Overconfidence is a persistent phenomenon in our modern society. Its biggest strength stays in the ability of convincing others of being qualitatively superior than the average. Burks et al. [2013] identify three main categories of motivations that could drive an agent to hold overly confident beliefs: consumption value, motivation value and signaling value. Leaving the first two for further explanation, I decided to focus my research on the latter. These individuals will have a socially rooted bias that would make them unable to react to update of information and make them hold excessively overestimated beliefs on their ability. One step further could be done by investigating the effect of this bias on cooperation, the mother of all social aspects, in order to see if this has negative effects or could help in overcoming problems of non-cooperation.

Mertins and Hoffeld stated in 2015, despite the presence of some previous literature in the field, that "given the lack of empirical evidence, it is a priori unclear how, if at all, overconfidence affects workers' willingness to cooperate". I thought that it might have been interesting to shed some additional light on this phenomenon and try and add a personal contribution to it. Overconfident agent can have an increasing utility from having higher self-image and self-esteem. If they manage to communicate their higher ability, they will be perceived as more competent and in turn being conferred higher status. This in fact is often based on valued characteristics and not on the actual possession of them. It is clear that being status mostly based on perception, signaling overconfidence being active in a cooperation game might be helpful. Moreover, these individuals often feel they need to help other less able coworkers contributing relatively more to the team project. Finally, they tend to self-select into more competitive environments than their unbiased colleagues. They overestimate the marginal product of their effort and will be willing to make a costly effort when the rational agent would not (e.g. if commitment is required).

Before this paper two methods have been used to test cooperation in this context: public good games (Li et al. [2016]) and ability tasks (Mertins and Hoffeld [2015]). I think both approaches can have some problems. The main problems of the public good game as it is been used is that it does not consider the results of the ability tasks in the initial endowments and it does not clarify enough the effects of other factors, such as inequity aversion. Moreover, conditional cooperation is at the heart of the game and it might potentially depend upon other aspects. In the second experimental setup individuals could choose between two tasks – individual and collective – and the payoff was the sum of the two, not respecting in my opinion the incentive compatibility. Therefore I decided to change this approach and think of a setup that meets the status-signaling characteristics of this bias.

The experiment is structured in two consecutive tasks, that aim to identify overconfident players and see their behavior in a situation where cooperation could be preferable if the probability of winning is high enough. In Task 1 the players are faced with a certain amount of questions, IQ test like, and they have to answer to them first and subsequently estimate how many of them were correct. I am going to use the "lottery method" suggested in Blavatskyy (2008) and used by Goette et al. (2015), as it directly assesses the overconfidence problem within an environment where incentive compatibility is granted. In Task 2 players are randomly matched with a single opponent and this happens for n times, in order to have multiple observations and everyone of them is independent from the other. The number of observations does not need to be too high, in order to avoid learning effects. One player is going to be selected as "leader" and the other as "follower", resembling a signaling game, with the focus being on those who in Task 1 were defined as "overconfident". The two players are going to see another question, similar to the ones faced in the previous task. The payoff – communicated to the players – follow this rule: if they both answered correctly they receive 7 each, if only one of them did he receives 3, the wrong answer is clearly awarded with zero points. Cooperation, if reached, can give a higher payoff to both players.

In time t=0 the leader can choose to "commit" or not. The choice of commitment implies that the player communicates to the opponent his answer and then has to stick to it. If the leader does not commit he has two choices: either answer with the expected utility of

$$U(answ) = p(correct)*(0,5*7 + 0,5*3) + (1-p)*0 = 10/2\ p = 5p.$$

or choosing a lottery that gives him a fifty-fifty chance to get 5 points U(lottery) = 2,5. If the player thinks to be just as good as the lottery (p= ½), then he's indifferent in the choice. The leader does not have any information to estimate the likelihood the other player will answer the same way he did and therefore takes as given a fifty-fifty chance for matching. If he answered correctly with ½ probability he gets 7, otherwise 3. Clearly if his answer is wrong he doesn't get any points.

However he can commit and at this point the follower can decide to follow or not the lead:

$$U^{LEADER}(\text{commit}|\text{followed}) = p(\text{correct})*7 + (1-p)*0 = 7p$$

$$U^{LEADER}(\text{commit}|\text{notfollowed}) = p*3 + (1-p)*0 = 3p$$

On average there is incentive compatibility; if the two events are expected to happen with equal probability: U(commit) = U(answer). Under certain conditions, however, that I judge as being related with overconfidence, the player might decide to commit. If the player is overconfident he might overestimate the probability of winning and be willing to communicate it to the other player in order to get the coordination payoff.

