



Orasi Webinar
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Optimizing Product Designs: Conjoint Analysis and How It Works

Brian D. Ottum, Ph.D.
President
Ottum Research & Consulting

398 Green Hills Dr. Saline, MI 48176 (734) 429-8215

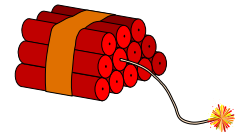
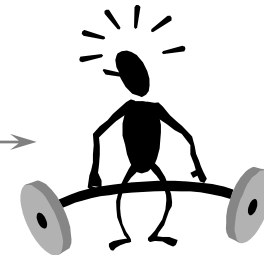
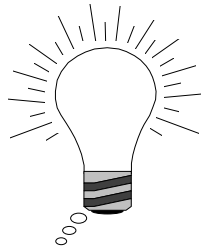
ottum@comcast.net <http://mywebpages.comcast.net/ottum/>



- ❖ How does conjoint work?
- ❖ When do I use it?

- ❖ Conjoint and NPD
- ❖ Overview of conjoint analysis
- ❖ Case studies
- ❖ Assumptions & limitations

“The Fuzzy Front End”



Strategy

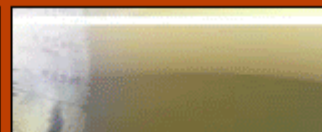
Research

Ideas

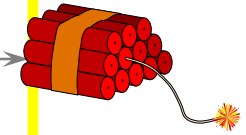
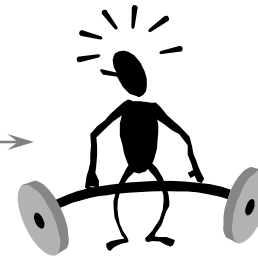
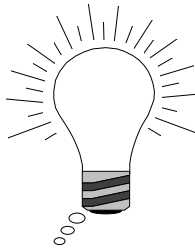
Screening

Development

Launch



Questions You Need to Answer



Strategy

Research

Ideas

Screening

Development

Launch

What types of new products SHOULD we try to develop?

What customer needs are unmet? In the future?

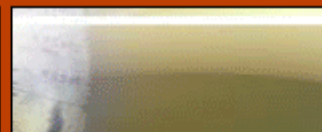
Where & how do I get good ideas?

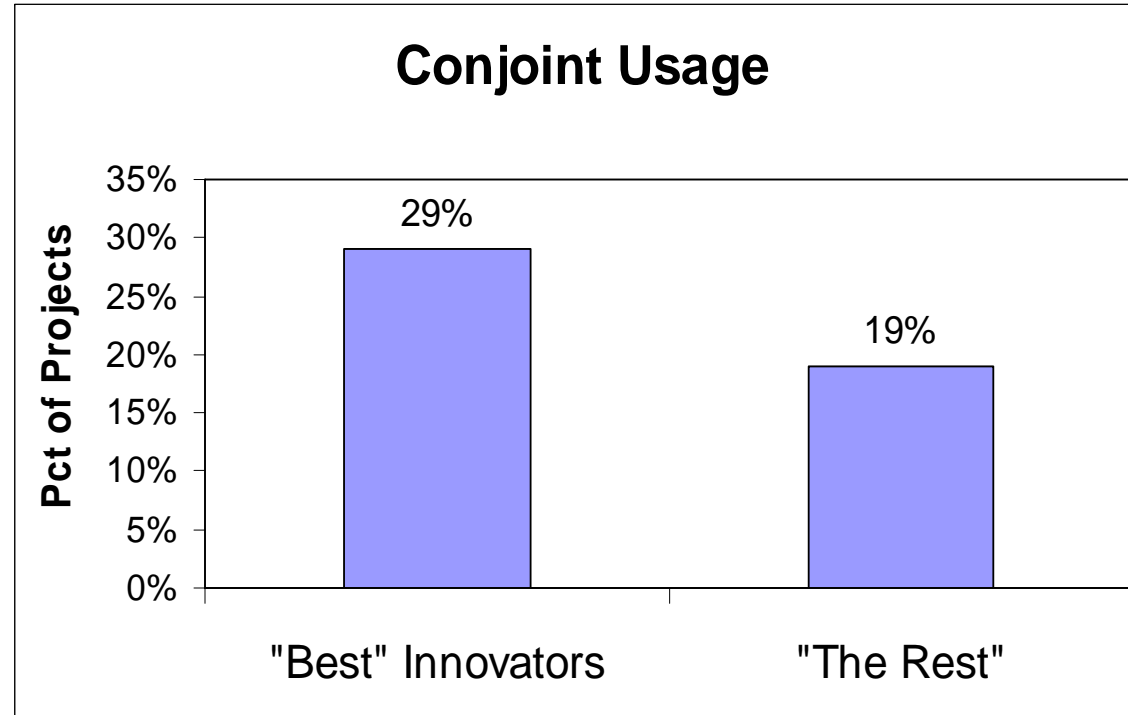
Is this idea worth developing?

