

# EMERGING DATA SETS IN MARKETING: THE FUTURE OF MARKETING SCIENCE

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# **How do you compute corporate profits?**

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# **The Future of Marketing is Customer Analytics: Making Profit One Customer At a Time**

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## What is “Customer Analytics”?

Customer analytics refers to the collection, management, analysis and strategic leverage of an organization’s granular data about the behavior(s) of its customers.

Customer analytics can be characterized as:

- **Inherently granular:** a focus on individual-level behavior, not aggregate patterns
- **Behavioral:** primary focus is on observed behavioral pattern(s), not demographics or attitudes
- **Forward-looking:** an orientation towards prediction, not just description
- **Multi-platform:** desire to combine behaviors from multiple measurement systems
- **Broadly applicable:** the definition of a “customer” is industry agnostic – it could be a user, reader, visitor, donor, client, etc.
- **Multidisciplinary:** relevant fields include marketing, statistics, computer science, information science, and operations research

# Wharton is the Academic Leader in Customer Analytics



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# **The Golden Age of Marketing always seems like now but never is**



**Speeding Train of Technology**

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# Outline

## I. Historical Data in Marketing

- The “Past/Future of Marketing Science”

## II. New Emerging Data Sets in Marketing

- Firms you might believe and those that will shock you!

## III. Future of Marketing Science (Beyond Purchase Data)

- Path Data (Geo-spatial data linked to purchasing)
- Eye Tracking (Seeing versus Buying)

## IV. Predictive Analytics

- Examples of Firms on the Edge!

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## The Golden Age of Marketing Research in the 1950s



**1950s: Store Audit Data “Ruled the Earth”**

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## **Answerable Business Questions in the 1950s**

- How do store-level prices relate to sales?
- What is the effectiveness of coupons?
- How much does “regional” advertising influence purchasing?
- What is the impact of in-store promotion on sales?

**STILL QUESTIONS OF INTEREST, BUT LEAVES A LOT OF  
MONEY ON THE TABLE. WHY?**

# The Golden Age of Marketing Research

## 1960s and 1970s



Direct Mail “Ruled the Earth”

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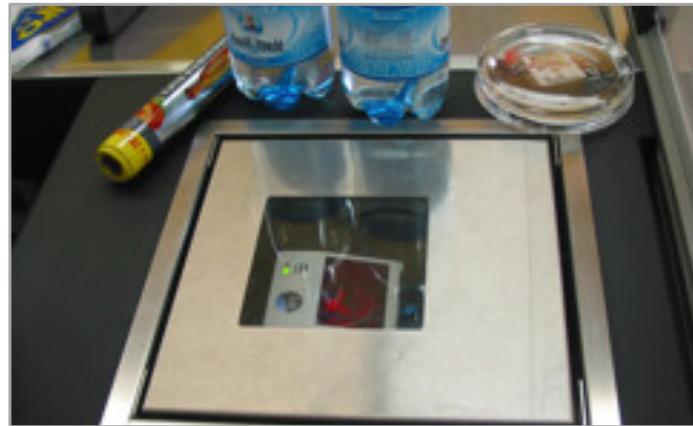
## **Newly Answerable Business Questions in the 1960s and 70s**

- How do individual-level prices relate to catalog shopping behavior?
- What is the impact of frequency and timing of catalogs/mailers on purchase behavior?
- How does product assortment influence household purchase behavior?
- What types of advertising appeals/messages are more/less effective?

**LEAVES A LOT LESS MONEY ON THE TABLE. WHY?**

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## The Golden Age of Marketing Research 1980s



The Invention of Store Scanners

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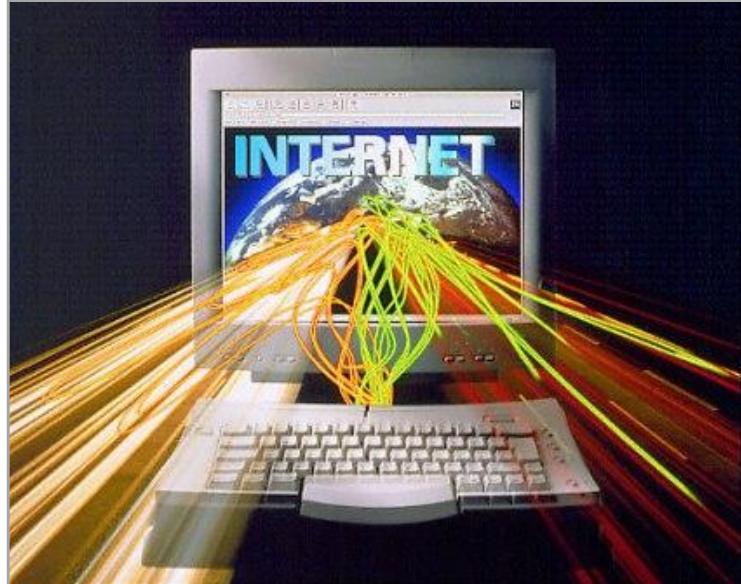
## **The 1980s is the beginning of the “modern age” of Marketing**

- Distribute individual-level discounts at checkout
- Track customers over time to understand their long-term buying habits
- Measure person-level coupon and discount usage
- Greater knowledge of in-store experience

As great as this data is, there is more missing than what is seen.

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## The 1990s and 2000s have led to even greater customer insight!



- Track Page Browsing
- Track Products Considered
- Targeted Ads (Based on Purchase History and Context)
- Link to Past Experience
  - Cookie Tracking
  - Loyalty Programs
- If Built Properly, Can Link to Offline

The Internet Changes the Face of Marketing

# The Explosion of New Data is Now Here



But, these are the companies you would have guessed!

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## II. New Emerging Data Sets in Marketing: What About These Companies?



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# **Sample Business Problems: Why People Are So Excited About Customer Analytics?**

