

## Mark Schneider – Curriculum Vitae

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### PROFESSIONAL EXPERIENCE

Postdoctoral fellow, **Economic Science Institute, Chapman University** (2015 – present)

### EDUCATION

Ph.D., Operations & Information Management, **University of Connecticut, School of Business** (2015)

**Dissertation Title:** *Essays on Decision Making under Risk with applications to Auction Theory*

**Dissertation Committee:** *Robert Day, Mike Shor, Manuel Nunez*

B.A., Economics, **Yale University** (2008)

**Senior Thesis:** *The Credit Card Effect on Consumption and Saving* **Advisor:** *Robert Shiller*

### PUBLICATIONS

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1. Schneider, M., Day, R. (2016). “**Target Adjusted Utility Functions and Expected Utility Paradoxes.**” Accepted, *Management Science*.
2. Schneider, M., Nunez, M. (2015). “**A Simple Mean-Dispersion Model of Ambiguity Attitudes.**” *Journal of Mathematical Economics*, 58, 25-31. [\[Link\]](#)
3. Schneider, M., Coulter, R.A. (2015). “**A Dual Process Evaluability Framework for decision anomalies.**” *Journal of Economic Psychology*, 51, 183-198. [\[Link\]](#)
4. Schneider, M., Leland, J. (2015). “**Reference-dependence, Cooperation, and Coordination in Games**” *Judgment and Decision Making*, 10, 123-129. [\[Link\]](#)
5. Schneider, M., Day, R., Garfinkel, R. (2015). “**Risk Aversion and Loss Aversion in Core Selecting Auctions.**” *Decision Support Systems*, 79, 161-170. [\[Link\]](#)
6. Leland, J., Schneider, M. (2015). “**Salience and Strategy Choice in 2x2 Games.**” *Games*, 6 521-559 [\[Link\]](#)

### PAPERS UNDER REVIEW

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1. Schneider, M., Shor, M. “**The Allais Common Ratio Effect in Choice, Pricing, and Happiness Tasks,**” *Journal of Behavioral Decision Making*, under second review.

## WORKING PAPERS

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1. Schneider, M. “**Frame Dependent Utility Theory**” (2014 INFORMS DAS Student Paper Award)
2. Schneider, M. “**Dual Process Utility Theory.**” [\[Link\]](#)
3. Schneider, M. “**Economic Analysis with Systematically Biased Agents.**” [\[Link\]](#)
4. Schneider, M., Leland, J., Wilcox, N. “**Ambiguity Framed.**” [\[Link\]](#)
5. Schneider, M., Porter, D. “**Cognitive Reflection Predicts Decision Quality.**” [\[Link\]](#)
6. Leland, J., Schneider, M. “**Saliency, Framing, and Decision Making.**” [\[Link\]](#)

## WORK IN PROGRESS

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1. **Optimizing Choice Architectures** with C. Deck, M. Shor, T. Besedes, S. Sarangi.
2. **Stability of Risk Preferences across Presentations** with J. Leland and N. Wilcox.
3. **Is there a Neural Basis for the Zero-Price Effect? The Neuroeconomics of FREE!**  
(with M. Shor, and T. Besedes).
4. **A Model of Markets with Multi-dimensional Information Structures** (with M. Nunez)
5. **Bargain Hunting Heuristics in Consumer Choice**
6. **Frame Dependent Valuations of Consumer Products**

## RESEARCH INTERESTS

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**Topics:** Choices involving Risk, Uncertainty, or Time, Behavioral Economics, Choice Architecture, Auctions, Game Theory, Market Design, Information Economics.

**Methods:** Experimental Design, Analytical Modeling, Game Theory, Probability Theory, Decision Analysis. Computer Simulations, Meta-Analysis, Data Analysis.

