Analysis of Conjoint Data: Introduction

Aurélie Lemmens

What Have We Done So Far?



Step 6: Estimate Preferences

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Different Methods of Analysis

- Counting Analysis
- Logit (logistic regression)
- Latent Class Analysis
- Hierarchical Bayesian Analysis

Business Case

The Golf Market

Business Case: The Golf Market

Magnum Force High Flyer Pro

Performance Plus developed a new ball that flies farther than average!

Business Case: The Golf Market

Magnum Force High Flyer Pro

Long Shot

Eclipse +

The Golf Market

- Performance Plus has developed a golf ball that flies farther than average balls. The proposed name for the ball is "Long Shot."
- Because Performance Plus is not well known among golfers, your client has considered approaching a well-known maker of golf clubs and balls (Golfers, Inc.) to market the ball using their existing brand name for balls: "Eclipse."
- Sales for Eclipse have been declining and they welcome the opportunity to benefit from the new technology. A line extension brand called "Eclipse+" has been proposed. However, the royalty Golfers, Inc. is proposing seems high.
- Two other manufacturers already market "high performance" balls: High-Flyer Pro (by Smith and Forester), and Magnum Force (by Durango).
- High performance balls command a price premium of between 20% to 50% over traditional balls and the market is growing rapidly.

The Managerial Questions

- I) How well could Long Shot hope to compete with existing competitors?
- 2) Should Performance Plus form an alliance with Eclipse and brand her new product as "Eclipse+"? How much incremental value does the brand name "Eclipse" add?
- 3) How do golfers trade off performance vs. price?
- 4) How should "Long Shot" be manufactured and positioned in terms of performance and price to maximize profitability?
- 5) Do novice or experienced golfers differ in their preferences for high performance golf balls? Could this lead to a target market strategy?

Pricing of Golf Balls

- Two competitors are currently selling packages of three balls for between \$7.99 to \$10.99.
- Good to select a wider range to cover the price levels we are interested in.
- We do not want any prices below \$4.99, having determined that such a low price cannot cover the manufacturing and marketing costs and result in a profit.

Golf Balls: Attributes and Levels

- Suppose we describe golf balls using the following three attributes:
 - Brand [4 levels]:
 - High-Flyer Pro
 - Magnum Force
 - Eclipse+
 - Long Shot
 - **Performance** [3 levels]:
 - Drives 5 yards farther than the average ball
 - Drives 10 yards farther than the average ball
 - Drives 15 yards farther than the average ball
 - Price [4 levels]
 - \$4.99 for a package of 3 balls
 - \$6.99 for a package of 3 balls
 - \$8.99 for a package of 3 balls
 - \$10.99 for a package of 3 balls



Golf Balls: Attributes and Levels

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Choice Sets

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3 alternatives + None option

Choice Sets

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Survey

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	Brand:	Magnum Force, by Durango	Long Shot, by Performance Plus	Eclipse+, by Golfers, Inc.		
	Performance:	Drives 10 yards farther than the average ball	Drives 5 yards farther than the average ball	Drives 15 yards farther than the average ball	NONE: I wouldn't choose any of these.	
	Price:	\$8.99 for package of 3 balls	\$10.99 for package of 3 balls	\$8.99 for package of 3 balls		
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Data Collection

> 250 respondents

Analysis of Conjoint Data Part I: Count Analysis

Aurélie Lemmens

- Counts provides quick and automatic calculation of the main effects and joint effects for collected CBC data.
- It calculates a proportion of "wins" for each level, based on how many times a concept including that level is chosen, *divided by* the number of times a concept including that level appeared in the choice task.
- As top-line survey of the results

Data Collection

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- In randomized CBC designs, each attribute level is equally likely to occur with each level of every other attribute. Therefore, the impact of each level can be assessed just by counting the proportion of times concepts including it are chosen.
- That method of analysis can be used not only for main effects, but for joint effects as well. CBC's "COUNT" option automatically does such an analysis for each main effect and for all two-way and three-way joint effects.
- Segmentation variables can also be specified as banner points in the COUNT option for comparing differences between respondent subgroups.

