

HOW TO MAKE BETTER PRICING AND PRODUCT DECISIONS

A Fast Guide to Conjoint Analysis: a Survey Technique That Produces Results

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INTRODUCTION

Who doesn't want to make better decisions? We all do as individuals, and certainly in our business roles we want the most favorable outcomes as well. But as we know too well, decision-making can be difficult, especially when we must choose among possibilities that seem to be multiplying before our eyes.



Statistics Offers a Tool

For those making decisions regarding the offering of products or services, one statistical and market research technique that can be very helpful is conjoint analysis. It is a tool that can help determine an optimal level of pricing, the most appealing product/service features, and the most attractive bundle of features, all because it helps reveal what the user of the product or service actually values.

One needn't possess an advanced degree in statistics to understand the basics of conjoint analysis and how to apply it in many business situations. This eBook is intended as an overview of the technique and a quick guide so that business decision-makers may choose to employ it in areas where its findings would be particularly useful. Let's start with the basics.

WHAT CONJOINT ANALYSIS IS AND WHY TO USE IT

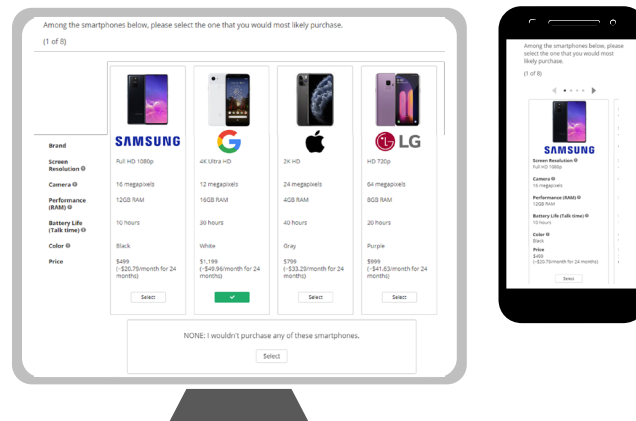
Simply put, conjoint analysis is a survey-based technique that asks respondents to rate, rank, or, most commonly, choose (depending on the type of conjoint analysis) which product concept they prefer. Based on the respondents' evaluations of the concepts, we can figure out how much unique value, or utility, each feature adds to the product. Typically, the greater value respondents ascribe to certain attributes or features, the more a provider can charge. Since charging too much can dissuade potential customers from making a purchase and charging too little can leave money on the table, research using conjoint analysis can be very useful in understanding what potential customers are truly willing to spend for a product or service. Of course, customers and potential customers can simply be asked what they would be willing to spend — or whether they prefer one feature over another — but experience has shown that responses to direct questions are unreliable and not necessarily representative of a respondent's true beliefs or intentions.

Conjoint Analysis Helps Understand What Customers Are Willing to Spend

In a survey using conjoint analysis, an array of many product or service attributes or features is presented to respondents. By requiring respondents to make specific trade-offs among these attributes, conjoint analysis reveals what they actually value and also the relative value they assign to each attribute. The “reveal,” so to speak, which identifies what customers or potential customers really care about, comes from evaluating the utility scores that attach to each feature as a result of respondent answers.

Utility Scores: What Are They?

The first step in a conjoint analysis is creating a list of product or service attributes. Let's take smartphones as an example.



All smartphones have attributes, among which are brand, color, screen resolution, camera quality, price, battery life, etc. Within each attribute are factors known as levels. Within the brand attribute, for example, the levels would be Samsung, Google, and Apple. Within price, the levels could be \$499, \$799, and \$1,199.

In choice-based conjoint surveys, respondents are asked which product or service they are most likely to purchase among a set of products (typically three or four). The resulting model provides what is known as a utility score for each level of each attribute. Add up the utilities for every level of a product or service and you come up with the total utility of the product or service. In our smartphone example, let's say the Samsung product has a total utility score of 10 and the Google product has a total utility score of 20. Because the total utility for the Google product is greater than the total utility for the Samsung model, we would assume that consumers would choose the Google phone over the Samsung phone.

