Faculty of Business, Economics and Statistics
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Supporting Bidding in Auctions

Essays in Behavioral Operational Research

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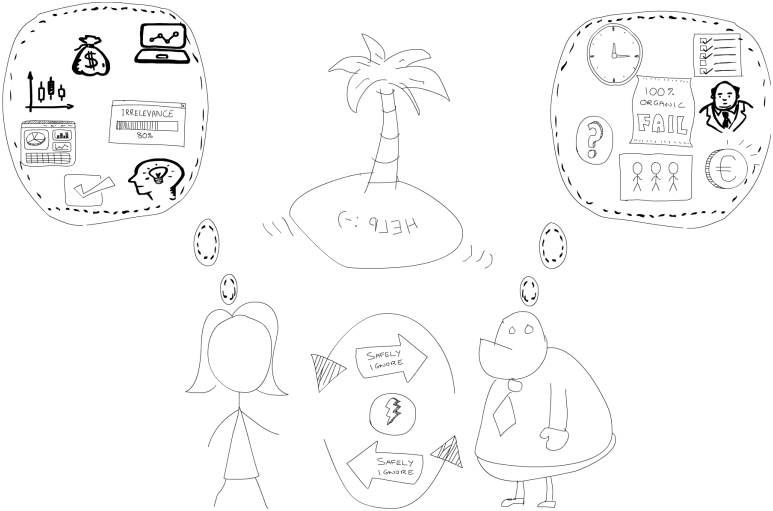
Table of Contents

Why Behavioral Operational Research (BOR)?

Introduction



What is BOR?
Introduction

Definition:

the study of behavioral aspects related to the use of OR methods in modeling, problem solving and decision support (Hämäläinen, Luoma, & Saarinen, 2013, p. 623).

Where can I use BOR methods? For decision support

Avoiding to lead decision makers in situations, where decision errors occur due to behavioral causes, e.g.:

- inappropriate representation of information → poor decision task performance
- consequences of unprocessed information
- consequences due to decision maker's psychometrics → overconfidence, framing, availability bias...

ERA - A Pilot Study Example

Introduction

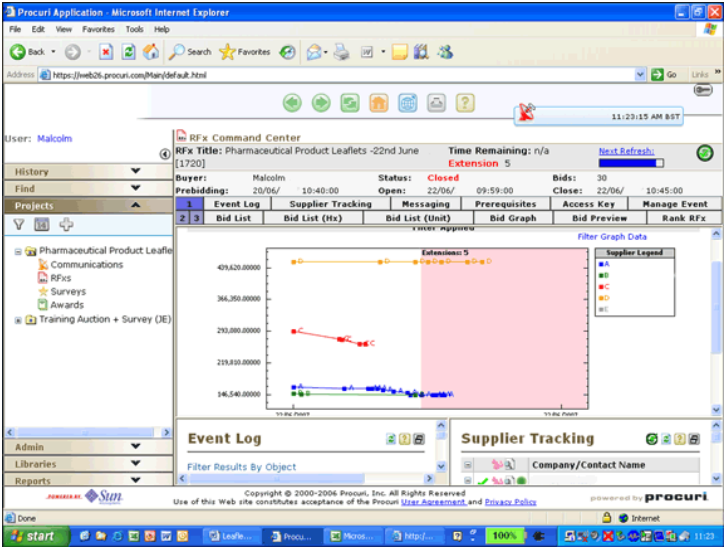
e-RA pilot case

- London borough of Newham (July 2005)
- About the results of auctions for the supply and delivery of 4 different lots
- **Size of the authority:** 11 districts and boroughs
- **Contract duration:** 1.09.2005 - 31.08.2009
- **Driver for e-RA implementation:** Max. cost savings

Commodity/Services	Value of Contract (GBP)	Saving %
Agency Staff	3.000.000	39
Outbound Telephony	1.000.000	35
IT Equipment	40.000.000	32
Mobile Telephony	15.100.000	20
Construction Service	76.000.000	16
Gas	200.000	13
Electrical Cable & Install	10.800.000	13
...	...	...
...	...	...
Total	**349.807.312**	**18.3**