Which product will customers like best?

How much are they willing to pay? How many will I sell?

Conjoint Here





2003 PDMA Comparative Performance Assessment Study:
<http://www.pdma.org/visions/july04/cpas-highlights.html>

What is Conjoint Analysis?

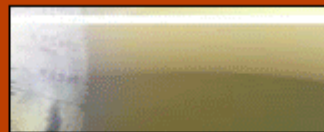
- ❖ A sophisticated market research tool
- ❖ For finding out the relative importance of various product alternatives
- ❖ Can be highly realistic and highly accurate

A multivariate technique used to quantify the value that people associate with different levels of product/service attributes. Respondents trade product attributes against each other to establish product (brand) preference and the relative importance of attributes.

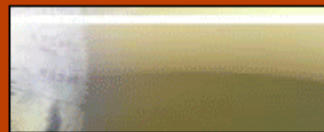
Why Conjoint Analysis?

- ❖ Old fashioned direct questioning is inaccurate and biased
- ❖ Conjoint does a better job mirroring the actual decisions people make
- ❖ Allows “what-if” investigations

- ❖ Deciding which features a new product should have
- ❖ Deciding what price to charge
- ❖ Understanding market segments
- ❖ Forecasting sales



- ❖ Uncovering unmet customer needs
- ❖ Trying to pick between diverse new product ideas
- ❖ Just to set the price only



- ❖ Motorola designing new cellular phone
- ❖ Need to optimize physical size, battery life and price

When Designing A New Cellular Phone... Direct Questions Don't Work!

1. How important is getting the smallest possible size?

Not at all Important		Somewhat Important		Extremely Important
1	2	3	4	5

2. How important is long battery life?

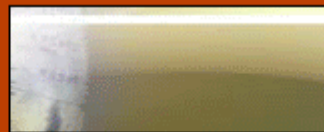
Not at all Important		Somewhat Important		Extremely Important
1	2	3	4	5

3. How important is low price?

Not at all Important		Somewhat Important		Extremely Important
1	2	3	4	5

- ❖ SIZE (brick, tiny, watch)
- ❖ BATTERY (2hrs, 8hrs, 14hrs)
- ❖ PRICE (\$50, \$150, \$250)

- ❖ Consumer's optimal is watch, 14hr battery, \$50.
- ❖ Motorola's optimal is brick size, 2hr battery, \$250.
- ❖ Neither is the answer



- ❖ Consumer #1 prefers watch with 8hr battery to tiny with 14hr battery
- ❖ Consumer #2 is the opposite
- ❖ Conjoint is the measurement of these trade-offs

		Battery Life		
		14hrs	8hrs	2hrs
Size	Watch	#1	#2	#4
	Tiny	#3	#5	#6
	Brick	#7	#8	#9

		Battery Life		
		14hrs	8hrs	2hrs
Size	Watch	#1	#3	#7
	Tiny	#2	#5	#8
	Brick	#4	#6	#9

		Battery Life		
		14hrs	8hrs	2hrs
Price	\$50	#1	#4	#7
	\$150	#2	#5	#8
	\$250	#3	#6	#9

UTILITIES (Part-worths)

	Size	Battery Life		Price	
Watch	60	14hrs	100	\$50	80
Tiny	40	8hrs	40	\$150	50
Brick	0	2hrs	10	\$250	0

Quick Conjoint Example

Which phone will sell more?

PHONE A

PHONE B

Size	Tiny		Watch	
Battery	8 hr		2 hr	
Price	\$50		\$150	

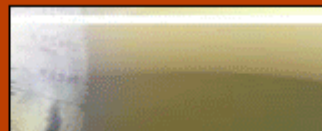
Quick Conjoint Example

Which phone will sell more?