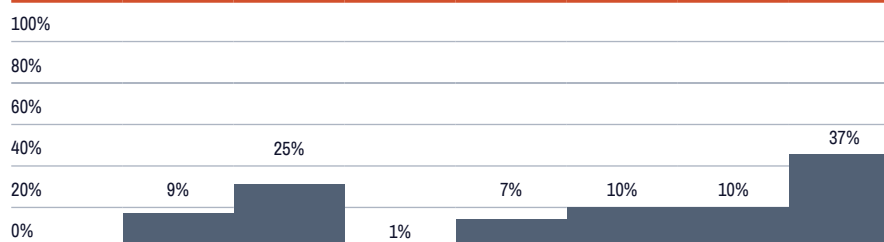
Utility Scores: Why They Matter

For those developing new products and marketing existing ones, the results of conjoint analysis can be illuminating and helpful. Most important, you can use the utility scores as inputs for a market simulator, which serves as a “choice laboratory” for testing many real-world consumer-choice possibilities.

Client logo

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	None
Include scenario	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Attribute 1	Level 2	Level 3	Level 2	Level 1	Level 2	Level 2	
Attribute 2	Level 3	Level 2	Level 5	Level 2	Level 2	Level 2	
Attribute 3	Level 2	Level 1	Level 2	Level 2	Level 2	Level 2	
Price (Enter between 0-25)	0	10	20	5	5	5	


Total Share of Preference



Conjoint is an additive model

Share of Preference

Total (N= 1,002)	9%	25%	1%	7%	10%	10%	37%
Segment							
seg 1 (N=306)	20%	20%	3%	14%	20%	20%	2%
seg 2 (N=272)	4%	55%	0%	3%	8%	8%	21%
seg 3 (N=220)	8%	5%	1%	6%	8%	8%	65%
seg 4 (N=204)	2%	12%	0%	1%	2%	2%	82%
Gender							
Male (N=477)	11%	24%	2%	8%	12%	12%	32%
Female (N=523)	8%	25%	1%	5%	9%	9%	42%



In our hypothetical smartphone example, for instance, Samsung could analyze the utility scores of its current product offering to see where certain features could be modified or improved. Depending on the results, perhaps improving screen resolution or upping RAM performance or extending battery life — or a combination of all three — would attract more customers. In fact, there are now powerful algorithms that can help run optimization searches that come up with the top two or three optimal combinations of features by searching through the thousands of possible combinations that conjoint analysis is able to produce.

Trigger Words

If any of these words keep popping up during planning discussions, conjoint analysis may be helpful:

- Preference
- Cannibalization
- Market Share
- Competition
- Simulate

Conjoint analysis is useful not only for existing products and services but also for those that are just ideas or are in development. If those involved in developing a new product or service use the words “cannibalization,” “trade-offs,” or “preferences,” for example, there’s a good chance that conjoint analysis would help clarify the development process. While conjoint analysis surveys happen just before the go-to-market step — usually to optimize pricing and features — running conjoint analyses between the conceptual phase and the development phase can be very useful. For example, making sure that feature A is what prospective customers really value (instead of the competition’s feature B) can make or break a new product or an update of an existing one.



Not Just About Pricing or New Products: Health, Movies, and COVID-19

While conjoint analysis is popular among market researchers helping companies on new products and services, its ability to reveal a hierarchy of preferences is useful in and applicable to a wide array of situations.

For example, Dr. Liana Fraenkel from Yale University used conjoint analysis to help patients trade off different treatment options when told they have cancer. The study was done because most people jump at the most aggressive forms of treatment, yet since many patients do not make it to the end of such treatments, completion rates were really low. By using conjoint analysis, Fraenkel was able to tease out what really mattered to people facing these decisions because there are options in the array of factors patients must consider, including quality of life and length of treatment.