## TEACHING INTERESTS

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Behavioral Economics, Experimental Economics, Game Theory, Microeconomics, Choice Theory

## HONORS AND AWARDS

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1. Student Paper Competition of the INFORMS Decision Analysis Society, First place winner (2014)
2. OPIM Departmental Outstanding Student Scholar Award, UConn School of Business (2013).
3. Yale College David Everett Chantler Award for graduating student exhibiting strength of character and high moral purpose (2008).
4. Department of Homeland Security Scholar in Science and Technology (2006).
5. Y50K Yale Entrepreneurial Society Business Plan Competition, Finalist (2005)
6. USA Today’s High School Academic First Team (2004)
7. Siemens-Westinghouse Math, Science, Technology Competition, National Winner (2003)

## **INVITED PRESENTATIONS**

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1. “Dual Process Utility Theory,” University of Chicago, Booth School of Business (2016)
2. “Dual Process Utility Theory,” University of Pennsylvania, Wharton School (2016)
3. “Frame-Dependent Utility Theory”, *INFORMS Annual Meeting*, San Francisco, (2014)
4. “Frame-Dependent Risk and Time Preferences”, Consumer Financial Protection Bureau (2014)
5. “Leveraging rationality: Losses Loom Larger than Gains,” Yale School of Management (2012)

## **PRESENTATIONS**

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1. *Bay Area Behavioral and Experimental Economics Workshop* (2016): “Ambiguity Framed.”
2. *Edwards Bayesian Research Conference* (2016): “Ambiguity Framed”
3. *International Game Theory Festival*, Stony Brook (2015): “Frame Dependent Utility Theory.”
4. *INFORMS Annual Meeting*, San Francisco (2014): “Resolving Expected Utility Paradoxes with a Moving Target Partial Moments Model,” with B. Day & R. Garfinkel.
5. *INFORMS Annual Meeting*, Minneapolis (2013): “Skewness Preference and Behavior towards Risk,” with B. Day & R. Garfinkel.
6. *INFORMS Annual Meeting*, Phoenix (2012): “An Algorithm for Finding Bayes-Nash equilibrium in Core-Selecting Auctions,” with B. Day.
7. *INFORMS Marketing Science Conference*, Boston (2012): “Deciding by Feeling and Calculation,” with R. Coulter.
8. *Annual Conference of the Society for Judgment & Decision making*, Minneapolis (2012): “Predicting the Influence of Affect,” with R. Coulter.
9. *INFORMS Annual Meeting*, Charlotte (2011): “Efficiency in Core-selecting Auctions,” with B. Day & R. Garfinkel.
10. *Annual Conference of the Society for Judgment & Decision making*, St. Louis (2010): “Towards an Integrated View of Rationality.” (poster presentation)
11. *Annual Conference of the Society for Judgment & Decision Making*, Boston (2009): “Context Dependent Choice Heuristics.” (poster presentation)
12. *DHS scholars and fellows Orientation*, Washington DC (2007): “Using Network Analysis to Identify Centers of Knowledge.” (poster presentation)

## **SKILLS**

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Statistical packages: STATA, R. Languages: C++, Visual Basic, Visual Studio, SQL, HTML  
Other: STELLA, ORA, Scientific Workplace, Mathematica, QUALTRICS survey software,  
CITI Program Training in Human Subjects Research

## **REFEREE**

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National Science Foundation, Management Science, Games and Economic Behavior

## **AFFILIATIONS**

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American Economic Association, Econometric Society

## INTERVIEWS WITH GREAT MINDS IN ECONOMICS AND COGNITIVE SCIENCE

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1. Schneider, M. (2012), "Sitting down with Noam Chomsky," *The Yale Scientific Magazine*.  
<http://www.yalescientific.org/2012/03/sitting-down-with-noam-chomsky/>
2. Schneider, M. (2008). "Great Minds in Economics: An interview with John Nash." *The Yale Economic Review*, Vol. IV, (2), 26-31. [\[Link\]](#)
3. Schneider, M. (2007). "Great Minds in Economics: An interview with Daniel Kahneman." *The Yale Economic Review*, Vol. IV, (1), 22-27. [\[Link\]](#)
4. Schneider, M. (2007). "Great Minds in Economics: An interview with Robert Solow." *The Yale Economic Review*, Vol. III, (2), 18-23. [\[Link\]](#)
5. Schneider, M. (2006). "Great Minds in Economics: An interview with Milton Friedman." *The Yale Economic Review*, Vol. III, (1), 39-43. [\[Link\]](#)
6. Schneider, M. (2006). "Great Minds in Economics: An interview with Paul Samuelson." *The Yale Economic Review*, Vol. II, (3), 39-42. [\[Link\]](#)

## WORK / RESEARCH EXPERIENCE

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### Research Assistant

1. Robert Day, University of Connecticut (2010-2014) "Equilibria in Combinatorial Auctions"
2. Robert Shiller, Yale University (2006), *Animal Spirits: How Human Psychology Drives the Economy, and Why it Matters for Global Capitalism*.
3. Lauren Cohen, Yale University (2006), Behavioral Finance.

