Research Statement

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I use theory and experiments to study how limited cognition and psychological motives influence economic behavior across strategic and non-strategic settings. My general methodological approach is to integrate ideas from cognitive science and psychology into existing economic frameworks such as game theory and models of social preferences. In doing so, my work not only innovates upon existing theory but also directly tests the implications of the new hypotheses I develop.

Job Market Paper

In my job market paper, "Rationally Inattentive and Strategically (un)Sophisticated: Theory and Experiment," I study how the strategic reasoning of a player affects their acquisition of information in strategic settings. While the rational inattention literature initially focused on how individuals gather costly pay-off relevant information in single-agent decisions, there has been a recent proliferation of research that applies the theory to strategic settings as well. However, although these papers allow for agents to be limited in their ability to acquire information, they assume agents have a perfect ability to reason strategically, which means they can fully model and predict the information acquisition of their opponents. My paper questions this assumption by integrating the theoretical concept of strategic sophistication into games with asymmetric costs of information, and tests the predictions developed by this theory in an experiment.

The game studied is intentionally simple for use as a direct test of players' ability to acquire information strategically. The game has two players—Red and Blue—who decide to accept or reject a deal represented by some predetermined but random state—*Red* or *Blue*. If both players accept a *Red* deal, the Red player benefits and the Blue player loses, with a *Blue* deal being analogous. If either or both parties reject a deal, they receive an outside option. *Red* and *Blue* deals are equally likely, and each player can acquire any possible information structure at cost, before deciding to accept or reject the deal. I derive the best-responses for each player in terms of State Dependent Stochastic Choice (SDSC) data—the probability a player will accept a deal of each color—as a function of their beliefs about their opponent's SDSC. A Nash equilibrium is then a fixed point in the above best-responses. To generate non-equilibrium predictions, I utilize Level-K theory, which categorizes players according to their level of strategic sophistication. A Level-0 player does not acquire any information and accepts deals unconditionally. A Level-1 player is rationally inattentive and assumes their opponent is Level-0, and a Level-2 player is rationally inattentive and assumes their opponent is a rationally inattentive Level-1 player. The above theories generate predictions for how players should behave in games when (1) their cost of information changes and (2) their opponent's cost of information changes. The SDSC of a low-sophistication player does not vary with the information costs of their opponent, while higher sophistication opponents focus attentional efforts on reducing the error of accepting unfavorable deals when their opponent has lower costs.

I then test the above predictions in a lab experiment. The purpose of the lab experiment is to see to what extent players can (1) predict the information acquisition of their opponents and (2) best respond to these predictions in their information acquisition strategies. Each subject plays a series of rounds of the above game where they face either high or low costs of information, and their opponent faces either high or low costs of information. I experimentally implement costs of information through a real-effort task. Subjects are shown a grid of red and blue dots, and the state is determined by whether there are more red or blue dots on the grid. The cost of information is then manipulated exogenously through two variants of this task, where one is significantly harder than the other. Before each round, subjects are told their task difficulty level and the task difficulty level of their opponent. By exposing subjects to these combinations of tasks in different rounds, I test whether subjects adjust their information acquisition in response to their opponent's cost.

The findings are an almost universal lack of strategic sophistication, with players being essentially non-responsive to the task of their opponent. Through elicited beliefs and regression analysis, I find this result is driven largely by the cognitive difficulties of predicting opponent information. A follow-up experiment further tests this mechanism by having players play against computer opponents who transparently and exactly mimic the behavior of an average participant in the main experiment. When the opponent's information strategy is known in this manner, subjects significantly adjust their information acquisition strategies to respond to the abilities of their opponent. These results suggest a necessary integration of the theories of rational inattention and costly strategic reasoning in strategic settings. In games with rational inattention, strategic reasoning is mentally costly (perhaps even prohibitively so). When this cost is removed—as it is in the computer treatment—subjects behave more in line with the theoretical predictions of rational inattention.

