

Analyzing a Toy Horse Conjoint Experiment

You are serving as an analyst/modeler in a consulting company. You are in charge of analyzing a conjoint analysis conducted for a relatively small toy company, EarlyRiders, that specializes in the manufacture of quality toy riding horses with a particular focus on natural materials.

EarlyRiders had a recent management change and realized that their product set was underperforming. They currently offer two products and one in particular was not doing well. The management team decided after much deliberation to revitalize their product portfolio based on the opinions of potential end-users. For this purpose, your company ran a conjoint analysis and you are now in charge of analyzing the data and creating a presentation to give to the management team of EarlyRiders.

Although the sales channels for the company includes both direct to local toy retailers and the Amazon marketplace, most of the sales and profits for the company come from the local retailer channel where consumers are able to feel the difference. The local retailers generally carry only 2 to 3 models because of the size of these products. Within this local retailer market serving the natural materials customer segment, the firm has one primary competitor who offers a very limited selection. Importantly, there are also much less expensive toy horse competitors online, but they do not have the natural materials differentiator, and reviews so far haven't served as a good signal of the quality. It is believed that these online competitors are unlikely to make much headway into the local market.

EarlyRiders commissioned a conjoint study of 200 individuals. These individuals are made up of parents of 2-4 year old kids who planned to purchase a toy horse. In the study, each parent had only one child in the desired age range. This sample was developed as a quota sample with equal weights on the 2 year-olds and the 3-4 year-olds. It is believed this sample can represent the population of buyers.

Each kid-parent pair was brought into a play location and given the opportunity to ride different prototype horses. After the kids played on the different horses for 30 minutes, the parents were asked to complete a short conjoint ratings study conducted via paper and pencil. Each parent rated a total of 12 profiles. They were told to get their children's input as if they were going to make this purchase for their child. The study was conducted at a play location that normally charges for use of their facilities. The parents/children were given access to the location for the afternoon following the study along with some food, but otherwise were not paid.

The conjoint study examined four attributes: price, height, motion, and style. From previous research, these four attributes appeared to capture the most important aspects of the decision

that the firm is considering. Other important attributes included stability, total floor footprint, quality of construction, and color/colorfulness. All of these other attributes were made the same in the study, both in the horses the kids played with and in the ratings task. Each factor was manipulated to take on **two factor levels**. The levels for retail price are \$119.99 and \$139.99, for height are 18" and 26", for motion are rocking or bouncing, and for style are glamorous or racing. Not all possible combinations of attributes (profiles) were shown to the parents.

In addition to the conjoint data, the gender and age of the child was recorded (Gender=1 if Female, 0 if Male; Age=0 if 2 years old, 1 if 3-4). Management had previously noted differences in styling preferences based on gender and age, and both wanted to confirm and quantify these differences. Further, they wondered whether there might be other differences across end-user preferences that the data might reveal. Such differences might help them tailor the packaging images and locations for advertising and promotional events.

EarlyRiders' new management team is primarily interested in understanding market preferences in order to revitalize their broader product line. From discussion with the management team, you recognize that if profitable, they would like to take advantage of differences across people to **target new products or modify existing products to better target segments**. The company would like to **forecast profits under different product line scenarios using the conjoint analysis**. That is, they would like to know the expected profits with their current products as compared to the situation in which they add or modify products in their product line. Ultimately, they are interested in profitability, but long-term profit is their main focus.

Currently, the firm offers two products: an 18" Glamorous Rocking Horse and an 18" Racing Rocking Horse. Both products are priced at \$139.99 in the retail channel. The competition is owned by an older man who is directly involved in the manufacturing and is very opinionated about the "right" kind of toy horse. It is believed the **competition will be unlikely to expand or change the product offering meaningfully**, but might respond by lowering price. **The competition offers a 26" Racing Rocking Horse at \$139.99**. For this analysis, assume that the total annual market size is 4,000 units, that the variable costs are as depicted below, and that each product in the product line results in fixed costs of \$20,000 per year (i.e., for 2 products the cost is \$40,000, for three \$60,000, etc.). Product is made in relatively large batches to achieve these levels of fixed costs. Switching product types with the same number of lines is somewhat costly amounting to around one third of the cost of running a product line.

