Bayesian Intro

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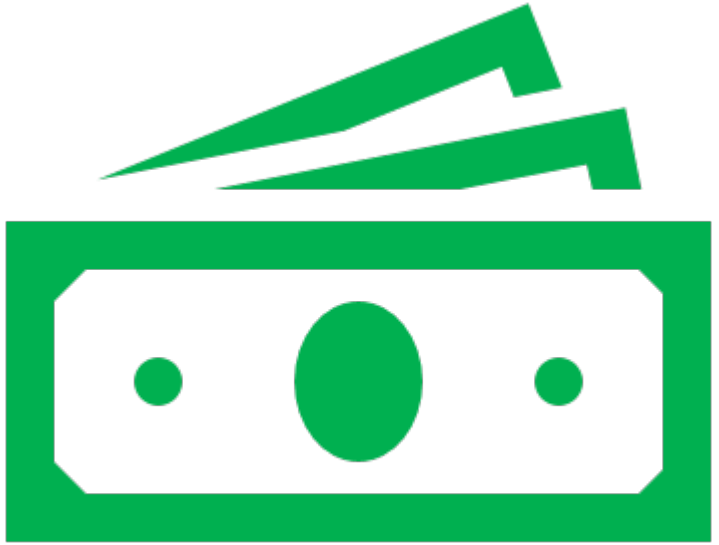
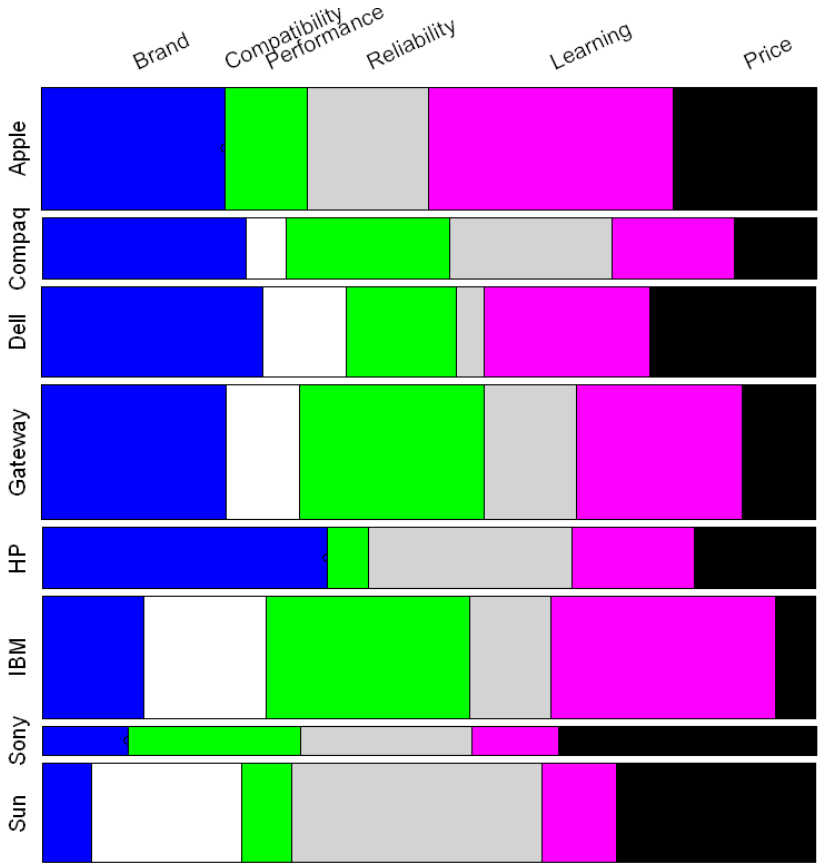
Patterns in Retail Behavior