Empathy, Social Pressure, and Avoidance in Charitable Giving

In a working paper, "Out of Sight, Out of Mind: An Experimental Study of Empathy and Social Pressure," I study the effects that the psychological forces of social pressure and empathetic appeals have on behavior in charitable giving settings. This paper speaks to the literature on charitable giving in field experiments that has shown (1) people give substantially more when asked and (2) people tend to avoid the ask if possible. The literature posits two possible mechanisms to explain this behavior. DellaVigna et al (2012) propose the hypothesis of social pressure—people do not enjoy giving, but dislike saying "no." Andreoni et al (2017) propose the hypothesis of empathy—the ask causes people to have more altruistic preferences, and thus, people may avoid the ask as a self-control device. To analyze these two mechanisms, I formulate empathy as an effect triggered by the giver seeing the ask itself, and social pressure as triggered by the recipient seeing how the giver responds.

Although these two forces are naturally difficult to separate in the field, I was able to test both directly in an online lab experiment. Subjects were assigned to be either solicitors or potential donors for a charity. Solicitors wrote messages encouraging their partners to donate to their charity. I varied (1) whether donors were shown the message and (2) whether solicitors saw how much their donor gave. I argue the first of these effects largely affects empathetic concern, while the second largely affects social pressure. I also allowed subjects

to attempt to avoid these effects, with a probabilistic device that allowed me to see the counterfactual giving behavior of subjects who chose to avoid each effect.

Subjects chose to avoid social pressure at a much higher rate than empathy. However, subjects gave similarly higher amounts when exposed to either, relative to a control. In addition, those who chose *not* to avoid social pressure were the ones to give significantly more when seen by the solicitor. This finding suggests that, in online environments, there are social image seekers and social pressure avoiders. Those who seek to be seen enjoy showing their generosity, while those who prefer to avoid social pressure would not necessarily give either way but still likely incur psychological costs of being seen as not charitable. Further, despite most people being "vulnerable" to empathetic stimulation, people largely do not wish to avoid it, as hypothesized in the previous literature.

Research in Progress and Future Work

In a work in progress, "Optimal Obfuscation," joint with Srijita Ghosh, we study theoretically how a perfectly informed sender should optimally obfuscate the costly information gathered by a rationally inattentive receiver. The sender's garbling of the receiver's information affects the learning strategy chosen by the receiver, with more obfuscation leading to lower levels of learning due to dampened payoffs. This response of the buyer generates a bound on the possible level of obfuscation for the seller. Future experimental work is planned to test the predictions of this experiment in the lab.

Another work in progress, "Equilibria in Simultaneous Information Acquisition Games," studies equilibria theoretically in the game presented in my job market paper. Typical methods of proving the existence of Nash equilibria in such games do not apply due to under-studied subtleties of rational inattention theory in strategic settings. I introduce a novel method for finding and analyzing Nash equilibria in such games.

I look forward to pursuing future research within the research agenda described above, and to exploring new topics outside of this agenda. My primary agenda is to continue studying strategic implications of costly information. In both my job market paper and my theory paper, I consider a specific case of a game with asymmetric *costs* of information. I believe the broader class of games is the natural next step in games with asymmetric information. However, my job market paper reveals that further integrating theories of costly strategic sophistication and information acquisition will be highly necessary in such settings. Thus I am interested in pursuing this integration more deeply and both experimentally and theoretically studying information acquisition in the broader class of asymmetric cost of information games. I also plan to examine the role costly information plays in charitable giving. My existing charitable giving paper suggests that people may seek information about charities, even when doing so results in giving away more of their money. Understanding to what extent individuals are aware of this effect of information and examining how much effort they are willing to expend to acquire this information is a promising avenue of future research.

References

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DellaVigna, S., List, J. A., & Malmendier, U. (2012). Testing for Altruism and Social Pressure in Charitable Giving. *The Quarterly Journal of Economics*, *127*(1), 1–56. https://doi.org/10.1093/qje/qjr050

Teaching Statment

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Throughout the last six years of my PhD, one of the most rewarding through-lines was learning how to most effectively teach economics and engage students in the economic thought process. As an undergraduate student, my best economics professors were those who fostered their students' curiosity and created an environment where students actively engaged with the course materials. From my experiences as a student and my academic interests in the science of pedagogy, I sought to create the same environment for my students as both an instructor and a teaching assistant.