### Research Intern

1. Lawrence Livermore National Laboratory (2007), *Using Network Analysis to Identify Centers of Knowledge*.
2. Connecticut Attorney General Office, Antitrust Department (2005)

### Yale Economic Review (September 2005 – August 2008)

1. Senior Editor (June 2006 – August 2008)
2. Academics Editor (September 2005 – May 2006)

## TEACHING EXPERIENCE

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1. OPIM 3104 (Operations Management; 3 credit course with a focus on operations and analytics). Course Instructor, Fall 2012, Spring 2013, Fall 2013, Spring 2014, Fall 2014 (Two sections)  
Teaching Evaluations<sup>1</sup>: 8.7/10, 4.4/5, 4.3/5, 3.9/5, 4.1/5, 4.4/5
2. BADM 3760 (Business Information Systems; 3 credit online course). Course Instructor, Summer 2012. Not formally evaluated.
3. BADM 3001, (Microsoft Office; 1 credit course), Course Coordinator and Instructor 2010-2012. Not formally evaluated.

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<sup>1</sup> Evaluation system changed from 10-pt to 5-pt scale in 2013.

## REFERENCES

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### **Robin A. Coulter, Ph.D.**

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### **Jonathan W. Leland, Ph.D.**

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### **Mike Shor, Ph.D.**

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### **Harry M. Markowitz, Ph.D.**

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## Abstracts of Selected Papers

### **“Target-Adjusted Utility Functions and Expected-Utility Paradoxes”** with R. Day

(Accepted, *Management Science*)

Experimental tests of expected-utility theory (EU) have accumulated empirical observations in which the predictions of EU are systematically violated. Cumulative Prospect Theory (CPT) explains violations such as the Allais paradoxes and fourfold pattern of risk attitudes as resulting from non-linear probability transformations. Here we show that the classical paradoxes for decisions under risk can be explained with preferences that are linear in probabilities for any choice set and that maximize an expected utility function with respect to an endogenous target return. We introduce the maximin payoff as a plausible and even natural target return from a choice set and show that the resulting Target-Adjusted Utility (TAU) model explains additional empirical observations such as the scale-dependence of the Allais paradox that cannot be explained by standard specifications of CPT. Further, using data from three prominent laboratory experiments, we find that TAU is effective in explaining observed behaviors.

### **“A Simple Mean-Dispersion Model of Ambiguity Attitudes”** with M. Nunez

(*Journal of Mathematical Economics*, 2015)

Several characterizations of ambiguity aversion decompose preferences into the expected utility of an act and an adjustment factor, an ambiguity index, or a dispersion function. In each of these cases, the adjustment factor has very little structure imposed on it, and thus these models provide little guidance as to which function to use from the infinite class of possible alternatives. In this paper, we provide a simple axiomatic characterization of mean-dispersion preferences which uniquely determines a subjective probability distribution over a set of possible priors and which uniquely identifies the dispersion function. We provide an algorithm for determining this subjective probability distribution and the coefficient in the dispersion function from experimental data. We also demonstrate that the model explains ambiguity aversion in the Ellsberg paradoxes.

### **“Salience and Strategy Choice in 2x2 Games”** with J. Leland

(*Games*, 2015)

We present a model of boundedly rational play in single-shot  $2 \times 2$  games. Players choose strategies based on the perceived salience of their own payoffs and, if own-payoff salience is uninformative, on the perceived salience of their opponent's payoffs. When own payoffs are salient, the model's predictions correspond to those of Level-1 players in a cognitive hierarchy model. When it is the other player's payoffs that are salient, the predictions of the model correspond to those of traditional game theory. The model provides unique predictions for the entire class of  $2 \times 2$  games. It identifies games where a Nash equilibrium will always occur, ones where it will never occur, and ones where it will occur only for certain payoff values. It also predicts the outcome of games for which there are no pure Nash equilibria. Experimental results supporting these predictions are presented.

