Discussion of

# Information Acquisition, Efficiency, and Non-Fundamental Volatlity

by Hebert and La'O

Andrew Caplin

# The Question

Considers conditions on information cost functions that guarantee

- the existence of equilibria that only depend only on payoffs
- that equilibrium is efficient.

# The Answer

Definitive Answer:

- Distinct conditions on cost functions
- Very interesting conditions per se: what do transformations of the state space do to learning costs
- Introduce partial invariance, partial monotonicity
- Shannon is remarkable in satisfying both ++
- Cannot improve on their work or delivery

# The Follow-Up Question

- Friendly amendment: attention cost IS a payoff
- No less fundamental than utility or technology
- Learning aids have real impact (framing)
- What about positive effects that relate to the shape of learning costs per se?
- Where to look for macro evidence for quantitative calibration purposes?

# How Big a Deal Are Costs of Attention?

Personal Perspective:

- Most exciting "new" branch of economic and psychological theory in my academic lifetime
  - Roots in psych. 175+ years (Weber-Fechner)
  - Roots in econ. 75+ years (Hayek)
  - Marschak, Arrow highlighted gap
  - Sims initiated modern era

- Trunk of the social scientific tree

# How Big a Deal Is it Anyway?

Why So Important?

- Deeply contemporary (attention scarce)
- Implications obvious in behavior
  - Needle-Haystack?
  - 100% on all tests?
  - Applied microeconomics 100 case studies of mistakes in Top 5 (“facts”)
- Missing primitives for comprehension

# How Big a Deal Is it Anyway?

Convergent Evolution

- Many researchers found gap for own reasons
  - Mine - Revealed Preference
  - Anxiety (with Leahy) hard to operationalize
  - Bigger issue: what reveals private information, asymmetric information, out of equilibrium strategy?
- Block and Marschak proposal:
  - Imperfect information and utility confounded in standard choice data, even stochastic
  - So further enrich data

# How Big a Deal Is it Anyway?

- "State dependent stochastic choice" (SDSC) favorite attention revealing data set
  - Based in psychometrics
  - Actual quality
  - Actual tax rate
  - RP Suited: with Daniel Martin, Bayesian Expected Utility maximizer iff No Improving Action Switches
  - With Mark Dean, rational inattention need also No Improving Attention Cycles

# How Big a Deal Is it Anyway?

- Looked for implementable special cases..
- Search is a clever cheat and hard to test and clunky (fully understand some options?)
- Buy a normal signal: more/less not what
- Shannon/Sims advances: shape learning precisely to balance utility against cost
- Hybrid of utility and production theory
- Surprised at beauty, simplicity (e.g. Matejka and Mackay weighted logit), and richness (consideration sets with Dean and Leahy)

# How Big a Deal Is it Anyway?

- With Dean and Leahy, “Characterizing and Generalizing”: revealed preference approach
- Start with SDSC “rationalizable” with “Posterior Separable” cost function (Hebert and La’O introduced)
- Allows dependence on prior, etc.

# Pulling Back on the Literature

- A1: Locally Invariant Posteriors (sequential sampling rationale Hebert and Woodford)
- A2: Invariance Under Compression (ignore payoff irrelevant factors
- Theorem 1: A1 iff Uniformly PS
- Theorem 2: A2 iff Invariant PS (thx. To referee)
- Theorem 3: A1+A2 iff Shannon
- Proofs: Easier said than done

# Domain Matters

- Hebert and La'O new classes for equilibrium properties
  - Invariance and (related) monotonicity on sub-domains of cost function
- Hidden key to new literature is domain of the cost function
  - In equilibrium models, learn about features of others learning (average actions in Hebert-La'O)
- Bigger picture on domain: Blackwell experiments, SDSC, Bayes' consistent distributions of posteriors all give different and important insights

# Barriers to Progress

- Field deeply rooted and work is fresh but progress since Hayek relatively slow

- Many microeconomic theorists and behavioral economists reluctant
  - Did costs of learning already
  - Incomprehension implies irrationality

# Barriers to Progress

- Majority of applied microeconomists:
  - Theory so yesterday
  - Mostly Harmless, RCTs, and Machine Learning will take over
- Ignore it and it may go away
  - Possible, unfortunately

# In My Ideal World

- Path forward in macro/finance
  - Theory a la Hebert and La'O will uncover properties of learning costs and how they DO matter for equilibrium outcomes
  - We will identify properties of data that reveal these as valid approximations
  - We will learn to quantify/calibrate using microeconomic studies

# In My Ideal World

- There will be dramatic and related progress in:
  - Revealed Costs and Revealed Comprehension in Lab and Field Studies (e.g. Morrison and Taubinsky)
  - Games and shape of learning: (e.g. Denti)
  - Models of memory and expectations formation (e.g. Woodford, Malmendier and Nagel, Wachter and Kahane)
  - New applied field: inattentive survey responses (e.g. Enke and Graeber)
  - Information Design (Kamenica and Gentzkow)

# In My Ideal World

- The end of the beginning of information revolution not the beginning of the end
  - Attention ultimate scarce resource, key to income, utility, etc.
  - Long run importance on level of standard production function and utility theory
  - Theories operational by design
  - Seamlessly integrated into applied work
  - Linking up distinct fields of social science

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