Toy Horse Conjoint Analysis

February 10 2020

MSMA Team 13

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Executive Summary

Recommendation:

- **Product**
  - Launch products targeting at **3 different segments** respectively, which correspond to
    - profile4($119.99/26"/Bouncing/Racing)/profile3($139.99/26"/Bouncing/Racing)
    - profile14($119.99/18"/Rocking/Glamour)/profile13($139.99/18"/Rocking/Glamour)
    - profile16($119.99/26"/Rocking/Glamour)/profile15($139.99/26"/Rocking/Glamour)
- **Pricing**
  - Monitor actions of competitor, prepare **different pricing strategy** to the same set of products.
- **Promotion**
  - Highlight **“Bouncing, Racing”** when promote horse toys to **boys** while promoting **“Rocking, Glamour”** to **girls.**
  - Promote **18-inch** toy horse with focus on the **only small size** in local market.

Analytics Framework

Our Analytics Needs

Better Target Segments

Maximize Profit

Use linear regression to get individual preference on different product attributes (price,size,style,motion)

Conduct cluster analysis to find target segments

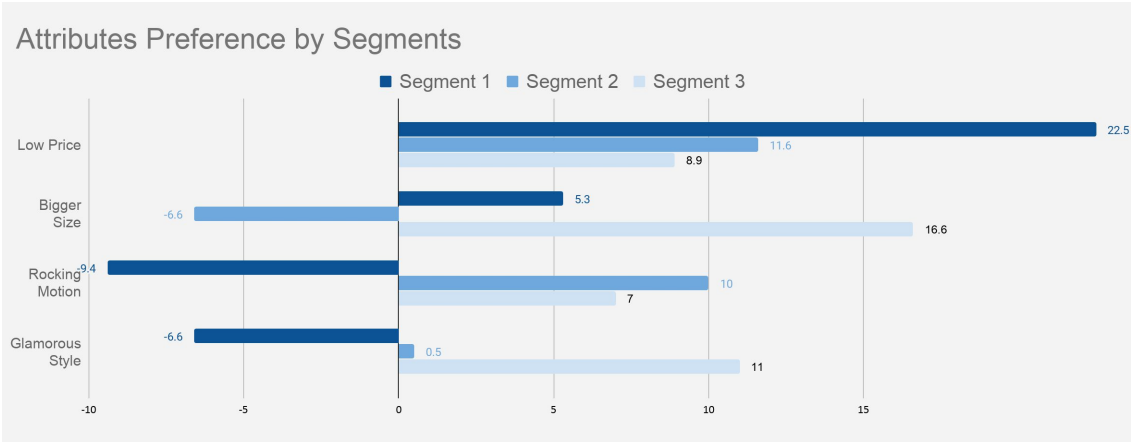
Simulate market share based on best choice conjoint model; Consider competition when computing profit

Get Partworths → **Predict Missing Conjoint Data** → **Cluster Analysis** → **A Priori Segmentation** → **Market Simulation & Strategy**

Predict individual ratings for profile 3/6/10/16 based on partworths

Segment on gender and age respectively, combining with cluster analysis

Benefit Segmentation - Cluster Analysis



Price Radar 40%

profile 4
Very price sensitive;
Prefer **26”, Racing, Bouncing** Toy Horse

Rock Star 26%

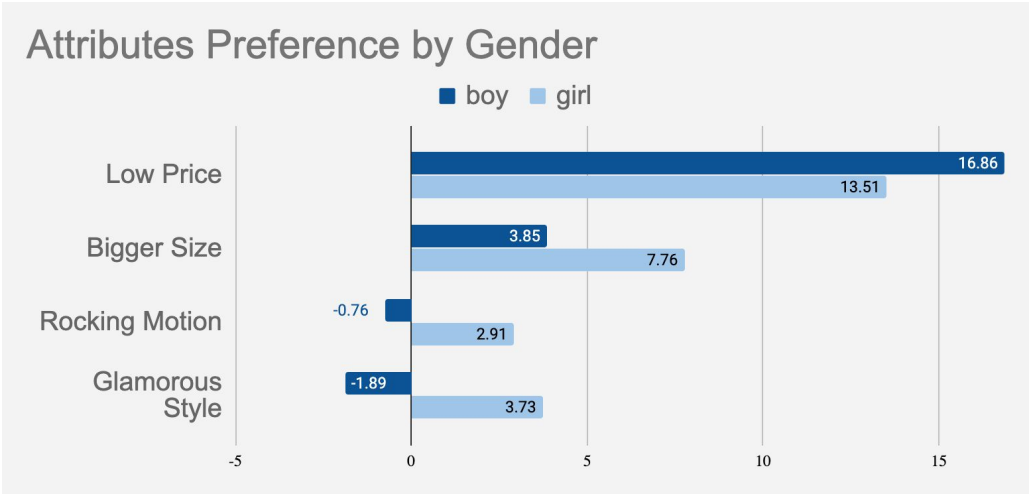
profile 14
Price sensitive;
Prefer **18”, Glamour, Rocking** Toy Horse

