Testing Models of Consumer Search Using Web Browsing Data

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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

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

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

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

Data

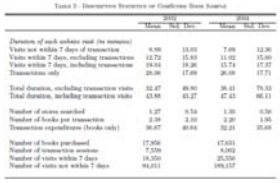
- Concentrate on purchase of books

TABLE 1—TRANSACTIONS AND VISITS BY BOOKSTORE

	Transactions		Visits	
Bookstore	Number	Percentage	Number	Percentage
Amazon	10,197	65.5	249,593	76.3
Barnes and Noble	3,042	19.6	25,758	7.9
Book Clubs				
christianbook.com	615	3.9	3,968	1.2
doubledaybookclub.com	468	3.0	4,001	1.2
charlesquin.com	61	0.4	3,647	1.1
literaryguild.com	322	2.1	3,500	1.1
mysteryguild.com	187	1.2	2,095	0.6
Other Bookstore				
1bookstreet.com	10	0.1	120	0.0
allbookstores.com	5	0.0	199	0.1
alldirect.com	27	0.2	490	0.1
ecampus.com	114	0.7	1,206	0.4
powells.com	68	0.4	1,326	0.4
varsitybooks.com	16	0.1	218	0.1
walmart.com	183	1.2	20,663	5.8
booksamillion.com	246	1.6	2,290	0.7
Total	15,561	100.0	327,074	100.0

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



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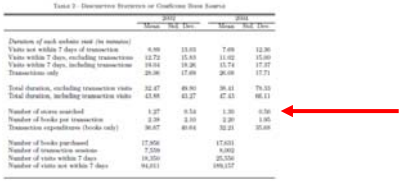


Data

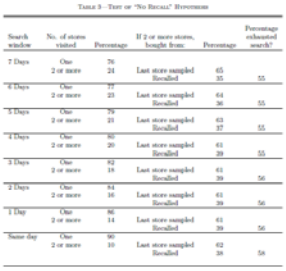
- Assume that the product the consumer wants is homogenous
  - They really want a copy of 'Inferno' by Dan Brown
- Search is over prices
  - Price of book in purchased store observed directly
  - Price of books in other store imputed from most recent purchase

Results

1. 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

Results

2. Some consumers do NOT buy the last searched product



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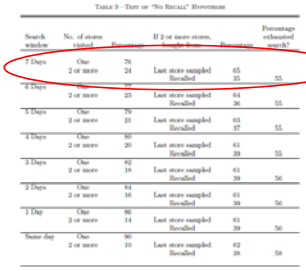

Results

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

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