Search and Satisficing

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Experimental Design

- We want to see if satisficing can explain behavior when people are not behaving like maximizers
- Experimental design has two aims
  - Identify enviroment in which people are not maximizers
  - Test satisficing model as an explanation for these mistakes
- Two design challenges
  - Find a set of choice objects for which 'choice quality' is obvious and subjects do not always choose best option
  - Find a way of eliciting 'choice process data'
- We first test behavior in a standard choice task, then add choice process

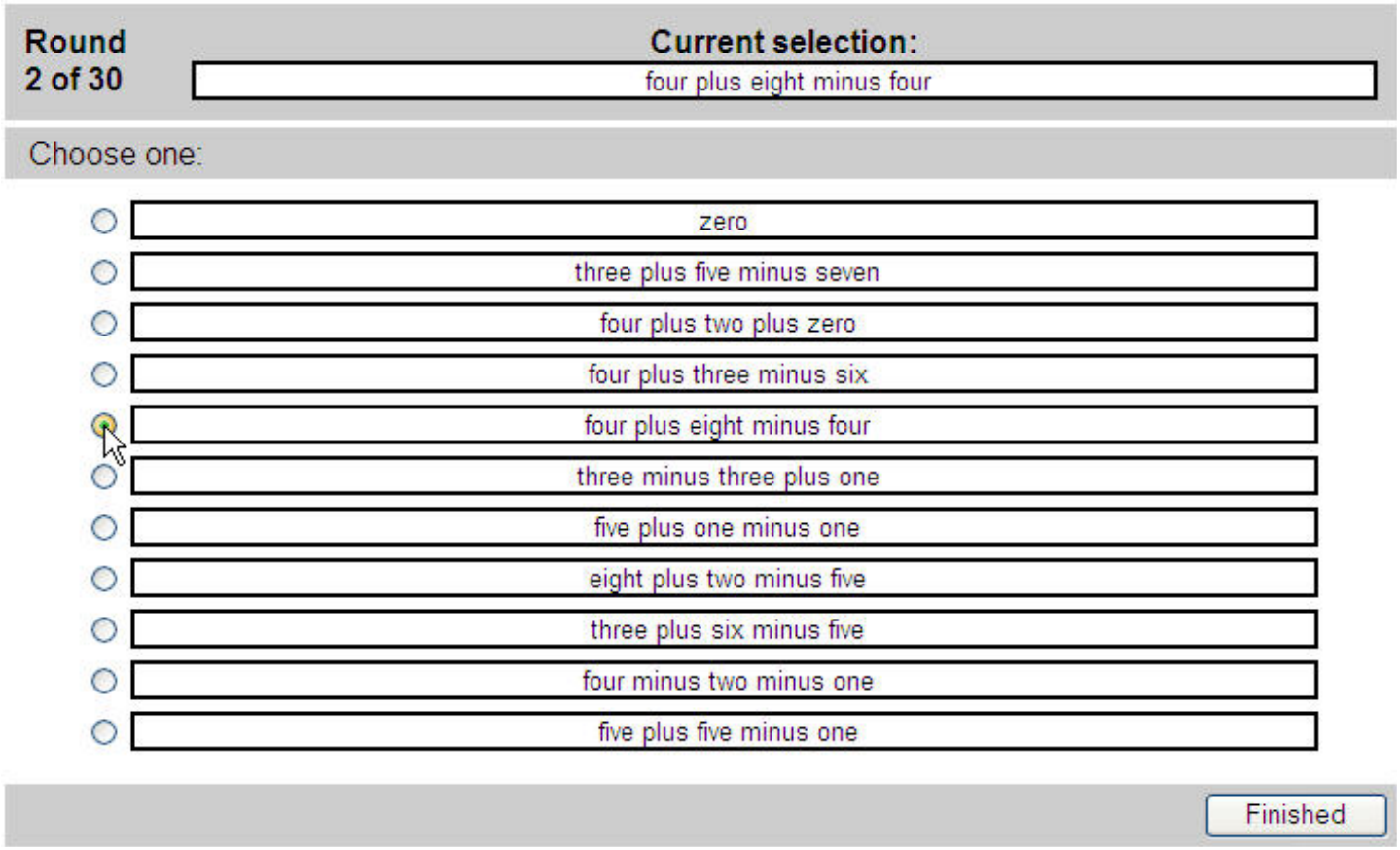
Choice Objects

- Subjects choose between 'sums'

four plus eight minus four

- Value of option is the value of the sum
- 'Full information' ranking obvious, but uncovering value takes effort
- 6 treatments
  - 2 x complexity (3 and 7 operations)
  - 3 x choice set size (10, 20 and 40 options)
- No time limit