Fancy Lover 34%

profile 16
Least price sensitive;
Prefer **26”, Glamour, Rocking** Toy Horse

*See cluster analysis results in Appendix 1 and Appendix 2.

Benefit Segmentation - A Priori Segmentation



- Both are price sensitive, and prefer bigger size.
- They have opposite preference of motion and style:
  - ➢ **Boys** prefer **Bouncing, Racing(profile4)**,
  - ➢ While **girls** prefer **Rocking, Glamour(profile16).**

- Combining earlier analysis, boys share similar preference with segment 1, so boys should be targeted with profile4;
- Girls share similar preference with segment 2, so girls should be targeted with profile16;

*There is no significant preference differences between younger and older kids, so we don't consider segmentation on age. (See Appendix 4)

Market Simulation

$111.99 wholesale price for both competitor and EarlyRiders

Scenario	Products	Market share	Profit(EarlyRider)
Current situation	EarlyRider: $139.99/18"/Rocking/Racing (Profile 5) $139.99/18"/Rocking/Glamour (Profile 13) Competitor: $139.99/26"/Rocking/Racing (Profile 7)	EarlyRider: 22% 21% Competitor: 57%	$ 95,862.8
Scen1	EarlyRider: **$139.99/18"/Rocking/Racing (Profile 3)** **$139.99/18"/Rocking/Glamour (Profile 13)** **$139.99/18"/Rocking/Glamour (Profile 15)** Competitor: $139.99/26"/Rocking/Racing (Profile 7)	EarlyRider: 38.5% 21% 34.5% Competitor: 6%	$ **218789.1**
Scen2	EarlyRider: $139.99/26"/Bouncing/Racing (Profile 3) $139.99/18"/Rocking/Glamour (Profile 15) Competitor: $139.99/26"/Rocking/Racing (Profile 7)	EarlyRider: 38.5% 44.5% Competitor: 17%	$ 200833.1
Scen3	EarlyRider: $139.99/18"/Rocking/Glamour (Profile 3) $139.99/26"/Rocking/Glamour (Profile 13) Competitor: $139.99/26"/Rocking/Racing (Profile 7)	EarlyRider: 41.5% 31% Competitor: 27.5%	$ 189044.3
Scen4	EarlyRider: $139.99/26"/Bouncing/Racing (Profile 13) $139.99/26"/Rocking/Glamour (Profile 15) Competitor: $139.99/26"/Rocking/Racing (Profile 7)	EarlyRider: 21% 39% Competitor: 40%	$ 130429.3

*In this case, we assume that our competitors do not drop price. Then Scen1 is our best option. We have more simulations based on different marketing reactions. See Appendix 3.

Market Simulation

$95.99 wholesale price for both competitor and EarlyRiders

Scenario	Products	Market share	Profit(EarlyRider)
Current situation	EarlyRider: $139.99/18"/Rocking/Racing (Profile 5) $139.99/18"/Rocking/Glamour (Profile 13) Competitor: $139.99/26"/Rocking/Racing (Profile 7)	EarlyRider: 22% 21% Competitor: 57%	$ 95,862.8
Scen5	EarlyRider: **$119.99/18"/Rocking/Racing (Profile 4)** **$119.99/18"/Rocking/Glamour (Profile 14)** **$119.99/26"/Rocking/Glamour (Profile 16)** Competitor: $119.99/26"/Rocking/Racing (Profile 8)	EarlyRider: 35.5% 22% 34% Competitor: 8.5%	$ **152010.1**
Scen6	EarlyRider: $119.99/26"/Bouncing/Racing (Profile 4) $119.99/18"/Rocking/Glamour (Profile 14) Competitor: $119.99/26"/Rocking/Racing (Profile 8)	EarlyRider: 40% 26.5% Competitor: 33.5%	$ 127286.7
Scen7	EarlyRider: $119.99/18"/Rocking/Glamour (Profile 14) $119.99/26"/Rocking/Glamour (Profile 16) Competitor: $119.99/26"/Rocking/Racing (Profile 8)	EarlyRider: 23% 36.5% Competitor: 40.5%	$ 91569.5
Scen8	EarlyRider: $119.99/26"/Bouncing/Racing (Profile 4) $119.99/26"/Rocking/Glamour (Profile 16) Competitor: $119.99/26"/Rocking/Racing (Profile 8)	EarlyRider: 35.5% 46.5% Competitor: 18%	$ 144073.9

