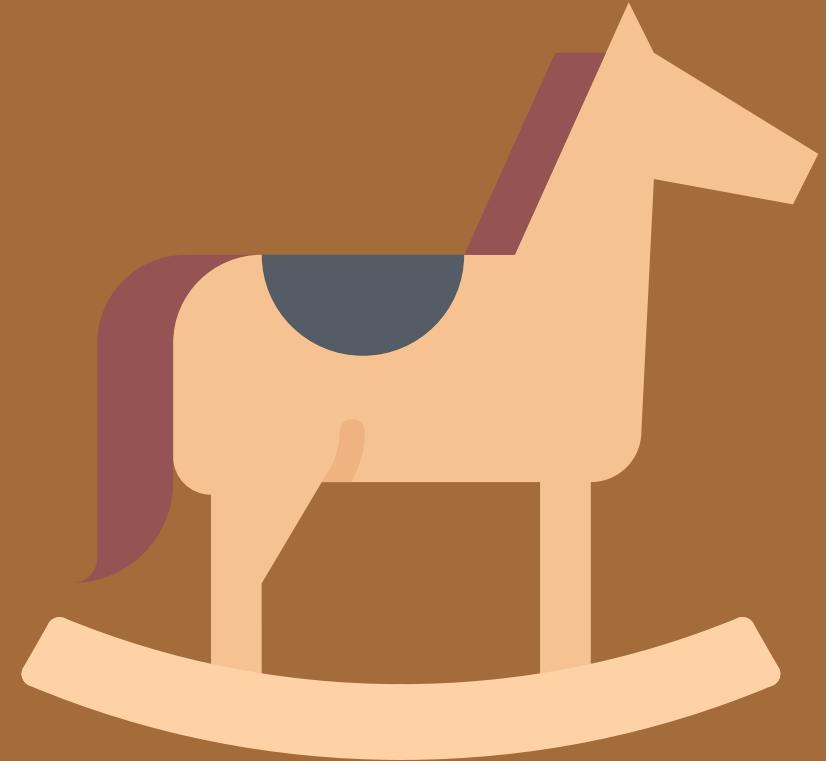


# Toy Horse Case

**Team B-F1: Jingyi Wu, Meiqi Wang,  
Trinh Nguyen, Yimin Wan, Yicheng Song**



# KEY INSIGHTS

**Goal:** Find the optimal product and profit to launch

## A priori segmentation-Market preference

- 2 years old

P6: \$119.99, 18 inches, Rocking, Racing

- 3-4 years old

P4: \$119.99, 26 inches, Bouncing, Racing

## A Post-hoc segmentation-Measure preference

P6: \$119.99, 18 inches, Rocking, Racing

P8: \$119.99, 26 inches, Rocking, Racing

P12: \$119.99, 26 inches, Bouncing, Glamour

## Market Simulation

- Current Market: P5, P13, P7
- Combination of two segmentation output
- SpeedGliders may respond by lowering price

# RECOMMENDATIONS

**66.5%**



THE OPTIMAL  
SCENARIO IN  
MARKET SHARE  
**P4, P6**

## Assumptions:

- Assume competitor will reduce its price (P8) and will not expand or change its product.
- Assume the market size, fixed cost, variable cost will not expand or change during simulation period.
- Assume 60-day return policy will cause profit reduce by 10%.
- The best profit here is the first-year actual profit.

THE OPTIMAL  
SCENARIO IN  
ACTUAL PROFIT  
**P6, P8**

**\$149,466.78**



# Methodology - Conjoint Analysis and Cluster Analysis

## CONJOINT ANALYSIS

- **What ?** - understand how customers value different features of their products

- **Highlights**- getting information about products when data not available

- **Why ? -Provide insights & Market prediction**

- Predict missing cells in rating survey
- Segment market and measure preferences
- Directs how to tailor products to segments
- Get Insights for identifying potential opportunities in choosing products
- Used to evaluate cannibalization, competitive staling and product & pricing decisions

## CLUSTER ANALYSIS

- **What ?** - group similar objects into respective categories

- **Highlights** - the researcher has not used prior judgment to divide the subjects

