

**Competition in Psychology and Experimental Economics**

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### **Abstract**

Competition is a fundamental phenomenon in human behavior and a key topic of interest for psychologists and economists alike. Both psychology and economics strive to better understand behavior in competitive environments, but they differ in their research objectives, theoretical perspectives, and empirical methods, resulting in markedly different, albeit complementary, insights. Economics typically adopts a normative approach, assuming that agents are rational and make decisions that balance the tradeoff between the costs of competing and the benefits associated with winning. Economists view competition as a class of incentive structures, and investigate comparative reward schemes and their effects on behavior and performance. They address, and experimentally test, questions of institutional design and individual behavior in structured environments. Psychological research, on its part, adopts a more descriptive approach, focusing on the individual separately from the institutional context. Psychologists are interested in the cognitive, affective, and motivational processes that come into play in decision making. They examine the interpersonal effects of competition and compare them with the effects of other interpersonal and intrapersonal situations. In this chapter, we review selected literature on competition in experimental economics and psychology. We delve into two common areas of research by the two disciplines. One is rank-order, effort-based tournaments, by which experimental economists study the effects of various incentive structures on effort and performance, whereas social psychologists examine processes of social comparison. The second area of interest is common value auctions and the winner's curse. We discuss how research in economics and psychology examine the winner's curse, explanations each discipline offers for the phenomenon and the different recommendations to overcome it. Finally, we outline possible directions for mutual enrichment for economists and psychologists interested in competition. We

believe that psychological studies on motivation can benefit from the precise definitions of competitive structures present in economic experiments. Economists, on their part, can use the insights on the underlying processes of competitive attitudes and behavior offered by research in psychology.

The study of social behavior involves various scientific disciplines, including psychology, sociology, political science, and anthropology, among others. These disciplines address similar social issues by applying different foci of interest, theoretical approaches, and methodological tools. Competition is no different. It is inherently a social behavior, which involves decision making on the part of two or more actors, who need to consider the choices of their actions in view of their conflicting interests. In this chapter, we refer to competition as encompassing both the process of competitive behavior and the institutional setting in which a competitive situation takes place (Garcia, Reese, & Tor, 2020).

The two main disciplines in the social sciences that study competitive behavior are psychology and economics. In this chapter, we consider the questions these two disciplines ask in their attempt to understand behavior in competition, and the different ways in which they address these questions. The approaches adopted by psychology and economics are similar in certain respects, but they differ in some fundamental parts. Understanding these differences can help researchers in each discipline appreciate the contributions of the other, use its insights to complement their work, and achieve a synthesis of the knowledge gained in each.

### **Conceptualizing Competition**

Competition is as basic and important a phenomenon in human behavior as it is ubiquitous. Animals compete for food and shelter. Firms compete for market share. People compete for land, prestige, and power. Academics compete for grants and publication space. Students compete for scholarships and class ranking. Competition seems to be inseparable from almost every facet of human experience.

Brown, Cron, and Slocum (1998) proposed three ways to conceptualize competition. The first is structural competition, referring to situations in which two or more people compete for rewards. The rewards can be either tangible or intangible, as long as they are sufficiently scarce to prevent everyone from enjoying them equally (Kohn 1992). For one person to win and enjoy a greater share of rewards, another must lose and settle for fewer. The second conceptualization is trait competitiveness, an aspect of one's personality that increases the enjoyment of competing, the desire to win, and the ambition to be better than others (Spence & Helmreich 1983). Finally, perceived environmental competition refers to the feeling that one is competing with another, even if no formal competitive structure is in place. In the present chapter, we focus primarily on structural competition and on social comparison processes that are integral to behavior in a competitive structure.

Competition is an important topic in both psychology and economics, but the two disciplines diverge on several essential attributes. Specifically, they differ in their objectives, theoretical perspectives, and the empirical methodologies they use to address their questions about behavior in competitive settings. This chapter aims to demonstrate the differences between experimental economics and psychology in their research on competition, and to highlight the features and insights that scholars in the two disciplines can gain from each other.

### **Fundamental Differences and Commonalities between Psychology and Economics**

The relation between economics and psychology has been the topic of discussion for a long time (e.g., Simon, 1986; Rabin, 1998; Ariely & Norton, 2007). Both seek to understand human behavior, but they do so from different perspectives, and have different assumptions about how people act. As Rabin (1988) pointed out, economics “has conventionally assumed that individuals have stable

and coherent preferences, and that they rationally maximize those preferences. Given a set of options and probabilistic beliefs, a person is assumed to maximize the expected value of a utility function,  $U(x)$ " (Rabin, 1998). For economists, the essential elements to be abstracted are derived from some general normative theory, based on the assumption that behavior is driven by utility maximization. Economists, therefore, emphasize the incentive structure of the situation (i.e., the costs and benefits of different outcomes that apply to various participants in the situation) and the information available to participants that is relevant to their decisions. Psychology, on its part, seeks to develop descriptive models of human behavior. To this end, it focuses on the cognitive, motivational and affective factors that help gain a better understanding of the underlying mechanisms of decision making and behavior.

Unlike economics, social psychology is not committed to a normative model, and its experiments often do not examine concrete predictions derived from such a model. Psychologists investigate people's decisions in given situations, therefore they often use cover stories, confederates and even deception to simulate real-life conditions as closely as possible. The requirements in economic research are somewhat different, and the important criterion is the correspondence to a theoretical, normative model or to the incentive structure of the environment. Great stress is placed on the need to control for any factor that can affect behavior, according to the theoretical model. Therefore, there is strong reluctance in economics research to employ any form of deception. This reluctance stems from the assumption that if participants in experiments believe that the information they receive is not valid, their responses might be limited to their beliefs regarding the experiment, rather than to what the incentive structure of the experiment represents in real life (Ariely & Norton, 2007).

In the last three decades, a new branch of economics has evolved, known as behavioral economics. Research in this field concerns the concrete actions carried out in situations involving

multiple interacting players. Behavioral economics expands analytical game theory by adding to it emotions, mistakes, limited foresight, conjectures about others' intelligence, and learning. It uses psychological regularities to suggest ways to weaken rationality assumptions and to extend theory (Camerer, 2003).

### **How psychology and experimental economics study competition**

Competition in economics is mainly about markets. A market, in the broadest sense of the term, refers to any context in which goods, services, and any other type of resource are exchanged (Pearce, 1994). Competition functions as a mechanism and a set of rules that can allow the market to operate efficiently, by enabling the allocation of productive resources to their most highly valued uses. Sellers compete to attract favorable offers from prospective buyers, potential buyers compete to obtain good offers from suppliers, and workers try to outperform each other in the pursuit of prizes, promotions, and recognition.