- Obtain
- Scrub
- **Explore**
- **Model**
- **iNterpret**

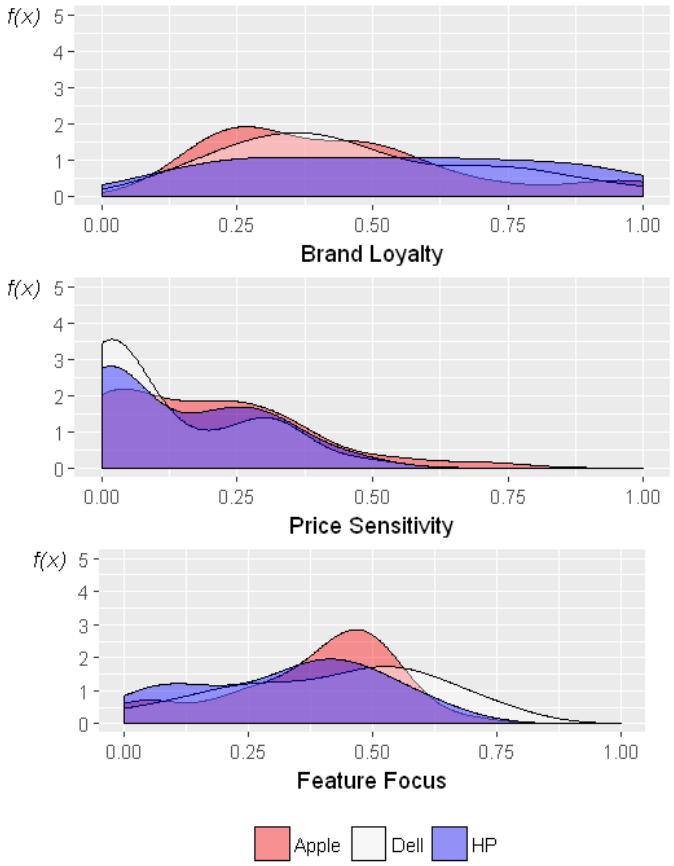
Our Challenge This Week?



Consumer Preference



Can the Bayesian Approach Provide More Insight into Consumer Choice?



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Data Review

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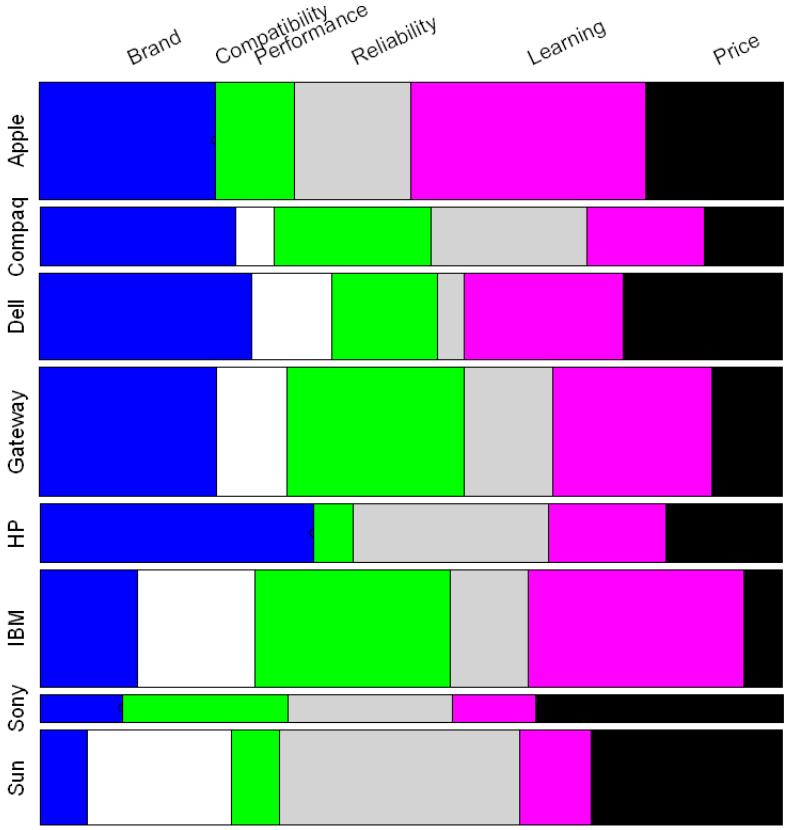
Choosing Data