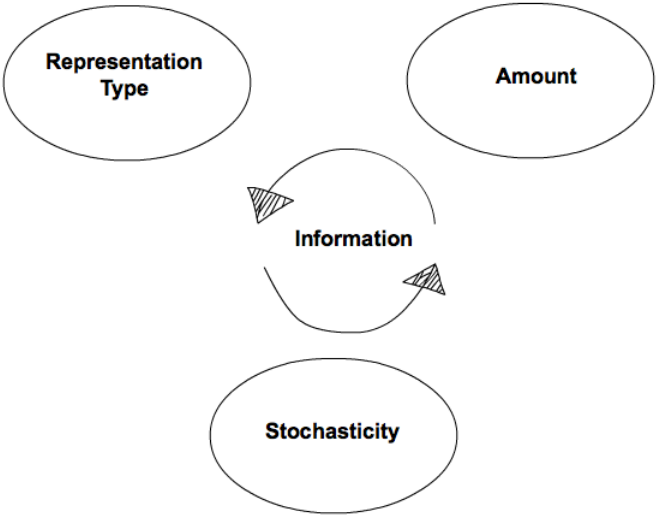
ERA - A Pilot Study Example

Introduction



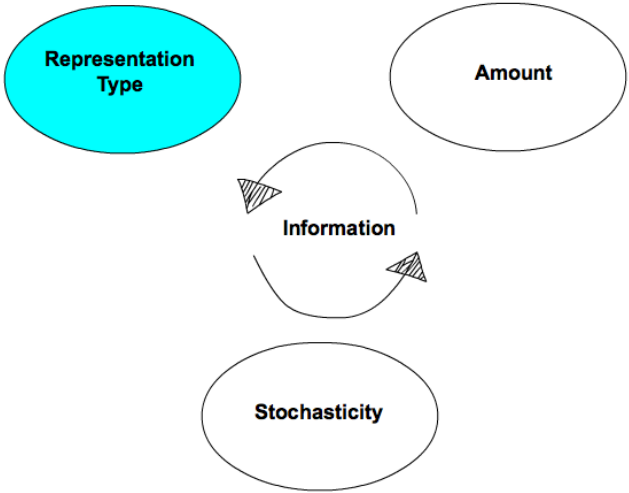
Overview of Studies

Introduction



Information Representation Study

Overview of Studies



Introduction

Information Representation Study (Engin & Vetschera, 2017)

Key Question of Interest:

Does information representation affect individual decision making?

Motivation:

- Early IS literature emphasizes the significance of the fit between problem characteristics & decision maker (Benbasat & Schroeder, 1977; DeSanctis, 1984)
- Literature concentrated primarily on the fit of the problem representation to the problem characteristics and **not to the decision maker** (Hwang & Wu, 1991). (For various justifications see (e.g. Huber, 1983; Davis, Bagozzi, & Warshaw, 1989; Agarwal & Prasad, 1999; Banker & Kauffman, 2004))

Introduction

Information Representation Study (Engin & Vetschera, 2017)

Paper's perspective:

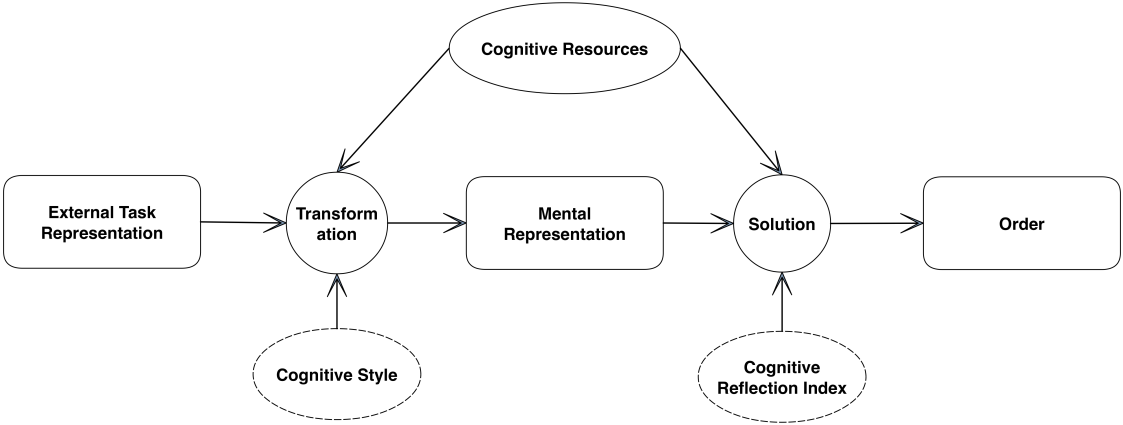
- Both fits between problem characteristics & problem representation and problem representation & decision maker have to be considered
- Evidence based guidance for the decision maker is needed to aid them in the choice of most suitable representation format for their needs (Mahoney, Roush, & Bandy, 2003)
- *"Softwares offer rich representation variety"* argument ignores the decision situations, where the decision maker does not have the choice to change the representation format (e.g. various e-commerce and auction platforms)