Other common, nonpricing situations where conjoint analysis is used include political campaigns, where various factors can be parsed in voters' choice of candidate, and entertainment companies, which try to figure out the "best" composition of characters, plot, and genre to encourage viewership. As the nation starts to recover from the coronavirus pandemic, expect to see more surveys using conjoint analysis to determine the optimal way to return to offices and other nonhome work environments. For example, the attributes that could be analyzed to determine the factors that would make employees most comfortable in returning from home could include statistics on COVID-19 cases and deaths, the number of employees usually in the workplace, the frequency of deep cleans, the number of days required in the workplace, and a mask requirement.

As the nation starts to recover from the coronavirus pandemic, expect to see more surveys using conjoint analysis to determine the optimal way to return to offices and other nonhome work environments.

A Simple Conjoint DIY Guide

If this basic overview of conjoint analysis suggests you have a situation where the technique may be useful, let's go through the basics of a typical analysis to provide a template for research you may want to consider. For purposes of illustration, let's use the smartphone example mentioned earlier.

Among the smartphones below, please select the one that you would most likely purchase.
(1 of 8)

Brand	Screen Resolution	Camera	Performance	Battery Life (Talk Time)	Color	Price
SAMSUNG	Full HD 1080p	16-megapixels	1.5GB RAM	10 hours	Black	\$499 (about 24 months for 24 months)
Google	4K Ultra HD	12-megapixels	1GB RAM	30 hours	White	\$1,199 (about 24 months for 24 months)
Apple	2K HD	24-megapixels	4GB RAM	40 hours	Gray	\$799 (about 24 months for 24 months)
LG	HD 720p	64-megapixels	8GB RAM	20 hours	Purple	\$999 (about 24 months for 24 months)

NONE: I wouldn't purchase any of these smartphones.

CONCEPTS

Here, we're asking potential buyers to assess smartphones from Samsung, Google, and Apple. We call those three the "concepts," or the ones a buyer would pick, and we add the concept of "none" since some number of potential buyers may choose not to buy any of them. Adding a "none" choice allows respondents to avoid making uncomfortable choices and quickly removes respondents for whom the product or service category does not apply.

ATTRIBUTES

We include seven attributes: brand, screen resolution, camera, performance (RAM), battery life (talk time), color, and price. When selecting attributes, we want to make sure these are independent aspects of the product or service. As far as the optimal number of attributes to include, the best results are from 5 to 7, with 10 about the maximum before other, more advanced approaches are recommended.

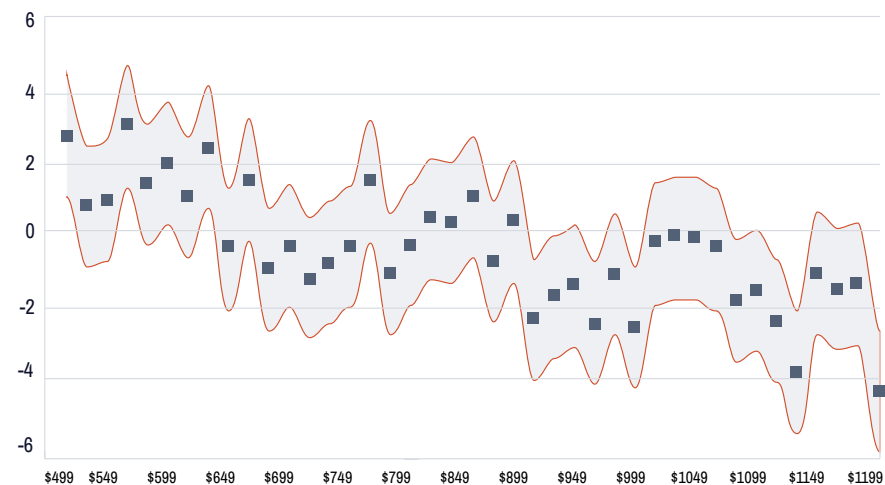
LEVELS

Since each attribute has varying degrees or levels — in "color," for example, there's white, silver, black, etc. — these should also be concrete and unambiguous. On the latter point, when listing the levels of pricing, for instance, use specific prices rather than a choice like "expensive." And particularly on price, go wide and include the broadest range possible to permit a wide range of market simulations later. Though the temptation is to include lots of prices, this is counterintuitive.