My central teaching philosophy is to stimulate students' natural curiosity about a subject to motivate deep learning of the topic thereafter. Besides being motivated by my experience as a student, this philosophy also has scientific support. Neuroscientists have shown that stimulating someone's curiosity triggers the brain's reward system, which helps the individual engage in deep learning[1]. Recent studies in educational economics show success in this philosophy in K-12 learning[2], and the above neuroscience literature suggests a similar philosophy can be successful for students in higher education as well. In addition, I am a strong proponent of experiential learning whenever possible. Economic concepts can often be abstract and inaccessible. I overcome these barriers by engaging students with connections to their own experiences as well as other academic disciplines.

My first experience designing and instructing a course was Introduction to Statistics in the summer of 2021. Most students enter a Statistics class with a misconception that the topic is dry or uninteresting. Because of this, stimulating curiosity and using experiential learning were vital in engaging students and inspiring deep learning. An additional challenge was that the course was instructed online over Zoom, which can often make students feel mentally distanced from the course as well. To engage students from the beginning, I had students fill out a brief questionnaire. This questionnaire asked various questions about the student's interests, beliefs about statistics, and life experiences. In addition, I presented them with choices from popular behavioral economics paradigms (for example, Tversky and Kahneman's Jacket and Calculator problem). Throughout the course, I would use (anonymous) data from this survey to inform practice exercises. For example, when studying hypothesis testing I was able to have students test the hypothesis that the framing in Tversky and Kahneman's Jacket and Calculator problem had an effect on their answers. In studying regression analysis, we performed regressions where the response variable was the student's aversion to statistics on a 0 to 100 scale. I believe these exercises were extremely helpful in keeping students engaged with the topics and produced a more fruitful learning experience as a result.

[1]Gruber MJ, Gelman BD, Ranganath C. States of curiosity modulate hippocampus-dependent learning via the dopaminergic circuit. Neuron. 2014 Oct 22;84(2):486-96. doi: 10.1016/j.neuron.2014.08.060. Epub 2014 Oct 2. PMID: 25284006; PMCID: PMC4252494.

[2]Alan S, Mumcu I. Nurturing Childhood Curiosity to Enhance Learning: Evidence from a Randomized Pedagogical Intervention. 2022 October 15.

My second experience in instructing a course was in Intermediate Microeconomics in the summer of 2022. This course is typically viewed as one of the more challenging courses in the undergraduate economics program. This perception largely stems from the degree of abstraction that is present in such a course and the course's quantitative requirements. Thus, at every step, I sought to bring the course's abstract concepts to life. A key example of this was during the last week of the course, which focused on game theory. To pique the students' curiosity, I had them play a series of live classroom experiments against one another (for example, various prisoner's dilemmas, coordination games, and the centipede game). After having them experience the games firsthand, I then derived the theoretical predictions of best-response and Nash equilibrium in the games analytically. We then compared these results to the results of their experiment, and either discussed possible reasons for any deviations or appreciated the predictive power of the theory. For this course, I also utilized two forms of instruction. Most classes would begin with a more classic presentation of slides about the course's content, introducing definitions and theoretical concepts. The second half of each class would then go to the whiteboard, where the students and I would put those concepts to work solving various problems. By doing so, I fostered a back-and-forth relationship between the abstract content of the course and the practical implementations of this content, which I believe helped the students have a deeper understanding of the course materials.

In addition to instructing and designing the two courses above, I have also served as a teaching assistant for two statistics courses and three microeconomics courses. My main responsibility as a teaching assistant was to lead recitation lectures and to aid students in grasping the concepts taught in their main lectures. In these lectures, I created additional practice problems for students to work on, in addition to their required homework problems. We then went through these problems step-by-step together. I also helped students by presenting lecture content from a different angle than that provided by the instructor. For example in intermediate microeconomics, I spent an entire recitation going through the intuition behind the Slutsky decomposition in consumer theory, to assist students in understanding the calculus-heavy approach taken in their lectures.

In all of the settings above, I also took pride in my accessibility and communication with students. I fostered an environment where students felt comfortable speaking up if they did not understand a concept, and could approach me during office hours, after class, or via e-mail if they need additional help with the content.

I would feel comfortable teaching any course at the undergraduate or master's level. I would also be comfortable teaching PhD-level microeconomic theory and experimental/behavioral economics. At the undergraduate and master's levels, I would be particularly excited to teach any course in microeconomic theory and application, econometrics, statistics, and experimental/behavioral economics.