*In this case, we assume our competitor has a quick response, lowering price.

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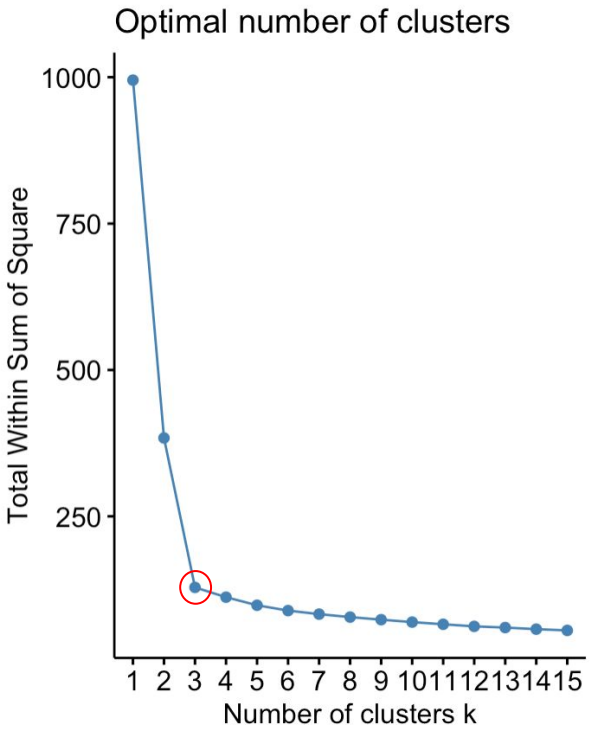
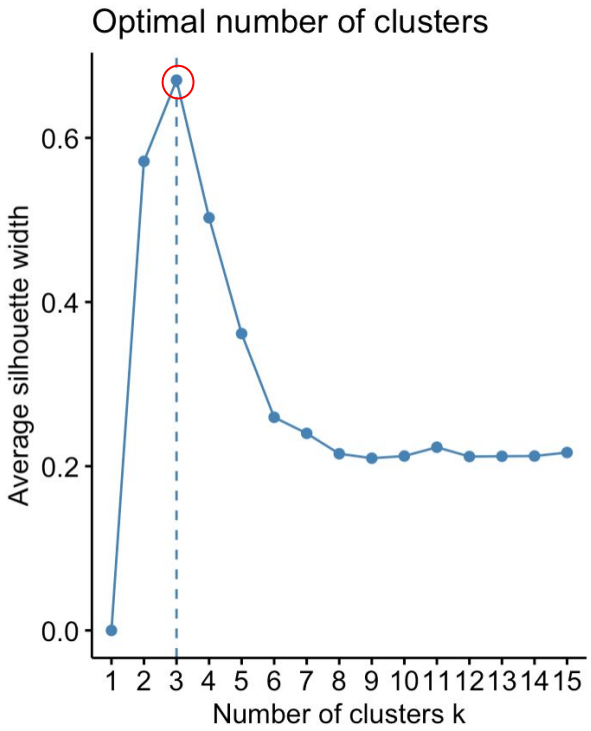
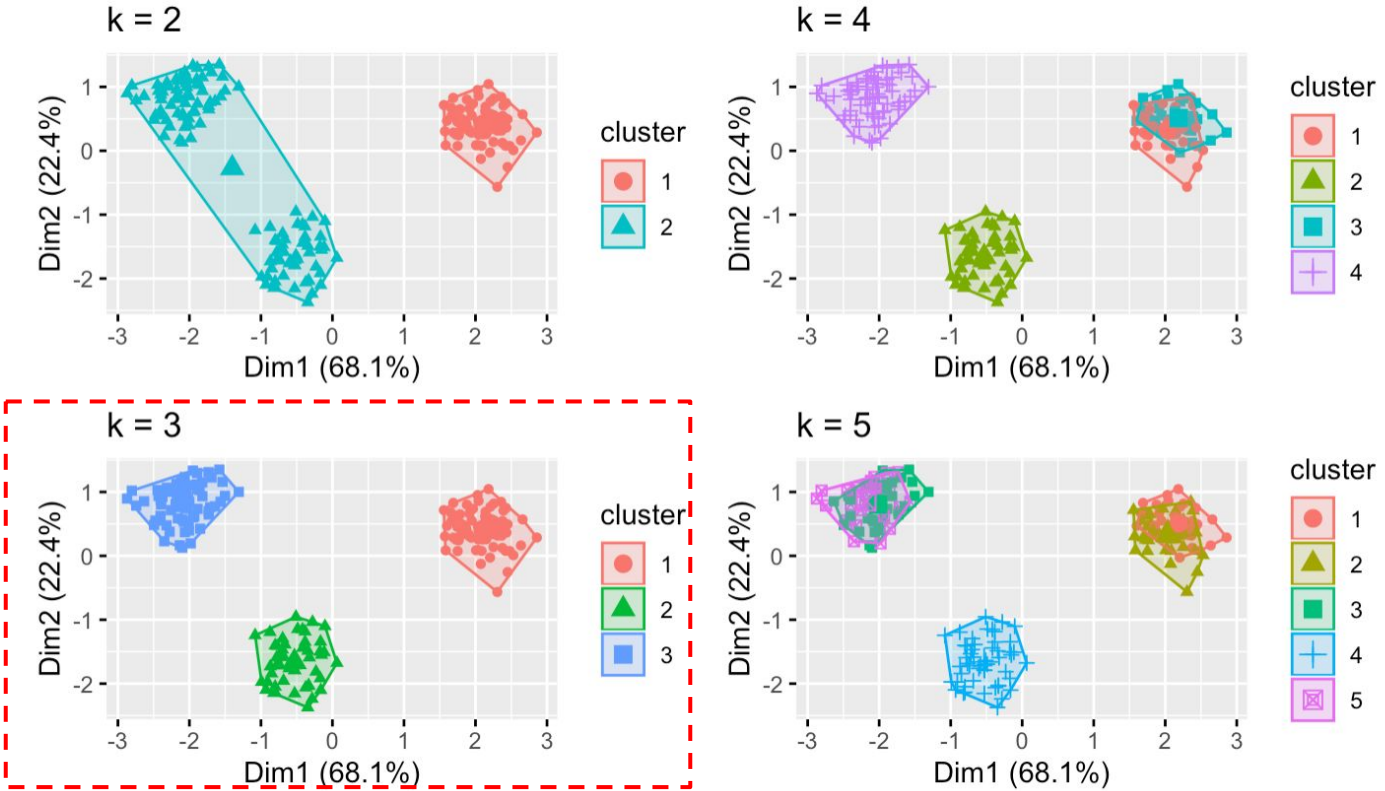
Appendix 1 - Optimal Number of Clusters