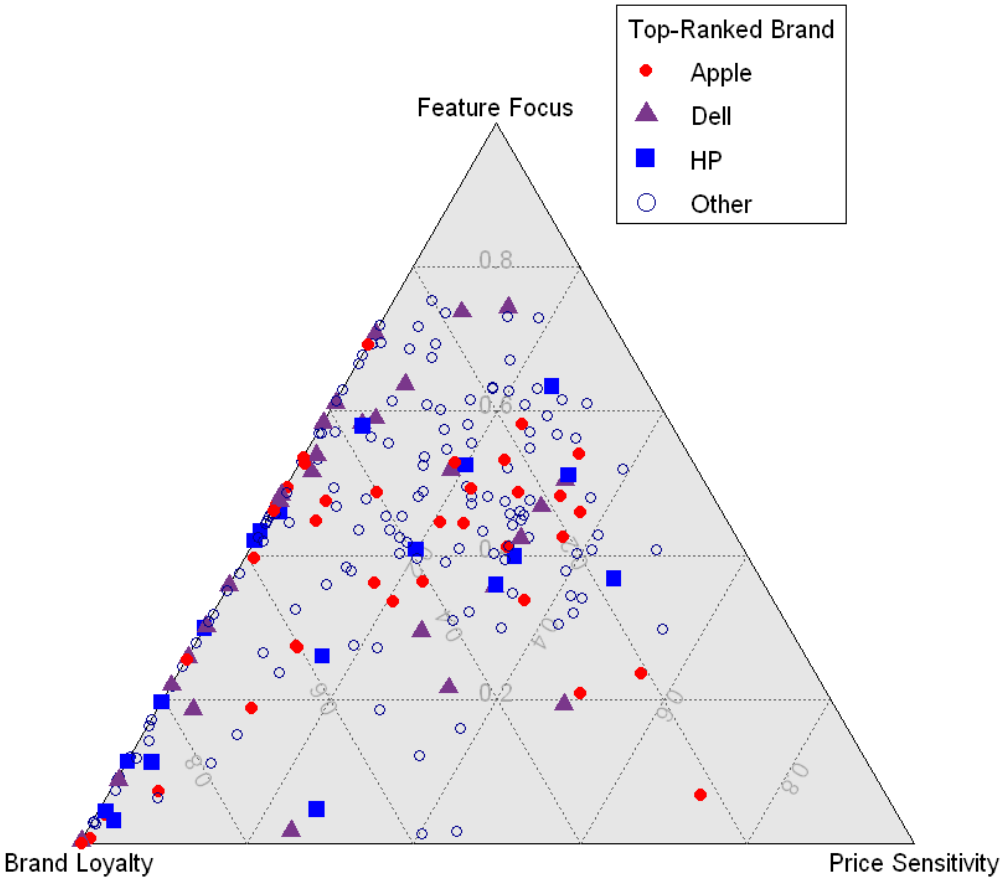
	Valued Attributes						
Top Ranked Brand	Brand	Compatibility	Performance	Reliability	Learning	Price	Total
Apple	9	0	4	6	12	7	38
Compaq	5	1	4	4	3	2	19
Dell	8	3	4	1	6	6	28
Gateway	10	4	10	5	9	4	42
HP	7	0	1	5	3	3	19
IBM	5	6	10	4	11	2	38
Sony	1	0	2	2	1	3	9
Sun	2	6	2	10	3	8	31
Total	47	20	37	37	48	35	224

Source: Adapted from Miller (2015).