**“A Dual Process Evaluability Framework for Decision Anomalies”** with R. Coulter

*(Journal of Economic Psychology, 2015)*

Alternative explanations have been offered to explain consumers’ inconsistent preferences in decision problems. We present a Dual Process Evaluability Framework (DPEF) which suggests that the characteristics of the decision problem, including response mode, presentation mode, and choice-set structure, are critical to predicting preference reversals related to decisions under risk and uncertainty, over time, and between product assortments, as well as presentation mode reversals involving joint versus separate evaluations, and response mode reversals involving a combination of choice tasks, monetary value tasks, and attractiveness ratings. Our framework, grounded in evaluability theory and dual process models, predicts how these decision problem characteristics directly affect the ease of evaluation of alternatives which subsequently affects the relative dominance of feeling versus calculation in these tasks. Application of DPEF to previously documented preference reversals, complemented by three studies which test new predictions of DPEF, reveals that DPEF provides a parsimonious explanation for a variety of decision anomalies.

**“Frame-Dependent Utility Theory”**

*(INFORMS Decision Analysis Society, Winner of 2014 Student Paper Award)*

We present a model of decisions under risk called frame-dependent utility theory which is based on emerging evidence from the neuroscience of decision making. The model generalizes expected utility theory by explicitly modeling both the framing of choice alternatives and the decision maker’s risk perception. The model predicts how different frames systematically elicit different preferences and provides a unified explanation for some important empirical violations of rational choice theory. We provide a simple preference foundation for the model and apply the model to the data which originally identified the fourfold pattern of risk attitudes. We show that, under the proposed model, the data can be more parsimoniously explained as a twofold pattern.

**“Risk Aversion and Loss Aversion in Core-Selecting Auctions”** with R. Day & R. Garfinkel

*(Decision Support Systems, 2015)*

Core-selecting combinatorial auctions have been introduced as an alternative to the Vickrey-Clarke-Groves (VCG) mechanism because VCG results in payments that are not in the core with respect to bids, leading to unfair payments, unacceptably low revenues, and unstable outcomes. This raises an auction selection problem for an auctioneer deciding whether to employ a core-selecting auction or VCG mechanism in practice. The downside of a core-selecting auction is that it is not incentive compatible, as bidders have an incentive to reduce (shade) their bids below their true values. It has been argued that such bid shading in core-selecting auctions may lead to lower efficiency, lower revenue, and outcomes that are, on average, farther from the core with respect to true values, than the VCG mechanism. Using a much-studied auction environment, we address the auction selection problem faced by an auctioneer and obtain Bayes-Nash equilibrium bidding strategies when bidders are loss averse. We also bound the equilibrium strategies when bidders are risk-averse. This analysis demonstrates that when bidders are risk-averse or loss-averse, core-selecting auctions outperform the VCG mechanism in terms of revenue and stability, while yielding efficient allocations with high probability.

### **“Salience, Framing, and Decisions under Risk, Uncertainty, and Time”** with J. Leland

We propose a comparative model of decision making under risk, uncertainty, and time, in which large differences in payoffs and probabilities or dates of receipt are perceived as salient and overweighted in the evaluation process. The predictions of the model depend on what differences are compared across alternatives which, in turn, depends on how the choice is framed. We formalize a class of matrix-based frames which applies to decisions under risk, uncertainty, and time, and we specify two important types of frames within this class: *minimal frames* which provide the simplest representation of choice alternatives, and *transparent frames* which make the normative appeal of the classical rationality axioms more transparent. We also propose two simple and natural assumptions regarding the perceived salience of differences in numerical magnitudes. We show that the model predicts systematic framing effects in which people will exhibit major violations of rational choice theory (the Allais paradox, common ratio effect, Ellsberg paradox, present bias, and violations of stochastic dominance) when the options are represented in a minimal frame but will behave more consistently with the classical axioms when the same choices are presented in a transparent frame.