	PHONE X	PHONE Y
Size	Brick	Tiny
Battery	14 hr	8 hr
Price	\$50	\$150

1. Decide the attributes to test
2. Decide the levels of each attribute
3. Find appropriate experimental design
4. Collect data
5. Analyze the data
6. Create simulation

Toughest steps



- ❖ Bike company needs to decide which bike(s) to produce for 2006 season
- ❖ Also wants to set the price
- ❖ A very smart company, it chooses to use conjoint to help guide their decisions

ATTRIBUTES & LEVELS

- ❖ Tire type (“knobby” or smooth)
- ❖ Suspension (full or none at all)
- ❖ Frame (folds up or regular rigid)
- ❖ Features (comfort vs. racing)
- ❖ Weight (30lbs vs. 22lbs)
- ❖ \$300, \$600, \$900, \$1,200 pricing

- ❖ Total levels of all attributes should not exceed 20
- ❖ Total profiles asked should not exceed 20
- ❖ Go bigger and you jeopardize the results; respondent overload!

Attribute:	Level “0”	Level “1”	Level “2”	Level “3”
Price:	\$1,200	\$900	\$600	\$300
Tires:	Smooth	Knobby		
Suspension:	None	Full		
Folds Up?	No	Yes		
Comfort?	Speed	Comfort		
Weight :	30 lbs	22 lbs		

- ❖ Knobby Tires
- ❖ Full suspension
- ❖ Fold-Up Frame
- ❖ Racing Features
- ❖ 30lbs
- ❖ \$1,200

How likely would you be to buy this bike?

1=Definitely Not buy 2=Probably Not buy 3=Might 4=Probably buy 5=Definitely buy

Bike #	Knobby	Suspension	Folds	Comfort	LightWt	PRICE
1	0	1	1	0	0	2
2	1	1	1	1	1	0
3	0	1	0	1	0	1
4	1	1	0	1	0	3
5	1	0	1	0	0	1
6	0	0	0	0	1	0
7	1	1	1	0	0	0
8	0	0	1	0	0	3
9	1	0	0	0	1	2
10	1	0	1	1	1	1
11	0	0	1	1	1	3
12	0	0	0	1	0	0
13	0	1	1	1	1	2
14	0	1	0	0	1	1
15	1	0	0	1	0	2
16	1	1	0	0	1	3

- ❖ **ORTHOGONALITY** is **CRITICAL** - there should be no correlation between any two attributes
- ❖ **BALANCE** is **CRITICAL** - all levels of all attributes should appear equally often

