Journal of Behavioral and Experimental Economics 59 (2015) 32–41

Contents lists available at ScienceDirect

Journal of Behavioral and Experimental Economics

journal homepage: www.elsevier.com/locate/socec

Cooperativeness and competitiveness in children☆

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ARTICLE INFO

Article history:
Received 5 May 2014
Revised 22 June 2015
Accepted 6 September 2015
Available online 26 September 2015

Keywords:
Cooperation
Competitiveness
Experiment
Children

ABSTRACT

Cooperation and competition are both essential elements of economic life. Here we explore how cooperativeness in a prisoner's dilemma correlates with competitiveness in a sample of 9–12 years old children in Colombia and Sweden. Using two different measures and four different tasks for competitiveness, we find no consistent relationship between cooperativeness and competitiveness. However, we find evidence of a negative relationship between willingness to compete in a math task and cooperativeness in the overall sample. Competitiveness in math has previously been related to educational choices, and may therefore be the most economically relevant relationship.

1. Introduction

In this study we investigate how two central individual economic behaviors, competitiveness and cooperativeness, correlate. While both competitiveness and cooperation have received substantial interest in previous research, most economic studies focus on either cooperation or competitiveness. However, in society today, economic success at the individual, firm, and societal levels requires that agents manage relationships containing elements of both cooperation and competition. For example, a market economy is designed to reward those who win in competitions – such as producing the most valuable innovations, or having the best skills – but does also require cooperation by avoiding to impose high externalities on others, or behaving honestly. Further, most firms are, themselves, cooperative units to further collective competitive position. It is also common for firms and individuals to collaborate in development and production stages of a product, but to have competing products in the market. In turn, in all but the least complicated contexts, incentive structures within organizations need to balance the two behaviors in order to optimize outcomes, and elicit cooperation when needed, while at the same time generating a constructive competitive climate, spurring achievement and invention within the organization. In fact, organizations are often testing individually based or team based incentives to reward their members with no clear winner. As discussed by Beersma et al. (2003), organizations are choosing these individual or team reward systems based on the type of production tasks, highlighting the importance of selecting the right rewards to improve performance. Knowing how cooperative behavior relates to competitive behavior at the individual level is essential in order to develop appropriate incentive structures.

Despite this knowledge, most organizations select and promote individuals mainly through competitive mechanisms. Will these selection processes lead to a suboptimal choice of "winners", by ignoring other aspects of human behavior critical for success, such as cooperative behavior? In this paper, we ask if there is a negative relationship between cooperativeness and competitiveness, and whether this potential conflict is general or varies depending on how competitiveness is measured.

Due to the prevalence of competitive selection processes in economically relevant settings, competitiveness has received a lot of attention in recent experimental research. In these studies, competitiveness is often measured together with other preferences that potentially correlate positively with competitiveness, such as risk preferences and overconfidence. Social preferences are often

☆ We thank Johan Almenberg, Anne Boschini, Thomas Buser, Uri Gneezy, Magnus Johannesson, Adriana Molina, Astri Muren, David G. Rand, Gloria Rodriguez and Roberto Weber for helpful Comments and assistance. Financial support from the Jan Wallander and Tom Hedelius Foundation and the Carl Silfvén Foundation, the Swedish Council for Working Life and Social Research (FAS), the Swiss National Science Foundation, and the Economics Department at the Universidad de Los Andes is gratefully acknowledged. The funding sources had no involvement in any aspect of the study.

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http://dx.doi.org/10.1016/j.socec.2015.09.003
2214-8043/

ruled out either in the experimental design, such as, for example, inequality aversion in the widely used design by Niederle and Vesterlund (2007), or measured separately, such as altruism in Dreber, von Essen and Ranehill (2014a). However, another much explored behavior in economics, cooperativeness, has to our knowledge not previously been directly related to competitiveness at the individual level. In everyday life, cooperation and competition are often described as opposites. If this holds and competitiveness is negatively correlated with cooperativeness, organizations face a tradeoff between attracting individuals that perform best in competitive situations or are attracted to competitive situations on the one hand, and forming the most cohesive and cooperative group on the other. Further, in economics, competitiveness is mainly described as a zero sum game, while cooperativeness involves a social multiplier. Whether individuals who prefer to compete and individuals who perform best under competition also are less cooperative and less prone to exploit social multipliers in cooperative settings, and thus to what extent organizations in their selection processes really face the abovementioned tradeoff are, however, rather unexplored questions.[1] It is thus important to shed light on the relationship of individuals' competitiveness and cooperativeness in order to understand how incentives can best be developed when group performance depends on both individual performance and group collaboration. This question is not only relevant for the workplace, but for individuals, policy makers and firms alike.

In this paper, we test whether competitive young individuals are also less cooperative, varying both the measure and the domain of competition. Our sample is a large group of children aged 9–12 years in Colombia and Sweden, and we look at the pooled sample as well as each gender and country separately. We believe that this type of sample is interesting to study since if there are correlations between cooperativeness and competitiveness already among children, this suggests that the relationship emerges early in life. Using a sample of school children as compared to the standard sample of university students also has the advantage of diminishing self-selection, which may be particularly important when investigating behavioral traits like cooperativeness and competitiveness. In this study, all children present in school on the day of the experiment participated.