### **“Ambiguity Framed”** with J. Leland & N. Wilcox

In his exposition of subjective expected utility theory, Savage (1954) proposed that the Allais paradox could be reduced if it were recast into a format which made the appeal of the independence axiom of expected utility theory more transparent. Recent studies consistently find support for this prediction. We consider a salience-based choice model which explains this frame-dependence of the Allais paradox and derive the novel prediction that the same type of presentation format will also reduce Ellsberg-style violations of subjective expected utility theory since that format makes the appeal of Savage’s “sure thing principle” more transparent. We design an experiment to test this prediction and find strong support for such frame dependence of ambiguity aversion in Ellsberg-style choices. In particular, we observe markedly less ambiguity-averse behavior in Savage’s matrix format than in a standard ‘prospect’ format.

### **“Dual Process Utility Theory: A Model of Decisions under Risk and over Time”**

Discounted Expected Utility theory has come under scrutiny with recent findings that risk preferences are not time preferences, that risk and time preferences are not independent, and that risk and time preferences are correlated with cognitive ability, a parameter that appears nowhere in classical economic models. Here we address these issues in a model of an agent’s risky and intertemporal choices based on the interaction of two valuation processes – valuation by feeling and valuation by calculation. The resulting Dual Process Utility theory provides a unified approach to modeling risk preference, time preference, and interactions between risk and time preferences. The model also provides a unification of three broad classes of decision theories – models based on a rational economic agent, models based on prospect theory or rank-dependent utility theory, and dual system or dual-selves models of decision making.

## **“Economic Analysis with Systematically Biased Agents”**

A tenet of behavioral economics is that biases are systematic and should have visible effects in economic applications. Expected utility maximization has been widely applied in economic analysis, but progress has been slower incorporating 'systematically biased' agents into applications involving risk. This contrasts with the widespread application of present-biased preferences in intertemporal settings. To address this gap, we advocate a model of quasi-rank dependent probability weighting as a natural analog to quasi-hyperbolic discounting for decisions under risk. The model satisfies stochastic dominance and transitivity and transforms individual rather than cumulative probabilities. We illustrate the model's tractability in several economic applications.

## **“Cognitive Reflection and Decision Quality in Individual and Strategic Decisions”** with D. Porter

Cognitive reflection has been shown to be an important trait which is correlated with the propensity to take risks, the propensity to delay gratification, and the propensity to form accurate beliefs about others' behavior. However, previous research has not cleanly identified whether reflective thinkers make 'better' decisions than intuitive thinkers since inferences of decision quality are confounded by inferences regarding risk preferences, time preferences, and beliefs. In this paper, we directly test for differences in decision quality between reflective thinkers and intuitive thinkers in both individual and strategic decisions using a design which makes it possible to objectively rank risky and strategic choices, independent of one's attitudes toward risk or one's beliefs about the strategic sophistication or altruism of other decision makers. Employing a lottery choice task involving a dominant and a dominated alternative, and implementing multiple rounds of a second price auction, we find that the tendency to cognitively reflect has strong predictive power across domains (reasoning tasks, choices between lotteries, bidding behavior in auctions), and across time (as the tasks were administered on separate dates). In particular, the *same* subjects who engaged in reflective thinking on simple reasoning problems were also more likely to choose optimally in the lottery choice task and to bid closer to the dominant strategy equilibrium in second price auctions. We also find that experience helps to narrow the gap in performance between reflective and intuitive thinkers.

## **“Optimizing Choice Architectures”** with C. Deck, M. Shor, T. Besedes, and S. Sarangi

Decision quality can be reduced in large choice sets. Choice architecture can potentially improve decision quality. This paper tests the ability of six choice architectures to induce better decisions. We manipulate two features of a choice architecture – the response mode (how rankings over alternatives are expressed) and presentation mode (how information is presented). Our design makes it possible to objectively rank all options. We find that joint presentation outperforms separate presentation. We also find that low cognitive ability subjects perform better when choosing from a *large* choice set than when choosing from small sets collectively containing the same alternatives. This finding illustrates a basic tradeoff in the design of choice architectures: For a fixed choice set, presenting fewer options improves decision quality within that set, but requires architectures to elicit multiple responses, increasing the opportunity for errors.