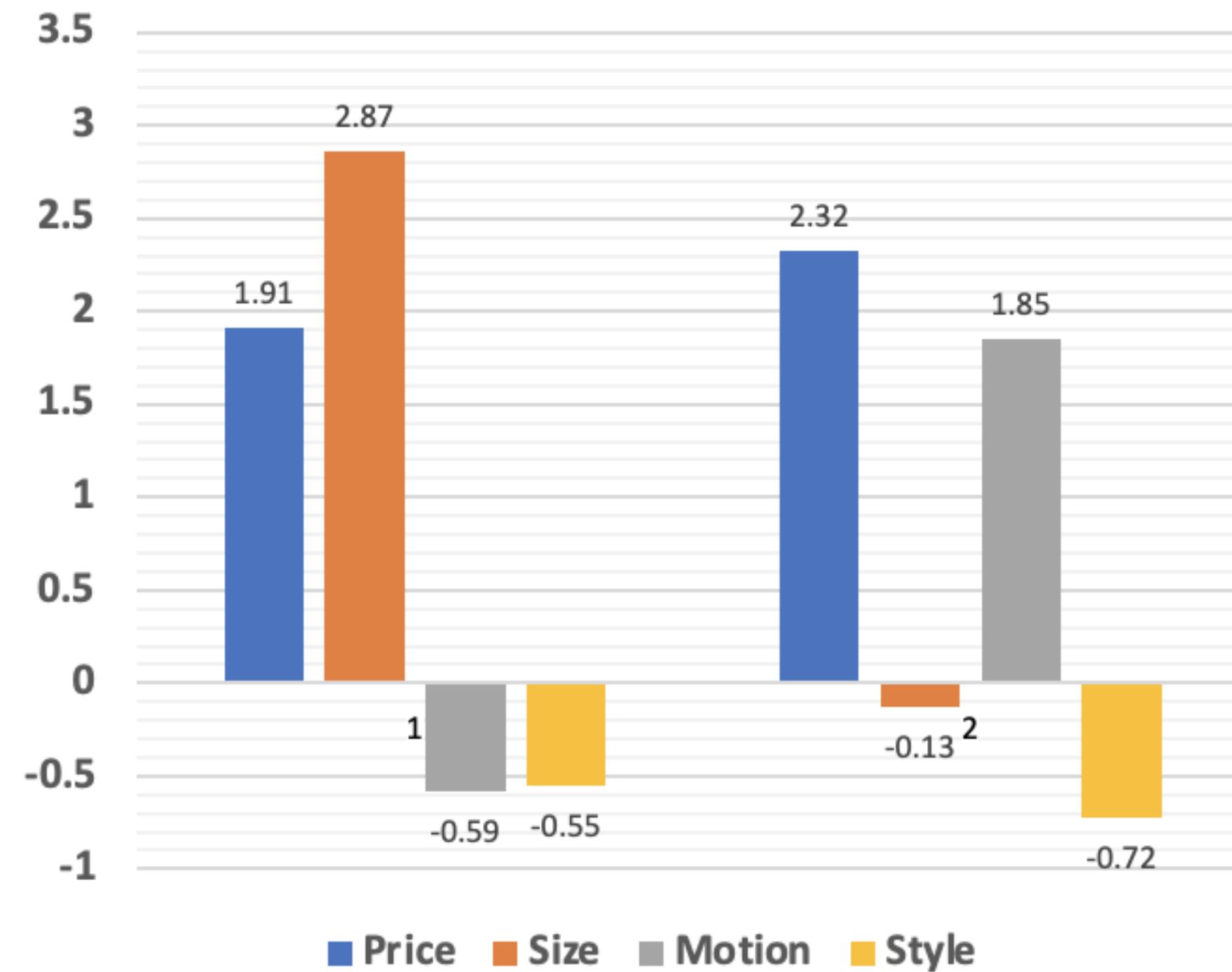
- **Why ? -Identify discrete groups of customers**

- Such as age groups, earnings brackets, and geographical areas
- Here we use cluster analysis to identify discrete groups based on the measure preference in the rating datasets (w/ predict ratings)