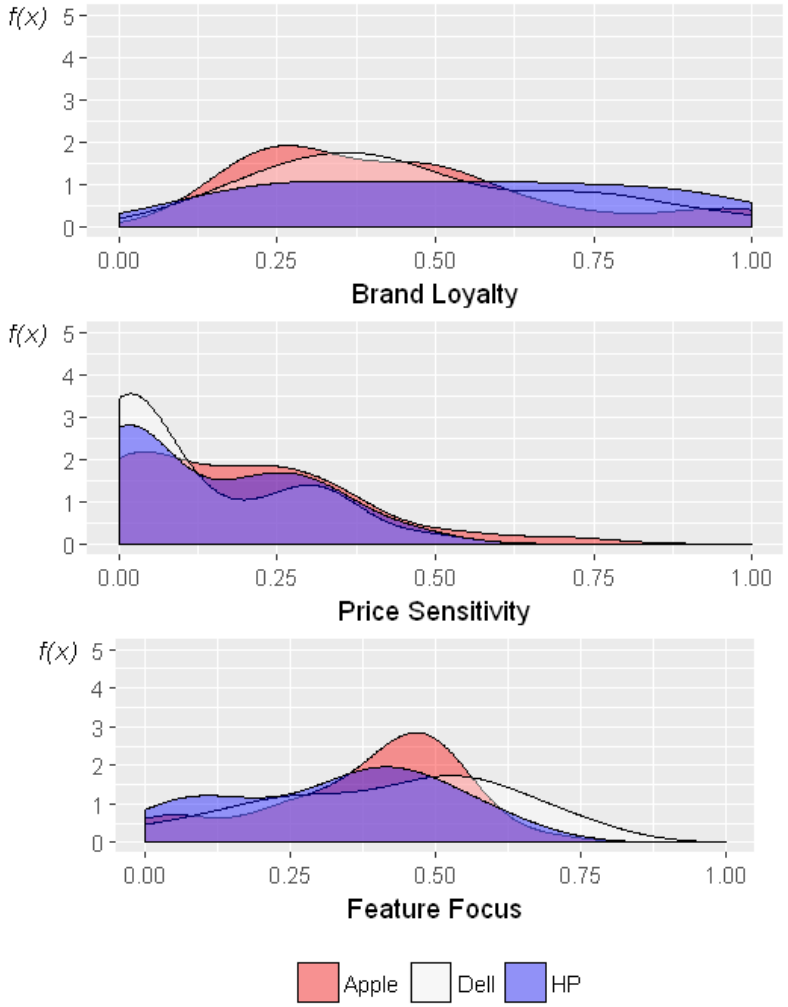
Consumer Preference



Reduced Choice Preference



Brand Preference



Recommendation

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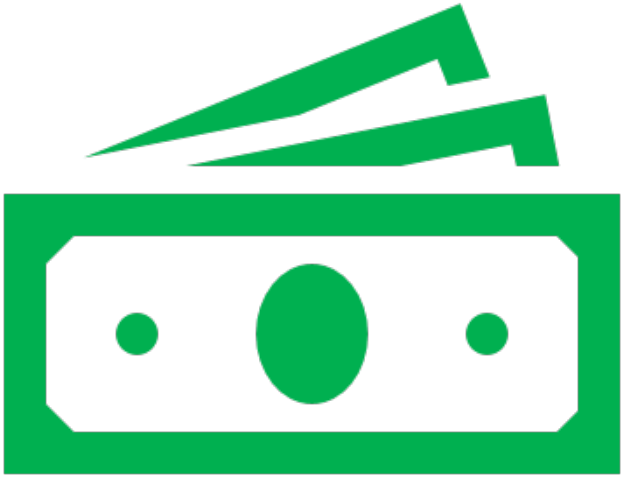
Our Challenge Was …



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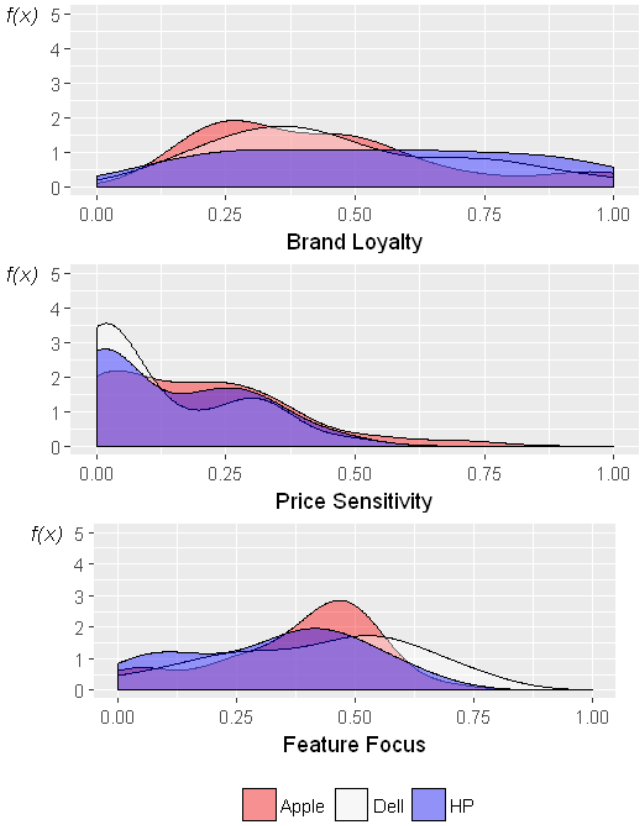