Notice that the utility for the follower is: $U^{FOLLOWER}(\text{follow}) = 7*p(\text{correct})$ & $U^{FOLLOWER}(\text{notfollow}) = 3*(1-p)$. Meaning that it's always optimal for the follower to follow the lead if p is sufficiently high ($p > 3/10$). The leader know it is profitable for him to convince the follower of being of good quality and it might be convenient the decision to commit.

At the end one turn for the Task 2 is going to be chosen and either this or the results from Task 1 are going to be chosen for the final payment.

The choice of the signaling structure comes from the paper by Gintis et al. (2001), which suggests that cooperation evolves because it is an "honest signal" of the member's quality. If honestly signaling can encourage cooperation I can do anything but ask myself what an "overconfident" signal could do. As in the paper we have an unconditional benefit given to the other players through commitment, or better revealing the choice. As in the paper, providing this benefit may be a reliable signal of the quality, otherwise difficult to assess directly. Communicating the own quality to the others might alter the behavior of other group members to act in ways that provide positive payoff to signalers (in my setup choosing to trust him and follow the lead). This communication happens prior of knowing anything about the partner in the round. Model is slightly different as the players do not know their quality, although they make some guess upon that and can estimate their knowledge. The honest signaling equilibrium indicates that Signalers signal high-quality if and only if they are (convinced of being) high quality and Partners choose among those players who signaled high-quality, giving room to my expectation of finding the overconfident players to be more cooperative. Moreover this method also meets the necessity of having an "incentive not to lie", as required by Burks et al. (2013), which is guaranteed in this case by the commitment to an answer. The commitment device also ensures a disutility from overstating and committing to often to an answer. Moreover, being a commitment, the signaling device cannot entail any kind of strategic thinking, meaning that the leader has no reason to give a wrong answer. Someone could argue that commitment is a weak sign of cooperation, but it is at least true that it shows the intention of sharing with others the own knowledge and this can quite clearly boost cooperation.

Something that needs to be considered about the instrument of the commitment device is that risk aversion might play its role here. We need to be sure that the choice about committing, answering or following the lottery is not influenced by a particular level of risk propension or aversion. In order to achieve this it is my intention to investigate these effects either with a risk elicitation task [Crosetto, Filippin (2012)] or within the follow-up survey. On this point I relied on the literature by Robinson and Marino (2015), who, within a context of entrepreneurship decisions, analyze the relationship between the two. One first claim is that overconfidence tends to produce biased (and lower) perceptions of risk, but then goes one step further, stating that "the relationship between overconfidence and venture creation decisions is mediated by risk perception". Judging a venture creation decision comparable to those the players face in my experiment, I take from this statement that risk perceptions and overconfidence are strictly intertwined, making then necessary to control for risk attitudes in my analysis.

The idea was to create a setup, where – as in Ludwig et al. – "high effort of the overconfident agent may also lead to a comparative payoff-advantage of the biased agent due to an increased probability

$\boxed{\text{Group A}}$ $\boxed{\text{Group B}}$

3

1 1 wins if higher ranking than 3

2 $\boxed{Q2}$ $\longleftrightarrow$ $\boxed{Q2}$ 4

If i wins

10 / lose 0

$\frac{1}{2}\,10\,(a_1 + a_2)$ T

outside option

10 | 0

p $1-p$

D

$\frac{1}{2} \cdot 10\,(p_1 + p_2)$

$a_i \in \{T, L\}$

$10\,p_1$

$5p_1 + 5p_2$

of success”. This applies to cooperation and signaling – which for now is only implicitly costly – in my experimental setup. The payoff is higher than the rational benchmark, as it’s much more likely the player will get the “coordination” payoff above the non-coordination one.

Finally, this setup would allow some extensions, beginning with those that could be created by simply adding a follow-up survey, hence analyze how individuals with different social potency or of different gender would behave, but also slightly changing the setup. The game could be repeated and reputation environments could be created. Another setup might make overconfidence being revealed to the others and overconfident individuals might be faced one each other. Finally, a robustness check to ensure that no effect is due to “confidence” rather than “overconfidence” could be a setup where overconfidence is artificially created, for instance with tasks of different difficulty.

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