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Research Statement  
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I am an applied microeconomist who uses game theory and experiments to understand how people and firms behave. My research intersects with labor economics and industrial organization. More specifically, I am interested in: (i) incorporating empirically motivated and psychologically more realistic assumptions into formal models of behavior; (ii) developing testable predictions of the formal models when people or firms interact; and (iii) using laboratory experiments to test these predictions. The goal is to identify empirically important deviations from traditional microeconomic assumptions that help to explain economic behavior and guide policymakers.

Within this broad framework my research fits into two themes. First, I study the role of emotions such as disappointment, guilt and embarrassment in driving behavior in strategic interactions. People who exhibit these emotions are assumed to be rational in the sense that they continue to maximize an objective function; the difference with standard microeconomic analysis is that people anticipate how these emotions affect their preferences. Much of this work intersects with labor economics by studying how emotions influence work effort, both theoretically and experimentally. I also investigate the implications of these emotions for how firms should interact with their workers and customers. Second, I study how people who are boundedly rational behave when they interact with others. In particular, I am interested in how individual characteristics such as people’s cognitive ability and personality impose predictable limits on their strategic sophistication.

A The role of emotions

A.1 Emotions and endogenous reference points

Kahneman and Tversky (1979)’s seminal contribution introduced the idea that people might be loss averse around a reference point. Loss aversion means that losses relative to the reference point are more painful than equally sized gains are pleasurable. However, Kahneman and Tversky (1979)’s theory does not establish what determines salient reference points. In a series of three papers I show how we can use the framework of loss aversion to understand how emotions drive behavior in strategic interactions. In particular, emotions such as disappointment and guilt help to determine people’s reference points. Furthermore, these reference points are endogenous: people understand how their own choices and the choices of those that they interact with influence their disappointment and guilt, and hence how these choices drive the reference points around which they are loss averse.

In “A Structural Analysis of Disappointment Aversion in a Real Effort Competition” (American Economic Review, 2012, with Victoria Prowse) we derive testable predictions from a model of disappointment aversion in which people who compete in a tournament are loss averse around reference points given by their endogenous expectations. Receiving less than expected induces painful disappointment, and so the competitors adjust their work effort to lower the disappointment that they expect to feel. Using a laboratory experiment in which subjects exerted real effort to compete for monetary prizes, we find empirical support for the reduced-form predictions of the model; furthermore, we use a structural model to estimate the strength and heterogeneity of disappointment aversion in our pool of subjects. The novel computerized real-effort “slider task” that we developed for the purpose of this project has already been used in almost fifty experimental research papers.

In “Fairness and Desert in Tournaments” (*Games and Economic Behavior*, 2010, with Rebecca Stone), we model the behavior of people who care about receiving what they feel they deserve when they compete in tournaments. Perceived entitlements are sensitive to how hard a competitor has worked relative to her rival, and competitors are loss averse around their meritocratically determined endogenous reference points. When people receive more than they feel they deserve, they suffer from guilt. We show that desert concerns drive competitors to push their effort levels apart in order to end up closer to their reference points on average. This finding can help to explain the excess variance in efforts that has been found by the empirical tournament literature. We also apply our theoretical results to shed new light on how firms design incentive schemes for workers: in particular, we provide a novel explanation for why firms often choose to use rank-order incentive schemes instead of schemes that are continuous in performance differences.

Finally, in “Desert and Inequity Aversion in Teams” (*Journal of Public Economics*, 2015, again with Rebecca Stone) we extend the scope of our meritocratic theory of desert to include cooperative interactions. In particular, we apply our framework to study the effort choices of workers who care about receiving what they feel they deserve when they cooperate in teams, and we develop novel equilibrium predictions that help to explain reciprocal behavior in team settings. We also apply our theoretical results to investigate how firms should design teams in the workplace: for example, we find that optimal team size is increasing in the strength of the guilt that workers experience from receiving more than they feel they deserve.