Focus:

- Effects of information presentation from the decision maker's perspective
- Hence, concentration on the acquisition of information needed for decision making, rather than on the subsequent processing steps

Research Model

Information Representation Study (Engin & Vetschera, 2017)



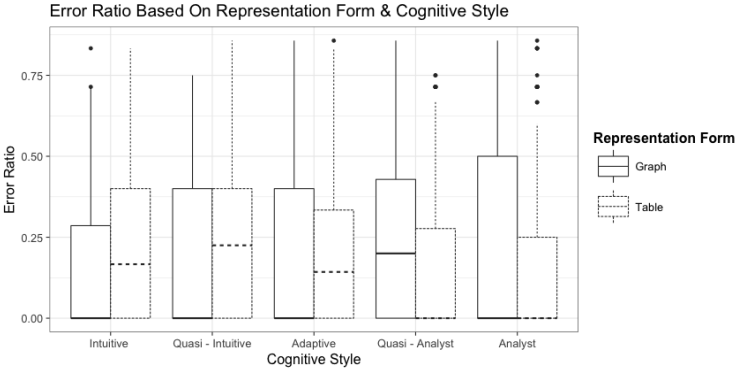
Layout of the information representation study

Results and Discussion

Information Representation Study (Engin & Vetschera, 2017)

Wilcoxon Rank Sum Test for error ratios (n = 227)

- non significant difference for adaptives
- significant difference at 5% level for quasi-intuitives (p=0.0103)
- significant difference at 1% level for all other types



Summary

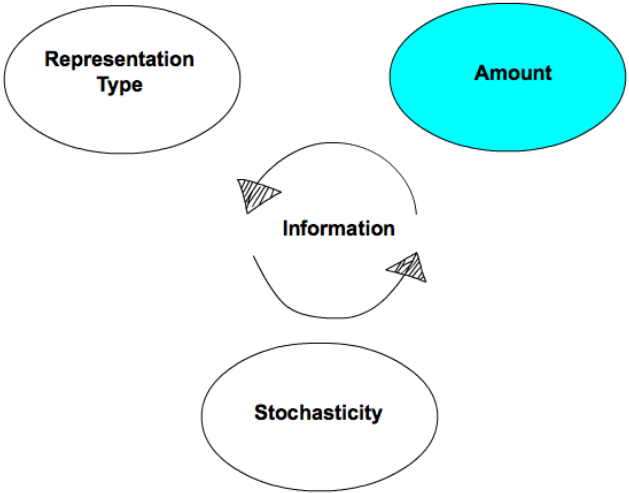
Information Representation Study (Engin & Vetschera, 2017)

Concluding Remarks

- Empirical evidence for the importance of representation fit not only to the task but also to the decision maker characteristics
- Implications for DSS; **"hidden costs"** of inappropriate representation formats w.r.t
  - weaker task performance in the current decision task
  - delayed effects of inappropriate representation to the subsequent tasks

Role of feedback on bidding behavior in ERAs

Overview of Studies



Introduction

Role of feedback on bidding behavior in ERAs

Motivation:

Normative DM literature argues more information in the environment leads to better decisions (e.g. Cantor & Macdonald, 2009; Sterman, 1989).