# Priori Segmentation

*Conjoint Output to estimate  
part-utilities*

Attribute Coefficient By Age



- Segment on the basis of Gender
- No significant effect

- Segment on the basis of Age
- **Group 1: Age from 3-4 years old**
- \$119.99, 26 inches, B/R (P4)
- Proportion: 65%
- **Group 2: Age is 2 years old**
- \$119.99, 18 inches, R/R (P6)
- Proportion: 35%

- Our scenario based on the prior segmentation
- P4, P6, P4+P6

# Post-hoc Segmentation

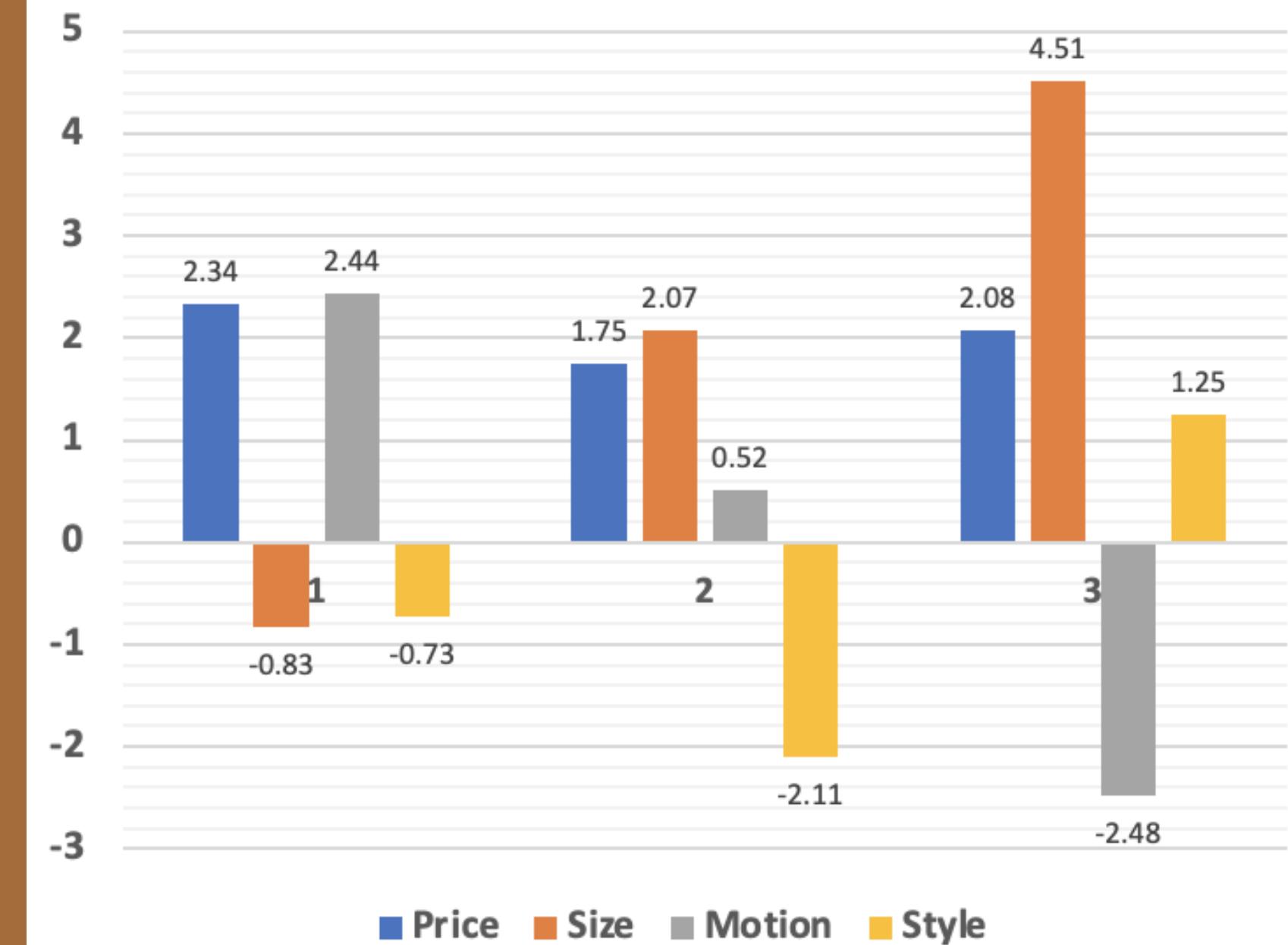
## *Cluster Output to estimate part-utilities*

