

Daniel G. Stephenson

Department of Economics
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Research Interests

mechanism design, dynamic games, learning, contests, experimental economics

Employment

Assistant Professor of Economics, Virginia Commonwealth University, 2019 - Present
Postdoctoral Research Associate, Chapman University, 2017 - 2019

Education

Ph.D. in Economics, Texas A&M University, 2011 - 2017
B.Sc. (Summa Cum Laude) in Economics, Campbell University, 2006 - 2010

Publications

Multi-battle Contests Over Complementary Battlefields
Review of Economic Design (2024)

Assignment Feedback in School Choice Mechanisms
Experimental Economics (2022)

Bargains, Price Signaling, and Efficiency in Markets with Asymmetric Information
Games and Economic Behavior (2021) (with Mark Schneider)

Playing the Field in All Pay Auctions
Experimental Economics (2021) (with Alex Brown)

Coordination and Evolutionary Dynamics: When are Evolutionary Models Reliable?
Games and Economic Behavior (2019)

Continuous-Time Experiments
Handbook of Experimental Game Theory (2020) (with Alexander L. Brown)
Rachel Croson, Tanya Rosenblatt, and Mary Rigdon (eds.)

Working Papers

Testing the simplicity of strategy-proof mechanisms
(with Alexander Brown and Rodrigo Velez)

The Endogenous Nature of War and Its Economic Consequences
(with Jordan Adamson)

Behavioral Reactions to Being Overruled
(with Manuel Hoffmann)

Disequilibrium Incentives in Resource Allocation Conflicts

Knowledge, Interest Rates, and Asset Price Bubbles

Learning, Signaling, and the Stability of Educational Systems

Adjustment Externalities in Dynamic Oligopolies

Teaching

ECON 338, Game Theory, Virginia Commonwealth University

SCMA 524, Statistical Analysis, Virginia Commonwealth University

Econ 202, Principles of Economics, Texas A&M University

Econ 459, Games and Economic Behavior, Texas A&M University

Awards

Distinguished Early Career Award
Virginia Commonwealth University, 2024

The John Van Huyck Graduate Fellowship
Department of Economics, Texas A&M University, 2016

The S. Charles Maurice Graduate Fellowship
Department of Economics, Texas A&M University, 2015

Outstanding Graduate Instructor in Upper Level Economics
Department of Economics, Texas A&M University, 2015

Doctoral Dissertation Research Improvement Grant
National Science Foundation, 2014

Best Fourth Year Presentation Award
Department of Economics, Texas A&M University, 2014

My research investigates dynamic interactions between boundedly rational agents. I seek to understand the factors that influence the stability of long-run behavior and the dynamic process of behavioral adjustment from which stable patterns of behavior may emerge over time. To address these questions, I test models of dynamic behavior using controlled laboratory experiments that study strategic environments including markets, auctions, conflicts, and allocation mechanisms. The remainder of this section provides further details about my work and my plans for future research.

My paper entitled “Coordination and evolutionary dynamics: When are evolutionary models reliable?” was published in *Games and Economic Behavior* in 2019. It reports a continuous-time experimental test of evolutionary models in coordinated attacker-defender games. It implements three experimental treatment conditions: one with strong coordination incentives, one with weak coordination incentives, and one with zero coordination incentives. Each treatment exhibits identical equilibrium predictions but distinct evolutionary predictions. Observed behavior was tightly clustered around equilibrium under both the zero coordination treatment and the weak coordination treatment but widely dispersed from equilibrium under the strong coordination treatment. This result was anticipated by explicitly dynamic evolutionary models but not by conventional stability criteria. In contrast to the widely maintained assumption of sign-preservation, subjects frequently switched to lower earning strategies, suggesting that non-sign-preserving evolutionary models may provide a more accurate characterization of human behavior.

Alex Brown and I published a paper titled “Playing the field in all-pay auctions” in *Experimental Economics* in 2021. It provides the first examination of all-pay auctions using continuous-time protocols, allowing subjects to adjust their bid at will, observe payoffs almost instantaneously, and gain more experience through repeated-play than in previous, discrete-time, implementations. Unlike previous studies of the all-pay auction, we observe underbidding relative to Nash equilibrium. To test the predictions of evolutionary models, we vary the number of bidders and prizes across treatments. If two bidders compete for a single prize, evolutionary models predict convergence to equilibrium. If three bidders compete for two prizes, evolutionary models predict non-convergent cyclical behavior. Consistent with evolutionary predictions, we observe cyclical behavior in both auctions and greater instability in two-prize auctions. These results suggest that evolutionary models can provide practitioners in the field with additional information about long-run aggregate behavior that is absent from conventional models. We also published a book chapter about continuous-time experiments in “*The Handbook of Experimental Game Theory*” in 2020.

Mark Schneider and I published a paper titled “Bargains, Price Signaling, and Efficiency in Markets with Asymmetric Information” in *Games and Economic Behavior* in 2021. In this paper, we experimentally investigate bargains, price signaling, and efficiency in markets with asymmetric information where some buyers are informed and some sellers are informed. We show that all perfect Bayesian equilibria where transactions occur under known gains from trade fall into one of two categories. In some cases, uninformed sellers charge high prices but uninformed buyers are only willing to pay low prices. Otherwise, uninformed sellers charge low prices and uninformed buyers are willing to pay high prices. This latter case is shown to exhibit more bargains and greater efficiency. Consistent with equilibrium predictions, we observe significantly fewer transactions and bargains in our first treatment.