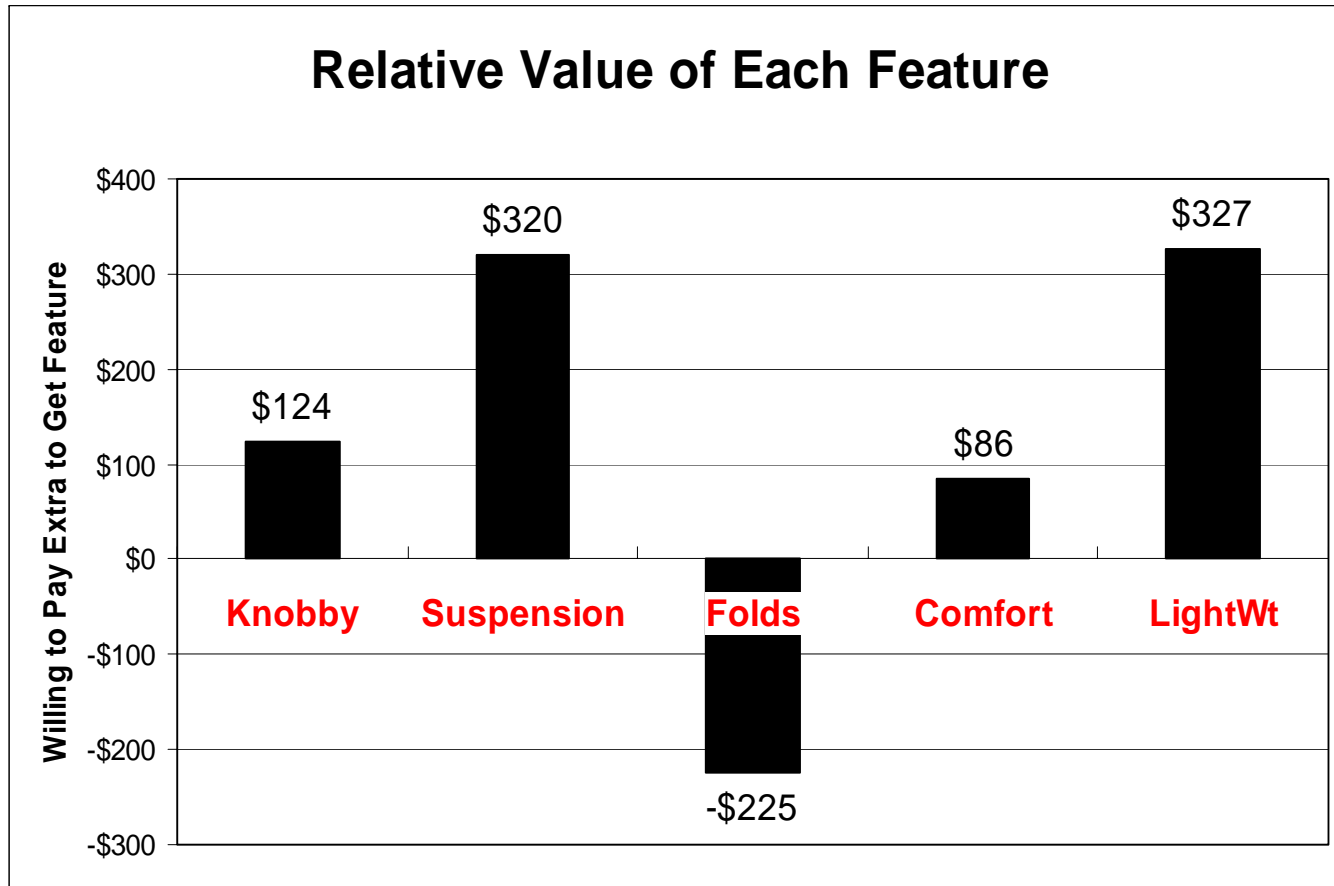
- ❖ Regression analysis
- ❖ Attribute columns in experimental design are the independent variables (the “X’s”)
- ❖ The average rating for each profile is the dependent variable (the “Y”)