- Measure preference based on predicted ratings
- Choose k=3 in cluster analysis by proportion

- Proportion of each cluster: 36%, 34%, 30%
- **Group 1:**
- \$119.99, 18 inches, R/R (P6)
- **Group 2:**
- \$119.99, 26 inches, R/R (P8)
- **Group 3:**
- \$119.99, 26 inches, B/G (P12)

- Our scenario based on the segmentation
- P6+P8, P6+P12, P8+P12, P6+P8+P12

Attribute Coefficient in Cluster Output



# MARKET SIMULATION-CURRENT MAKRET

Scenarios	EarlyRiders Offerings	SpeedGliders Offering	EarlyRiders Market Share	Competitor's Market Share	EarlyRiders Profit (in \$1,000s)	Competitor's Profit (in \$1,000s)
Status Duo	P5, P13	P7	33%	67%	100.87	245.62315
1	P5, P13	P8	5%	95%	-18.602	280.162

- EarlyRiders' current market share is much lower than competitor's market share.
- If the competitor reduces its price, EarlyRiders will not be competitive any more.
- It is necessary to change our product line to get more market share and profit.
- SpeedGliders will not choose P7 anymore, when we change our product line.
- Assumption:
  1. *The Competitor will not expand or change its product line.*
  2. *The market size in the local will not change.*
  3. *The variable cost and fixed cost will be the same.*

# MARKET SIMULATION-SCENARIOS

Scenarios	EarlyRiders Offerings	SpeedGliders Offering	EarlyRiders Market Share	Competitor's Market Share	EarlyRiders Profit (in \$1,000s)	Competitor's Profit (in \$1,000s)
2	P4	P8	39%	61%	89.16	171.95
3	P6	P8	29%	71%	80.91	204.33
→ 4	P4, P6	P8	67%	34%	164.89	85.85
→ 5	P6, P12	P8	60%	40%	145.66	106.38
→ 6	P6, P8	P8	65%	36%	166.07	92.17
7	P12, P8	P8	66%	34%	147.46	88.48
8	<u>P6,P8,P12</u>	P8	80%	20%	181.39	43.72

- Assume the competitor will reduce its price.
- P4, P6 cover two segmentations in the priori segmentation.
- There are three clusters in post-hoc segmentation, because the local retailers generally carry only 3 models, so we can only cover two of the segmentation.
- Scenario 8 is our assumption that local retailers will expand their product carries.

# MARKET SIMULATION-FURTHER ANALYSIS

## *Second year profit prediction*

Scenarios	EarlyRiders Offerings	SpeedGliders Offering	EarlyRiders Market Share	Competitor's Market Share	EarlyRiders Profit (in \$1,000s)	Actual Profit (in \$1,000s)
4	P4, P6	P8	67%	34%	171.893	154.70406
6	P6, P8	P8	65%	36%	173.074	155.76678

- Assume 60-days return policy will cause profit loss by 10%.
- In second year, EarlyRiders does not need to consider the quality control cost \$7,000.
- The scenario P6, P8 still get the highest profit.
- The accumulate profit with scenario 6 in next five years is \$772,530.
- There is no cannibalization problem because we launch two new products, which will not affect our old products.
- Hybrid Model can get more accurate result.



# | Q & A



# APPENDIX

## Aggregate (using all the individuals for one set of coefficient)

Call:

```
lm(formula = ratings ~ price + size + motion + style, data = conjointData)
```

Residuals:

Min	1Q	Median	3Q	Max
-8.0380	-1.8983	0.0433	2.0433	7.5739

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	7.7366	0.1339	57.759	< 2e-16 ***
price	2.0584	0.1255	16.400	< 2e-16 ***
size	1.7736	0.1202	14.759	< 2e-16 ***
motion	0.3014	0.1202	2.508	0.0122 *
style	-0.6119	0.1202	-5.092	3.82e-07 ***

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.899 on 2395 degrees of freedom

(800 observations deleted due to missingness)

Multiple R-squared: 0.2145, Adjusted R-squared: 0.2132

F-statistic: 163.5 on 4 and 2395 DF, p-value: < 2.2e-16

# APPENDIX CONT - CONJOINT ANALYSIS

## Priori segments using iterations

### Priori segmentation with age

Call:

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

Residuals:

Min	1Q	Median	3Q	Max
-11.6898	-1.2999	0.1558	1.3102	9.6093

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	9.8418	0.1764	55.808	< 2e-16 ***
price	2.3211	0.1652	14.046	< 2e-16 ***
size	-0.1266	0.1582	-0.800	0.4238
motion	1.8480	0.1582	11.681	< 2e-16 ***
style	-0.7227	0.1582	-4.568	5.17e-06 ***
age	-3.3152	0.2213	-14.980	< 2e-16 ***
price:age	-0.4136	0.2074	-1.994	0.0462 *
size:age	2.9924	0.1985	15.072	< 2e-16 ***
motion:age	-2.4356	0.1985	-12.267	< 2e-16 ***
style:age	0.1745	0.1985	0.879	0.3795
---				

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.306 on 2390 degrees of freedom  
(800 observations deleted due to missingness)

Multiple R-squared: 0.5041, Adjusted R-squared: 0.5022  
F-statistic: 269.9 on 9 and 2390 DF, p-value: < 2.2e-16

### Priori segmentation with gender

Call:

```
lm(formula = ratings ~ (price + size + motion + style) * gender,  
  data = data)
```

Residuals:

Min	1Q	Median	3Q	Max
-8.4544	-1.9007	0.0089	2.0089	7.2030

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	7.98472	0.18438	43.306	< 2e-16 ***
price	2.03690	0.17277	11.790	< 2e-16 ***
size	1.53671	0.16542	9.290	< 2e-16 ***
motion	0.46964	0.16542	2.839	0.00456 **
style	-0.65734	0.16542	-3.974	7.28e-05 ***
gender	-0.52233	0.26753	-1.952	0.05100 .
price:gender	0.04533	0.25068	0.181	0.85651
size:gender	0.49871	0.24001	2.078	0.03783 *
motion:gender	-0.35418	0.24001	-1.476	0.14016
style:gender	0.09561	0.24001	0.398	0.69041
---				

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.891 on 2390 degrees of freedom  
(800 observations deleted due to missingness)

Multiple R-squared: 0.2203, Adjusted R-squared: 0.2174  
F-statistic: 75.03 on 9 and 2390 DF, p-value: < 2.2e-16

# APPENDIX CONT - CONJOINT ANALYSIS

## Priori segmentation with age

```
Call:  
lm(formula = ratings ~ price + size + motion + style, data = data,  
subset = age == 1)
```

### Residuals:

Min	1Q	Median	3Q	Max
-5.9390	-1.7123	0.0217	1.3342	9.6093

### Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	6.5266	0.1370	47.654	< 2e-16 ***
price	1.9075	0.1283	14.863	< 2e-16 ***
size	2.8658	0.1229	23.324	< 2e-16 ***
motion	-0.5876	0.1229	-4.782	1.90e-06 ***
style	-0.5482	0.1229	-4.462	8.73e-06 ***

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.362 on 1519 degrees of freedom  
(508 observations deleted due to missingness)

Multiple R-squared: 0.4019, Adjusted R-squared: 0.4003  
F-statistic: 255.1 on 4 and 1519 DF, p-value: < 2.2e-16

```
Call:  
lm(formula = ratings ~ price + size + motion + style, data = data,  
subset = age == 0)
```

### Residuals:

Min	1Q	Median	3Q	Max
-11.6898	-0.8408	0.3102	1.3102	4.1595

### Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	9.8418	0.1686	58.373	< 2e-16 ***
price	2.3211	0.1580	14.692	< 2e-16 ***
size	-0.1266	0.1513	-0.837	0.403
motion	1.8480	0.1513	12.218	< 2e-16 ***
style	-0.7227	0.1513	-4.778	2.08e-06 ***