Size 10, Complexity 3



Size 20, Complexity 7

- zero
- seven minus four minus two minus four minus two plus eleven minus four
- six plus five minus eight plus two minus nine plus one plus four
- seven minus two minus four plus three plus four minus three minus three
- seven plus five minus two minus two minus three plus zero minus two
- six plus seven plus six minus two minus six minus eight plus four
- six plus two plus five minus four minus two minus seven plus three
- six minus four minus one minus one plus five plus three minus six
- two plus six plus seven minus two minus four minus two plus zero
- two minus three minus five plus nine minus one plus five minus three
- three plus zero plus two plus zero plus one minus three minus one
- four plus three plus zero minus two plus three plus four minus ten
- seven plus two plus seven minus seven plus three minus two minus two
- three plus three minus two plus zero plus zero minus four plus five
- two minus two plus zero plus nine minus two minus one minus one
- three plus four minus three plus three minus four plus three minus four
- three plus five plus seven plus five minus two minus seven minus ten
- three plus six minus eight plus one plus two minus two plus zero
- three plus five plus zero plus four plus three minus four minus two
- eight minus one plus one minus four minus four minus five plus six
- four minus five plus four minus one minus four plus zero plus four

Finished

Results

Failure rates (%) (22 subjects, 657 choices)

Failure rate		
	Complexity	
Set size	3	7
10	7%	24%
20	22%	56%
40	29%	65%

Average Loss ($)		
	Complexity	
Set size	3	7
10	0.41	1.69
20	1.10	4.00
40	2.30	7.12