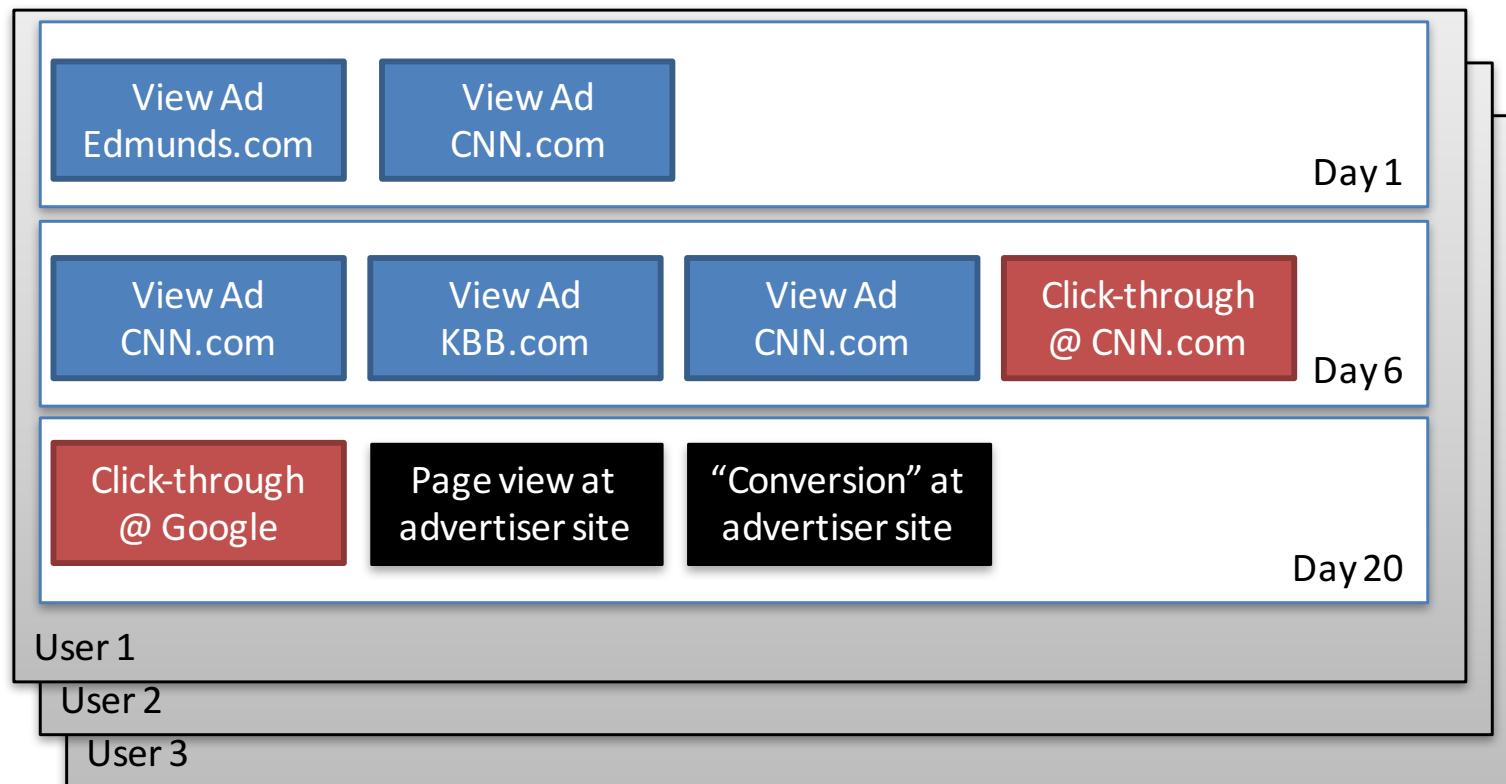
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# **HOW EFFECTIVE IS DISPLAY (LONG-TERM) VERSUS SEM (SHORT-TERM) DIGITAL ADVERTISING?**

Known as the Advertising Attribution Problem  
(Current Practice is Last Click)

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## **Result: Display advertising much more effective than previously thought**



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## **HOW DO CUSTOMERS UTILIZE MULTIPLE MEDIA PLATFORMS (FRIENDS OR FOE?)**

Known as the Media Optimization or Channel  
Cannibalization Problem

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## WHY IMPORTANT?

Reach and Frequency, and its monetization  
counterpart

$$\text{GRP} = \text{Reach} * \text{Frequency}$$

is the currency of advertising, thus do more  
channels add or not?

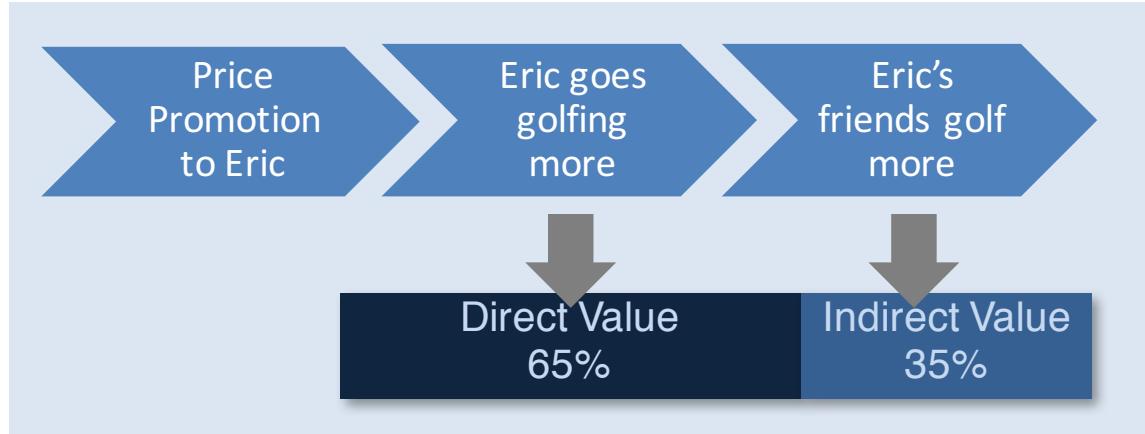
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- Findings:
    - Channels do NOT cannibalize each other in the long-term, heavy users are heavy users (e.g. adding the mobile channel did not decrease the others)
    - Channels do slightly cannibalize each other on a given day

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# **HOW VALUABLE ARE PRICE DISCOUNTS?**

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Most firms ignore the indirect value of promotions!



Consumers bring additional value through their social network

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## **WHAT IS THE ROI OF FACEBOOK?**

Is More “Likes”/Mentions Valuable?

Why is this the **WRONG** question?

## IF YOU “LIKE” WILL YOU BUY? DATA

**Online:** The panelist is exposed to a banner ad while browsing the internet.

**Television:** While watching TV he is exposed to three more ads for the same brand over a week.

**Facebook:** The panelist’s friend becomes a fan of the brand’s Facebook page and invites him to join. The panelist then sees someone’s status update mention the brand in his news feed.

**Purchase:** The panelist purchases three products from this brand.



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## Results

- FB and Online have greater short-term effects
- TV has a longer carry-over effect
- When compared to cost, the markets are fairly efficient, i.e. total integrated impact over time is proportional to cost

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### **III. RADICALLY NEW DATA SETS IN MARKETING**