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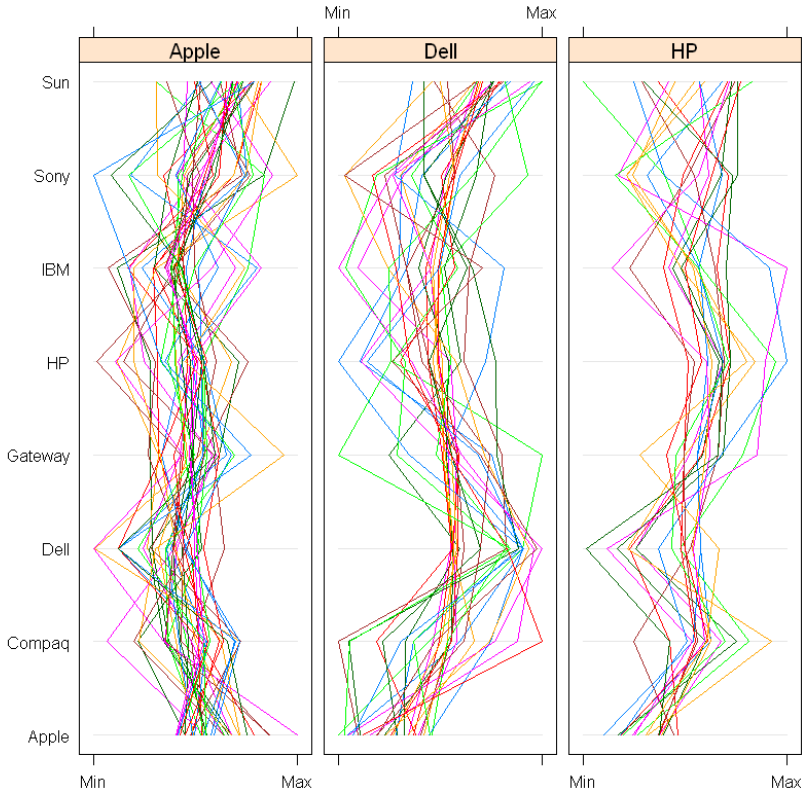
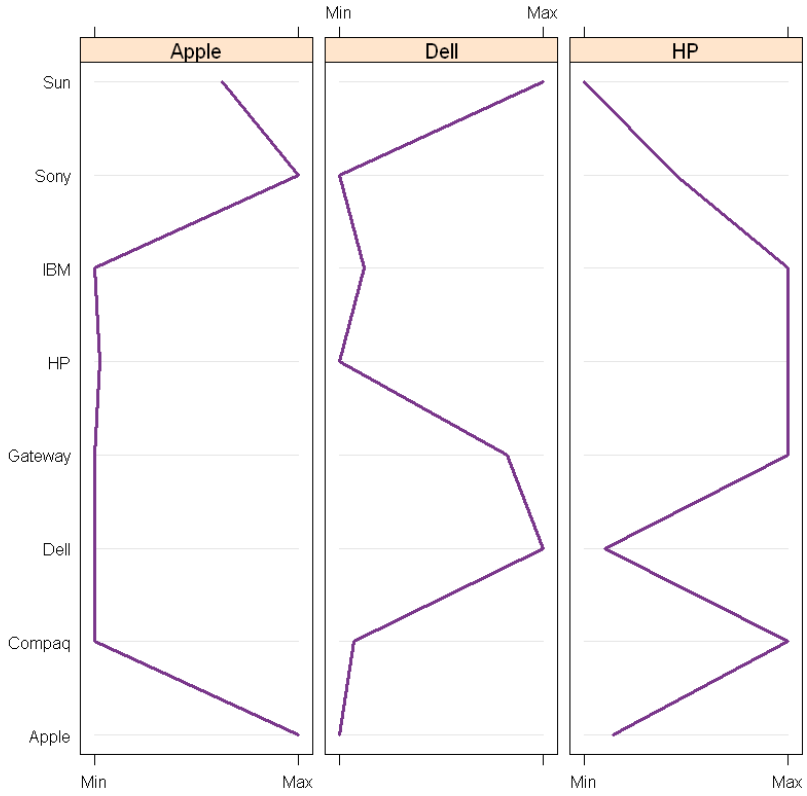
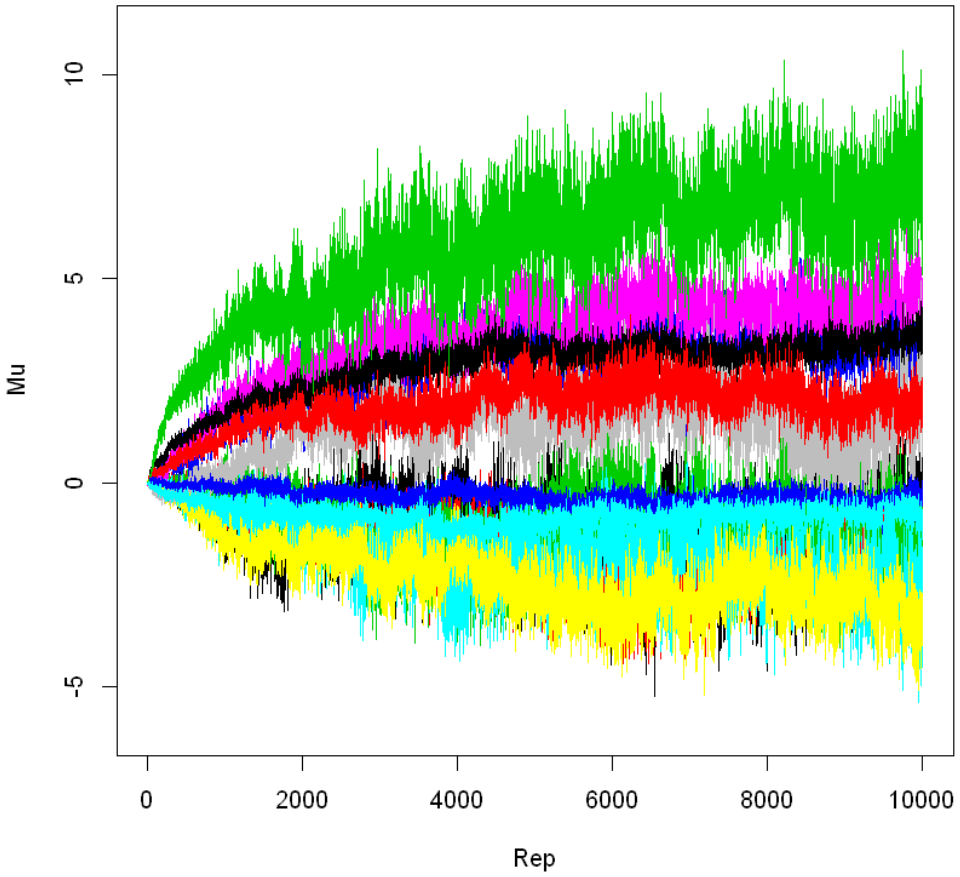
How Might Customers Switch?



