

Testing the Satisficing Model Using Web Browsing Data

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Columbia University
Mark Dean

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Introduction

- Choice alone cannot be used to test the Satisficing model
- We need other data
- Choice process data is one option
- Another would be to use data directly on search
- Assume we observe exactly what alternatives have been looked at, and in what order

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Satisficing and Search Data

- Satisficing make 2 predictions
1. Object chosen should be last searched (unless they have search all available alternatives)
 - Search stops when an above reservation alternative is found
 - That alternative is then chosen
 2. Value of the best option currently seen should predict probability of continuing to search
 - Higher value alternatives more likely to be above reservation level
 - More likely that search will stop

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An Alternative Model

- Fixed search set size
 - Before starting to search decide how many alternatives to look at
 - Search that number of alternatives regardless of what is seen along the way
 - Note that such behavior is not optimal if one can 'dynamically optimize'
- Fixed search set implies
 - Last object seen not necessarily the one purchased
 - Value of object seen not predictive of whether search will continue

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Data

- Web browsing data allows us to approximate search data
 - We can record what websites a subject has looked at
 - (Note this is not the same thing as a subject understanding what is on the website)
- Dataset: 152,000 users from ComScore
 - Company that records web browsing activity (!)
 - Date
 - Time
 - Duration
 - Purchase description, price and quantity

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Data

- Concentrate on purchase of books

Table 1 - Transactions and Value by Bookstore

Bookstore	Transactions		Value	
	Number	Percentage	Number	Percentage
Amazon	10,197	65.5	249,543	76.3
Barnes and Noble	3,042	19.6	25,758	7.9
Book Club				
christianbook.com	615	3.9	3,968	1.2
christianbookstore.com	408	2.6	4,061	1.2
christianbook.com	61	0.4	3,647	1.1
brary.org	322	2.1	3,560	1.1
christianbook.com	197	1.2	2,095	0.6
Other Bookstore				
bookstreet.com	10	0.1	130	0.0
allbookstore.com	5	0.0	199	0.1
allbook.com	27	0.2	490	0.1
ocw.org	114	0.7	1,296	0.4
book.com	68	0.4	1,296	0.4
book.com	16	0.1	219	0.1
book.com	163	1.1	20,663	6.3
book.com	246	1.6	2,290	0.7
Total	15,561	100.0	327,074	100.0

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Data

- Aggregate data into 4 'stores'
 - Amazon
 - Barnes and Noble
 - Book clubs
 - Other Book stores
- Construct search history by looking at web browsing history for 7 days prior to transaction

Table 3 - Descriptive Statistics on Conditional Book Search

	2002			
	Amazon	B&N	Book Clubs	Other Book Stores
Duration of each website visit (in minutes)	4.99	13.03	7.69	12.36
Visits per 7 days of transaction	12.72	15.63	11.02	12.60
Visits within 7 days, including transactions	18.54	19.26	13.74	17.27
Transactions only	29.46	17.69	26.49	17.71
Total duration, including transaction visits	32.47	69.90	39.41	79.10
Total duration, including transaction visits	43.95	83.27	47.43	86.11
Number of stores searched	1.27	1.54	1.39	1.50
Number of books per transaction	2.39	2.00	2.29	1.85
Transaction expenditures (books only)	36.67	40.64	32.23	35.69
Number of books purchased	17,926	17,503	17,503	17,503
Number of transactions executed	7,209	6,962	7,209	6,962
Number of visits within 7 days	18,203	20,229	18,203	20,229
Number of visits per 7 days	89,411	109,127	89,411	109,127

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Data

- Assume that the product the consumer wants is homogenous
 - They really want a copy of 'Inferno' by Dan Brown
- Search is over prices
 - Price of book in purchased store observed directly
 - Price of books in other store imputed from most recent purchase

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Results

- Consumers do not maximize on price
 - Buy from lowest priced store in 63% of observations
 - Average loss \$2.60 compared to lowest available price
 - BUT this difference is not due entirely to unawareness
 - Average loss relative to lowest of stores searched is \$1.99

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Results

- Some consumers do NOT buy the last searched product

Table 3 - Test of "No Recall" Hypothesis

Search window	No. of stores visited	Percentage	If 2 or more stores bought from		Percentage subsequent search?
			Last store sampled	Other	
7 Days	Other	76	Last store sampled	65	55
	2 or more	24	Recalled	35	
8 Days	Other	99	Last store sampled	64	55
	2 or more	23	Recalled	36	
9 Days	Other	79	Last store sampled	63	55
	2 or more	21	Recalled	37	
4 Days	Other	80	Last store sampled	61	55
	2 or more	20	Recalled	39	
3 Days	Other	82	Last store sampled	61	56
	2 or more	18	Recalled	39	
2 Days	Other	84	Last store sampled	61	56
	2 or more	16	Recalled	39	
1 Day	Other	86	Last store sampled	61	56
	2 or more	14	Recalled	41	
Same day	Other	90	Last store sampled	62	56
	2 or more	10	Recalled	38	

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Results

3. Observed price does NOT affect the decision to continue searching

TABLE 5—PRICE OF THE FIRST STORE BY NUMBER OF SEARCHES

Price of the first store	Once	Twice	Total
Lower or equal	63.55%	61.89%	63.32%
Higher	36.45%	38.11%	36.68%
Number of observations	2,244	349	2,593

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Summary

- We have introduced the 'Satisficing' model of incomplete attention
- Shown that satisficing can be optimal in the face of per-item search costs
- Shown that it is difficult to test satisficing with standard choice data
- Introduced two data sets which can be used to test satisficing
 - Choice process
 - Search data
- In the lab, satisficing seems to do a reasonable job of explaining behavior
- But in web search, behavior seems better described by a 'fixed search' algorithm
 - But data set does not have a lot of power

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