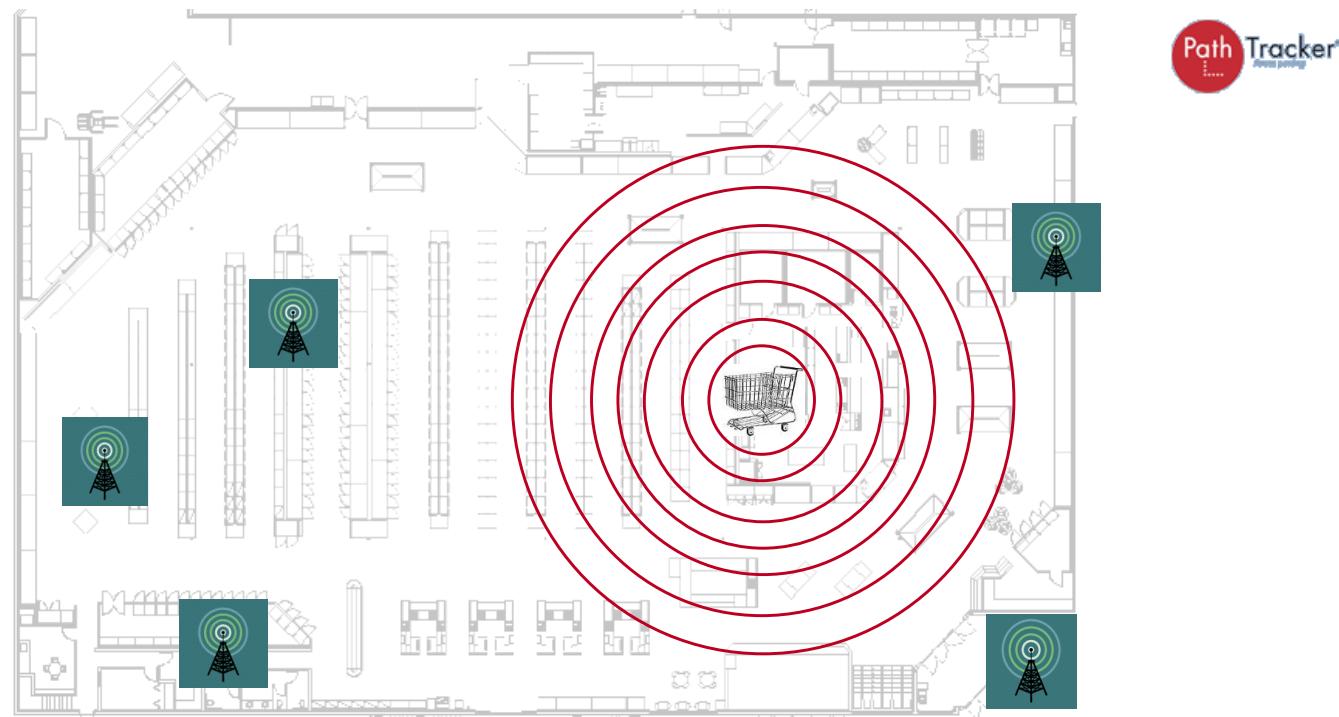
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## In-store drivers of unplanned purchases: Key takeaways

- We use a series of measurement devices to track shoppers:
  - Shopping plan (intentions survey)
  - Shopping path (RFID)
  - Field of vision (Eye-cam)
  - Purchase (scanner data)

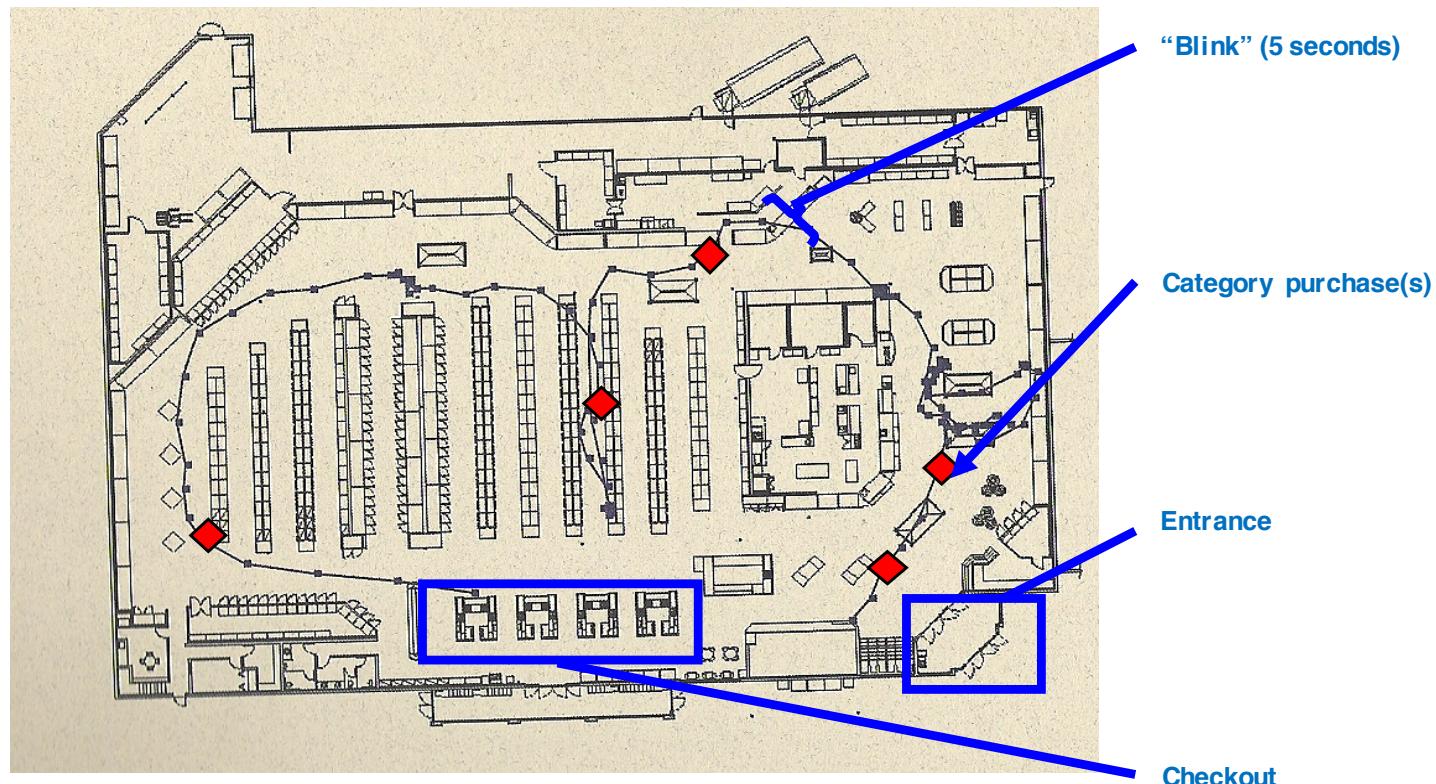
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# Imagine a World Where Customers Could be Tracked In Store