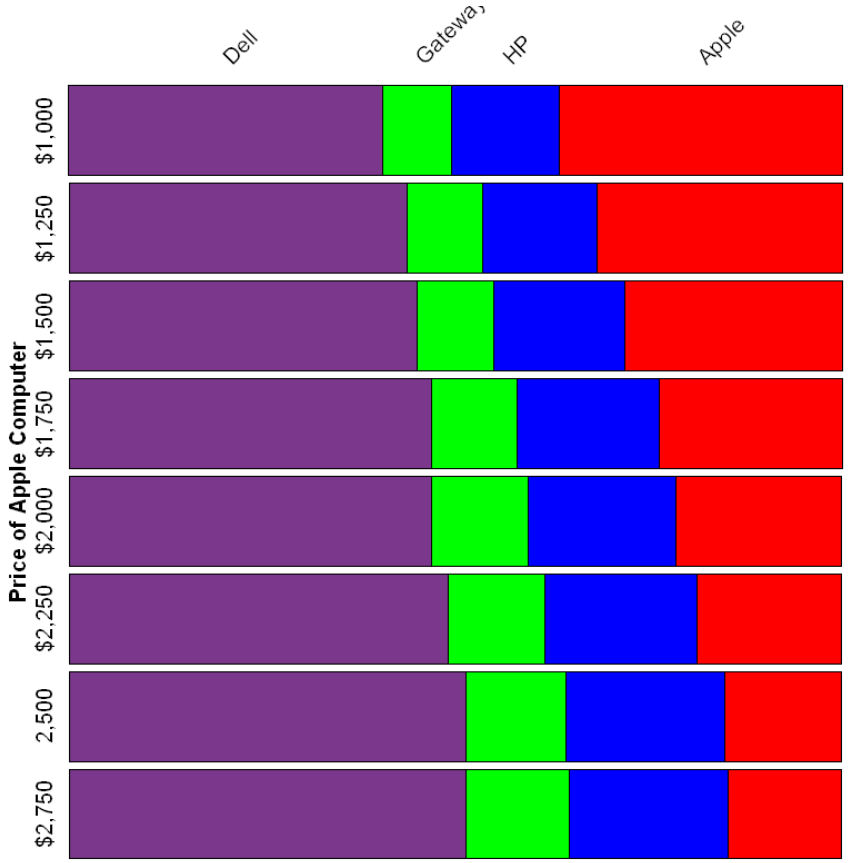


Simulating Brand Preference



Recommendation

- Gaining share is a function of price
- Lowering Apple prices grows market share
- Smaller choice sets make simulations easier
- Preference/choice /sales /shares



Bayes Basics

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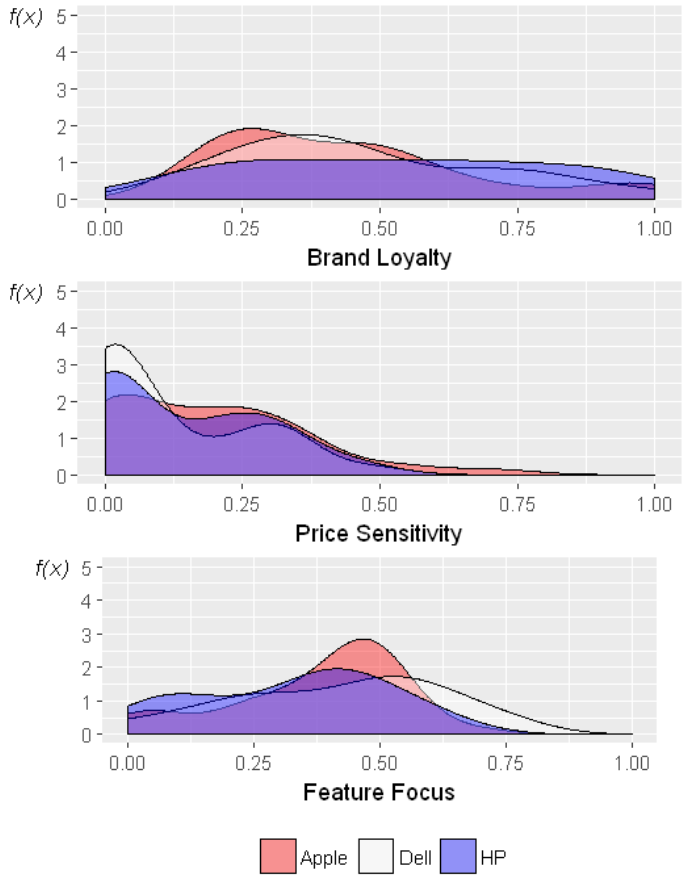
What Is the Bayesian Approach?