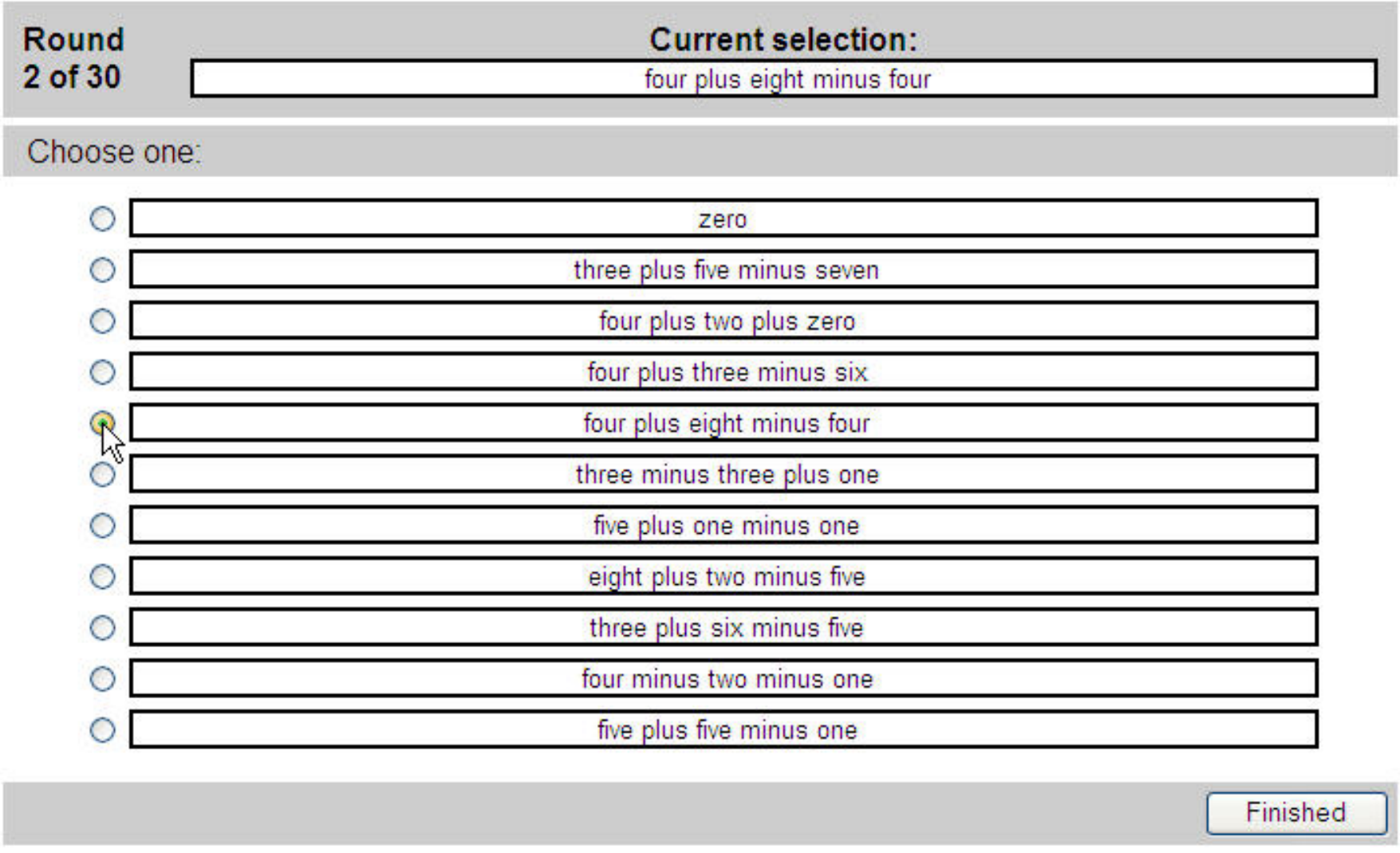
Results

- In this environment, people do not choose the best option
- Choice does not imply revealed preference
- Can behavior be explained by search and satisficing model?
- Do these models resurrect the concept of revealed preference?