Research in the field of industrial organization (IO) in economics tended to deal mainly with market deviations from idealized conditions of perfect competition (Einav & Levin, 2010). Experimental studies examine competitions through auctions, lotteries, and tournaments. A subfield of experimental economics deals with experimental studies related to IO. The detailed review of the IO literature is beyond the scope of the present chapter, where we focus on common-value auctions, and in particular, on the winner's curse phenomenon, and on rank-order tournaments.

Auctions are a common mechanism for setting the price of a commodity or service. Economic approaches to auctions are based on a large theoretical and experimental literature that compares different kinds of items (e.g., private value vs. common value) and mechanisms (e.g., English, Dutch, first-price, and second-price sealed-bid auctions) with respect to the revenue they

generate (for a review, see Kagel, 1995; Ku, Malhotra & Murnighan, 2005). One way of studying competition in both experimental economics and psychology is through auction games, where individuals compete by investing monetary resources to buy a commodity (i.e., to win a prize). Tournaments compare competitors on such dimensions as effort, output, and performance. The theoretical components they test often have to do with the incentives provided to players for doing their work (e.g., different prize structures, rank orders, and pay dispersions). Psychological research on competition uses similar mechanisms to those discussed above. Studies use auction settings to investigate cognitive biases and other phenomena in judgment and decision making, and tournaments to explore motivation, self-assessment, social cognition, and affect.

To date, the study of competition in social psychology and in experimental economics appears to have been conducted in parallel, with too few points of contact. Although parallel research of the same questions in different disciplines may create redundancies, many of the findings in the two disciplines are complementary, and most insights from one discipline prove useful for the other. In general, psychology has a broader view of competition, and considers factors beyond market structure, incentive types, effort, and outcomes. It is sensitive to affective, motivational, and perceptual processes that can explain behavior and competitive outcomes but are often overlooked in economics. At the same time, psychologists can learn from the economists' precise and profound understanding of competitive structures. Most studies in psychology operationalize competition by simply setting a goal of outperforming an individual or a subset of other participants. By contrast, economic experiments carefully formalize the rules and incentive structure of the competition, recognizing a wide range of types of competition, which can then be systematically tested. Understanding the principles of each discipline can

greatly enhance the understanding of competition and open the door to higher-quality research in both psychology and economics. The current chapter discusses two main areas of research on competition common to economics and psychology: tournaments and common value auctions. We discuss the differences between the structure-oriented approach of experimental economics and the mechanism-oriented approach of social psychology, as well as the shared themes between the two disciplines in these two common areas of research.

### **Rank-Order Tournaments and Effort-Based Competitions**

Many organizational, educational, gaming, and sports settings involve tournaments—competitions that are based on comparative effort and rank-order incentives. Competition takes the form of an incentive system that links players' rewards to their rank among competitors on a focal dimension, rather than to their absolute performance or result on that dimension. The differences in approach between psychology and economics, discussed at the beginning of this chapter, are clearly apparent in their research on tournaments.

Studies in psychology typically compare only competitive (e.g., rank-order) incentives with non-competitive ones (i.e., piece-rate or fixed pay), whereas studies in experimental economics are sensitive to more nuanced attributes of competitive incentive structures. Economic experiments examine factors such as the dispersion of prize value awarded to different ranks (e.g., Harbring & Irlenbusch, 2011), prize distribution among multiple winners (e.g., Amaldoss, Meyer, Raju, & Rapoport, 2000), and the relation between effort levels observed in competition and theoretical equilibrium levels (e.g., Bull, Schotter, & Weigelt, 1987).

Extensive research in economics on behavior in tournaments began with Lazear and Rosen's (1981) tournament theory. A tournament setting is one in which two or more actors

invest effort or resources to win a prize, which is awarded based on relative rank (Lazear, 1989). An actor's chance to win the prize is a function of both the actor's willingness and ability to compete, and of the number and qualities of other competitors. This structure mirrors that of an all-pay auction (Hillman & Riley, 1989; Baye, Kovenock, & De Vries, 1996).

Tournament theory explains how relative rank-order prizes are better at motivating multiple actors than are individual pay-for-performance incentives. According to the theory, performance motivation is higher when the prize for success is not contingent on one's absolute result, but is rather determined by identifying the best result among participants. The increased motivation is driven by the prospect of generating large differences in rewards by even small differences in performance, which induces individuals to keep striving to do better. This argument has received ample empirical support (e.g., Bull et al., 1987; Eisenkopf & Teyssier, 2013; Orrison, Schotter, and Weigelt, 2004; Schotter & Weigelt, 1992). For example, Bull et al. (1987) conducted a series of lab experiments comparing various competitive incentive structures to piece-rate incentives and measured the costs participants were willing to bear to defeat their competitors (these costs represented effort levels). They found that players who competed with others often exerted greater effort than their theoretic equilibrium levels (i.e., at which the value of their costs is equal to the expected value of their gains), and were considerably more likely to do so than players working in a piece-rate system. Other research found that competitive effort may at times reach a level that is counterproductive, for example, when players choose to compete even when opting out of the competition offers higher expected value (Niederle & Vesterlund, 2007). Later studies found that the effects of relative incentive schemes on players' behavior become even more pronounced when the players choose their incentive scheme rather

than having it assigned to them (Agranov & Tergiman, 2013; Camerer & Lovallo, 1999; Eriksson, Teyssier, & Villeval, 2009).

Social psychology has also paid a great deal of research attention to rank-order competitions. Whereas economics studies competition from a formalistic, structural perspective, research in social psychology views rank-order competition through the prism of the cognitive, motivational, and affective processes elicited by the competitive setting, and it has therefore been able to explain deviations in competitors' behavior from the predictions of economic models, such as excess entry and overbidding in auctions (Cain, Moore, & Haran, 2015; Ku et al., 2005). The central theoretical construct in the psychological study of competition is social comparison. According to social comparison theory (Festinger, 1954), people are motivated by the desire to outperform others, achieve higher status than others, or compare favorably to them. Comparing favorably to others improves individuals' self-esteem (Taylor & Lobel, 1989), reduces their negative affect (Wills, 1981), and increases their optimism about the future. For example, in response to a win by their favorite sports team, fans report a more positive mood, higher self-esteem, and greater life satisfaction (Hirt, Zillmann, Erickson, & Kennedy, 1992; Schwarz, Strack, Kommer, & Wagner, 1987).

Psychological research has regarded competition as a manifestation of social comparison. Information about social comparison serves as a source of self-evaluation, making it a necessary component of competition (Ames & Ames, 1984; Garcia, Tor, & Schiff, 2013). Competitive motivation has also been equated with the motivation to compare favorably with others, while competitive behavior is the investment of effort or resources to prevail in these comparisons. Competitive settings, markets, and reward structures are structural factors that highlight and enhance social comparison (Murayama & Elliot, 2012), directing the attention of participants to comparative

information and cues. They focus competitors' attention on social comparison information even when competitors do not have any prior interest in such information (Ames & Ames, 1984). As a result, goals based on relative performance encourage greater levels of task effort and persistence than individual achievement goals (Haran, 2019). In the next section we discuss the attributes of competition that affect people's behavior, and which have been of particular interest to social psychology and experimental economics.