The Reverend

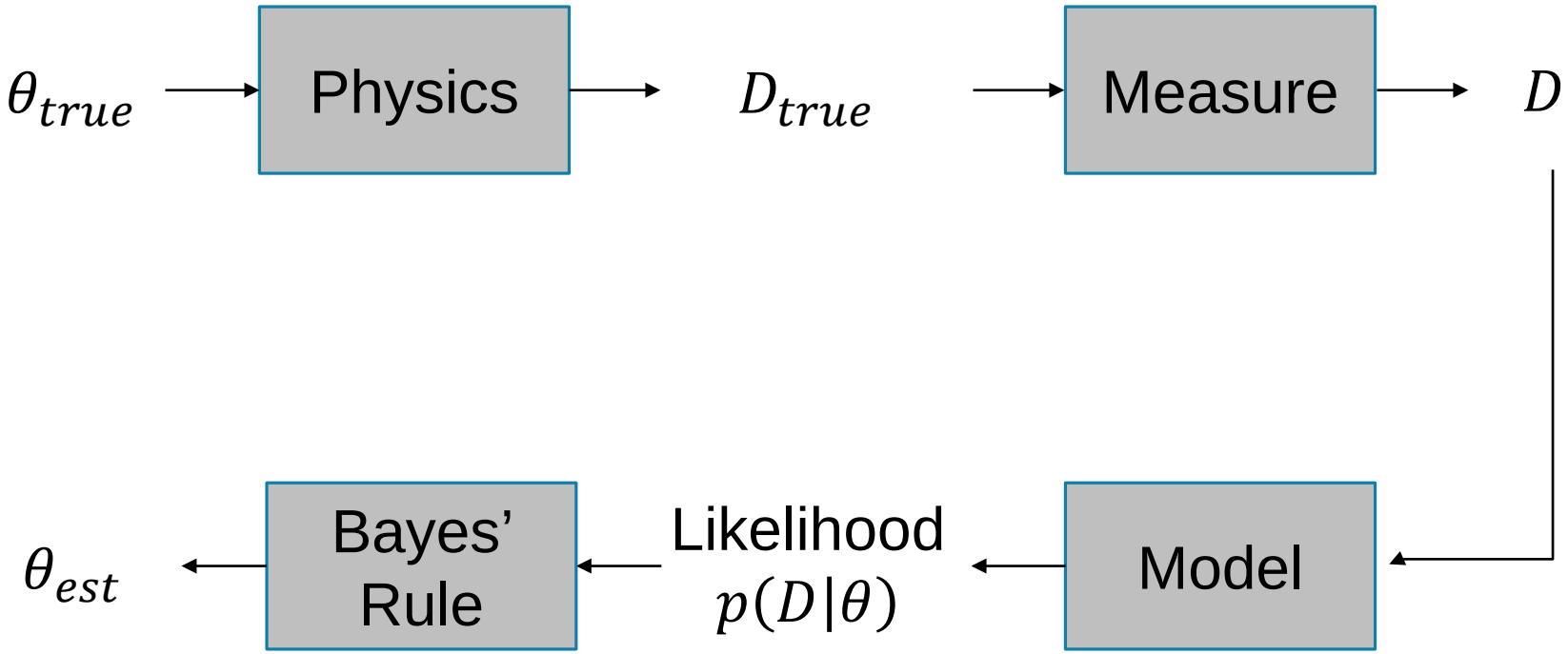
Bayes Theorem

$$p(H|D) = \frac{p(D|H)p(H)}{p(D)}$$

- Given $H \equiv$ hypothesis and $D \equiv$ data
- What is the probability our hypothesis is true given the data observed?