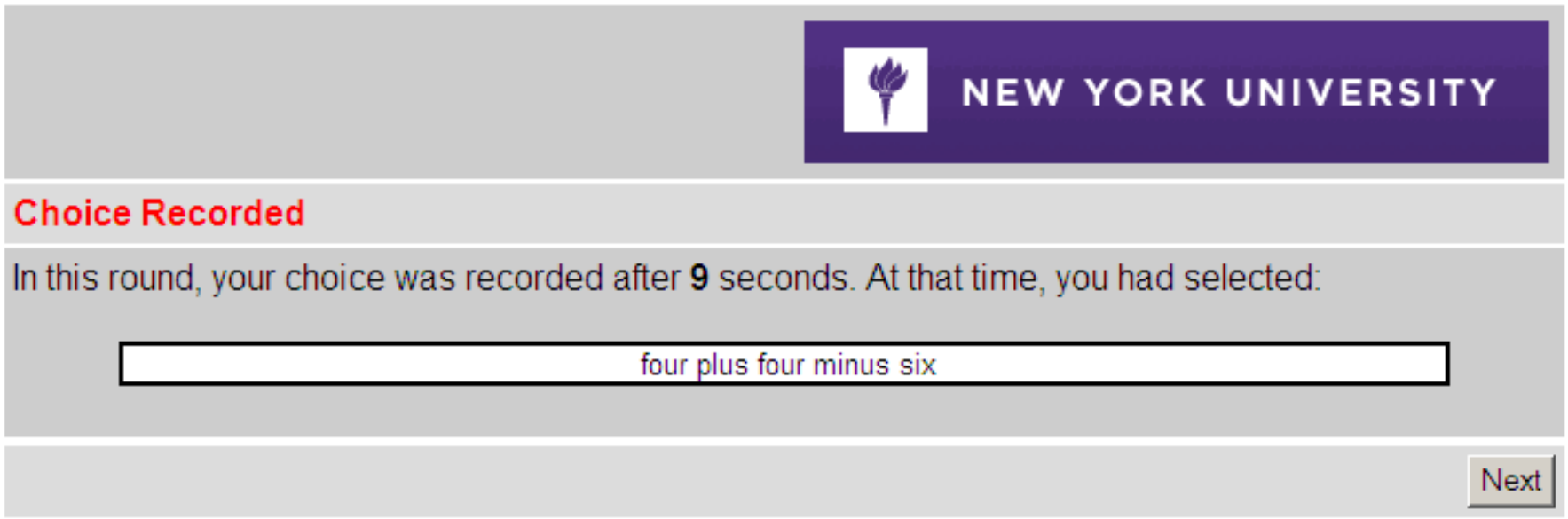
Eliciting Choice Process Data

1. Allow subjects to select any alternative at any time
   - Can change selection as often as they like
2. Choice will be recorded at a random time between 0 and 120 seconds unknown to subject
   - Incentivizes subjects to always keep selected current best alternative
   - Treat the sequence of selections as choice process data
3. Round can end in two ways
   - After 120 seconds has elapsed
   - When subject presses the 'finish' button
   - We discard any rounds in which subjects do not press 'finish'