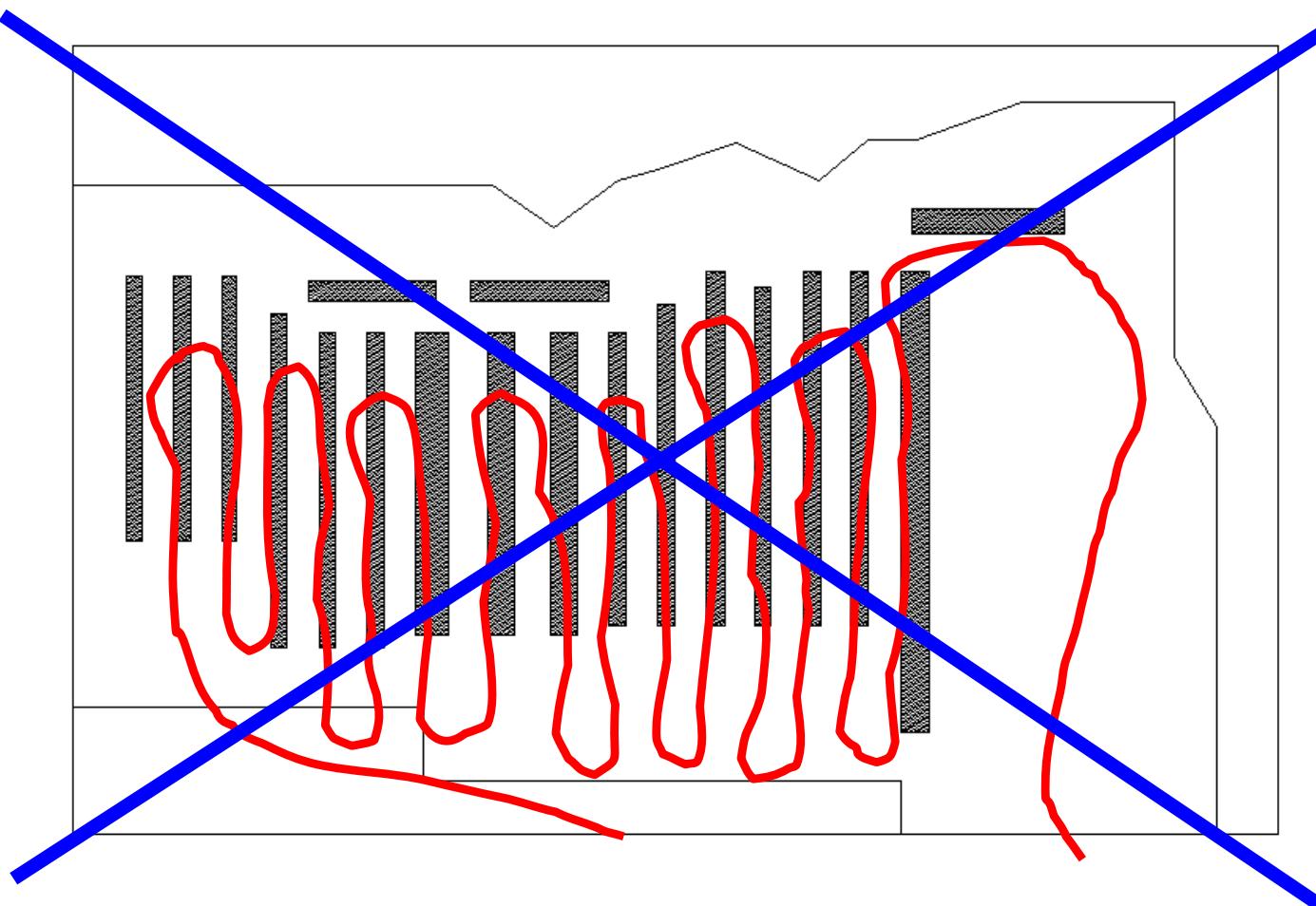


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# Imagine a World Where Customers Could be Tracked In Store