As a measure of cooperativeness we use a simple incentivized prisoner's dilemma game with simple visual aids (colored balls) and physical effort (running), where cooperation entails incurring a cost for someone else to receive a larger benefit and maximize social welfare, whereas defection implies doing nothing for the other person and receiving a larger private gain. Cooperativeness in a one-shot interaction, or more generally when there are no cooperative equilibria in the game, can be considered to be due to social preferences (see for example Dreber, Fudenberg and Rand, 2014b). We chose to focus on cooperativeness because it measures the ability of individuals to forego private gains, and work for the team to create a social surplus. We use prisoner's dilemma to measure cooperation, as this is the standard cooperation measure in the literature. We thus do not address other social preferences that may or may not correlate with cooperativeness.

Competitiveness can be measured in different ways: by an individual's reaction to incentives through either willingness to compete by self-selection into environments with competitive or piece-rate payment schemes (as in Niederle and Vesterlund, 2007), or through the performance change as a response to a competitive payment scheme in comparison to a piece-rate payment scheme (as in e.g. Gneezy, Niederle and Rustichini, 2003). Competitiveness could explain why certain individuals are attracted to specific educational tracks and job environments, and also why certain individuals are more likely to be promoted – because they apply more for competitive promotions (see for example Bertrand (2011) for a discussion on this and Zhang (2012) and Buser, Niederle and Oosterbeck (2014) for direct evidence). Since it has previously been shown that competitiveness, and in particular gender differences in competitiveness, may depend on the task, we explore competitiveness in four different tasks. Competitiveness is thus measured as performance change in a running, a skipping rope, a math, and a verbal task. In the math and the verbal task we also measure competitiveness from subjects' willingness to compete, after they have experienced both payment settings. The two physical tasks are performed in a physical education class with only intrinsic motivation, whereas the two other tasks are performed in a classroom with extrinsic incentives. We choose to focus on individual competitiveness rather than group competition since the focus in this study is on how individual cooperativeness and competitiveness correlate.

To our knowledge, this is the first paper to study the correlation between cooperative and competitive individual preferences.[2] There are, however, some related studies investigating competitiveness and other social preferences. Bartling et al. (2009) study willingness to compete in a simple math task among a sample of mothers of preschool children and find that more egalitarian individuals are less willing to compete, while altruistic individuals are more competitive. Balafoutas, Kerschbamer and Sutter (2012) also find that inequality averse individuals, as well as spiteful individuals, are less willing to compete in math than efficiency minded individuals. However, spiteful individuals are more competitive than inequality averse and efficiency minded individuals in terms of performance change when forced to compete. In a similar vein, Teyssier (2008) finds that inequity averse individuals are less likely to self-select into competitive schemes compared to revenue-sharing schemes. In another experimental study, Dohmen and Falk (2011) find that neither trusting nor reciprocal individuals (measured in a sequential trust game) are more or less willing to compete than other individuals.[3]

There is a related literature on simultaneous games, where individuals participate in a cooperative and a competitive game at the same time with the same other individuals. For example, Savikhin and Sheremeta (2013) find that suboptimal overbidding in a lottery contest decreases when individuals play a public goods game at the same time, compared to when the games are played in isolation. Cason and Gangadharan (2013) find that public goods game contributions in a threshold game decrease when individuals simultaneously participate in a double-auction market.

Previous literature prompts different hypotheses depending on what relationship we focus on. Since cooperativeness is likely to be positively related to altruism and efficiency, these previous studies should lead us to expect a positive relationship between cooperativeness and competitiveness as measured by willingness to compete.

[1] Further, in the current biology literature, there is a revival of the debate on group selection, or multilevel selection, which investigates the importance of competitive and cooperative traits in group members. This literature has generated a growing set of theoretical models and experimental tests that suggest that there may be a relationship of complementarity (see for example Bowles and Gintis, 2011; Burton-Chellew and West, 2012; Hausken, 2000; Puurtinen and Mappes, 2009). One of the arguments in favor of this complementarity is that inter-group competition decreases the intra-group conflicts associated with cooperation dilemmas (Rapoport and Bornstein, 1987; Bornstein, 1992; Erev, Bornstein and Galili, 1993; Bornstein and Ben-Yossef, 1994). Assuming that preferences for competition between individuals and between groups are positively correlated, this would predict a positive correlation between cooperativeness and competitiveness in our study.

[2] Charness and Villeval (2009) experimentally elicit measures of cooperativeness and competitiveness in their study. However, their focus is on the behavioral differences between senior and junior employees, as well as on the impact of group age composition on these behaviors, and not on the intra-individual correlation between the two behaviors.

[3] There are also examples of studies that study both competitiveness and cooperativeness but do not explore their correlation: see, for example, Ahlgren (1983), Beersma et.al (2003) and Bigoni et al. (2011).