### **Determinants of behavior in competitions**

Research on tournaments in both experimental economics and psychology examines variables related to the players' willingness to invest effort or resources to achieve their goals. At times, the two disciplines even use the same constructs and measures. For example, opting in vs. out of tournaments serves as a measure of competitive behavior both in economic (e.g., Gneezy, Leonard, & List, 2009) and in psychological research (e.g., Haran, Van Dijk, Barina, Krief, & Rosenzweig, 2021). In all these studies, participants completed a task and chose the way they preferred to be compensated for their performance. One alternative was based on their individual performance; the other involved comparing their performance with that of another participant and rewarding them based on their relative success. Although the economic studies focused on tournament structure whereas the psychological ones on emotional antecedents of competitive behavior, they all used the same dependent variable. Nevertheless, differences remain in theoretical foci between the two disciplines, and they are also observed in the research questions they strive to answer. The variables of interest for economists are structural, namely the size of the competitive field and the prize spread—the difference between the prize awarded to the winner(s) and that awarded to the loser(s). Social psychology, while also studying these factors, is interested primarily in how competitive incentives affect people's motivation and in the

downstream consequences of competing with others on various psychological outcomes, including future motivation, self-evaluation, and affect.

In economics, tournament theory makes two foundational predictions (Knoeber & Thurman, 1994): (a) that players' level of effort, investment, or performance is determined by how that effort, investment, or performance affects their probability of winning (similarly to expectancy theory, which makes the same proposition in the context of employee motivation; Vroom, 1964); and (b) that players care more about the differences between the winner's and loser's payouts than about the absolute size of those payouts (Knoeber & Thurman, 1994). Thus, according to the theory, tournaments can help competitors achieve optimal output levels by accurately determining the prize spread. To achieve these optimal output levels, the spread should be high enough to encourage players to exert high levels of effort, but not high enough for production to exceed need (Knoeber, 1989; Lazear & Rosen 1981).

In light of these predictions, research on tournaments in experimental economics has dealt primarily with the number of participants included in them and with ways of distributing prizes to contestants (Harbring & Irlenbusch, 2003). To psychologists, this focus may seem nuanced and of limited scope, but it offers highly precise definitions and operationalizations of incentive structures and prize distribution systems, which studies in psychology typically do not attain. Orrison et al. (2004) varied tournament size and prize distribution using a task similar to that employed by Bull et al. (1987), in which participants' effort was determined by the price they were willing to pay to win. They varied tournament size using 2-person, 4-person, and 6-person tournaments, and varied the number of winners, or competitors who can receive a prize, between 2 and 4 winners in a 6-person contest. They found that effort levels are higher in small competitions than in large ones, and that effort is higher in competitions that offer a few prizes of

high value than in those that offer many prizes. Sheremeta (2011) varied the number of players in a lottery contest and found that the effort participants were willing to invest decreases as the number of contestants rises, from 33% of the prize value in a two-player contest to 25% of the prize value in a four-player contest.

Studies of all-pay auctions revealed similar trends.<sup>1</sup> Similarly to tournaments, in which all players exert effort but only the player with the highest performance wins, all-pay auctions require that all players pay their bids but only the highest-bidding player wins the prize with certainty. An example of such an auction is the bidding process to host the Olympic games. Before the International Olympic Committee awards one city the right to host the event, all candidate cities must each submit a bid, which typically costs between \$50 million and \$150 million to prepare (McBride, 2018). Most studies of all-pay auctions find significant overbidding relative to the Nash equilibrium prediction, with some bidders submitting very low bids and others very high ones (Dechenaux, Kovenock, & Sheremeta, 2015). Overbidding becomes even more rampant when the competitive field is smaller. As cost-minded bidders drop out and fewer competitors are left, remaining bidders tend to become more competitive by bidding past their limits, and the likelihood of individual bidders dropping out of the auction at the later stages decreases (Gneezy & Smorodinsky, 2006; Ku, Malhotra, & Murnighan, 2005). Ku, Malhotra, and Murnighan (2005) argued that an affective state of competitive arousal, which they describe as “an adrenaline rush that accompanies individuals’ desires to win,” occurs when there are few, rather than many, bidders in the auction, when the auction is nearing its end, and when bidders feel that they are under

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<sup>1</sup> We discuss auctions in the second part of the chapter, but we describe all-pay auctions in this part because of their structural similarity to tournaments.

time pressure. The affective state intensifies further when the bidding is public, before an audience, placing the individual in the spotlight, and when bidding against a rival (see section on rivalry below). Competitive arousal, like other pressure-related states, impairs systematic decision making and leads to irrational choices, such as overbidding. Fong, Zhao, and Smillie (2020) examined whether personality traits and individual differences in competitiveness can explain this behavior. They found that extraversion was positively related to competitiveness, whereas agreeableness predicted both lower self-reported competitiveness and less competitive auction bidding.

Tournament theory stresses two main structural variables, competition size and prize spread, but experimental economists have studied other structural characteristics of competitions as well. One such characteristic is the difference in competitors' abilities, or their *a priori* likelihood to win. Several studies (e.g., Baik, 1994; Gradstein 1995; Stein 2002) suggested that high variation in abilities between players creates a discouragement effect. The high effort required to compete and the low likelihood of defeating superior players deters weaker players, and leads to a reduction of their investment in pursuit of the goal. This makes the competition easier for the stronger players, for whom investing high resources to win becomes unnecessary. Economists are also interested in the number of stages in the competition (i.e., whether the competition is a static, one-shot decision game or a dynamic situation with sequential rounds of resource investment), the focal point of the competitive goal (winning vs. avoiding elimination), and the number of contests competitors engage in simultaneously (Dechenaux et al., 2015), among other issues.

Some research in psychology also varied structural factors and measured their influence on competitive behavior. Garcia and Tor (2009) argued that social comparison processes, and, consequently, competitive behaviors, are more emphasized when the competitive landscape includes

fewer actors, whereas a multitude of targets for social comparison diffuses these processes and reduces their effects. In their study, participants exhibited willingness to work harder and completed tasks significantly faster when they competed against a few others than when they competed against many. This effect was resistant against possible sampling error by competitors, and persisted even when competitors estimated their chances of winning accurately (Tor & Garcia, 2010).

The interest of psychology in competitive behavior is manifested in research on social comparison and its effects on behavior in rank-order competitions. The empirical evidence suggests that, similarly to relative incentive structures, evaluation of oneself through social comparison exerts a stronger influence on people's judgment, feelings, and behavior than do evaluations of one's performance in absolute terms. Strickhouser and Zell (2015) asked participants to take a quantitative test and a verbal test, then informed them of their rank in both tests, before measuring their self-evaluated ability in the two domains, as well as their emotional responses to their results. The comparison with other people had a significantly greater influence on how participants assessed their performance and ability and on how they felt than did inter-domain comparisons.