### A.2 Emotions and subsequent behavior

In Section A.1 I described research that studies how people adjust their behavior in strategic interactions to influence emotions that they expect to experience. In three experimental papers I study a related question: how do emotional responses affect subsequent economic behavior?

In “First-Place Loving and Last-Place Loathing: How Rank in the Distribution of Performance Affects Effort Provision” (submitted, with Zdenka Kissova, Jaesun Lee and Victoria Prowse) we study how work effort responds to feedback about rank in the distribution of performance. Even though pay does not vary with performance or rank, we find that subjects respond to the content of rank-order feedback. In particular, subjects exhibit ‘first-place loving’ and ‘last-place loathing’, that is subjects increase their work effort the most after being ranked first or last. In “Gender Differences and Dynamics in Competition: The Role of Luck” (*Quantitative Economics*, 2014, with Victoria Prowse) we study how the work effort of men and women responds to the outcomes of previous competitions for monetary prizes. We find that for any size of prize women respond to losing by reducing work effort, while men respond to losing by working less hard only when the prize that they failed to win was big enough. Finally, in “Cheating in the Workplace: An Experimental Study of the Impact of Bonuses and Productivity” (*Journal of Economic Behavior and Organization*, 2013, with Victoria Prowse and Michael Vlassopoulos) we find that workers perceive exposure to random bonuses as unfair and respond by subsequently cheating more.

All these findings have important implications for the optimal design of firms’ performance feedback policies, workplace organizational structures and incentives schemes. For instance, bonuses, promotions, performance appraisals and symbolic awards often depend on rank-order relative-performance evaluation and therefore generate implicit incentives in addition to the more obvious pecuniary incentives that standard economic theory emphasizes. In particular, the fact that workers strive for high rank generates implicit incentives for higher performers, which suggests that marginal pecuniary incentives should be focused more towards middle performers than standard economic theory would suggest.
A.3 Emotions and consumer bargaining

The existing literature on bargaining assumes that people choose whether to bargain or not according to a standard economic cost-benefit analysis. In two companion papers I study the implications for welfare and equilibrium firm pricing of consumers who suffer psychological costs such as embarrassment when they attempt to bargain with firms.

In “Competition in Posted Prices with Stochastic Discounts” (Economic Journal, 2016, with John Thanassoulis) we study competition between firms when they set posted prices that are potentially negotiable. Consumers suffer psychological costs such as embarrassment from bargaining: as a result, some consumers never attempt to bargain, while the tension associated with bargaining and the danger of frayed emotions lead to the possibility that negotiations break down when consumers do attempt to bargain. Even though consumers who try to bargain sometimes succeed in negotiating discounts off the posted prices, we find that in equilibrium their presence dampens competitive pressure in the market by reducing the incentive to undercut a rival’s posted price, thus raising all prices and increasing profits. Welfare falls because of the uncertainty in the bargaining process, which generates some misallocation of products to consumers. We also find that the bargainers facilitate collusion by reducing the market share that can be gained from a deviation. In “The Impact of Bargaining on Markets with Price Takers: Too Many Bargainers Spoil the Broth” (European Economic Review, 2009, again with John Thanassoulios) we study similar questions in a setting where firms compete in quantities instead of prices.

Our theoretical results are directly relevant to the formulation of policy on bargaining in markets. A naive view would argue that, since consumers who negotiate reductions off posted prices pay lower prices than do price takers, bargaining should be encouraged. Indeed, some competition authorities explicitly encourage bargaining in markets for this reason. However, since we find that increasing the proportion of consumers that attempt to bargain raises prices and lowers welfare, such a policy recommendation might well be counterproductive.

A.4 Work in progress on emotions

A number of my current research projects intersect with this stream of research on the role of emotions. In solo work I am analyzing how praise and blame induce emotional responses that affect work effort and the quality of decision-making. With Thomas Norman I am investigating how emotions evolve. John Thanassoulios and I are extending our work on emotions and bargaining to situations in which firms can commit to never bargain with consumers. Finally, work in progress (with Damon Clark, Victoria Prowse and Mark Rush) seeks to evaluate the impact of reference points induced by goal setting on the performance of real students competing for grades in the classroom.