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

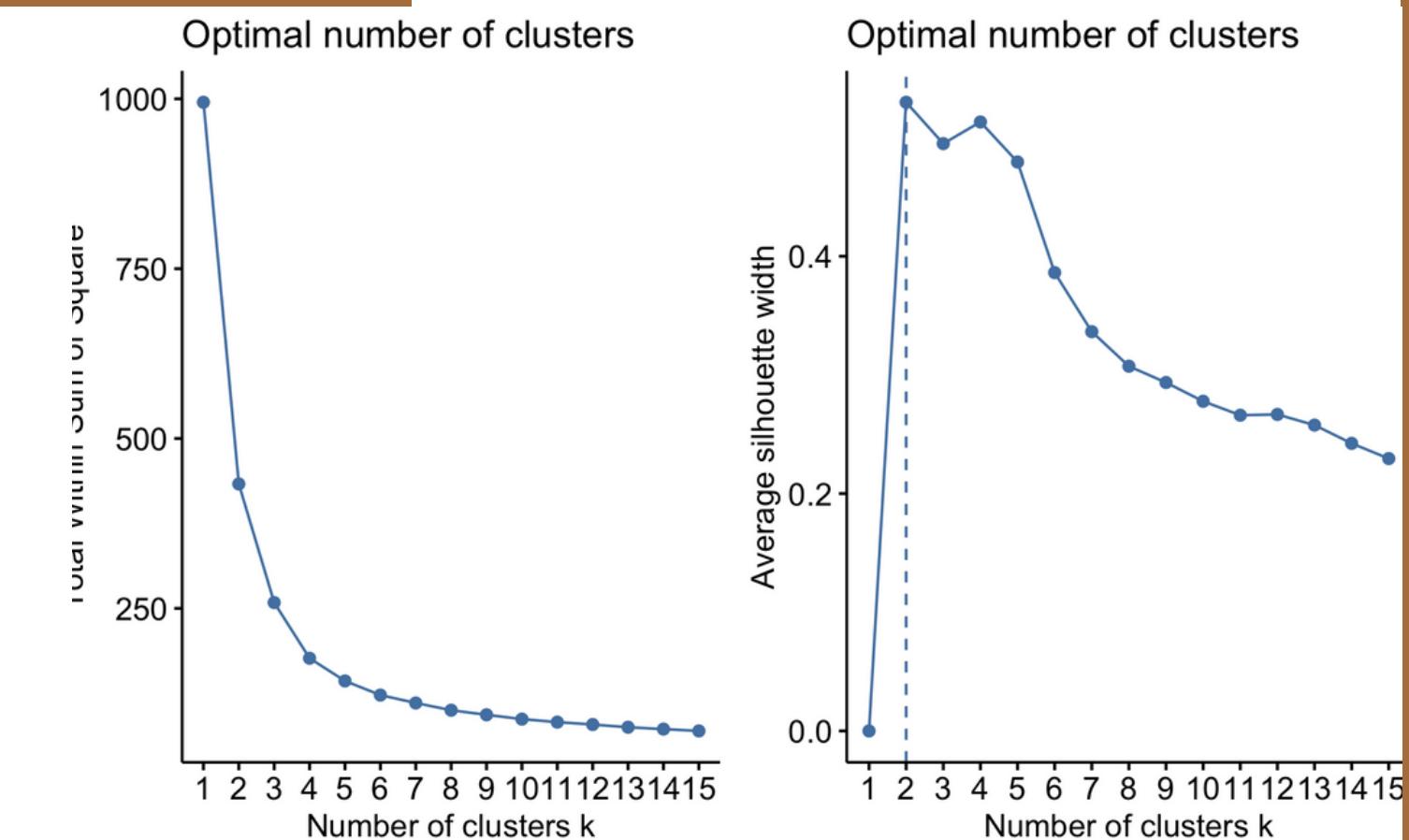
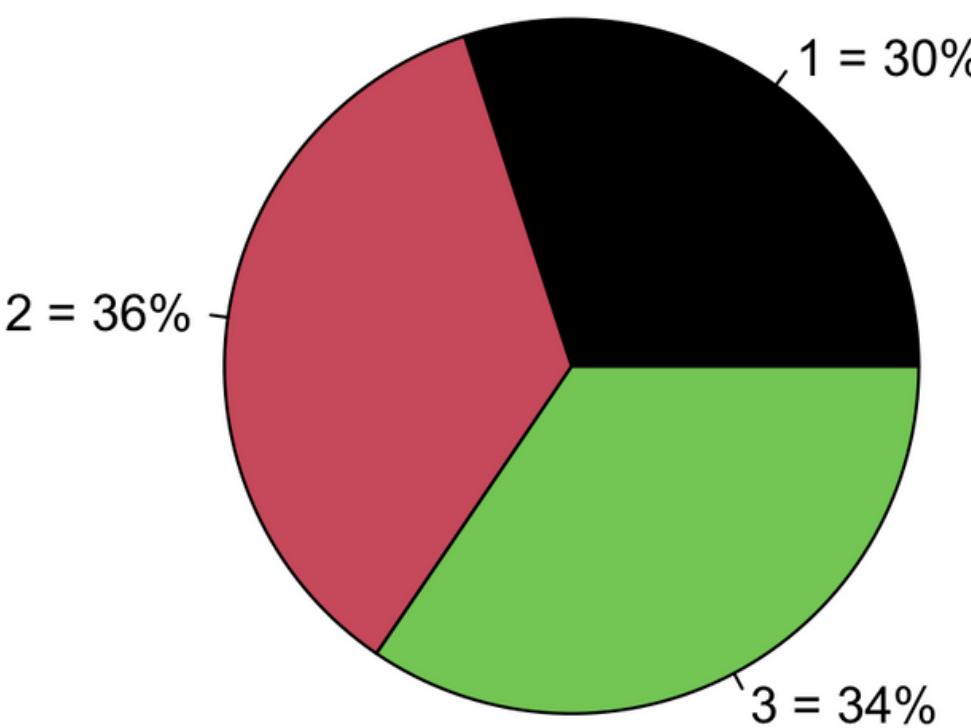