Main Effects

lysis Manager	August 14	16		
,		17	Performance:	
f		18		To
- Duplicate Analy	sis Types	19	Total Respondents	2
	🖬 🖬 Sa	20	Drives 5 yards farther than the average ball	0.1
Rename Run Coun	ts 🔹 👻	21	Drives 10 yards farther than the average ball	0.2
ANALYSIS RUNS	RUN SETTINGS RE	22	Drives 15 yards farther than the average ball	0.3
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		24	Within Att. Chi-Square	198.5
Analysis run 1 ×		25	D.F.	
۵	B	26	Significance	p <
Brand:		27		
	Total	28		
Total Responde	nts 250	29	Price:	
High-Flyer Pro, by Smith and Fores	ter 0.369	30		Т
Magnum Force, by Durar	go 0.329	31	Total Respondents	
Eclipse+, by Golfers, I	nc. 0.188	32	\$4.99 for package of 3 balls	0.3
Long Shot, by Performance P	us 0.156	33	\$6.99 for package of 3 balls	0.2
		34	\$8.99 for package of 3 balls	0.2
Within Att. Chi-Square	352.705	35	\$10.99 for package of 3 balls	0.1
D.F.	3	36		
Significance	p < .01	37	Within Att. Chi-Square	385.0
-		38	D.F.	
		39	Significance	p <

Brands seem to matter when choosing a golf ball. Respondents tend to prefer High-Flyer Pro.

Main Effects

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Performance and price also matter. Not surprisingly, respondents prefer high performance and low prices.

Chi-Square statistic:

- > Whether the proportions in that table differ significantly from one another.
- DF = degrees of freedom = number of levels I
- In the case of a main effect count, the Chi-Square indicates whether levels of that attribute differ significantly in their frequency of choice.
- Beware of interpreting the Chi-Square from aggregate counts as a measure of "Importance" for an attribute or assuming that the main-effect Chi-Square test that is not significant indicates that the attribute had little impact on choice.
 - Disagreement between individuals on what level is preferred can mask the impact of an attribute when respondent choices are aggregated. For example, if half of the respondents strongly prefer Brand A over Brand B, and the other half feels exactly the opposite, the aggregate count proportions will be equal, and the Chi-Square will also be zero. In that case, we would be in error to infer that brand had no impact on choice for individuals.

Interaction effects:

• The output of counts is particularly useful for understanding how the demand for each brand varies as a function of price.

61				
62	Brand: x Price:			
63			Total	
64	Total Respondents		250	
65	High-Flyer Pro, by Smith and Forester	\$4.99 for package of 3 balls	0.556	
66	High-Flyer Pro, by Smith and Forester	\$6.99 for package of 3 balls	0.400	
67	High-Flyer Pro, by Smith and Forester	\$8.99 for package of 3 balls	0.331	
68	High-Flyer Pro, by Smith and Forester	\$10.99 for package of 3 balls	0.201	
69	Magnum Force, by Durango	\$4.99 for package of 3 balls	0.454	
70	Magnum Force, by Durango	\$6.99 for package of 3 balls	0.328	
71	Magnum Force, by Durango	\$8.99 for package of 3 balls	0.316	
72	Magnum Force, by Durango	\$10.99 for package of 3 balls	0.215	
73	Eclipse+, by Golfers, Inc.	\$4.99 for package of 3 balls	0.287	
74	Eclipse+, by Golfers, Inc.	\$6.99 for package of 3 balls	0.226	
75	Eclipse+, by Golfers, Inc.	\$8.99 for package of 3 balls	0.151	
76	Eclipse+, by Golfers, Inc.	\$10.99 for package of 3 balls	0.081	
77	Long Shot, by Performance Plus	\$4.99 for package of 3 balls	0.282	
78	Long Shot, by Performance Plus	\$6.99 for package of 3 balls	0.193	
79	Long Shot, by Performance Plus	\$8.99 for package of 3 balls	0.121	
80	Long Shot, by Performance Plus	\$10.99 for package of 3 balls	0.039	
81				
82	Interaction Chi-Square		45.647	
83	D.F		9	
84	Significance		p < .01	
-				

- Joint effects:
 - The output of counts is particularly useful for understanding how the demand for each brand varies as a function of price.

Average Percent Choice for Each Brand at Each Price

	\$ 4.99	\$ 6.99	\$ 8.99	\$ 10.99	Average
High-Flyer Pro	55.6%	40.0%	33.1%	20.1%	37.2%
Magnum Force	46.4%	32.8%	31.6%	21.5%	33.1%
Eclipse +	28.7%	22.6%	15.1%	8.1%	18.6%
Long Shot	28.2%	19.3%	12.1%	3.9%	15.9%

High-Flyer is the most popular and receives 20% choices at highest price, and 56% at lowest price



- As a first step only! Depends on the orthogonality criterion:
 - Given a large enough sample size, the number of times each level was displayed should be nearly balanced.
 - But with smaller sample sizes, random imbalances in the design can distort counts proportions. For example, if a particular brand level happened to be shown at a low price more often than other brands, the count proportion for that brand could be distorted upward.
 - Other methods of analysis (Logit, Latent Class, or HB) are not subject to this difficulty.