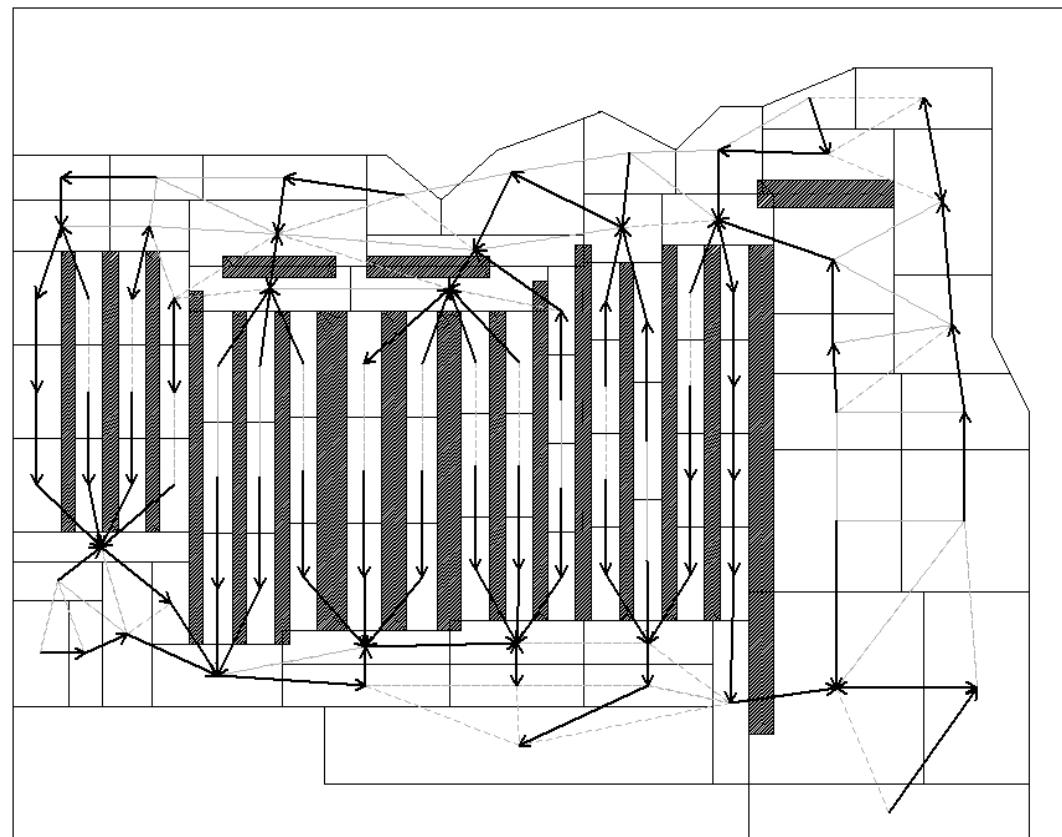


# How do shoppers move?



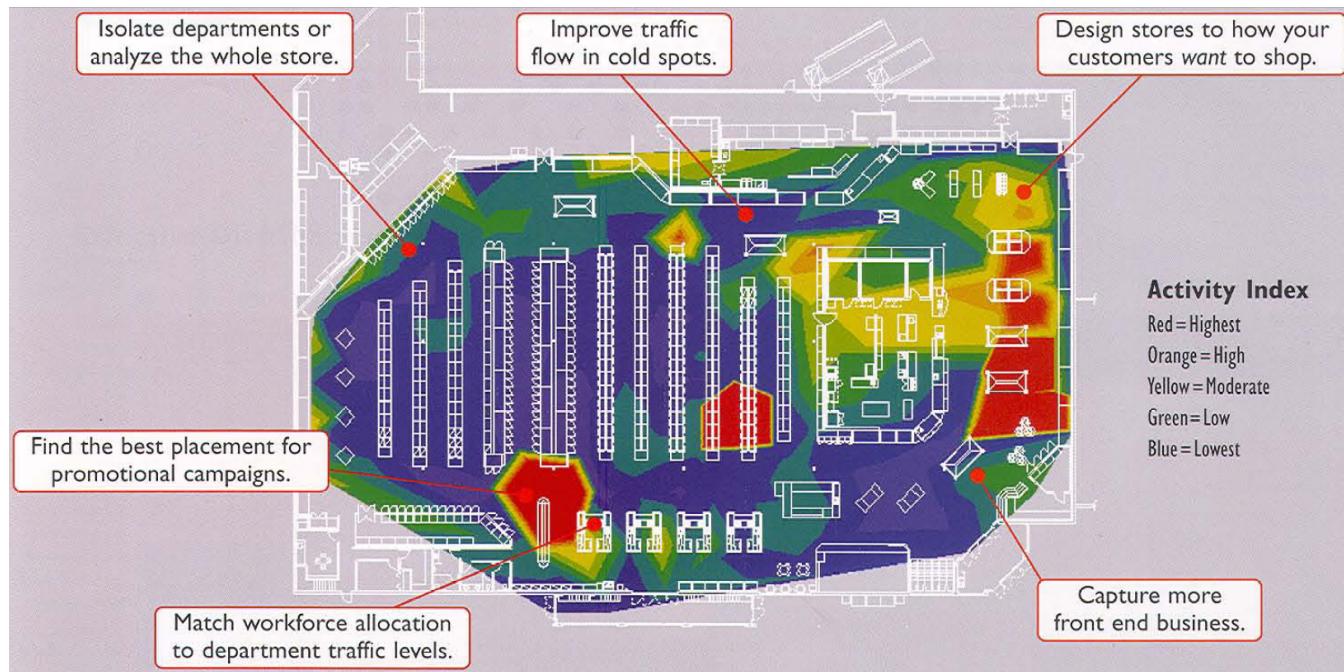
# How do shoppers move?

- On average, a shopper only covers ~25% of a store.



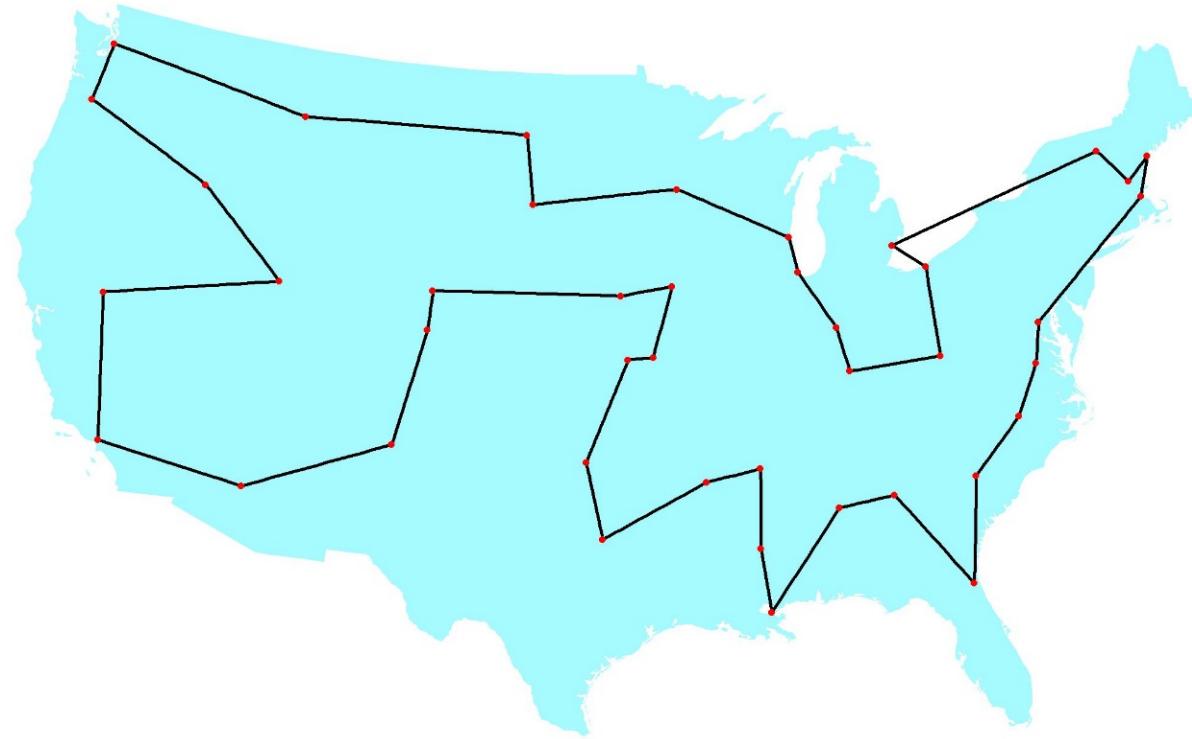
“Excursion”  
behavior

# RFID Tracking Leads to Improved Retailing, Improved Results for Shelf Space Allocation



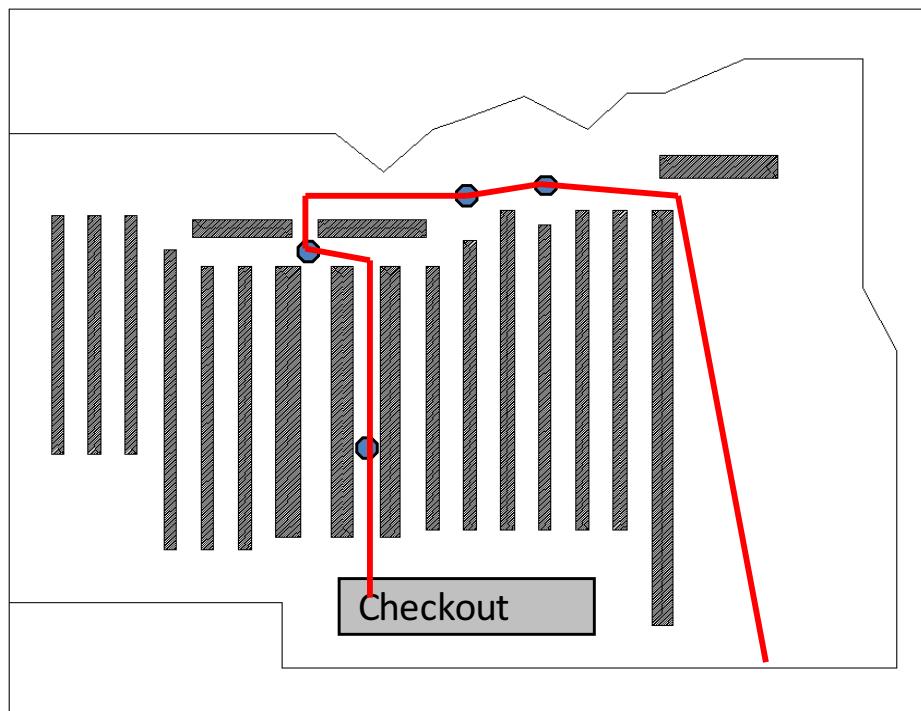
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## **How “efficient” are shoppers? Traveling Salesman Problem**



## TSP-Optimal Path

- We define the **TSP-Optimal path** as the path that connects the entrance, all purchases, and checkout, with the shortest total travel distance.