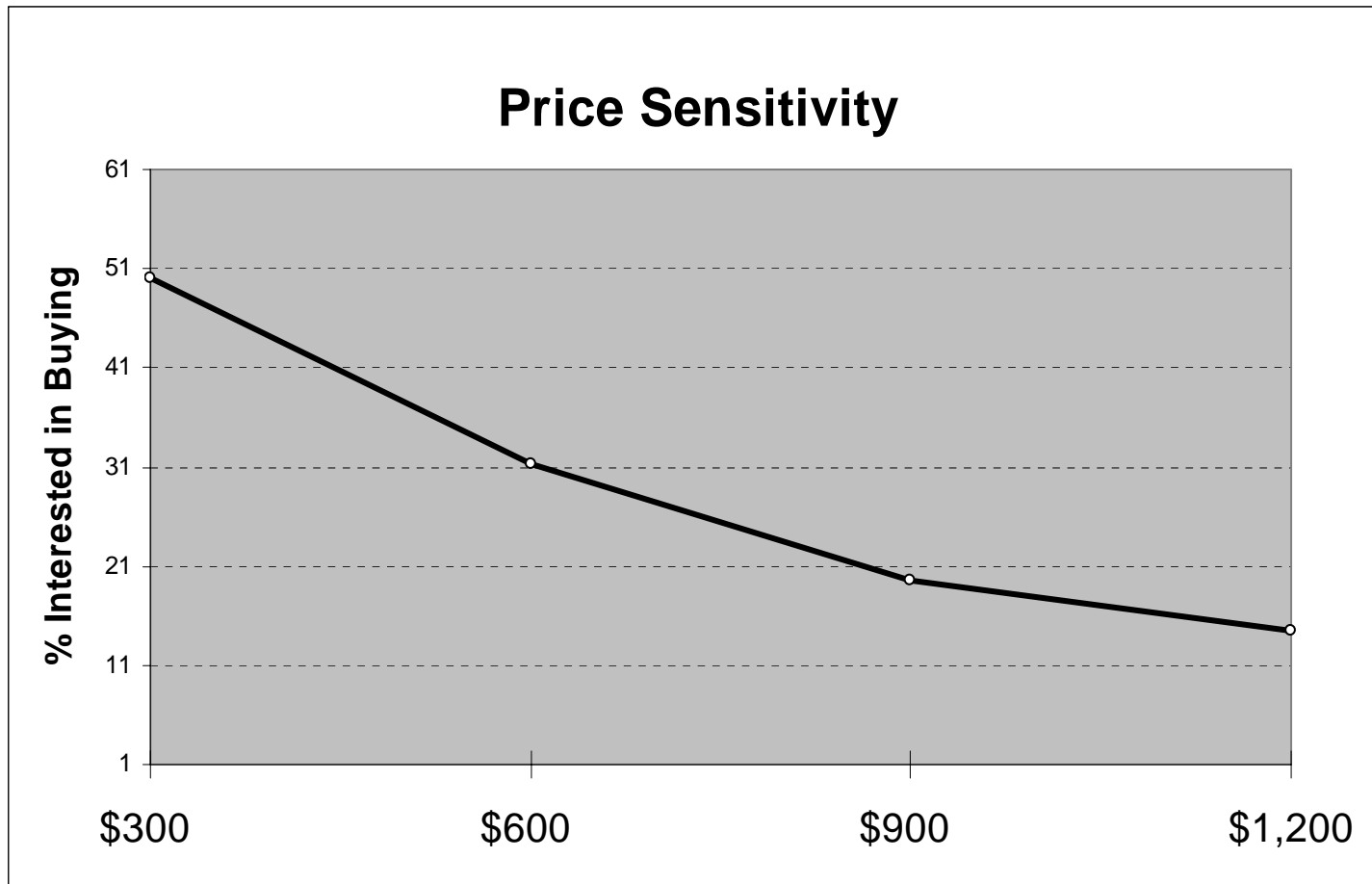
Bike #	Knobby	Suspension	Folds	Comfort	LightWt	PRICE	%Buy
1	0	1	1	0	0	2	20
2	1	1	1	1	1	0	20
3	0	1	0	1	0	1	20
4	1	1	0	1	0	3	60
5	1	0	1	0	0	1	6
6	0	0	0	0	1	0	22
7	1	1	1	0	0	0	14
8	0	0	1	0	0	3	25
9	1	0	0	0	1	2	28
10	1	0	1	1	1	1	20
11	0	0	1	1	1	3	45
12	0	0	0	1	0	0	2
13	0	1	1	1	1	2	45
14	0	1	0	0	1	1	32
15	1	0	0	1	0	2	32
16	1	1	0	0	1	3	70

	Coefficients	Standard Error	t Stat	P-value
Intercept	-1.4	5.16	-0.26	0.80
Knobby	4.9	3.70	1.32	0.22
Suspension	12.6	3.70	3.42	0.01
Folds	-8.9	3.70	-2.40	0.04
Comfort	3.4	3.70	0.91	0.38
LightWt	12.9	3.70	3.48	0.01
PRICE	11.8	1.65	7.16	0.00

$$\% \text{ Who Will Buy} = -1.4 + 4.9(\text{knobby}) + 12.6(\text{suspension}) - 8.9(\text{folds}) + 3.4(\text{comfort}) + 12.9(\text{weight}) + 11.8(\text{PRICE})$$

- ❖ R&D cannot easily work from a concept.
- ❖ Hard numbers (specifications) are most useful.
- ❖ Best possible situation is to know how much customers are willing to pay for each added component of the product.
- ❖ This is what conjoint provides!

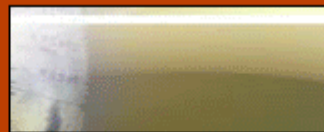




1. Decide the attributes to test
2. Decide the levels of each attribute
3. Find appropriate experimental design
4. Collect data
5. Analyze the data
6. Create simulation

- ❖ Appliance manufacturer wanted to decide features and set price for a new model
- ❖ Also needed to segment the market; find the target market for marketing purposes

