

September 29, 2021

Dear Reviewer,

we thank you very much for your comments, which we have followed preparing this revised version of the paper. Following the indications of the Associate Editor, the most important changes have concerned: (i) Section 1 (Introduction), where we now try to better motivate the real-world relevance of our model by means of concrete applications; (ii) Section 6 (Concluding remarks), where we provide a more detailed discussion of specific assumptions of our model. Also, we added a paragraph at the end of Section 5 to provide the intuition behind our results, and another paragraph (the second one) in Section 6 where we contrast our results with previous findings in the literature.

Here below you can find our replies to the points you explicitly raised in your letter (for the ease of reference, we have reported each of your points just before our reply to it):

1. *The introduction of social competition needs to be better motivated, for example, along the lines of my review above.*

Reply:

2. *As part of the motivation, examples of the social reward x should be given.*

Reply:

3. *It should be made clear that payoff ties are broken at random when allocating social rewards.*

Reply: In the revised version, on page 9, we state more clearly that payoff ties are broken at random when allocating social rewards.

4. *There is a double use of x to denote actions as well as the value of the social reward.*

Reply: We thank the Reviewer for pointing us to this inaccuracy. We now use z and z' in place of x and y to indicate generic actions.

5. *On page 11, just above Figure 2, it should read $\beta(\alpha)$, not $\beta(x)$.*

Reply: We corrected the typo, thanks again.

6. *The construction of $\beta(\alpha)$ is correct, but more details should be provided in the proof of Proposition 1. In particular, the construction depends on a single interaction for each player in a given period. The result does not hold for the playing the field model in which each player interacts with every other.*

Reply: The Reviewer is clearly right when writing that the result does not hold for the playing the field model in which each player interacts with every other. In the revised version we are clearer on this point: at the end of Section 3 (Model), we provide approximating expressions of the payoff functions of A - and of B - players in case of a large population, and we refer to those expressions in the proof of Proposition 1. Moreover, also following the suggestion of the other Reviewer, in the concluding remarks we now stress that this assumption is crucial for our results: under the alternative assumption of a round robin tournament, the risk-dominant action always pays more when half of the population adopts it.

7. *The intuition for the result needs to be fleshed out. The result comes from the effect of social rewards on the relative performance of the payoff-dominant action out of equilibrium.*

Reply: We added a paragraph at the end of Section 5 where we provide the sketch of the proofs of Proposition 1 and Proposition 2, trying to highlight the mechanism driving our results.

Beyond adding a few references when discussing assumptions in the Concluding remarks, we have made a number of minor changes due to consistency reasons. Finally, we have gone through the manuscript with care to correct typos and other language errors.

We hope that you enjoy reading this revised version.

Sincerely,

Leonardo Boncinelli