Assumption:

1. DM's are capable of processing the existing information
2. In case the first argument does not hold there are no consequences of unprocessed information, hence more information $\longrightarrow$ better decisions.

Research Question:

- We test the effect of different amounts of information on the individuals' decisions.
- **Self Harming Bidding Behavior:**
  Bidding behavior that leads to losses (i.e. offering a price less than own private cost)
- **Framework:** First price electronic reverse auctions
- **Methodology:** Experimental (n= 345)

Concluding Remarks:

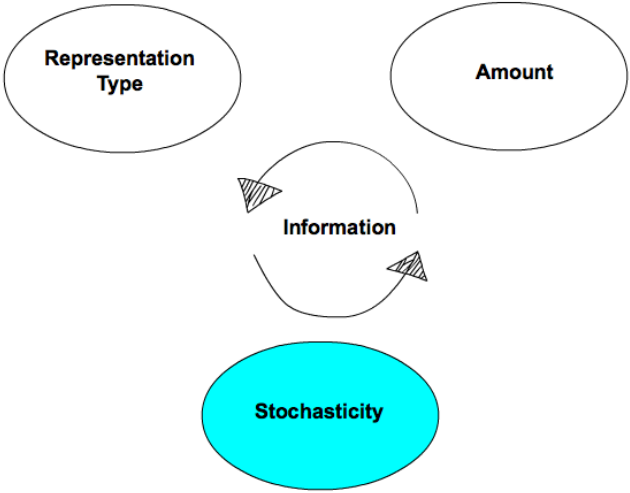
- Further investigation using **information compatibility theory** (Lichtenstein & Slovic, 1971)

Contribution to BOR literature with the following arguments:

- The argument that **all DM's** make better decisions with more information only holds conditionally.
- The argument that unused information does not affect the decision maker does not hold for bounded rational decision makers.
- Replication of the results from Hashim, Kannan, and Maximiano, 2017 in individual decision making case for the cases that the individuals' payoff directly depend on their decisions.

Optimistic overconfidence in bidding behavior with differently represented cost feedback in ERAs

Overview of Studies



Motivation:

Individual bidding behavior is influenced by the feedback bidders receive from the auction platform.

Assumption:

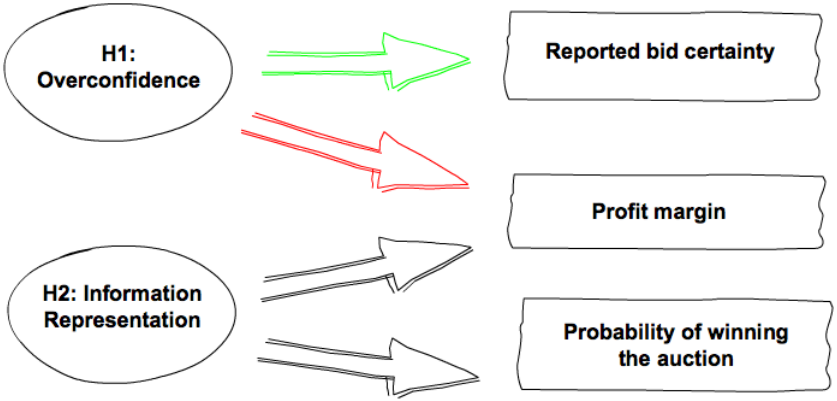
1. DM's perceive the information as stochastic
2. Individuals' psychometric differences (e. g. overconfidence, risk literacy, behavioral probabilities (Viscusi & Evans, 2006)) influence how they treat the information they receive.

Research Question:

- How are the bidding behavior and certainty of individuals influenced by stochastic information with different representations?

Hypotheses

Optimistic overconfidence in bidding behavior with differently represented cost feedback in ERAs



Summary

Optimistic overconfidence in bidding behavior with differently represented cost feedback in ERAs

Concluding Remarks:

- Psychometric profile of the individuals plays a significant role w.r.t. their probability judgements and the decisions based on them
- The argument that matching information representation to individual's cognitive makes the information more easily understandable and usable (Engin & Vetschera, 2017) holds in the competitive reverse auction environment as well.

Thank you for your attention!

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