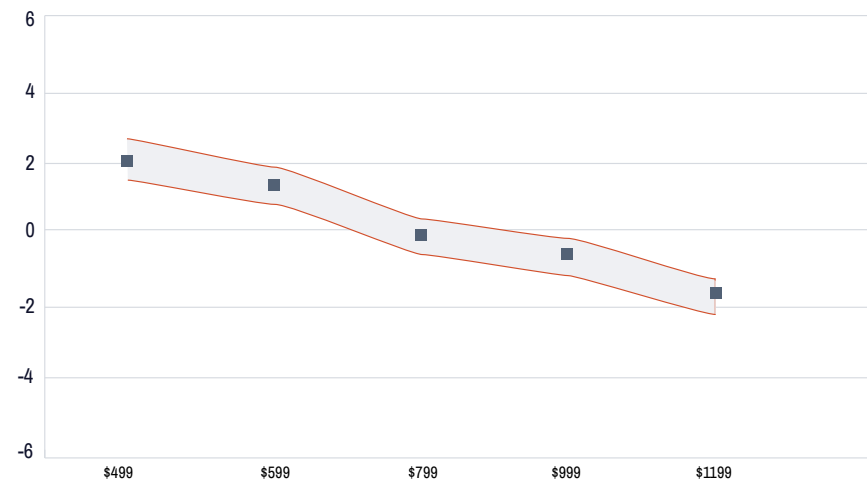
**Don't Include
Too Many
Levels for Any
One Attribute**

Using too many
price levels,
for example,
produces too
much uncertainty,
as shown at right.

More Levels of Price = Higher Uncertainty



Fewer Levels of Price = Less Uncertainty



In formulating attributes and levels, include input from all stakeholders — customers, the sales force, engineering, management, and support staff — to make sure all possibilities are considered. Also include the results of customer focus groups and information from competitors' websites and sales literature, which may reveal possibilities others have overlooked.

Sample size guide

For aggregate-level analysis, the following rule of thumb is a good start.

$$\frac{nta}{c} > 500$$

where **n** is the number of respondents, **t** is the number of tasks, **a** is the number of alternatives per task (not including the none), and **c** is equal to the largest number of levels for any one attribute.

If you are also considering all two-way interactions, **c** is equal to the largest product of levels of any two attributes. (Johnson and Orme 2003)

Survey Best Practices

In constructing the analysis and gathering responses, here are some guidelines based on past survey experience:

- Try to make sure that every level is seen at least six times for stable individual-level estimation.
- Respondents can handle between 10 and 14 tasks.
- Show three or four concepts per screen plus a “none” option, if applicable. Showing just two concepts is suboptimal under most circumstances.
- Consider any information or instructions respondents should be given before or during the exercise.
- Try to make the conjoint choices mimic the choices in the real world.