In contrast to equilibrium predictions, uninformed buyers selected far lower reservation prices than informed high quality buyers in the second treatment as predicted by adaptive models. My paper titled “Assignment feedback in school choice mechanisms” was published in *Experimental Economics* in 2022. It experimentally investigates the provision of real-time feedback about school assignments during the preference reporting period in three widely employed mechanisms: deferred acceptance, top trading cycles, and the Boston mechanism. Adaptive models predict that greater sensitivity to tentative assignments during the reporting period will produce more equilibrium assignments in all three mechanisms. Consistent with adaptive predictions, real-time assignment feedback consistently increased equilibrium assignments but did not increase truthful reporting. These findings suggest that providing feedback about assignments during the preference reporting period could help student assignment mechanisms more reliably achieve policy goals.

My paper titled “Multi-battle contests over complementary battlefields” was published in the *Review of Economic Design* in 2024. This paper studies contests with complementary prizes where each agent simultaneously distributes a fixed budget over multiple battlefields. Each battlefield has a single prize which is divided among the competitors in proportion to an arbitrary power function of their investment levels. A unique pure strategy Nash equilibrium is shown to exist under arbitrarily sensitive battlefield success functions if objective functions exhibit constant subunitary elasticity of substitution between prize shares. In contrast, Blotto contests with linear objectives have only mixed strategy Nash equilibria if battlefield success functions are sufficiently sensitive to investment levels. Sufficient complementarity between prize shares allows pure strategy Nash equilibria to exist under arbitrarily sensitive battlefield success functions.

This paper provides the theoretical foundation for my working paper titled “Disequilibrium Incentives in Resource Allocation Conflicts.” This paper experimentally investigates conflicts where agents allocate resources to compete for shares of complementary factors. A competitor’s share of a given factor is proportional to a power function of their resource allocation to the corresponding contest. Objective functions exhibit constant subunitary elasticity between factors. More responsive contest success functions produce stronger incentives to best respond, but also bring non-equilibrium best responses farther from equilibrium. The experimental design varies the responsiveness of success functions across treatment conditions. Consistent with best responses to non-equilibrium behavior, observed resource allocations were significantly closer to equilibrium predictions under less responsive success functions, suggesting that non-equilibrium incentives contain important information about the reliability of equilibrium predictions.

Rodrigo Velez, Alex Brown, and I have a paper under review at *Theoretical Economics* titled “Testing the simplicity of strategy-proof mechanisms.” This paper experimentally evaluates four mechanisms intended to achieve the Uniform outcome in rationing problems. Our benchmark is the dominant-strategy, direct-revelation mechanism of the Uniform rule. A strategically equivalent mechanism that provides non-binding feedback during the reporting period greatly improves performance. A sequential revelation mechanism produces modest improvements despite not possessing dominant strategies. A novel, obviously strategy-proof mechanism does not improve performance. We characterize each alternative to the direct

mechanism, finding general lessons about the advantages of real-time feedback and sequentiality of play as well as the potential shortcomings of an obviously strategy-proof mechanism.

Jordan Adamson and I have a paper under review at the Journal of Political Economy titled “The Endogenous Nature of War and Its Economic Consequences.” This paper studies the movement of populations between production, attack, and defense within competing nation states. Macrohistorical theories of development often depict war as positively affecting the economy. Yet these theories, and the supporting evidence, assume that war is an exogenous shock. After revisiting the raw data in Europe, we suppose instead that war is endogenous and create a model of how different populations of producers, attackers, and defenders change over time. We then investigate what typical statistical analyses estimate with data generated from our model. These statistical analyses typically suggest war positively affects the economy when in fact it is harmful. We caution against "mostly harmless" econometrics that suggest European prosperity comes from its violent past rather than its peaceful present.

My working paper titled “Knowledge, Interest Rates, and Asset Price Bubbles” characterizes the relationship between interest rates, investment horizons, and the size of price bubbles under finite order knowledge of rationality. An outcome is said to be rationalizable if it is consistent with the assumption that all agents possess common knowledge of rationality. As the transaction rate approaches infinity, the unique rationalizable price path is shown to instantaneously coincide with the fundamental value. Under finite transaction rates, the unique rationalizable price path is shown to converge on the fundamental value as quickly as possible. In contrast, rational agents with finite order knowledge of rationality are shown to generate price bubbles that deviate from the rationalizable price path. Lower interest rates and shorter investment horizons are shown to produce larger bubbles under every finite order knowledge of rationality.

I am a Co-Principal Investigator for a research project conducting multidisciplinary analysis of vaccination games for equity funded by a continuing grant from the National Science Foundation. This project addresses the global health threat of vaccine inequity in the fight against emerging infectious diseases. This project aims to provide a comprehensive understanding of vaccination coverage and identify key drivers of vaccine uptake. This will reduce the risk of future pandemics by enabling targeted interventions to increase vaccine acceptance among vulnerable populations. My colleagues and I have constructed a model that makes testable predictions about vaccination rates in heterogeneous populations and we have designed an experiment that will allow us to identify the behavioral effects of heterogeneity and how these effects interact with the basic reproduction number of the disease. We plan to start running experimental sessions in the Fall.

I have several ongoing research projects. I have a project with Manuel Hoffmann investigating behavioral reactions to being overruled. I have a project comparing the stability of educational systems that signal preexisting ability with the stability of educational systems that augment ability. I also have a project investigating adjustment externalities in dynamic oligopolies. I have presented my research at high quality academic conferences including the Stony Brook International Conference on Game Theory, the World Economic Science Association Meetings, and the Royal Economic Society Annual Conference.