Stage 1: Selection

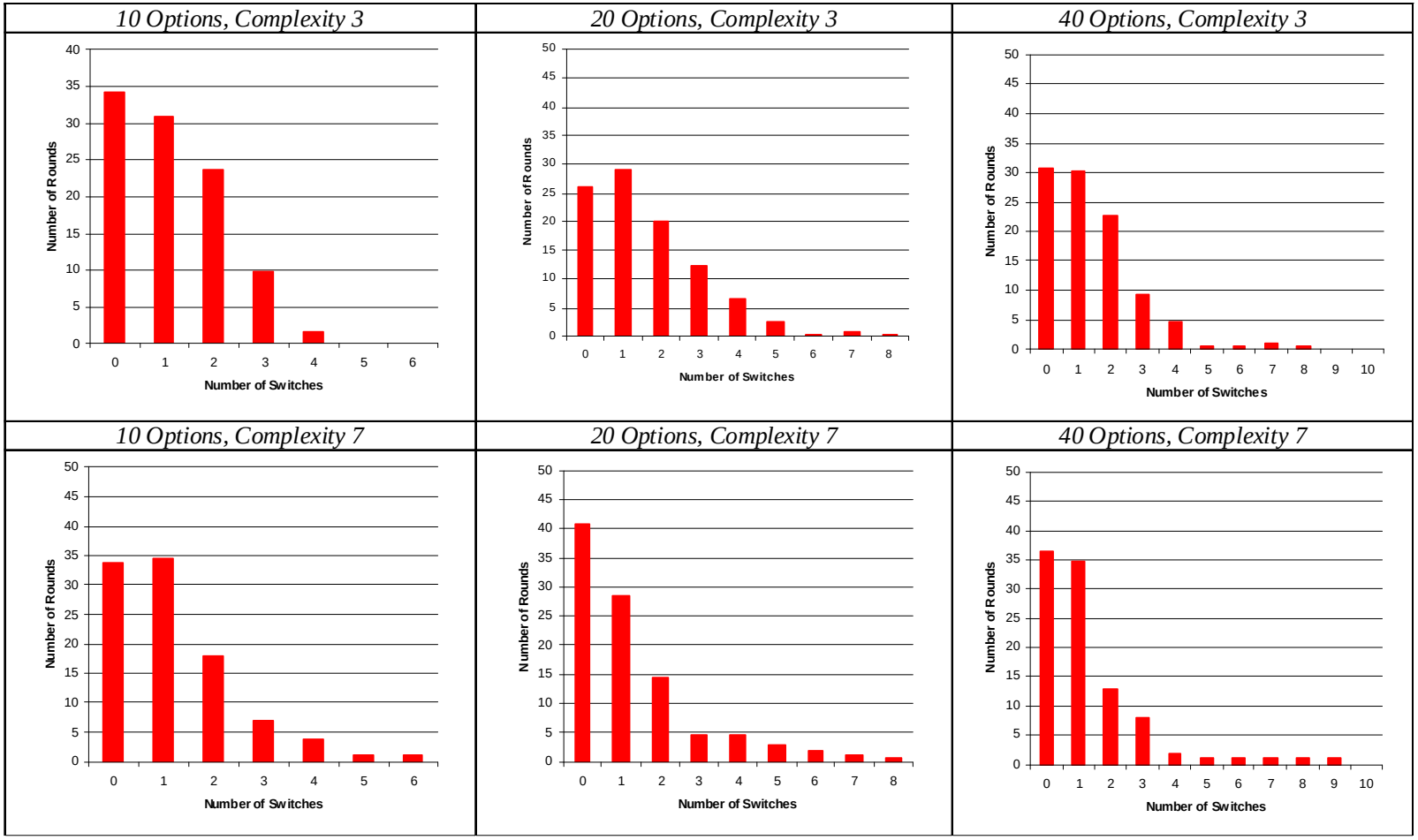


Stage 2: Choice Recorded



Do We Get Richer Data from Choice Process Methodology?

978 Rounds, 76 Subjects

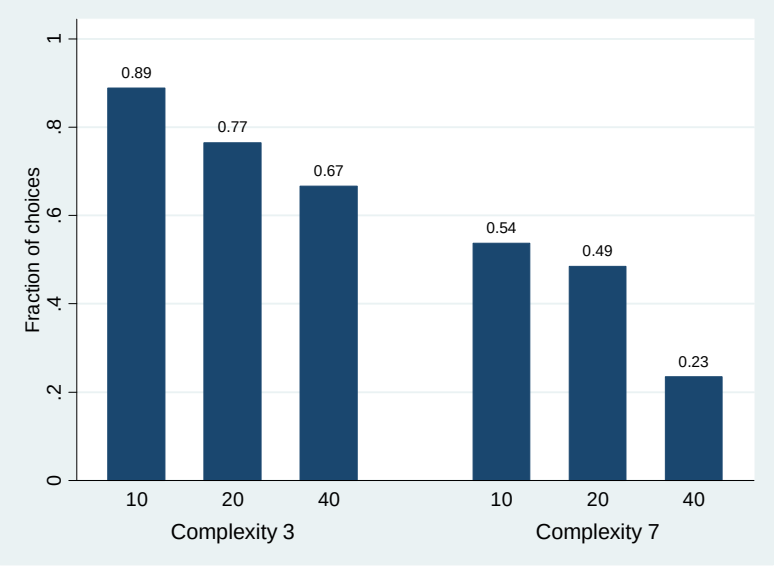


Testing Condition 1

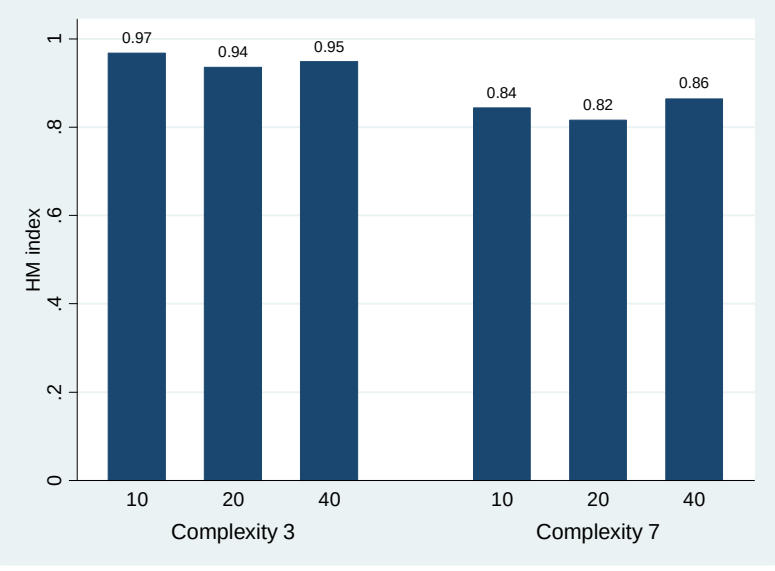
- Subjects must always switch to higher-valued objects **(Condition 1)**
- Graph the fraction of switches that satisfy condition 1
- Compare to the fraction of choices that satisfy 'standard' revealed preference