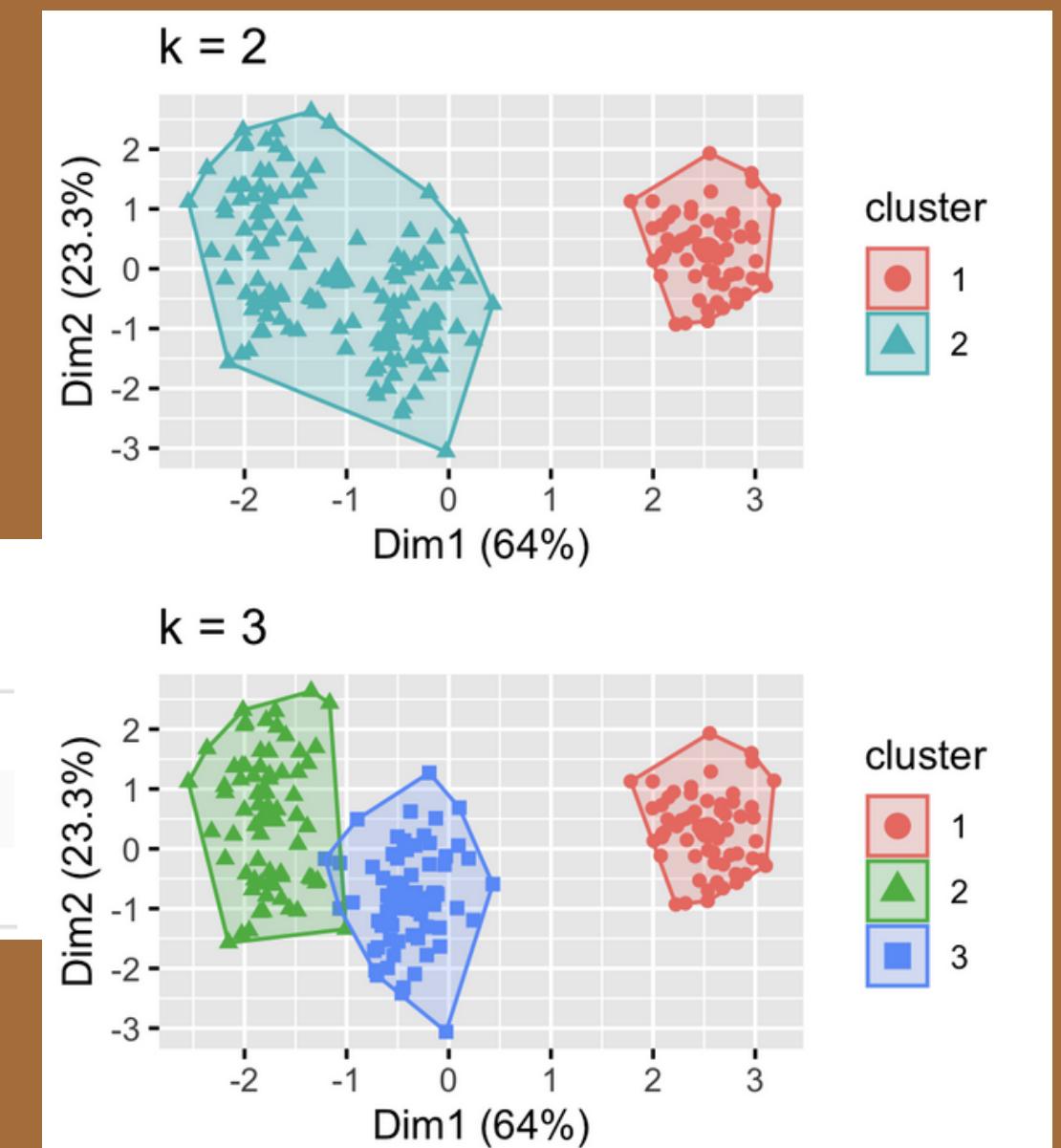
Residual standard error: 2.204 on 871 degrees of freedom  
(292 observations deleted due to missingness)