As the underlying psychological process of competition, social comparison determines competitive motivation and behavior. Even the decision to compete in the first place is influenced primarily by comparative self-assessment, and this influence seems to be stronger than that of perceptions of one's own skill. Cain et al. (2015) studied the phenomenon of excess market entry, which research on entrepreneurship attributes to overconfidence (Koellinger, Minniti, & Schade, 2007). Although self-evaluations of ability and performance tend to display underconfidence in easy domains and overconfidence in difficult ones (Moore & Healy, 2008), people prefer entering markets in easy domains over more difficult ones. Cain et al. (2015) discovered that in the markets of easy

domains, entrants were overconfident about their rank relative to other market players, which predicted their entry choices.

Social comparison increases not only individuals' desire to compete, but also competitors' desire to win. Locke (2007) surveyed race runners, who reported run faster when comparing themselves to another participant in the race whom they knew well than when their targets of comparison were other runners in general. A similar result was obtained in lab studies of competing dyads. Haran and Ritov (2014) applied a minimal intervention to increase the salience of a social comparison target by manipulating its identifiability. In half the dyads, competitors were unspecified to each other, knowing only that their opponent was "another participant in the study," and in the other half they were identified by a participant ID number. Participants exerted greater effort to defeat an identified counterpart than an unspecified one. These increases in competitiveness correlated with a similarly increased concern participants had about losing to their counterparts, highlighting the role of social comparison in encouraging competitive behavior.

The findings discussed above highlight the interest of psychologists in the affective and cognitive variables that influence competitive behavior through social comparison. Because social comparison and competition are embedded in an interpersonal context, they are naturally affected by relational factors. The psychological literature focuses primarily on two factors, the similarity between the actor and the target and the closeness of their relationship. Research on social comparison finds that people are more likely to compare themselves with others who are similar to them than with others who are not (Festinger, 1954), and with people who are closer to them than with more distant targets (Tesser & Campbell, 1982). Furthermore, similarity and closeness increase social comparison even when they are unrelated to the domain on which the counterparts are competing (Miller, Turnbull, & McFarland, 1988). For example, after an exam, we may engage in comparing our

potential score to that of the person who sat next to us during the exam, but given a chance, we would also compare the model of our car to that person's.

Perhaps the most salient example of how the similarity and closeness between competitors affect their relationship is rivalry. Rivalries are subjective competitive relationships between actors that entail increased psychological involvement and perceived stakes, independent of the objective characteristics of the situation (Kilduff, Anger Elfenbein, & Staw, 2010). Rivalries lead individuals, teams, and organizations to display higher motivation, invest greater resources, and even engage in more unethical behavior to defeat a rival than when competing with non-rival counterparts (Converse & Reinhard, 2016; Hsieh, Tsai, & Chen, 2014; Kilduff, 2014; Kilduff, Galinsky, Gallo, & Reade, 2016). Rivalries form when actors perceive themselves as similar to each other and their relationship as competitive. Repeated opportunities to compete further develop and enhance rivalries. Thus, actors who are similar or close to each other in their location or their attributes are likely to become rivals. For example, US collegiate sports teams are more likely to form a rivalry the closer they are to each other geographically. Similarities in other attributes, unrelated to sports, such as academic quality and the number of enrolled students, also contribute to the emergence of rivalries (Kilduff et al., 2010). These findings show that the mechanisms that affect the competitive behavior of individuals are influential at the team level as well.

### **Team competitions: Collaborate in order to compete**

A key question pertaining to competitive motivation concerns the effect of competition-related factors on the performance of groups and teams.<sup>2</sup> Although competition between groups

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<sup>2</sup> Some studies refer to groups and others to teams. Here we use the two terms interchangeably.

is prevalent, competing groups depend on the willingness of their individual members to forgo their immediate objectives, cooperate with each other, and contribute costly resources for the sake of their team's higher objectives (Sheremeta, 2018). For example, in the Tour de France, individual cyclists undertake tough assignments, which often slow them down, to help the team captain win the race, so that team success then depends on its individual members sacrificing their own competitive goals.

From the perspective of pure self-interest, team competitions present a clear disincentive for individual team members to contribute to the team. First, the negative effect of one's contribution on one's own outcome is almost always greater than the positive effect of that contribution on the team as a whole (Halevy, Bornstein, & Sagiv, 2008). Furthermore, the benefits gained from winning, or being part of the winning team, are often available to all team members regardless of their individual contributions, therefore one can theoretically contribute very little, or even nothing to the collective effort of the team, and still enjoy part of the collective gain (Bornstein, 1992, 2003; Rapoport & Bornstein, 1987). Nevertheless, empirical findings suggest that group competition increases the level of effort individuals expend to help their team win. Erev, Bornstein, and Galili (1993) conducted a field experiment with orange pickers, who were each paid according to one of three incentive schemes. In one condition, pickers were paid according to their individual output; in another condition, they were assigned to teams and received an equal share of the team's total pay; and a third condition presented a competitive incentive structure, where groups of participants were compared with each other, and participants received a bonus if their group outperformed the competing group. Worker output was highest in the group competition condition, and its advantage over the two other incentive schemes even increased over time.

Both social psychology and experimental economics have attempted to explain the puzzle of group competition, but their approaches to the solution have focused on different factors. Research in psychology finds that intergroup competition increases the importance of the group's relative standing and decreases the importance of its overall welfare (Turner, Brown, & Tajfel, 1979). Members of competing groups are willing to sacrifice absolute gains, both for themselves and for their group, to maximize their group's relative gains vis-à-vis other groups. Thus, increased prosociality and cooperation between team members result in more competitive behavior by the team as a whole (McCallum et al., 1985).

The heightened competitive motivation in group competition appears to be related to social comparison: when individuals were distributing money between themselves and members of a relevant comparison group, they displayed greater ingroup favoritism than when the group to which their counterparts belonged was not relevant for social comparison. Tamir and Nadler (2007) found the same effect for group similarity: participants in their study displayed more competitive behavior in allocating resources between members of their own group and those of an outgroup when the outgroup was similar to their own than when the groups were different from each other.

Other research found that competition enhances factors that contribute to individuals' commitment to the team, such as norms of altruism and members' prosocial goals (Hardy & Van Vugt, 2006). Competing teams emphasize and enforce norms of altruism more actively than do teams that are not in a competitive situation (Goette, Huffman, Meier, & Suter, 2012), and some have argued that intergroup competition played a role in the evolution of altruism in humans (Bowles, 2006). Research findings provide ample support for the idea that intergroup competition is conducive to enhancing cooperation between group members (Bornstein & Erev, 1994; Burton-Chellew, Ross-Gillespie, & West, 2010; Erev et al., 1993). In a study of behavior

in a public goods game, Burton-Chellew et al. (2010) assigned participants to groups and varied whether or not the groups were competing with each other. They found that group competition increased not only individuals' willingness to contribute to the group, but also the extent to which they viewed other members of their group as collaborators, rather than as competitors.