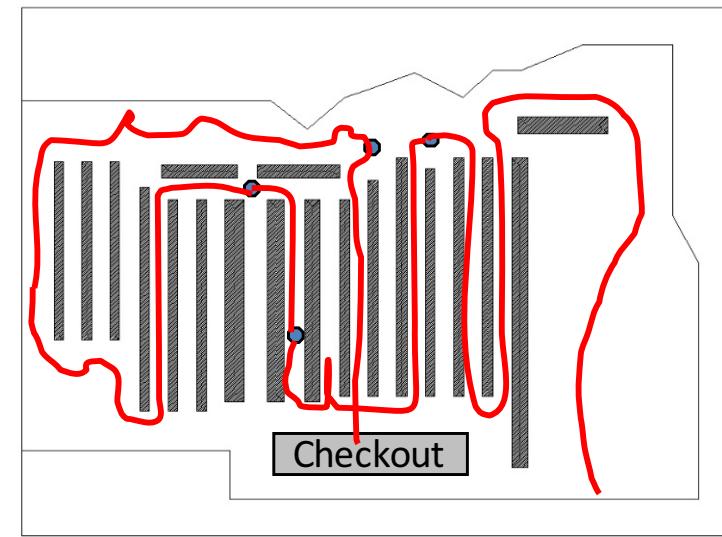


## “Efficient” vs. “Inefficient” Paths

Path A

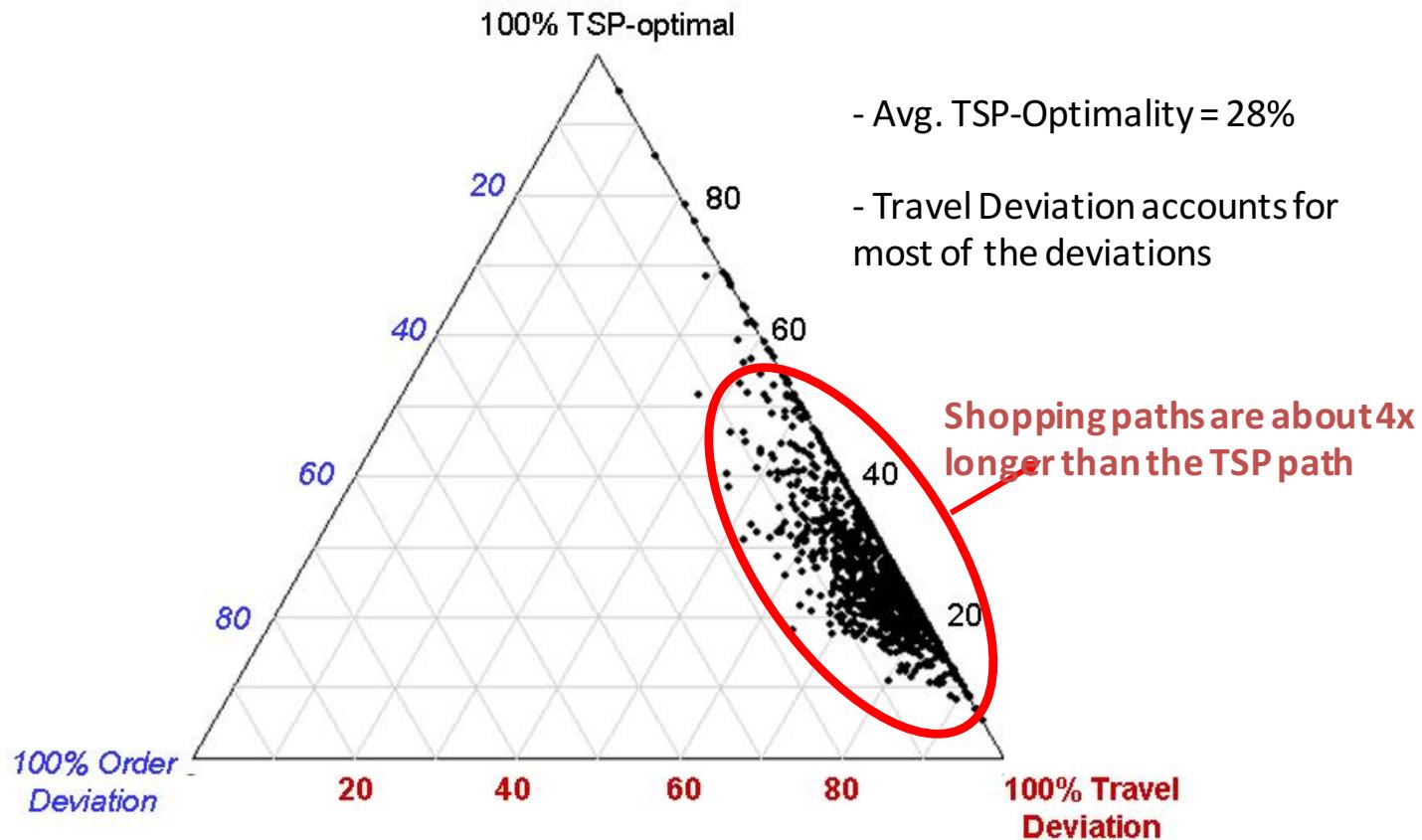


Path B



- Path A has less TSP-deviation than Path B, based on total travel distance

# Decomposition Results



## Clustering Consumers Based on Deviations

Paths with high order deviation tend to be associated with more purchases (no effect for travel deviation)

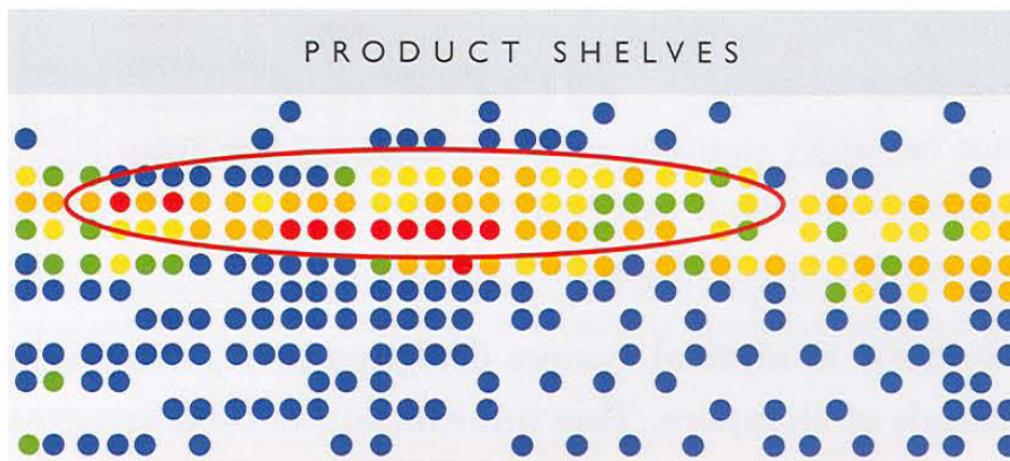
	Group 1	Group 2	Group 3	Group 4
Order Deviation (H/L)	L	H	L	H
Travel Deviation (H/L)	L	L	H	H
Number of shoppers	203	294	294	202
Mean % order deviation	0.4%	6.3%	0.6%	4.8%
Mean % travel deviation	59.5%	62.5%	78.6%	76.1%
Mean unique number of zones visited	38.2	52.1	48.9	59.7
Mean basket size (number of categories)	4.5	8.7	5.6	9.6
Mean unique number of aisles entered	4.7	7.7	7.1	9.6
Mean unique number of aisles traversed	1.4	2.8	2.5	3.7

# Intentions and Eye-tracking Data

- We use a “bluetooth” shaped eye cam developed by TNS Sorensen to capture shopper’s field of vision.



