

Understanding, optimizing and predicting decisions

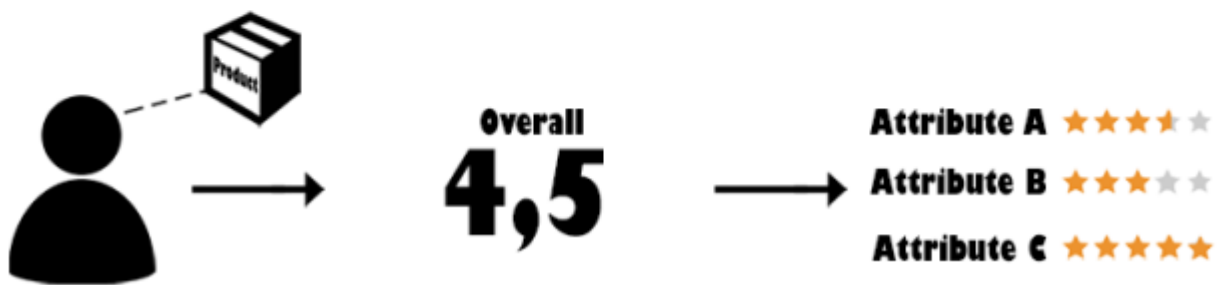
Conjoint Analysis is a collection of methods based on *judgment data* to understand people's preferences and decisions. Judgment data refers to data obtained in scenarios, where a person has to judge or rate a certain option. Modern approaches of conjoint analysis also include the possibility to collect actual *choice data*, e.g. data where the person actually makes a decision between several alternatives. Conjoint Analysis is especially useful in all areas that involve human decision making, from marketing, product development to even human resources.

The main factor that sets the conjoint analysis apart from classical decision methods is based on the procedure of the method. While classical methods would first ask individuals for their rating for each *attribute* and then conclude what would be the overall *utility function* and the associated utility score for an option, conjoint analysis asks first for ratings or decisions and then calculates the most likely utility function. An attribute is a variable or a feature of the set of alternatives to be investigated, for example, max speed is an attribute if you are making a decision about cars. A utility function describes the persons. Have a look at the following overview:

Classical



Conjoint Analysis



Important: The different approach of conjoint analysis compared to classical methods gives rise to its main advantages. The method becomes less costly, since you have to ask only for the overall rating and not for every attribute, the reliability is higher as people do not necessarily act according to how they think they will act.

Example: Imagine you are a toothbrush producer and you want to develop a new toothbrush. Of course, you could do it according to the classical method, develop some products and test them in the market. However, you could also use conjoint analysis to understand consumers' preferences before producing anything. You select the attributes like color, cleaning speed, durability, price, and comfortability and you collect data to determine how the optimal toothbrush should be.

In the next section, we will have a look at which problems conjoint analysis can help to solve.

The Problem: Understanding, optimizing and predicting decisions

As the conjoint analysis is based on understanding the underlying utilities, there are few

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very interesting applications especially with respect to marketing, human resources, employer branding, product development, work design and R&D. Here a list of possible problems that can be tackled:

- **Understanding customers** - You want to understand individual customers or a group of customers and why they decide in the way they do. This might be even interesting for employer branding and for identifying ways to improve that.
- **Product evaluation** - You want to understand which features of your product provide the highest benefit to your customer and how you could improve your product.
- **Market simulation** - You want to estimate a preference or market share given a scenario like the launch of a new product.
- **Decision problem** - You want to make an optimal decision that leaves everyone as happy as possible; for instance, you are redeveloping the office and work environment and you want to understand how to maximize the productivity of your employees

These are a few examples where conjoint analysis can come in very handy. In the next section, I will give you a short overview of the methods and possible disadvantages for taking into consideration.

Method & Premises: A powerful framework has its rules

As I have already mentioned, conjoint analysis is, in fact, a collection of methods. We call it a framework at Economalytics. This means that it is flexible and can be adapted to the problem at hand. If you want to estimate a possible market share, then you might need a different set of procedures than when you just want to understand your consumer. The number of attributes you choose, the budget and even the way your consumers think influence what procedures you will finally decide on. Generally, there are six components to a conjoint analysis, where each component has several alternatives. Here we list the seven steps and we will not go into detail at this point:

1. **Problem & Attribute** - What is the problem and what are the relevant attributes?
2. **Preference model** - How do you want to model the preferences of your consumers?
3. **Data collection** - How do you want to collect the data on the consumers' choices or preferences?
4. **Experimental design** - How do I design the experiment?