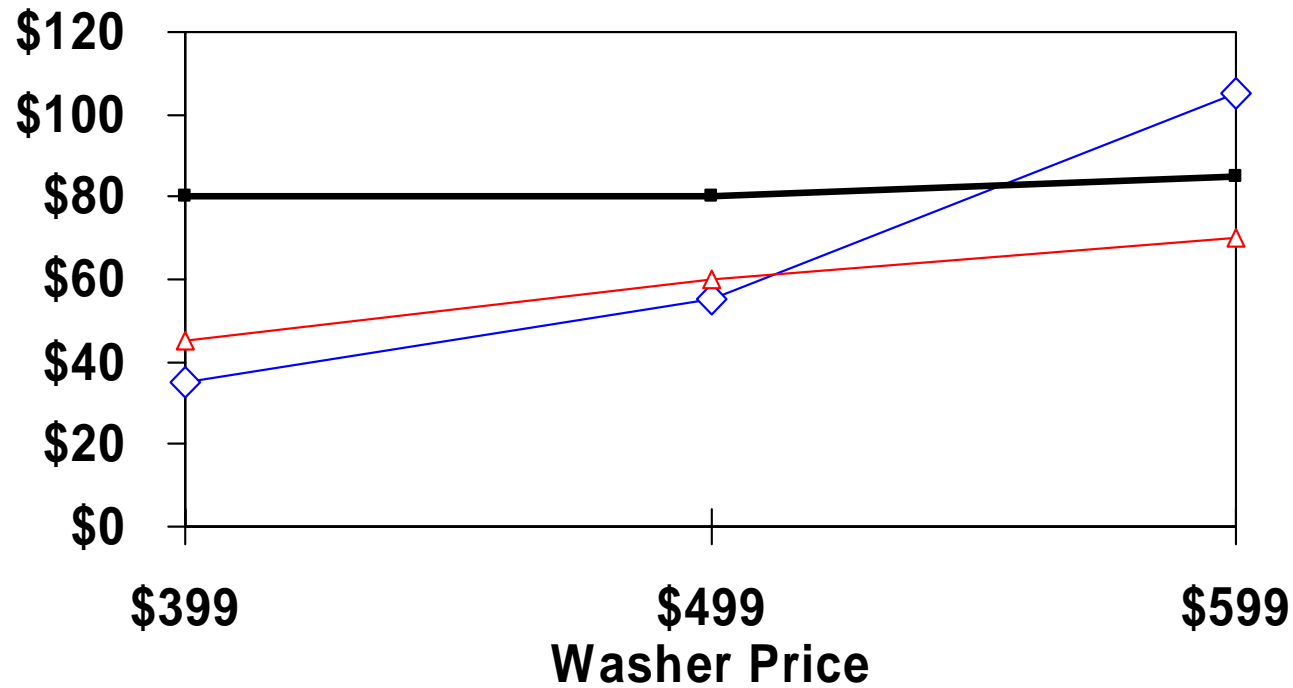
- ❖ Brands (several tested)
- ❖ Features (basic, middle and top)
- ❖ Promotion (\$\$\$ off, free stuff)
- ❖ Price (four levels tested)
- ❖ Other (free delivery, disposal of old)



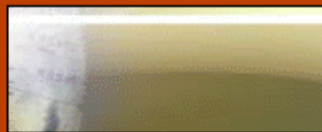
- ❖ The effect of promotion very likely to be affected by price level (INTERACTION must be tested)
- ❖ 27 total profiles
- ❖ Segmentation of the results