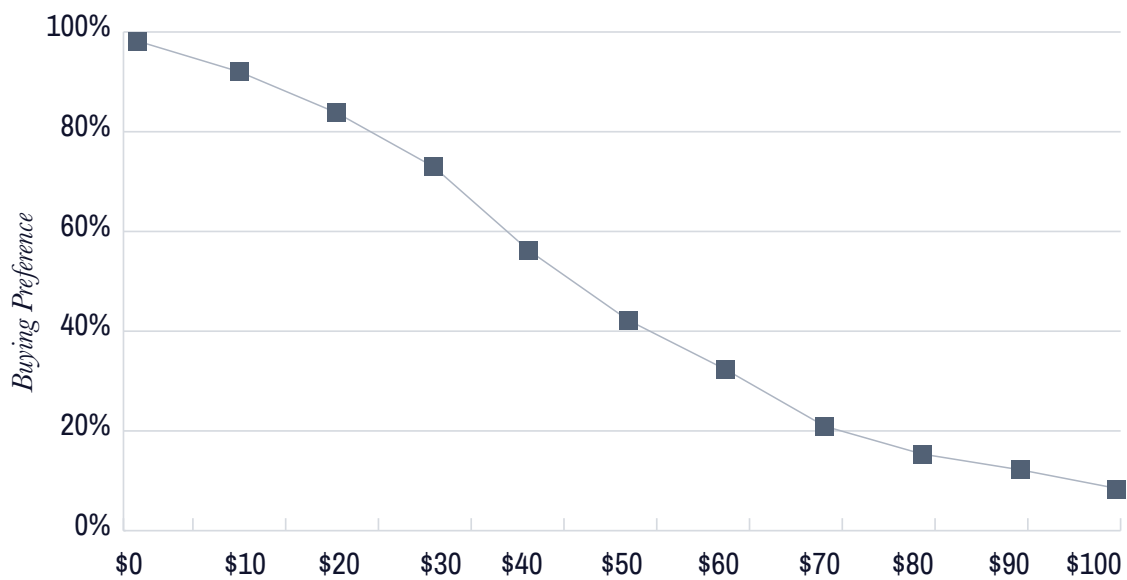
USING THE RESULTS

When survey results are collected and utility scores computed for each level, the work of analyzing the results can begin. Since utilities are on a different scale for each attribute, you can’t compare the utility for Google as a brand, for example, against the utility for 16 megabytes of RAM. So it’s best to steer clear of looking at individual or aggregate utilities, which just reveal preference. Instead, what’s really needed is a simulator.

A simulator allows you to change prices, change levels, and change other findings to see how product or service preferences would change. Since you can’t necessarily change a brand, the next best thing is to change the features to increase preference for the product, and that can come about by changing certain elements — which can come about by understanding the preferences that the simulator reveals.

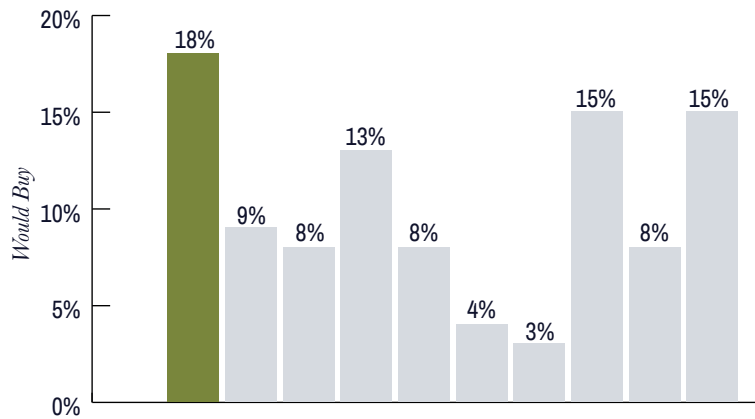
Price, of course, is a key area, and a simulator can measure how sensitive consumers are to changes in price. The chart below is an example of how this relationship might be expressed through the results of one conjoint analysis, in which buying preference is the y-axis.

Example of Price Sensitivity



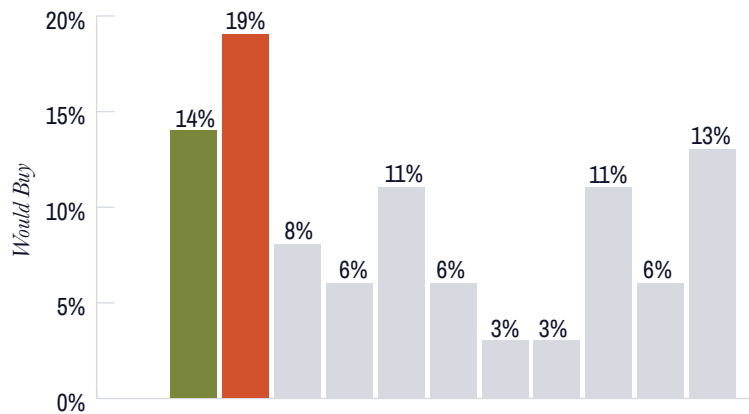
In using a simulator to analyze results, it's best to start with the current state. For illustrative purposes, let's assume our current widget is being sold on the market for \$279.