back

Appendix 2 - Optimal Clusters



back

Appendix 3 - Prisoners Dilemma

		EarlyRiders: high	EarlyRiders: low
competitor	high	**-2962.4**, 218789.1 (**7,** 3,13,15)	**-12901,** 208594.3 (**7,** 4,13,15)
	low	**23992,** 140714.7 (**8,** 4,14,15)	**-1303.4,** 152010.1 (**8,** 4,14,16)

back to market simulation

Appendix 3 - Market Simulation

$111.99 for both competitor and EarlyRiders

Profile3,13,15 is our best option to maximize profit

status quo(7, 5,13): our profit: 95862.8, competitor profit: 141857.2

scenario	profile7	profile3	profile13	profile15	profit	profitCompet
1	**0.06**	**0.385**	**0.21**	**0.345**	**218789.066666667**	-2962.4
2	0.17	0.385		0.445	200833.466666667	28273.2
3	0.275	0.415	0.31		189044.333333333	58089
4	0.4		0.21	0.39	130429.333333333	93584

Assumptions:

- When there is a tie in the first choice, we split the possibility equally.
- Competitors' cost structures are the same with ours.
- Competitors all have the same move.
- Only allow one product line change per year.
- There is no cost for dropping products.
- Only allow price change once.

back to market simulation

Appendix 3 - Market Simulation

We drop price and they don't respond, profile14,15 is our best option to maximize profit

scenario	profile7	profile3	profile4	profile13	profile14	profile15	profile16	profit	profitCompet
21	0.095		0.52			0.385		195330.466666667	6976.2
22	0.005	0.035					0.96	169446.866666667	-18580.2
23	0		0.405				0.595	186066.666666667	-20000
24	0.145		0.65	0.205				192279.133333333	21174.2
25	0.09	0.185			0.725			197416.933333333	5556.4
26	0.055		0.52		0.425			199755.533333333	-4382.2
27	**0.025**				**0.675**	**0.3**		**208594.333333333**	-12901
28	0.005			0.05			0.945	176993.533333333	-18580.2
29	0.005				0.3		0.695	181793.533333333	-18580.2
30	0.03		0.48	0.18		0.31		200187.866666667	-11481.2
31	0.02	0.18			0.5	0.3		197587.466666667	-14320.8
32	0.005	0.035		0.05			0.91	154246.866666667	-18580.2
33	0.01		0.435		0.28	0.275		191867.066666667	-17160.4
34	0		0.405	0.05			0.545	170866.666666667	-20000
35	0.005	0.035			0.3		0.66	159046.866666667	-18580.2
36	0		0.4		0.25		0.35	173826.666666667	-20000

back to market simulation

Appendix 3 - Market Simulation

$95.99 for both competitor and EarlyRiders, 4,14,16 is best option

scenario	profile8	profile4	profile14	profile16	profit	profitCompet
37	**0.085**	**0.355**	**0.22**	**0.34**	**152010.066666667**	-1303.4
38	0.335	0.4	0.265		127286.733333333	53686.6
39	0.405		0.23	0.365	91569.5333333333	69083.8
40	0.18	0.355		0.465	144073.866666667	19592.8

back to market simulation

Appendix 3 - Market Simulation

Competitors drop price, we respond with lowering some of prices, 4,14,15 is best option

scenario	profile8	profile3	profile4	profile13	profile14	profile15	profile16	profit	profitCompet
5	0.71	0.005		0.065		0.22		11335.0666666667	136171.6
6	0.77	0.005				0.225		12217.4666666667	149369.2
7	0.93	0.005		0.065				-24469.4666666667	184562.8
8	0.715			0.065		0.22		36341.9333333333	137271.4
9	0.345		0.375	0.065		0.215		108740.466666667	55886.2
10	0.545	0			0.245	0.21		48028.4666666667	99878.2
11	0.495	0		0.035			0.47	41106.4666666667	88880.2
12	0.405	0			0.23		0.365	64902.8666666667	69083.8
13	0.17		0.355	0.035			0.44	129633.466666667	17393.2
14	**0.2**		**0.37**		**0.225**	**0.205**		**140714.666666667**	23992
15	0.405		0.375			0.22		109622.866666667	69083.8
16	0.505	0					0.495	55546.8666666667	91079.8
17	0.52		0.415	0.065				85074.1333333333	94379.2
18	0.7	0			0.3			28921.3333333333	133972
19	0.495			0.035			0.47	67773.1333333333	88880.2
20	0.545				0.245	0.21		74695.1333333333	99878.2

back to market simulation

Appendix 4 - Statistic Test

```
Call:
lm(formula = ratings ~ (price + size + motion + style) * age,
    data = fulldf)

Residuals:
    Min      1Q  Median      3Q     Max
-43.528 -12.886  -1.307  12.388  44.386

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  39.5462     1.0867  36.390  < 2e-16 ***
price        14.4133     1.0183  14.154  < 2e-16 ***
size          3.8532     0.9749   3.952 7.97e-05 ***
motion        2.7950     0.9749   2.867  0.00418 **
style         1.1867     0.9749   1.217  0.22367
age          -1.2982     1.5292  -0.849  0.39601
price:age     1.2588     1.4330   0.878  0.37977
size:age      4.1708     1.3720   3.040  0.00239 **
motion:age   -3.1188     1.3720  -2.273  0.02310 *
style:age    -0.0857     1.3720  -0.062  0.95020
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 16.55 on 2390 degrees of freedom
Multiple R-squared:  0.2069,    Adjusted R-squared:  0.204
F-statistic:  69.3 on 9 and 2390 DF,  p-value: < 2.2e-16
```

p-value > 5%, therefore reject the null hypothesis.

back