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5. **Stimulus presentation** - How do you want to present the experiment to the target people?
6. **Measurement scale** - Do you want to measure the utility as ordinal, binary, or a ratio variable?
7. **Estimation method** - What method will you use to derive the importance scores for the individual attributes from the overall utility?

In the next article on conjoint analysis, we will go through each step in little more detail and explain the procedure. However, there are also some constraints that need to be taken into account when constructing a conjoint analysis. This constraint might even make conjoint analyses unsuitable for certain situations:

- **Absence of Interaction** - Testing of a higher amount of attributes with many values is usually only feasible and precise if there is no *interaction* between them. Interaction describes the idea that two independent variables a and b influence each others' effects on a dependent variable y, e.g. the effect of b on y differs at different levels of a. A good example is tea and coffee as the choice of drink (variable a) and temperature (variable b) on how enjoying a drink (variable y). Regardless of the temperature, tea tasted good, because we like ice tea as well as hot tea, e.g. no interaction. However, we like warm coffee, but cold coffee does not taste good, e.g. interaction.
- **Linearity** - If the contribution of the attributes to the overall utility is not linear, then constructing a conjoint analysis becomes more complex.
- **Scientific expertise** - Conjoint analysis requires scientific rigidity, which means it requires domain expertise and needs to be conducted according to scientific rules in order to be successful.
- **Single purpose** - A conjoint analysis has to be designed for a certain purpose. If you, for instance, want to understand your consumers and predict a market share, it might be necessary to design two conjoint analyses and look at to what degree they can be combined.
- **Accessibility to population** - It is important that the *population* that is going to be studied is accessible, meaning that it is actually possible to collect data. A population describes the group of people that share common characteristics from which you will sample people. The idea is to be able to generalize from the group of people to the population.

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- **Stable market** - If a market is highly disruptive and innovative, if the market experiences regularly new entrants, then these will shape the preferences of the people because they will alter the alternatives or even add new ones. It is important that the market is stable over the course of the conjoint analysis, otherwise, it may introduce bias into the analysis or the results might be rendered useless if the market has changed substantially by the time the conjoint analysis has been finalized.
- **Market variability** - Conjoint analysis is more difficult to apply and less useful if the market is characterized by a perfect competition and price is the only way of differentiation.
- **No perceived correlation** - *Perceived correlations* is where the consumers perceive a correlation while there is actually no which are often based on heuristics. One example is the price-quality shortcut. If we had two identical products where one is just more expensive than the other one, consumers would tend to ascribe a higher quality to the more expensive one even though they are identical. This shortcut can make your result less valid.

To all the issues above mentioned, there are workarounds which can be applied to some degree. For each problem, it is necessary to check on an individual basis whether a conjoint analysis is applicable.

Important: Revealed and stated preferences

In applied psychology, there is an important distinction between *stated preferences* and *revealed preferences*. Stated preferences describe only preference data where an individual indicated that he prefers a certain alternative. The researcher would approach and ask an individual which alternative he would decide for. Revealed preferences refer to actual choices. In this case, the researcher does not ask but passively observes the choice of the individual. Revealed preference data enables us, for instance, to make estimations about hypothetical scenarios (introduction of a new product), while stated preferences are more accurate and enable us to understand an individual better.

Conclusion: More than just socio-demographic data

The conjoint analysis provides a powerful set of tools that enable a person to understand consumers based on their actual utility levels rather than just socio-demographic data. This opens a new door to understanding consumers' decisions which is more valid because it

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seems more valid to assume, that the utilities lead to decisions rather than socio-demographic characteristics. A person with the same socio-demographic characters might have the same utilities and make therefore different decisions. At the same time, conjoint analysis enables us to test new scenarios like the introduction of a new product or the estimation of a preference share.

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