Current State

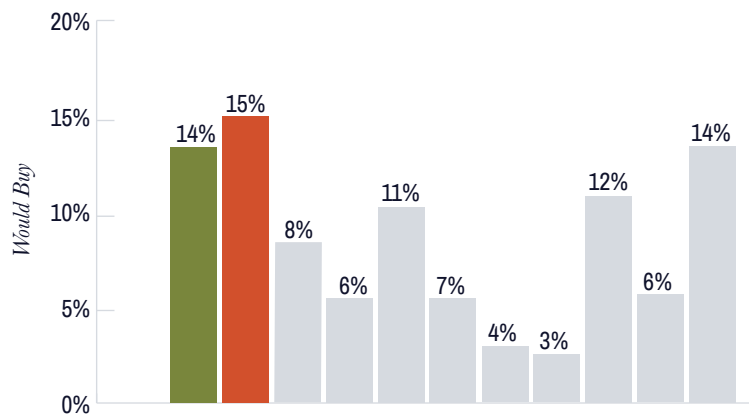
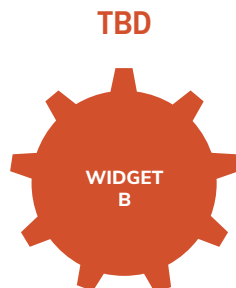


We see that 18% of respondents would choose our product at \$279. A company plans to expand its product line by adding widget B, but it's not sure at what price. We believe it probably needs to be priced somewhere between \$179 and \$229, and by using the market simulator, we can simulate what happens when we bring widget B to market.

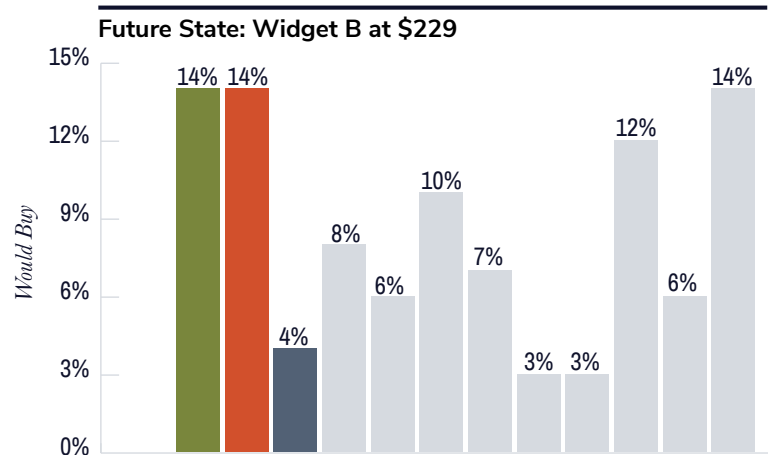
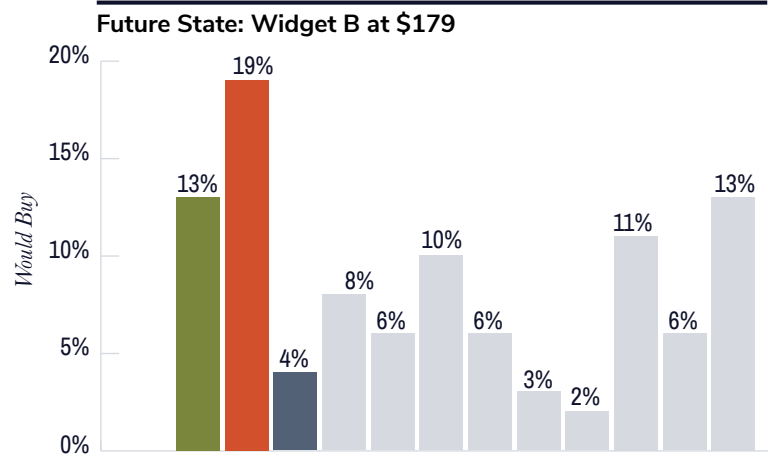
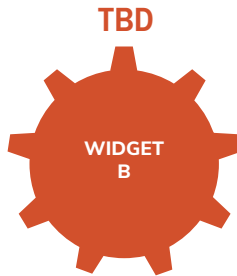
Future State: Widget B at \$179



