marketing firms rely on customer database information to create relevant messaging that influences customer behavior. How is this information organized and leveraged to create successful strategy?

• **Part 3 Descriptive Math: The Road to Analytics – Anoosha Anvari**
  – Understanding the shape of data, creating benchmarks, prioritization, and recalibration are essential to make informed decisions.
The High School Years

- The fun began with Course II
  - Final Grade 64%
    - Only failed class in HS
  - Led to *Discrete Math*
    Senior Year
The College Years

• If you’d like to be a Business major you’ll need to complete an extra year of Math coursework or...you could major in Communication
Enough is Enough

- Advertising Agency success
  - 7 years of doubling client revenue across two agencies
- “How did my campaign perform? What about the analytics?”

Good question...
“Can we schedule a meeting next week?”
Who uses math and data anyways?

(Sandy Carter of IBM)

• World’s largest taxi company owns no taxis

• Largest accommodation provider doesn’t own estate

• Largest phone companies own no telco infra

• World’s most valuable retailer has no inventory

• Most popular media owner creates no content

• Fastest growing banks have no actual money

• World’s largest movie house owns no theaters

• Largest software vendors don’t write the apps
So what...

- Many of these companies are using numbers & data to create algorithms based on complex math to assess predict behaviors
  - Those at the tip of the spear are then integrating AI to learn how, when, were and why you will take your next action
Return On Investment (ROI)

\[
ROI = \frac{\text{Revenue} - \text{Cost}}{\text{Cost}} \times 100
\]

\[
ROI = \frac{\$3000 - \$1000}{\$1000} \times 100 = 200\% 
\]

A 200% Return on Investment
Part 2
The Math of Direct Marketing
Bio

• Graduate of SUNY Buffalo in 2005
• Over 7 years of consultative direct mail experience with a concentration in healthcare fundraising
• Math has always been my friend....
Math in Direct Mail

• The average household receives 19.1 mail pieces per week

• $46 BILLION spent on Direct mail in the USA in 2014
Math in Direct Mail

• With so much competition, how are we relevant?
  – One-to-One communication
  – Constantly testing new copy and creative in order to consistently increase response rate

• How do we know if what we are doing is working?
  – Tracking and Response reporting
  – MATH
Math in Direct Mail

What we know

- # of pieces mailed
- # of responses
- Action taken during response
- Cost of Appeal
- Historical Data
Math in Direct Mail

• Formulas - Campaigns
  – **Response Rate**: (# of Pieces Mailed / # of Responses) \* 100
    • (10,000 pieces mailed / 2,000 responses) \* 100 = 20%
  – **Cost per Piece**: Cost of Appeal / Total Pieces Mailed
    • $25,000 / 100,000 pieces mailed = $.25
  – **Cost per Lead**: Cost of Appeal / Total Responses
    • $25,000 / 2,000 = $12.50
  – **Cost per Acquisition**: Cost of Appeal/# New Sales
    • $25,000 / 500 = $50
Math in Direct Mail

• **Continued Formulas**
  - **Cost per Dollar Raised**: Cost of Appeal / Total Revenue
    - $25,000 / $30,000 = $.83
  - **Net Profit**: Revenue – Cost of Appeal
    - $30,000 - $25,000 = $5,000
  - **Average Lifetime Value**: (Total $ Generated life of customers – Cost of Outreach) / Total Customers
    - ($1,000,000 - $250,000) / 10,000 = $75
Math in Direct Mail

- **Retention Rate**: The percentage of individuals that purchased the current year as well as the year before
- **Reactivation Rate**: Percentage of individuals that purchased in the current year as well as some time before but not in the previous year
- **Attrition Rate**: Percentage of individuals that purchased or donated in the past year but not this year
Example

• Plan A
  – Sent 1,000 Direct Mail Pieces
  – Total Cost $4,000
  – Sold 100 units

• Plan B
  – Sent 100,000 Direct Mail Pieces
  – Total Cost $25,000
  – Sold 2,500 units

Net Profit on the sale of 1 unit is $15
Agenda

• My bio
• Defining relational algebra
• Relational algebra as a marketing solution
Bio

• Grew up in The Finger Lakes
• Graduated from Williams College (Williamstown, MA)
• Won public policy & applied economics/ statistics fellowship (but majored in English and Sociology... not math)
• Have worked as data analyst for 3 years
My focus at CESM

• Is on cleaning, analyzing, and appending data
• Most datasets are too big to facilitate any of these processes by hand
• So... relational algebra TO THE RESCUE!
To the rescue... HOW?

• Relational algebra = formal system for manipulating relations
• The relational algebra concepts I use the most are:
  – Projection & Selection
  – Join
Projection & Selection

- Great for getting a subset of the data based on certain parameters
  - Example: CESM runs a survey on grocery shopping habits and wants to see the results only for respondents age 25-34 that spend more than $300 a month on groceries
- Solution: Run a query to SELECT all the data related to shoppers WHERE AGE > 24 AND AGE <35 WHERE BUDGET > 300
- Tools: A query language (I use R and the package sqldf)
Join

• Great for identifying data points that appear in multiple data sets
  – Example: CESM is mailing a fundraising piece and doesn’t want to send mail to people who’ve opted out
    • Solution: Run a join on the list of potential donors and the list of opt outs. DO NOT mail to anyone who appears on both the potential donors and the opt out list.
    • Tools: R has a built in tool for this called SEMI JOIN. It’s part of the dplyr package. *

• *This solution is imperfect...this is where the logic comes in!
Anoosha Anvari
Marketing Analyst

Part 4
Descriptive Math: The Road to Analytics
Mean, Median, Mode, Range, Standard Deviation, and Variance

"Bell Curve"
Standard Normal Distribution

Z-Score
-4
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
0
+1σ
+2σ
+3σ
+4σ

Standard Deviation

Cumulative Percent

0.1%
2.3%
15.9%
50%
84.1%
97.7%
99.9%

0.1%
5%
10%
20
30
40
50
60
70
80
90%
95%
99%
The Most Important ?’s

• Where does your data set say you are?
• Where are you going?
• Why are you where you are?
• How do you get to where you want to go?
The Shape of Your Data = Leveraging The Right Insight