Economists studying group performance focus on group incentives and their role in determining the output of groups. These studies generally find that the factors that enhance individual performance do the same for groups. Similarly to individuals, groups are more sensitive to incentives that reward high relative performance than to those based on individual targets and they tend to respond to competitive incentives with investing more resources to win those incentives than they normatively should (Brookins, Lightle, & Ryvkin, 2015). In one study, Nalbantian and Schotter (1997) organized participants in groups of six members each, all of them contributing resources from their individual endowments to their group's collective pool. Team performance was defined as the sum of all individual contributions within the group. Some groups were rewarded based on their own performance, whereas others competed with other groups, with the goal of outperforming the competitor to receive the reward. The authors found that the competitive incentive scheme resulted in higher levels of contribution and less free riding by group members. Other research has found that competitive incentives are more effective in increasing the effort of groups than of individuals, although both groups and individuals respond to competitive incentives with expenditures that are higher than the level predicted by the Nash equilibrium (Abbink, Brands, Herrmann, & Orzen, 2010).

Experimental economists are interested not only in the type of reward the group receives, but also in how that reward is distributed within the group. In real-life competitions, there is variation in the individual rewards that individual team members receive. For example, when a band's song climbs to number one in the charts, the increased royalties may be shared equally among all members

or be awarded mainly (or even exclusively) to the members who wrote the song. Despite the prevalence of this variation in real life, psychological studies of group competition have not paid much attention to it, and most of the insight regarding its effects comes from economics. The general finding is that incentive structures that reward group members based on their own individual performance elicit higher effort than egalitarian prize sharing structures (e.g., Amaldoss et al., 2000; Gunnthorsdottir & Rapoport, 2006). Amaldoss et al. (2000) compared team performance in a competition between two profit-sharing systems. One allocated profits equally, each member of the winning team receiving the same portion of the prize as the others; the other was a proportional profit-sharing system, where players' rewards were based on their individual investments. The results showed that linking the reward to a player's contribution increased players' willingness to commit resources for the good of the group.

In sum, both social psychology and experimental economics are interested in the effect of competition on groups and on the behavior of individual group members, and both disciplines reach similar conclusions regarding ultimate performance, namely that group competition enhances intra-group cooperation and competitive behavior of the group as a whole. The disciplines diverge along the expected lines with regard to their interests beyond effort and performance, with economics aiming to understand the nuanced effects of incentive structures and psychology exploring the emotional and interpersonal effects of group competition.

### **The dark side of competition: How competitive incentives encourage harmful behavior**

In the previous sections of this chapter we discussed the many advantages of competition for motivation and performance that studies in psychology and economics have documented. But the effects of competitive structure and incentives are not uniformly positive. Studies in both disciplines

report similar findings regarding the possible drawbacks of competitive settings, and the differences between psychology and economics in empirical approach and variables of interest make their findings complementary. Numerous studies have shown that competition can inhibit rather than enhance motivation and effort, and may create adversarial relationships between competitors, leading to harmful and at times unethical behaviors.

### ***When competition reduces motivation***

Research in experimental economics, which focuses mostly on competitors' material welfare and investment of effort, found that competition can have a negative effect on these outcomes. For example, some studies have reported that competition can reduce rather than increase effort. Van Dijk, Sonnemans, and van Winden (2001) conducted a real-effort experiment, in which one group of participants worked individually for a piece-rate payment, another group was divided into pairs which were paid according to their collective performance, and a third group included pairs of competing participants who were paid based on a competitive, rank-order incentive scheme. Although the highest average effort level was observed in the competition condition, this condition also displayed the highest variability in effort, with more workers exerting low effort levels in the competition than in the other work settings. The authors noted another negative outcome of competition, that the hardest-working competitors were undercompensated for their high levels of effort. Lazear (1989) argued that the structure of rank-order incentives makes it beneficial to look for competitions populated by low-quality players, with whom achieving a favorable comparison is easier and more likely, thus benefiting from a favorable comparison to them. Similarly, Van Dijk et al. (2001) demonstrated that attempting to achieve superior performance by maximizing effort may be a suboptimal strategy.

Another negative effect of competition on motivation has been observed on individuals' desire to compete. Competitive incentive structures can at times be perceived as a deterrent, rather than an enticing opportunity. Fershtman and Gneezy (2011) compared levels of tournament rewards as part of 10th grade gym class activities on students' behavior and performance. They found that increasing the competitive incentive increased participants' likelihood to drop out of the competitive activity and effectively forgo the pursuit of their goal altogether. Rather than promote higher effort, competition resulted in higher rates of quitting.

Studies in psychology have also reported cases in which competitive incentives resulted in lower task effort, but their focus was on the psychological underpinnings of the reduction in motivation. For example, competition presents an inevitable conflict between the motivation to achieve one's personal goal and the desire to maintain good relationships with others (Haran, 2019). When the maintenance of interpersonal relationships is important, with their counterparts in particular or with others generally, competitors experience an internal conflict that can harm their desire to achieve their goal and taint the good feeling brought about by winning. Exline and Lobel (1999) found that the perception of oneself as a target for upward social comparison often makes people uncomfortable. When they believe that others are making envious comparisons with them, people feel uneasiness, distress, or sorrow. Feelings of guilt, an emotion generally associated with high motivation for goal-achievement, lead to lower motivation and performance in the pursuit of competitive goals. Consequences of this emotional state include lower task motivation in a competition (Haran, 2019) and preferences for more cooperative and altruistic outcomes, such as diminishing the significance of the outcome or sharing the winner's reward (Zell & Exline 2010).

***When competition becomes counterproductive and harmful***

An inevitable consequence of competitions and tournaments is that they create inequality and hierarchy between people. They emphasize a certain goal or outcome that is pursued by multiple individuals or groups but can be attained only by one. A favorable comparison of one person over another cannot be attained by both; the same is true for victory in a competition. Naturally, this inherent conflict adds difficulties to maintaining a mutually beneficial relationship between competitors (Danziger, Disatnik, & Shani, 2017; Exline & Lobel, 1999). Social comparison makes people perceive their targets of comparison as possessing lower integrity and as more hostile, and the emotional bonds between themselves and their targets as weaker. As a result, people's willingness to trust their counterparts is lower when engaging in social comparison (Dunn, Ruedy, & Schweitzer, 2012). Similarly, competing with others makes attitudes toward them more negative: after playing a competitive game, players remember their counterparts' faces as more aggressive than do participants who played a cooperative version of the same game, and evaluate competitors who have defeated them as more hostile (Balas & Thomas, 2015; Salovey & Rodin, 1984). These negative attitudes ultimately reduce individuals' willingness to help their competitors and their propensity to inflict punishment upon each other increases (Tesser & Smith, 1980; Yip, Schweitzer, & Nurmohamed, 2017).