Source: Adapted from Stanton (2017)

Forward & Inverse Probability



Source: Adapted from Stone (2013)

Bayesian Modeling

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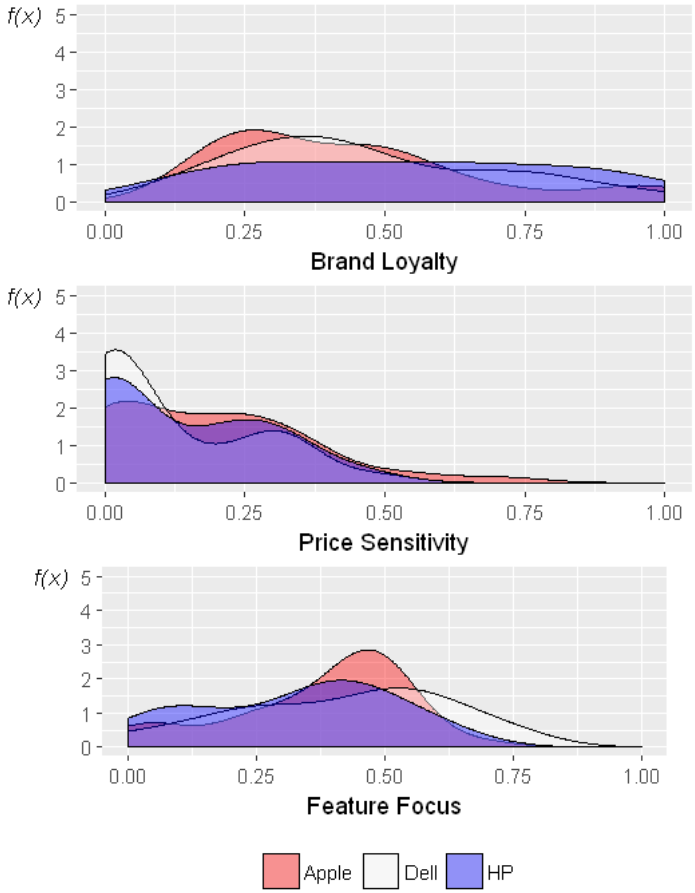
Bayesian State of Mind



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Binomial Distribution

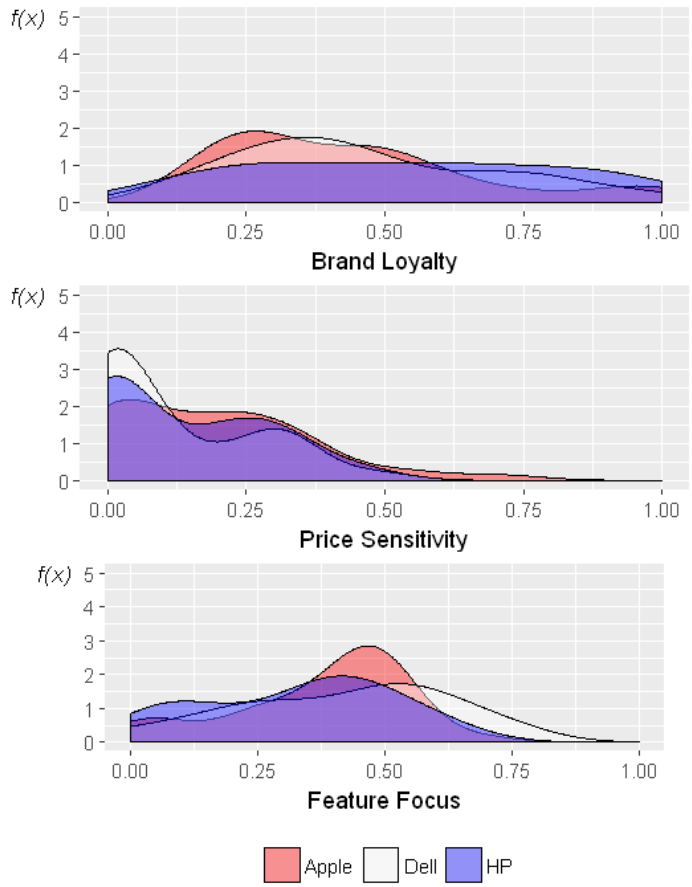
$$P(X = k) = \binom{N}{k} p^k (1-p)^{N-k}$$

- Discrete distribution
- Special case for $N = 1$

Source: Adapted from Stanton (2017)

Parent and Child Relationships

- Parent variable
- Child variables
- Stochastic variables
- Deterministic variables



Modeling Approach

- Best random variable for data?
- What do we need to generate the variable?
- Do we know the parameter?
- What distribution represents the parameter?
- Can we estimate this parameter?