Traditional vs ABS Revealed Preference

Traditional



ABS



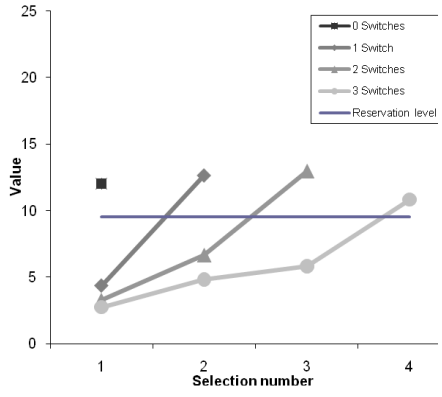
Satisficing

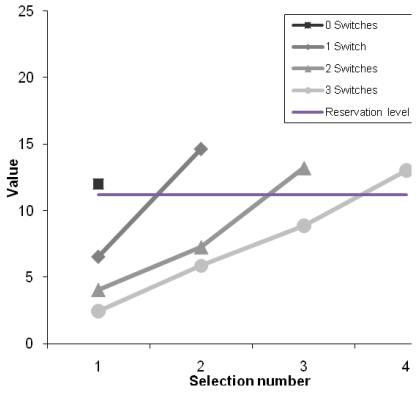
- Broadly speaking, subjects are searching sequentially
- Are they Satisficers?
- Can we find a utility level u^* such that they stop search if and only if they encounter a utility above u^*?

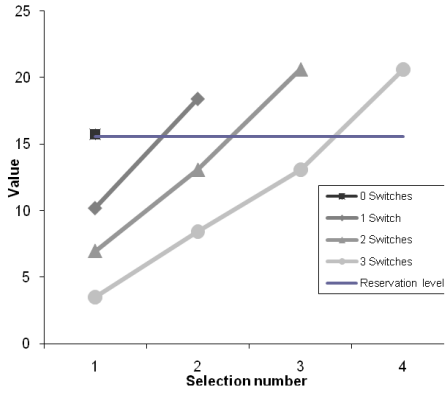
Satisficing Behavior a la Simon [1955]

10 20 40

3







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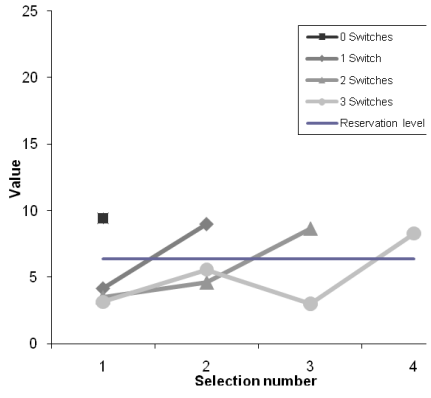

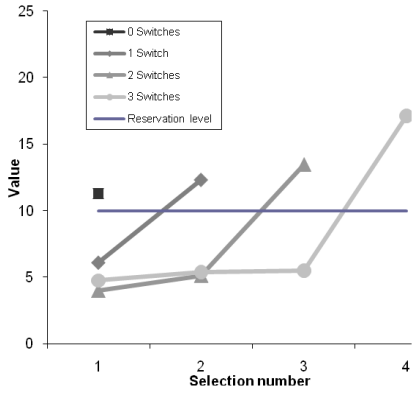

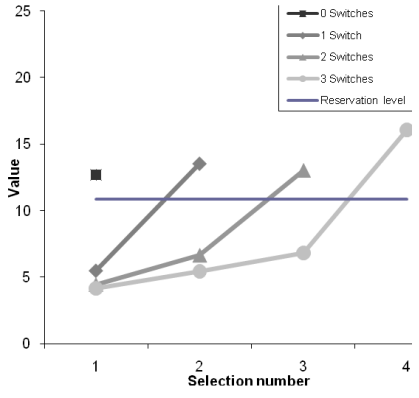

Estimating Reservation Levels

- Choice process data allows observation of subjects
  - Stopping search
  - Continuing to search
- Allows us to estimate reservation levels
- Assume that reservation level is calculated with some noise at each switch
- Can estimate reservation levels for each treatment using maximum likelihood

Estimated Reservation Levels

	Complexity			
Set size	3		7	
10	9.54	(0.20)	6.36	(0.13)
20	11.18	(0.12)	9.95	(0.10)
40	15.54	(0.11)	10.84	(0.10)

Estimating Reservation Levels

- Reservation levels decrease with complexity
  - As predicted by theory
- Increase with choice set size
  - Not predicted by theory