Value of Freebies

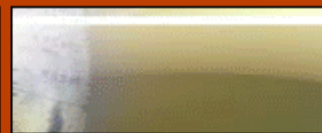
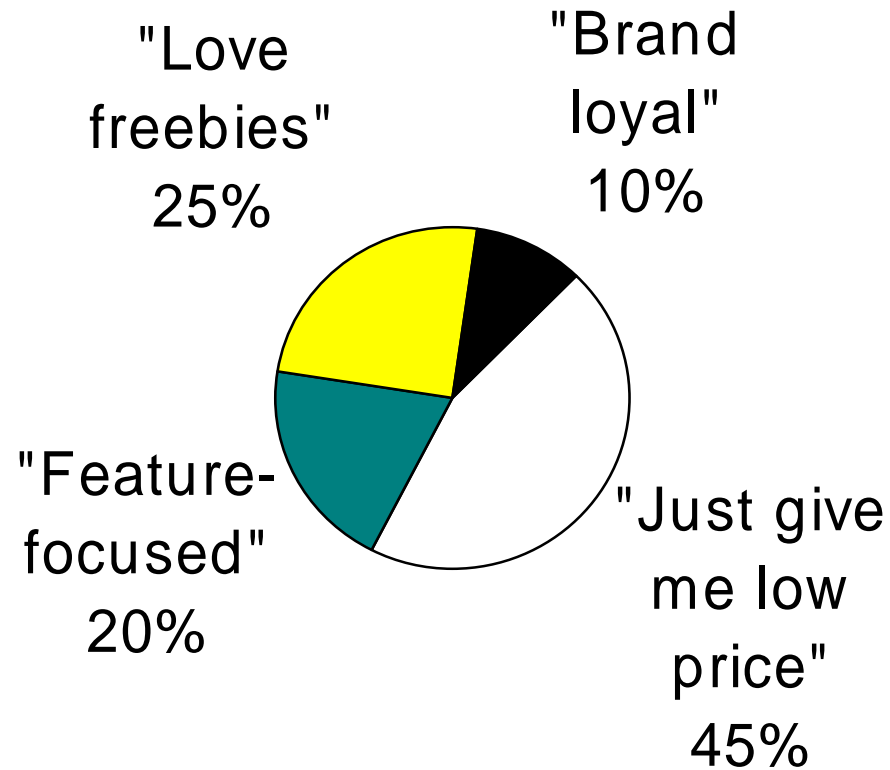
—◇— Free service contract —■— Free dinners —△— Free \$50 gift certificate



- ❖ A model calculated for every person
- ❖ Save regression weights
- ❖ Cluster the weights to find segments
- ❖ Describe the segments



Washer Segmentation Results



- ❖ When you exceed the 20 levels (or 20 profile questions) rules...
 - ❖ Blocking
 - ❖ Adaptive Conjoint Analysis (ACA)
 - ❖ Handle lesser attributes outside conjoint

- ❖ Conjoint assumes perfect information
 - ❖ customers well educated an all products
- ❖ Conjoint assumes perfect distribution
 - ❖ all products always available
- ❖ Conjoint simplifies the market
 - ❖ not all options included

- ❖ One-at-a-time evaluation of products is unrealistic
 - ❖ Even ACA's two-at-a-time pairs are unrealistic
- ❖ Conjoint forces all brands to have the same features & prices
 - ❖ Yet brands often have unique features & prices
- ❖ Conjoint may offer impossible combinations of features

- ❖ Conjoint is poor for intangible products and services
 - ❖ Emotion hard to quantify in markets like “fashion”
 - ❖ Tons of interactions
 - ❖ holistic vs. parts

- ❖ Kia wants to improve minivan sales
- ❖ Needs to beat current competition
- ❖ By offering new features (& low \$)

