

DESCRIPTION

Stated preference (SP) surveys help quantify how people might behave in a new situation by showing them “experiments.” In these experiments, respondents are asked to choose between different policies, products, or services that have both desirable and undesirable characteristics. In doing so, they indirectly reveal which parts are most important to them.

SP surveys are especially useful in cases where no real-world data exists to make conclusions. SP surveys are most widely used in transportation to understand how people will trade off money to gain something less tangible, such as time savings or reliability. These surveys can also reveal how changes to infrastructure or services will alter travel behavior.

This guide details **choice experiments**, which are the most powerful and flexible method of SP surveys. Choice experiments comprise several related techniques (e.g., MaxDiff, contingent valuation), all underpinned by economic rationality theory. This theory assumes people make most decisions by maximizing their own personal utility from a discrete set of options.

SP questionnaires contain sets of choice experiments that ask respondents to choose between two or more **alternatives** (e.g., bus, train) each described by one or more **attributes** (e.g., time, cost).

An attribute is a characteristic of a service or product (e.g., price, brand, or color), which is described by **levels** (e.g., \$2, \$4, \$6). The researcher curates which attributes and level values to include based on knowledge of which competing sets of features are most important for traveler decision-making and to meet agency goals for the study. When the attributes and levels composing each alternative are systematically varied, researchers can use statistical methods to isolate exactly what features make the alternatives more or less desirable.

SP data collected in surveys are used to build models that mathematically describe the relationship of attributes and levels and their effect on choices (expressed as utilities). The utility for each attribute can be applied to make market simulators that predict preference shares, sensitivity to costs, and elasticity of demand.

SP surveys are complex. They may require specialized expertise in specific methodologies and statistics to properly design, conduct, and analyze.



HOW WILL THIS SURVEY HELP ME?

- > **Establish feasibility:** Forecast the demand for new services or travel options like roads, express lanes, rail lines.
- > **Project revenue:** Determine how much travelers might be willing to spend on a new service, mode, or product and the resulting revenues.
- > **Predict demand:** Establish a price point and set of features for a product or service that maximizes revenue while controlling for demand.
- > **Prioritize features:** Concretely assess what features or attributes of a service or product are most important to a potential customer.

> **Revealed Preference v. Stated Preference** Revealed preference (RP) data are choices already made by individuals (in reality), while SP data are the hypothetical choices made when you ask (such as in an experiment).

RP data can tell you what people have already done. The data are reliable but yield one observation per respondent, which often limits the type of analysis.

SP data can tell you what people might do if available options change. SP data allow you to control relationships between attributes and yield multiple observations per respondent. SP data are only reliable when respondents fully understand experiments.

COST

Medium



TIME

Medium



METHODS

Online



On-Site



CHALLENGES

Survey Design



Cost



Accuracy



EXPERTISE

Statistics



Data



Wrangling

Anatomy of a Stated Preference Experiment

Which would you chose for your next trip to work?



> Stated Preference in Transportation

SP surveys are used in several transportation contexts. All SP surveys follow a similar format (see reverse). Common areas where SP surveys excel include the following:

Mode choice studies: Used to predict the share or absolute number of trips made by mode. Useful for ascertaining the potential market share for new travel options, particularly transit, before they are built.

Value of time and reliability studies: Used to understand the monetary value travelers place on reliable travel or on saving time. These surveys are typically used to optimize toll fee structures and are a necessary part of any traffic and revenue study financed through bonds.

Vehicle choice studies: Used to understand future vehicle purchasing decisions. Useful to understand how new options (e.g., electric and automated vehicles) influence purchasing behavior and adoption rates of emerging and potentially disruptive technologies.

STUDY ROADMAP

1 QUESTIONNAIRE DESIGN/ADMINISTRATION

Attributes and Levels: Include as many attributes of the service, policy, or product that are important to shaping demand—and no more. Irrelevant information can negatively affect your results, so careful background research (and even focus groups) are often required to reveal what is important and how best to describe it. Show 10 or fewer experiments, and limit attributes and levels to what can be easily shown on a single screen since many people take surveys on their phones.

Experimental Designs: An experimental design dictates what combinations of attributes and levels are shown in each experiment. This enables statistical estimation for utilities of any attribute independent of others. Specialized software such as nGene is needed to generate SP designs. Always check correlations between all attribute combinations generated in a design (over 0.20 can be problematic because the correlation interferes with estimating coefficients).