Future State: Widget B at \$229



Originally, our market share for widget A was 18%. If we price widget B at \$179, market share for widget A declines to 14% — but we're capturing 19% of new share. So the net new share is 15%, which is on top of the 14% share that widget A is getting. While there is some cannibalization — the share of widget A has fallen to 14% from 18% — it's not that much, and total share has increased. But what if we also were considering adding widget C to our product line at \$229?



At that price point, widget C would be the choice of only 4% of respondents, which is not a great showing, although it would increase market share somewhat. In this case, the trade-off probably would be the added cost of making widget C versus the revenue it would gain. The trade-off might be worth it, or you might be fine with just A and B.

RESULT CAVEATS

The market simulators that generate results similar to those illustrated above are useful, but not perfect. Assumptions must be made such as equal availability of products, equal sales forces, no out-of-stock conditions, and other scenarios that don't quite mesh with the real world. You must take care when interpreting the results of a conjoint simulator, as with any piece of research. Still, simulators provide very meaningful information about customer and potential customer preferences, which can be extremely useful in product development, design, and marketing. The bottom line is that conjoint analysis will provide a better understanding of how to optimize pricing or a feature set at a level more sophisticated than any other marketing research pricing technique.

Everything You Need to Know About Market Simulators

Market simulators, which lie at the heart of conjoint analysis, are extremely important in helping produce useful guidance because they can answer several strategic questions. They are also based on several assumptions. Following are those questions and assumptions.

Questions market simulators can answer:

- Who will choose our product/service/ offering?
- At what price will people switch to a competitor?
- Can we modify our product to reduce cost while maintaining share?
- Should we launch a high-end product, a budget model, or both?
- Would a new product cannibalize current sales?
- If we can't deliver on feature X, how does that affect our preference share?
- Will delivering on feature Y gain enough incremental preference to justify the cost?

Assumptions:

- The right people have been interviewed
- Each person is in the market to buy
- A proper measurement technique has been used
- Respondents have answered reliably and truthfully
- All attributes that affect buyer choices in the real world have been accounted for
- Respondents are aware of all products/ services
- Products/services have been on the market for roughly the same time
- Sales forces are equally effective
- No out-of-stock conditions exist



Some Final Insights

Conjoint analysis is an extremely useful tool, but it's important to put it in the right context when making business decisions. First, consider that many more factors typically go into a consumer's buying choice other than what can be included in a model. As a result, the output of a conjoint analysis won't directly translate into a projection of how many people will buy a product or service.

In addition, conjoint analysis does not assess how good or bad a feature is, but rather how preferred it is to some other feature. Moreover, it doesn't typically tell us *why* a product is preferred or not.

Despite its not being perfect, conjoint analysis is a proven and useful technique. In a world where business decision-making is increasingly difficult, it is well worthy of consideration.

REFERENCES

Orme, B., and R. Johnson. 2005. *Getting Started with Conjoint Analysis*. Sawtooth Software Inc.

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ABOUT MEGAN PEITZ

Megan Peitz is a self-proclaimed nerd with a master's in mathematics and statistics. Megan has challenged stereotypes as the female owner of Numerous Inc. With over 10 years of marketing research experience, Megan has helped some of the world's largest companies fine-tune their products and services using math. She has a passion for teaching and has presented at many industry conferences on discrete choice techniques. Most recently, Megan's work was published in the *Journal of Choice Modeling*. She also finds time to mentor females interested in STEM careers.



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