Dodge Caravan



- * 200Hp V6
- * 3000lb towing
- * Tough interior
- * 17 MPG
- \$23,000

Honda Odyssey



- * 180Hp V6
- * Seats fold flat
- * New styling
- * 18 MPG
- \$24,000

Mazda MPV



- * 220Hp V6
- * 4WD
- * Cupholders
- * 18 MPG
- \$27,000

Toyota Sienna



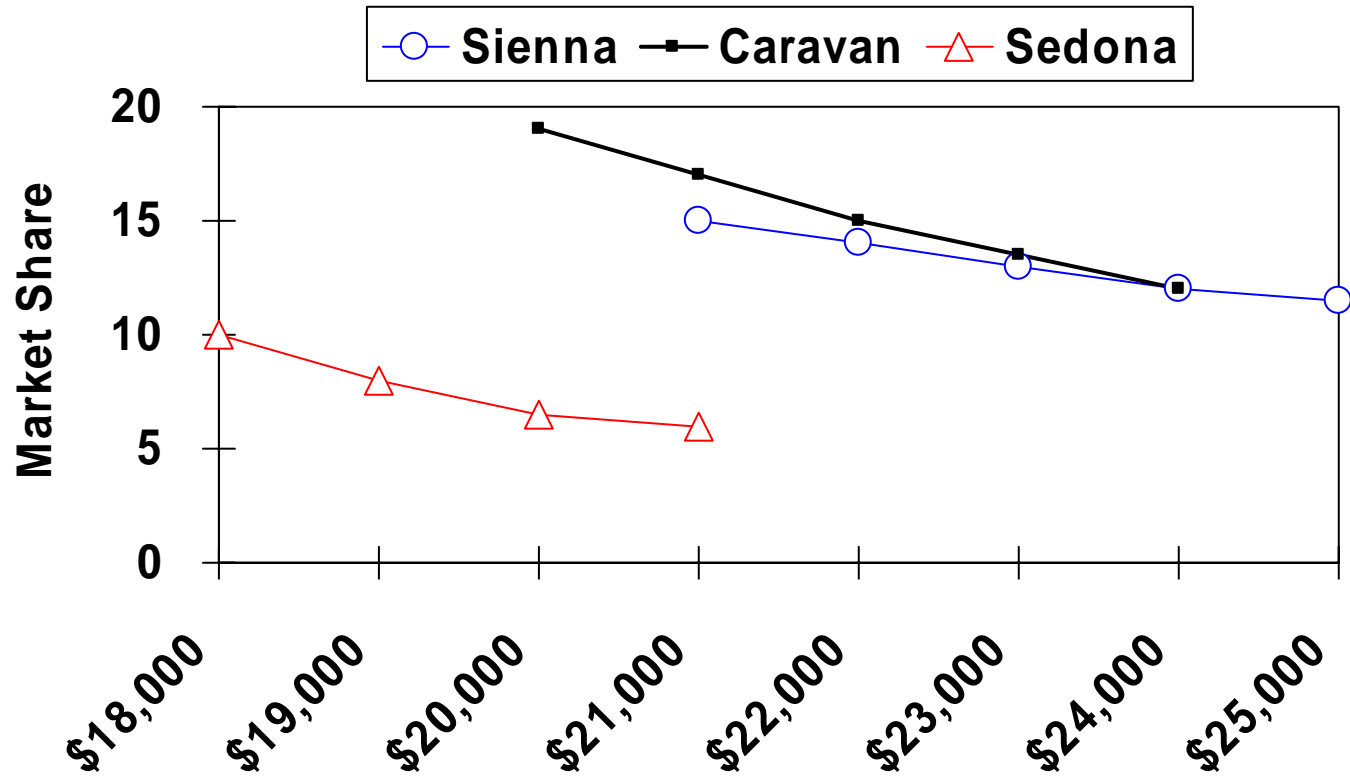
- * 220Hp V6
- * 8000 towing
- * Luxury interior
- * 20 MPG
- \$25,000

Kia Sedona



- * 180Hp V6
- * DVD system
- * Navigation
- * 18 MPG
- \$19,000

Which would you choose, or none of these?



Dynamic Spreadsheet built from “Choice-Based”

Brand	<i>Caravan</i>	<i>Odyssey</i>	<i>MPV</i>	<i>Sienna</i>	<i>Sedona</i>
HP	180	180	220	220	180
Feature #1	Tow 1500lbs	Redesign	Back view	Luxury Interior	Seats fold flat
Feature #2	DVD ent	Cupholders	Navigation	4WD	DVD ent
MPG	19	19	18	20	22
Price	\$23,000	\$25,000	\$29,000	\$28,000	\$20,000
Market Share	14.0%	8.0%	9.0%	20.0%	11.0%

Play all your “what-if” games

- ❖ Conjoint is good for setting priorities, designing the optimal product, segmenting markets
- ❖ Discrete choice is good for setting price, forecasting volume, looking at cannibalization (choice-based conjoint)

Early

Late

- ❖ How does conjoint work?
- ❖ When do I use it?

- ❖ PDMA Handbook of New Product Development book by Brian Ottum and many others, 2nd Edition, late 2004, Irwin (a chapter on many different subjects, including conjoint)
- ❖ Marketing Engineering book by Gary Lilien & Arvind Rangaswamy, Prentice Hall, 2003 (mechanics of conjoint and other quantitative marketing tools)
- ❖ Stated Choice Methods: Analysis & Applications book by Jordan Louviere et al, Cambridge University Press, 2000 (Discrete Choice/Choice-Based Conjoint deep reference)
- ❖ <http://marketing.byu.edu/htmlpages/tutorials/conjoint.htm> (excellent tutorial on conjoint by BYU)
- ❖ Voices Into Choices book, by Gary Burchill & Christina Hepner Brodie, Center for Quality of Management and Joiner Publications, 1997 (fantastic resource for Ethnography)