Administration Methods: Online/computer only: SP experiments are often tailored to the respondent based on their answers to previous questions. For this reason, online administration is often the only feasible collection method.

2 SAMPLING/RECRUITMENT

Sample is collected via online instruments and targeting the correct population of affected users is important for the survey's success. Methodologies can greatly affect project budget. Typical administration methods include the following:

- **Random address-based sampling:** Invitations are distributed to households in a specific region. Mail-based invitations can be costly but are generally less logistically challenging than on-site administration.
- **Online panels:** Purchased online panels are fast, efficient, and can be cost effective. Incidence rates (IR), or the number of candidates, will affect costs. For example, a study aimed at decision behavior of less common commercial vehicle shippers will have a much lower IR and be far more expensive than obtaining a sample of plentiful I-95 drivers.
- **On-site surveys:** Surveys of transit users, airline passengers, or other specific populations often require an on-site recruitment effort. These are managed by data collection teams who recruit respondents to complete surveys on laptops or tablets. On-site efforts are time consuming and expensive, but this is sometimes the only feasible collection method to target the correct population.

3 ANALYSIS AND PROCESSING

SP analysis and choice modeling are complex, but there are simple ways to look at choice data. For example, counting analysis, which is performed by summing choices at different price thresholds by segment, can yield powerful insights without using models.

SP data are typically analyzed with specialized statistical methods. Off-the-shelf commercial software that simplifies some modeling is prevalent. These software tools often exist in a “black box” and are not always suitable for analysis that assesses infrastructure or investment-grade planning. However, such tools may be appropriate for applications not guiding investment decisions.

Aggregate-level utilities can use simpler logit models, while individual-level estimates of utility require more advanced methods.

> Questionnaire Skeleton

Screener Questions Qualify each respondent:

SP surveys should only collect data from those who have personally made **recent decisions or actions** that the new service would affect.

Revealed Preference Questions Describe a recent qualifying behavior or trip:

This section asks about how people are currently behaving. For example, many transit SP studies ask respondents to recount the details of their **most recent trip** (e.g., travel time, start/end locations, departure time, purpose) that would benefit in the future from a proposed new service. Recounting a most recent trip (rather than a typical trip) collects a **sample** across the population that better characterizes how a system currently operates.

Stated Preference Questions RP informs the SP:

SP surveys in transportation work best when the experiments pose realistic trade-offs corresponding to actual experiences. Use the most recent trip details to tailor the values of levels within a respondent's set of experiments. For example, if studying a new rail line, respondents should be shown options that are compared against the details of a recent trip. This realism facilitates better decision-making.

Opinions & Attitudes Questions Control for bias

and opinions: Devise attitudinal and opinion questions to help explain choices in the SP survey and identify strategic bias (e.g., people making oppositional protest choices, especially for infrastructure that might be controversial).

Demographic Questions Quantify the sample:

Sociodemographic details such as income, gender, employment, and household size are important to understanding the diversity of your sample. Collect these with questions that conform to the American Community Survey or Census for weighting and quantification of representativeness.



TYPICAL CHALLENGES

Cost: Done properly, SP surveys often require expertise in statistics, experimental design, and simulation, and can require highly specific criteria for participation. These factors can make SP surveys expensive and time consuming to field.

Survey design: Do not overlook the importance of clear and well-constructed experiments. Defining the attributes and levels that describe each alternative and presenting the right level of context to explain each scenario, is critical to designing a successful study. Always pilot SP surveys to a small sample (100+) to test any assumptions and verify data collection accuracy.



ADDITIONAL RESOURCES

Orme, Brian. 2012. Getting Started with Conjoint Analysis, Research Publishers, LLC. The best gentle introduction to SP methods ever written. Nontechnical, approachable, excellent for managers. Available for purchase.

DataCamp (online) Choice Modeling for Marketing in R, <https://www.datacamp.com/courses/marketing-analytics-in-r-choice-modeling>. Online course for learning about developing choice experiments. Excellent introduction to how to think about and format SP surveys. Requires subscription to DataCamp.

For more information visit the **Statewide Survey Colloquium:** <https://bit.ly/SurveyColloq>