# Park Place of The Grocery Shelf: Eye level

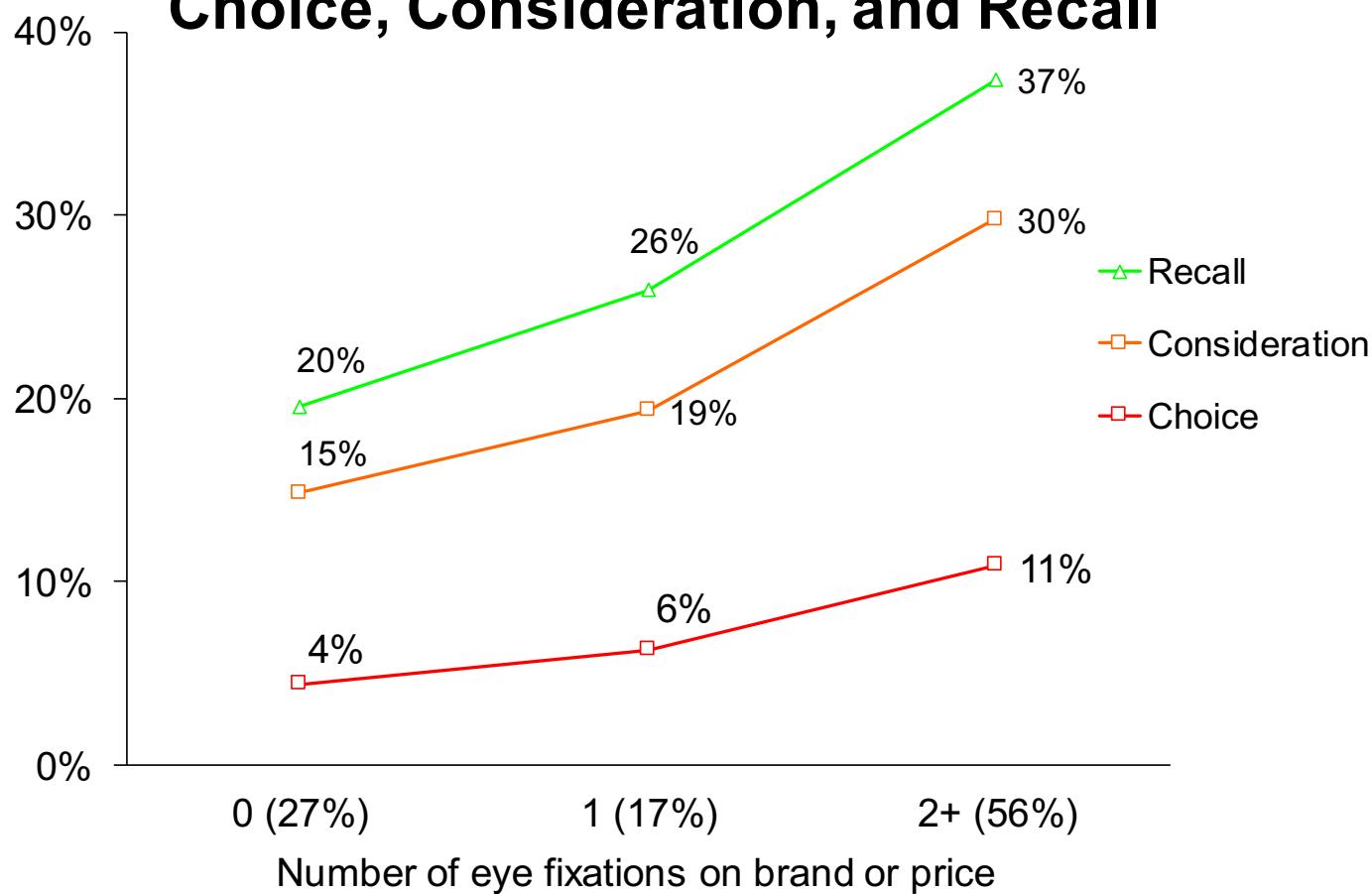


## Activity Index

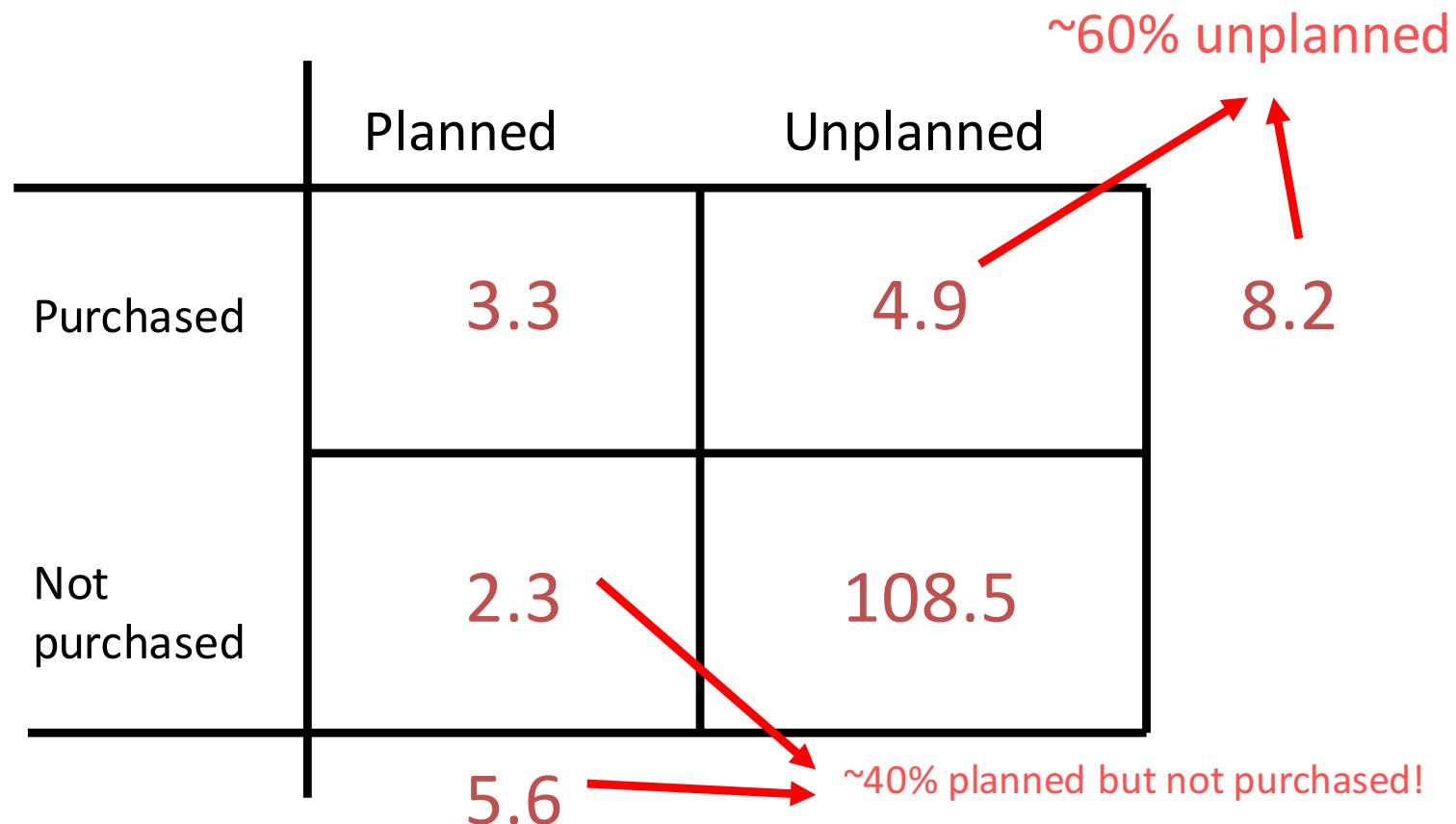
- Red = Highest
- Orange = High
- Yellow = Moderate
- Green = Low
- Blue = Lowest