Studies in both economics and psychology have found that rank-order competition encourages unethical behavior. Research in psychology has reported that situations that highlight social comparison increase people's likelihood of cheating on tasks. This phenomenon occurs both among those who compare unfavorably and those who enjoy a favorable comparison. John, Loewenstein, and Rick (2014) had participants complete a series of tasks for variable wages, with some participants being paid more than others for the same level of performance. Cheating, by submitting falsified

performance reports, was more prevalent among underpaid participants than among those who had been treated favorably, but only when the pay of their overpaid counterparts was made known. Schurr and Ritov (2016) found that winning could also result in cheating. Following a contest from which they emerged as either winners or losers, participants privately rolled a pair of dice to determine their monetary payoffs in the experiment, and self-reported the results. Winners reported higher outcomes of the die-roll, claiming greater pay than did losers. The authors argued that increased social comparison, combined with the favorable result and the claimed winner status, induced a sense of entitlement in winners, which encouraged their unethical behavior.

Research in economics has also reported a link between competitive incentives and unethical, counterproductive behavior. Although tournaments are designed to enhance competitors' efforts toward improving their performance, at times they encourage competitors to aim their efforts at harming other participants or the competitive field as a whole. Collusion, for example, occurs when contestants coordinate with each other to collectively reduce effort levels to prevent competitive escalation. Although this cooperative behavior may benefit the individual parties to this relationship, it typically harms the overall field by creating unfair advantages and market failures, and it is often in violation of laws and regulations designed to protect competitors and other stakeholders (e.g., consumers). Harbring (2006) demonstrated the risk of collusion by providing competitors the ability to communicate with each other by chat. Participants who used the chat feature in a collaborative team compensation scheme displayed higher effort than other groups, but when the incentive scheme was competitive, free communication between contestants resulted in lower overall effort. Lugovskyy, Puzzello, and Tucker (2010) found that collusion can develop even without communication by simply letting contestants play against each other repeatedly over time. In a repeated all-pay auction

experiment, participants who were matched with the same counterparts for the duration of the study ended up bidding lower amounts than those whose counterparts changed from round to round.

Tournament settings may also encourage sabotaging the work of others to make it less favorable in comparison to one's own performance. Evidence of sabotaging behavior has been found in experimental studies by Harbring and Irlenbusch (2008; 2011). In one study, participants had the opportunity to determine both their productive and destructive efforts vis-à-vis their competitors. Wider spreads between prizes awarded to the winner and to the loser were associated with higher investment by players in sabotaging the output of their competitors. This effect was resistant to variations in the size of the competitive field. Carpenter, Matthews, and Schirm (2010) demonstrated just how counterproductive these behaviors can be. Their study varied both participants' incentive scheme (piece-rate vs. tournament) and possibility of sabotage. Although the highest performance was observed in the tournament where sabotage was not possible, whenever it was possible, sabotage was popular among contestants and resulted in the lowest total output.

To summarize, behavior in tournaments is studied by both experimental economists and social psychologists, who are interested in many common questions pertaining to this type of competition. Whereas economists are interested primarily in structural factors and in direct effects on behaviors and outcomes, psychologists study the cognitive, motivational, and affective processes that are invoked by assigning competitive achievement goals, and how these processes shape competitors' motivation and goal-directed behavior.

### **The Winner's Curse and Common Value Auction**

Auctions are a prevalent form of competition used in various circumstances, and they have been studied extensively in both psychology and economics. Works of art, antique furniture, artisanal

wines, real estate, used cars, and the radio spectrum are all commonly objects of auctions. The most common types of auctions are the English and the Dutch. In an English auction, bidders adjust their bids upward, and the highest bid wins the auction. The Dutch auction is a descending one: the auctioneer starts with a high price and adjusts it downward until a bidder stops the auction and claims the good for the price that was declared at the moment of the action. There are first-price auctions, in which the highest bidder claims the object for the amount of the bid, and second-price auctions, which are awarded to the highest bidder, but the winner pays only the amount of the second highest bid. Auction theory makes different predictions about the prices that rational bidders will pay for an object, based on precise assumptions about the rules of the auction and the way in which bidders value the object (Camerer, 2003). Experimental economists then test these predictions in the lab. Issues such as risk aversion, uncertainty, collusion, learning, and the number of bidders have played large roles in this research (Ku, Malhotra and Murnighan 2005). In this section we focus on common value auctions, that is, auctions in which the value of the auctioned items is equal for all bidders. We review experiments conducted on the winner's curse phenomenon, which has been widely studied by both economists and psychologists, and discuss the differences between the goals, perspectives, and methods of the two disciplines in studying this phenomenon.

### **What are common value auctions?**

In common value auctions, the value of the auctioned item is the same for all bidders, as for example, in the case of drilling rights for oil. The amount of oil a certain location can yield is assumed to be the same for all companies. However, because it is difficult to estimate the exact value of the item, estimates of its value can vary substantially between bidders. In most cases, the bidder with the highest estimate of the value of the item makes the highest offer for it and wins the auction. Because high estimates are usually not based on better information, the winner

most likely overpays for the item. This is an example of an *adverse selection* problem, which, if not taken into account by bidders before submitting their bids, can result in suboptimal or even negative profits for winners. The winner's curse refers to the fact that to win in a common value auction, the winner is likely to have overestimated the value of the item. Consequently, the winner is likely to gain less than expected and may even lose (i.e., is said to be "cursed"). Indeed, research has shown that "winning bidders" often find that they have overpaid for the acquired commodities (e.g., Kagel & Levin, 1986).

Standard economic theory does not predict the effect of the winner's curse, which is not expected from rational bidders. It was first discovered by Capen, Clapp, and Campbell (1971), who studied field data from oil field auctions. The authors pointed out that, on average, firms that acquired oil fields in auctions fell prey to the winner's curse and sustained a loss. If all bidders are rational and adjust their bids to account for adverse selection, the winner's curse cannot materialize, therefore evidence for the phenomenon in market settings indicates an anomaly. Economists are doubtful about this finding because it demonstrates an out-of-equilibrium phenomenon (Roth, 1995).

### **The winner's curse is real (psychologists and economists agree)**

Laboratory experiments in economics that have examined the winner's curse, tested the robustness of the phenomenon and determined the features of the auction to which it may respond. Bazerman and Samuelson (1983) were the first to explore the winner's curse in an experimental setting. The study was conducted on MBA students who participated in a sealed-bid auction for collections of various objects, including coins, paper clips, etc., contained in a jar with a total value of \$8. Participants were told that the highest bidder would receive the value of

the jar minus their bid. The authors varied the number of bidders and the contents of the jar. They also asked bidders in addition to their bids to estimate the value of the jar and to give their 90% confidence intervals around these estimates. Although participants underestimated the value of the objects in the jar, providing a mean value estimate of \$5.13, the mean winning bid was \$10.01, higher than both the bidders' own value estimates and the actual value of the jar. Thus, winners incurred a loss of \$2.01, on average, at these auctions. The authors found that the size of the winner's curse increased with the number of bidders and with uncertainty about the value of the jar.