Multiple R-squared: 0.2985, Adjusted R-squared: 0.2953  
F-statistic: 92.66 on 4 and 871 DF, p-value: < 2.2e-16

# APPENDIX CONT- CLUSTER ANALYSIS

## Post-hoc Segmentation

Segment <int>	Intercept <dbl>	price <dbl>	size <dbl>	motion <dbl>	style <dbl>	Size <dbl>
2	10.588322	2.339789	-0.8289319	2.4392606	-0.7344484	0.355
3	7.869414	1.749094	2.0732186	0.5161534	-2.1070350	0.345
1	4.209375	2.081250	4.5086806	-2.4753472	1.2524306	0.300



# APPENDIX CONT-SIMULATION

	price	variableCost	isfirstyear for EarlyRiders	isfirstyear for SpeedGliders	firstyear price	fixed cost
p4	119.99	46	1		7000	20000
p5	139.99	33	0		7000	20000
p6	119.99	33	0		7000	20000
p7	139.99	41	1	0	7000	20000
p8	119.99	41	1	0	7000	20000
p11	139.99	46	1		7000	20000
p12	119.99	46	1		7000	20000
p13	139.99	33	0		7000	20000
Annual market unit	4000					

	9 p6	p8	p12	p8	0.2016667	0.3066667	0.2016667
profit		0.29					
sum		80908.4					
		36718.61053					
		181388.0871					
		0.7983334					

scen	EarlyRiders			SpeedGliders	SumMarketshare			
1 p5	0.2233333	p13		p7				
profit	75577.71907		25292.41907	0.6708333	245623.1535	0.9999999		
sum	100870.1381		0.3291666					
2 p5	0.04	p13		p8		1		
profit	-2881.6		-15720.4	280162				
sum	-18602		0.05					
3 p4				p8			1	
profit	0.3925			0.6075				
sum	89164.3			171945.7				
4 p6	0.29			p8		1		
profit	80908.4			204331.6				
sum	80908.4							
5 p4	p6	p8				Year 2	p4	p6
profit	0.375	0.29	0.335			1	0.375	0.29
sum	83985	80908.4	85846.6				90985	80908.4
	164893.4						171893.4	
	0.665						0.665	
6 p6	p12	p8					p8	
profit	0.29	0.31	0.4			1		
sum	80908.4	64747.6	106384					
	145656							
	0.6							
7 p6	p8	p8				Year 2	p6	p8
profit	0.29	0.355	0.355			1	0.29	0.355
sum	80908.4	85165.8	92165.8				80908.4	92165.8
	166074.2						173074.2	
	0.645						0.645	
8 p12	p8	p8					p8	
profit	0.31416667	0.3433333	0.3433333				1.00083327	149466.78
sum	65980.76765	81479.58947	88479.58947					
	147460.3571							
	0.65749997							