B Bounded rationality

Traditional game theory assumes common knowledge of rationality. Real people, however, are boundedly rational: they suffer from cognitive constraints that impair their ability to best respond to their beliefs about the behavior of others and to form accurate conjectures about how others will in fact behave. And the fact that others are boundedly rational makes predicting their behavior in strategic interactions difficult even for those who are themselves strategically sophisticated.

In “Cognitive Ability, Character Skills, and Learning to Play Equilibrium: A Level-k Analysis” (Journal of Political Economy, forthcoming, with Victoria Prowse) we investigate how cognitive ability and personality influence strategic sophistication. Using a laboratory experiment, we study
behavior in the $p$-beauty contest, a simple zero-sum game that represents in simplified form a market mechanism in which timing is important. For example, the game captures labor market hiring where there is an advantage to making job offers a little earlier than competitors, but moving too early is costly because the firm then misses out on new information about job candidates. We find that more cognitively able subjects are more successful (in the sense that they earn more) and converge more frequently to equilibrium play. To understand better how subjects with different cognitive abilities behave and learn differently, we estimate a structural model of boundedly rational learning based on level-$k$ reasoning. Level-0 types naively copy the average group behavior from the previous round, level-1 types best respond to the choices of level-0 types, level-2 types best respond to the choices of level-1 types, and so on. We find a systematic positive relationship between cognitive ability and levels. Furthermore more cognitively able subjects understand that their less cognitively able opponents are boundedly rational: the average level of more cognitively able subjects responds positively to the cognitive ability of their opponents, while the average level of less cognitively able subjects does not respond. We also find that personality affects behavior and learning in the $p$-beauty contest: more agreeable and emotionally stable subjects perform better and learn faster, although the effect of cognitive ability on behavior is stronger than that of personality.

These findings have important implications for how mechanism design should allow for bounded rationality. In particular, the design of institutions and mechanisms needs to take into account the impact of bounded rationality on how agents learn to behave in the strategic environment implied by the rules of the institution or mechanism. Our findings also raise potentially far-reaching practical and ethical questions. For instance: How much protection should public policy afford to slow learners when they operate in markets, especially newer markets in which some participants have price-setting power? And is redistribution appropriate to correct for differences in outcomes when people of different cognitive abilities and personality interact repeatedly?

Three new projects build on this work. With Daniel Sgroi I am building an economic model of how personality affects behavior in strategic interactions. With Eduardo Fe, I am studying how strategic sophistication develops in children. And with Victoria Prowse I am analyzing how cognitive ability and personality influence whether and when people choose dominated strategies in games.

C Other work

Three early papers consider how firms can signal their type to consumers or competing firms. “The Optimal Choice of Pre-Launch Reviewer” (Journal of Economic Theory, 2012) and “Sequential Decisions with Tests” (Games and Economic Behavior, 2008), both with Daniel Sgroi, consider how firms signal product quality through the use of pass-fail tests. When prices can adjust to the outcome of the test, we find that profits are convex in test toughness, and so firms select either the toughest or softest test available. In “Strategic Disclosure of Intermediate Research Results” (Journal of Economics and Management Strategy, 2008) I consider the incentives of firms to disclose valuable intermediate research results during the course of a patent contest to signal commitment to the project.

In two very early papers published while I was still a Ph.D student I developed a model of repeated political campaigns to show why donors often choose to donate to both parties (“Soft Money and Hard Choices: Why Political Parties Might Legislate Against Soft Money Donations,” Public Choice, 2005, with Christine Lipsmeyer) and I analyzed the incentive of takeover raiders to approach shareholders sequentially (“Sequential Decision-Making and Asymmetric Equilibria: An Application to Takeovers,” B.E. Journal of Theoretical Economics, 2004, with Daniel Sgroi).