Subsequent experiments involving the winner's curse, especially those conducted by economists, implemented the common value auction in a more formal way. This enabled researchers to manipulate more precisely factors that were important from an economic theoretical perspective, such as the number of bidders, the uncertainty regarding the value of the good, and the type of auction.

The perspective of experimental economics with regard to the winner's curse is neatly demonstrated by Kagel and Levine (1986), who engaged participants in several auctions. In each auction, the value of the auctioned good,  $x_0$ , was randomly chosen from a uniform distribution and was the same for all bidders. Each bidder received a private information signal,  $x_i$ , drawn from a uniform distribution on  $[x_0 - \varepsilon, x_0 + \varepsilon]$ , with  $\varepsilon$  known to participants. Because economists assume that bidders are rational, lab experiments provide participants with optimal conditions to reveal their rationality, especially with respect to experience and feedback. Participants in the Kagel and Levine (1986) study received an initial cash endowment, and those who lost their entire endowment in the auction were declared bankrupt and prevented from further bidding. After each auction, participants received extensive feedback about their bid, the value of the winning bid, the true value of the good,

and the performance of other participants in the auction. Participants were able to observe the earnings of the winning bidders and of the others, and learn from their experience. Despite this meticulous experimental design, the winner's curse persisted. The authors also found a more pronounced bias in large auctions than in ones that included a small group of bidders. Participants in large auctions bid more aggressively than in small ones, whereas rationally, they should have bid more conservatively as more bidders participated in the auction. Experience, however, helped reduce the winner's curse, but does not eliminate it.

A common criticism of economic findings, especially when they fail to agree with economic theory, concerns the subject pool, and argues that the students who composed the subject pool may not be representative of people who voluntarily join auctions and bid in real life. But the results regarding the winner's curse seem to be consistent across various populations, including MBA students (Bazerman and Samuelson, 1983; Kagel and Levin, 1986), talented undergraduates (Lind and Plott, 1991), and construction firm managers (Dyer, Kagel and Levine, 1987).

### **Theoretical explanations of the winner's curse**

Nash equilibrium in common value auctions requires complicated calculations of the best response to other bidders' actions that involve beliefs about others' rationality and strategic uncertainty. The robustness of the winner's curse observed in the lab for inexperienced bidders motivated theorists to explain the phenomenon within a normative Nash bidding model with fewer assumptions, which permits a more relaxed belief system (Kagel & Roth, 2015). Eyster and Rabin (2005) assumed that the bidders accurately predict the distribution of others' bids and know how to best respond to it, but do not correctly perceive how these other bids depend on other bidders' information. Crawford and Iriberry (2007) explained the winner's curse by different levels of

“sophistication” or “k-level reasoning.” They demonstrated that the majority of players can be classified as level-0 players who chose randomly between possible actions or level-1 players who plan their response to the expected behavior of level-0 players. The relative lack of players with higher levels of sophisticated planning explains the high prevalence of the winner’s curse. Thus, both studies allow for a more relaxed belief system while maintaining assumptions about rational players making the best response in accordance with their (relaxed) belief structure.

### **The underlying mechanism of the winner’s curse, as demonstrated by the Acquiring a Company problem**

To understand the cognitive process that accounts for the winners’ curse, psychologists have used mostly the Acquiring a Company task, in which the optimal behavior does not depend on beliefs regarding the rationality of other players. The task, an adaptation of Akerlof’s (1970) market for lemons problem by Samuelson and Bazerman (1985), models bargaining under asymmetric information. The Acquiring a Company task describes a company that considers acquiring another. The seller, who owns the target company, knows its exact value,  $v$ , but the buyer knows only that  $v$  is a value taken from a uniform distribution ranging between 0 and 100 monetary units. Both parties know that if purchased, the value of the company to the buyer will increase by 50% to  $1.5v$ . In these circumstances, what final offer should the buyer make for the company?

Since the seller knows the value of the company, the seller agrees to sell the company only for the price of  $v$  or more. This selective acceptance of offers by the seller leads to a negative expected profit for any accepted bid. Thus, any offer greater than zero has a negative expected profit and is therefore not profitable.

Despite the simplicity of this game, which removes many of the complications embodied in a multiplayer auction context, players still suffer from not recognizing the adverse selection effect of winning and succumb to the winner's curse. Participants typically bid somewhere between the expected value to the seller of 50 monetary units and the ex-ante expected value to the acquirer of 75. Carroll, Bazerman, and Maury (1988) sought to understand this non-optimal behavior of the buyers. Using a classic method of experimental social psychology, they asked participants to think aloud while performing the task. They found that participants simplified their decision task by ignoring the selective acceptance of the seller, treating the problem as if the seller had the same limited information they had. The authors suggested that this simplification is a special case of individuals' more general tendency to make simplifying and potentially biased assumptions when trying to incorporate knowledge about future contingent events. Accordingly, they showed that performance did not improve when changing the cover story from a bidding scenario to an individual decision-making task.

Similarly, Charness and Levin (2009) transformed the Acquiring a Company task to an individual decision-making problem in which there is no responding seller or any mention of such a role. Their objective was to examine the normative models suggested by Eyster and Rabin (2005) and by Crawford and Iriberri (2007) using a winner's curse task in which avoiding the winner's curse does not depend on beliefs about other bidders' actions. Despite this simplification of the winner's curse task, no convergence to the optimal bid was found. Charness and Levin's results rule out both models as an explanation for the winner's curse because there are no other players whose actions must be taken into account. The authors suggested that the suboptimal performance reflects people's difficulty performing contingent reasoning on future events. Recently, Koch and Penczynski (2018) also examined the cognitive processes involved in the winner's curse from an economic

perspective, and assessed whether the phenomenon is driven predominantly by conditional reasoning or by belief formation, that is, by ignoring the selective acceptance of the bid or by beliefs that do not take into account others' bidding. In the modified auction setting that requires neither conditional reasoning nor belief formation for optimal behavior, the authors observed bids that are close to equilibrium. Unlike psychologists, they proposed to relate deviations from equilibrium play to objective game complexities rather than to focus on people's behavior and on the way they think about complex games.

### **Learning to overcome the winner's curse**

The winner's curse demonstrates the bidders' inability to take into account the other's perspective and its resulting choice when determining their bids. One explanation provided by economists to this behavioral pattern is participants' inexperience with the task. According to the mainstream economic argument (e.g., Thaler, 1992), although people can be deceived once or twice by such a problem, with experience they figure out the principles and traps inherent in the task. Psychologists agree that experience can help people learn to attenuate biases, but they do not share the economists' optimism that all biases can be overcome with sufficient experience. Research in psychology aims to understand the cognitive process that leads to the bias and provide feedback based on this process. By contrast, economists incorporate the learning process into a theoretical model to test the conditions under which behavior converges to its theoretical economic equilibrium.