Further for this analysis the management team suggested you can assume that all retailers offer the product at the suggested retail price and that they charge 25% more than wholesale price

so that wholesale prices are \$111.99 for the \$139.99 retail price and \$95.99 for the \$119.99 retail price. A significant portion of the product is sold around the holidays, and the standard contracts for these products give retailers 60 days to pay. During the 60-day window, retailers can return product at no additional cost.

Product Variable Costs

Product	Variable Costs
18" Rocking	\$33
26" Rocking	\$41
18" Bouncing	\$21
26" Bouncing	\$29

Note that the styling does not change the variable costs.

Your Task

Use the tools learned in class and lab to analyze the conjoint data and make recommendations about the product line. You can also provide any recommendations related to messaging, packaging, etc. that arises from your data analysis, but keep in mind that the main focus is on product decisions.

The lead salesperson for your company indicated the management team is not very sophisticated in terms of technical skills (little if any statistics background), but that the new management wants to become more business-like in their decision-making. Further, the salesperson indicated that the management team is having a family member come to the meeting who is familiar with conjoint analysis. As a result, you need to be prepared with some detailed appendix slides to address questions in case they arise.

You have been directed to loosely structure the presentation as follows in order to deliver up to a 7 minute presentation:

Executive summary including key insights and recommendations

Benefit segmentation (a priori and/or post-hoc) (no more than 6 slides)

Market simulations (present at least 4 scenarios!) (no more than 6 slides)

Appendix

Include appendix slides that provide any detailed support you would like during the presentation related to the a priori and post hoc benefit segmentation and the market simulations.

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Your complete solution should do the following :

- A. Use Regression to estimate the conjoint model at the individual level
 - Produce part-utilities to pass to part B
 - Produce predictions for missing profiles to pass to part D
- B. Conduct Benefit Segmentation via Cluster Analysis of Conjoint Part-Utilities.
 - Use cluster analysis on the part-utilities (including the constant)
 - Test at least two cluster analysis schemes (i.e., number of clusters) and select the best one in your view. Justify this decision.
 - Interpret the segments in the chosen scheme and identify the ideal product for each segment
- C. Conduct a priori segmentation.
 - Conduct a priori segmentation using the variables gender and age in order to profile the attribute preferences based on these variables (use segment-level regressions)
 - Test whether these a priori segmentation variables affect the part-utilities. What does this test tell you about these as segmentation schemes?
 - If the differences are meaningful, profile the segment-level attribute preferences and identify the ideal product for the a priori segments.
- D. Simulate market shares for different product-line scenarios.
 - Use disaggregate analysis with a first choice rule to forecast market shares. Using these market shares and the information about costs in the case, calculate profitability for each product in the product line as well as the overall profitability for the firm.
 - You should present at least 4 scenarios that try to identify the best possible product line strategy given considerations related to competitive response, cannibalization, profitability, and long-run performance.
 - Be sure to briefly justify why you chose the scenarios you chose!

Note that you do NOT need to include A-D in your main slides. Details should be relegated to the .Rmd appendix or the appendix slides. The .Rmd file, however, should have clearly marked each of these five sections in your code via the following comment line #####PART X##### where X is the letter above.

The grading will be out of 10 points

Framing (3 points)

- The completeness of your assignment (Were all parts completed and the outputs provided in the main document or the appendix)
- The value provided in terms of business impact of your managerial recommendations (how deeply did you evaluate the implications of the analysis for the manager; how broadly did you consider how the results can apply; how specific and actionable are the recommendations and insights)
- Do the main slides reflect clear prioritization of analysis in terms of the decisions the management team will need to take?

Analysis (5 pts)

- The correctness of your analysis (Are the numbers correct)
- The quality of insights and analysis (How much insight and how well did you use the tools to provide insight)
- How well does the code provide software using the functional programming approach to creating the market simulations from ratings data? (note this is only required for the market share simulations)

Communication (2 pts)

- Does the .Rmd file follow the required assignment format?
- Does the presentation tell the story of the data?
- Are insights/recommendations/analysis easy to locate (i.e., on each slide)?
- Are the tables/figures easily understood without explanation?
- Are the sources and inputs to figures clear and correct?
- Is the language and level of detail appropriate for a managerial audience?

In addition to this write-up, the case includes an R dataset containing the survey data.