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## Relationship Between Eye Fixations, Choice, Consideration, and Recall



# Planned and unplanned purchases



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# The Future of Shopping



**MediaCart™**

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## **IV. Uses of Advanced Management Science by Leading Firms**

# Kohl's: Smartphone Targeting



BRING THIS TO THE STORE WITH YOU TO REDEEM YOUR OFFER.

**\$10 off**

your men's wardrobe purchase of \$30 or more in store or 15% off online. Shop Kohls.com with promo code MENSTYLE15.

PROMOTIONAL OFFER VALID SUN., SEPT. 8–SUN., SEPT. 22

**KOHL'S**  
expect great things

\$10 OFF \$30 OFFER VALID FOR ONE-TIME USE IN STORE ONLY OR 15% OFFER VALID ONLINE ONLY SEPT. 8–22, 2013. ONLY ONE MEN'S WARDROBE MERCHANDISE OFFER MAY BE USED PER CUSTOMER. \$10 offer valid on a minimum \$30 pre-tax purchase of men's apparel, dress and casual footwear. \$15 online offer valid on a minimum \$30 pre-tax purchase of men's apparel, dress and casual footwear. Both offers must be presented at time of in-store purchase. \$10 offer can be combined with other offers and will be applied prior to percent-off total purchase discounts. Offer cannot be redeemed for cash. No cash back. Return value of merchandise purchased from Kohl's Stores may be subject to a maximum 15% offer redemption and valid only on men's apparel, dress and casual footwear and luggage merchandise on Kohls.com. 15% Promo Code must be entered at Kohls.com to receive discount. 15% offer cannot be combined with any other percent-off discounts, including age-specific discounts, promotional offers, price adjustments, promotional purchases, purchase of Gift Cards, payment on a Kohl's Charge account, the purchase of Kohl's Care® cause merchandise or other charitable items or in conjunction with any percent-off discounts, including age-specific discounts. Offer excludes single brands of cosmetics and skincare, select seasonal brands of apparel. For complete list of brands excluded brands, go to Kohls.com/beauty/exclusions or look for signs in our stores. Offer also excludes select electronics; see store for details. Photocopies or duplicates not acceptable. One men's wardrobe merchandise offer may be used per customer. See store for details.

Prices good Sun.. Sept. 8–Sun.. Sept. 22, 2013, unless otherwise indicated.



**KOHL'S**  
expect great things®

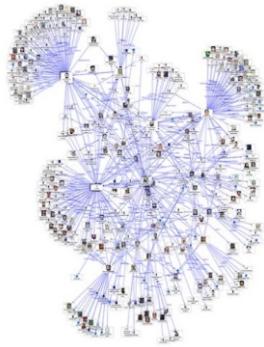
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# NetFlix: Designing Content



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# American Express: Social Network-Based Churn Modeling



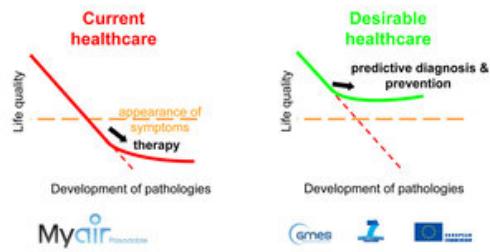
## Customer Churn



# Health Care Providers: Patient Health



New philosophy of predictive medicine  
& targeted prevention of diseases



# Google Free Taxi

Purchase History			
Latest Purchase			
Item	Artist	Type	Price
3D Brick Breaker Revolution FREE, v1.1.3, Se...	Digital Chocolate, ...	Application	Free
CardStar, v1.3.2, Seller: Mesa Dynamics, LLC	Mesa Dynamics, LLC	Application	Free
foursquare, v1.3.2, Seller: Naveen Selvadurai	naveenium	Application	Free
NPR News, v1.0, Seller: NPR	NPR	Application	Free
TomTom U.S. & Canada, v1.0, Seller: TomTom	TomTom Internati...	Application	\$99.99

$$CLV = \sum_{t=0}^T m \frac{r^t}{(1 + d)^t}$$



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# Starbucks: Customer Deals But Who Gets Them?



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# Call Centers: Call Ordering



A word cloud centered around the acronym NLP (Natural Language Processing). The words are arranged in a cluster, with larger words representing more frequent terms and smaller words representing less frequent ones. Key words include: language, machine, speech, evaluation, systems, text, processing, recognition, tasks, understanding, input, output, research, training, word, project, real-world, process, especially, hand-written, human, common, number, names, morphology, models, information, rules, statistical, sentence, standard, segmentation, words, speech, task, geo, sentences, written, etc.



# Amazon: Ship before you buy!

Purchase History			
Latest Purchase			
Item	Artist	Type	Price
3D Brick Breaker Revolution FREE, v1.1.3, Se...	Digital Chocolate, ...	Application	Free
CardStar, v1.3.2, Seller: Mesa Dynamics, LLC	Mesa Dynamics, LLC	Application	Free
foursquare, v1.3.2, Seller: Naveen Selvadurai	naveenium	Application	Free
NPR News, v1.0, Seller: NPR	NPR	Application	Free
TomTom U.S. & Canada, v1.0, Seller: TomTom	TomTom Internati...	Application	\$99.99

Subtotal: \$99.99  
Tax: \$3.41  
Credit Card Total: \$103.40



YOUR HOUSE  
YOUR®  
HOUSE

amazon®

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## Takeaways

- Technology meets management science
- It is never the golden age, and better data leads to better science
- It is real monetization!

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**THANK YOU!**