Ball, Bazerman, and Carroll (1991) examined learning in the Acquiring a Company task. They let participants complete 20 trials of the task, with financial incentives and full feedback, but did not observe any learning or gradual decrease in the bids. In a second experiment, the

researchers allowed participants to reverse roles to make the asymmetry of information more salient to the buyers. For the group that switched roles, the rate of learners (defined as participants who bid zero at any particular trial and continue to do so until the end of the experiment) increased from 9% to 37%. At the same time, the mean offer decreased only slightly for those not defined as learners. A limitation of the learning in this study was that participants could learn only from their own experience. They received no information about others' losses or their own potential for losses if their bids had been accepted. Foreman and Murnighan (1996) addressed this limitation by giving participants ample feedback and experience, as is customary in experimental economics. Over a period of four weeks, participants participated in two Acquiring a Company tasks and four common value auctions, and were encouraged to reflect on their bids between sessions. One group received full feedback on their and others' bids and outcomes, which enabled them to learn from their own experience as well as from that of others. Despite this optimal learning environment, experience had little effect on bidding, and although the additional feedback reduced overbidding to some extent, it never extinguished the winner's curse. Note that the experiment was conducted on students with no real incentives, which may have attenuated learning.

Economists Selten, Abbink, and Cox (2005) also studied learning in the Acquiring a Company task. Approaching the task from an economic perspective, they showed that a simple directional learning model can capture the behavior in this task. Participants completed 100 trials of the task, compared with 20 in the Ball et al. (1991) paradigm, to address the possibility that the lack of convergence to the optimum in the prior study was due to an insufficient number of rounds. They also experimented the task with different minimum values, so as not to restrict the

study to conditions under which the optimum is extreme. Despite these changes, no apparent convergence toward the optimum was observed.

Unlike in psychology, studies in experimental economics are careful to design the incentive structures in a way that participants are paid according to their performance. Bereby-Meyer and Grosskopf (2008) suggested that one factor that may account for the slow learning in the Acquiring a Company task is the noise in the feedback, i.e., the variance in participants' ultimate payoff. The task used by Ball et al. (1991) had a large gain-loss variance, so that the same offer could potentially end up with a profit of 50% or with a significant loss. These sources of variability result in choices and outcomes that are only partly correlated, therefore sub-optimal choices may have high positive payoffs. Indeed, a third of the time, participants gain positive amounts of money while bidding and acquiring a company, which makes it difficult for participants to reject the hypothesis that it is good to bid. Bereby-Meyer and Grosskopf (2008) showed in an experiment that when the variance in the feedback was reduced, bids decreased and performance improved significantly. The susceptibility of learning to feedback variance suggests that economists may be right in arguing that biases can be eliminated with experience, but this effect may be restricted to environments with low amounts of noise. This highlights the importance of conducting experiments that test learning in noisy environments that better reflect real-life situations.

Research has found that decision makers failed to perform optimally in competitive settings because they paid attention and focused only on their own thoughts and actions, and failed to incorporate a clear understanding of the rules of the game and their interaction with their competitors' behaviors (e.g., Carroll, Bazerman, & Maury, 1988; Tor & Bazerman, 2003). Using protocol analysis, Tor and Bazerman (2003) showed that the interactions between the

parties and the rules of the game were the most important predictors of success. They suggested that the difference between successful and unsuccessful decision makers was not necessarily how much they thought about the different aspects of the competitive situation, but how they thought about the decisions of others and the rules of the game. They found that the same errors existed and predicted failure across three seemingly different tasks: the Acquiring a Company problem, the Monty Hall problem, and the Multiparty Ultimatum game.

Idson and colleagues (2004) proposed a cognitive intervention to overcome the winner's curse. Inspired by the findings of Tor and Bazerman (2003), as well as by research on analogical reasoning in negotiation (Loewenstein, Thompson, & Gentner, 1999; Thompson, Gentner, & Loewenstein, 2000), they explored whether participants can learn by understanding differences in seemingly similar task problems, versions of the Monty Hall problem (Nalebuff, 1987; Friedman, 1998) and the Multiparty Ultimatum game (Messick, Moore, & Bazerman, 1997; Tor & Bazerman, 2003), to focus more accurately on other parties' decisions and the rules of the game. The analogical training was found to be successful in focusing participants on the rules of the games and consequently overcoming the winner's curse. A similar active approach was adopted by Grosskopf, Bereby-Meyer and Bazerman (2007), who added cognitive feedback to the Acquiring a Company task, as suggested in the psychology literature. They presented participants with different parameters of the task, asking them to compare and contrast the different parameters (see Idson et al. (2004) for a similar manipulation). Participants received full feedback on the history of their choices and the resulting outcomes, and were allowed to interact with a human opponent instead of a computer program. None of these manipulations led to a better understanding of the task. The bias in participants' behavior proved persistent and was impervious to these learning interventions.

In sum, although economics and psychology use different approaches to the winner's curse, the conclusions from the research are similar: the winners' curse is a robust bias that is difficult to overcome, even with ample experience and feedback, and it involves complex cognitive learning procedures. It may be attenuated, but it is difficult to eliminate.

### **Conclusion**

In his paper, "Rationality in Psychology and Economics" (1986), Herbert Simon wrote that "economics has almost uniformly treated human behavior as rational. Psychology, on the other hand, had always been concerned with both the irrational and the rational aspects of behavior." In this chapter, we propose that this distinction between the two disciplines is also apparent in the way they have studied competition. But the approach of economics to the study of competition also reflects the changes in the way it has viewed rationality over the last two decades, that is, taking into account mistakes, doubts about how smart others are, and learning the normative models of competition. Experimental economists aim to develop rational models and strive to capture a better understanding of agents' bounded rationality, given the complexity of the environment. The field of economics can continue enriching its models by incorporating insights from psychological studies on cognition, emotions, and motivation into their theories of competition.

Social psychology, in turn, has also evolved in its approach to competition. We have witnessed a transition from scenario-based research to incentivized experiments of real behavior, including the provision of extensive feedback. Still, psychologists can further enrich their research on competition by adopting some principles of experimental economics. Psychology would be well served by aiming to develop formal models that more precisely abstract the social

context to include the different agents in the situation, such as buyers and sellers in the Acquiring a Company task, rather than trying to achieve simplification. This may be a challenging task, however, given the goal of understanding cognitive processes without losing internal validity.

To conclude, we find the increase in multidisciplinary research on competition in social psychology and experimental economics an encouraging trend. The high level of openness and mutual enrichment between the two disciplines suggests that the two may be moving closer to each other, and that they are better able to learn from one another and to collaborate in developing a rich understanding of this fascinating human behavior.

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