Response to reviews

July 19, 2018

1 Comments from editor

Thank you for the review of our paper. We are delighted by the reviews: the second author feeling there are no modifications necessary and the second pointing out clarifications which have given us the opportunity to improve the manuscript.

> 1. Please ensure that your manuscript meets PLOS ONE's style requirements, including those for file naming. The PLOS ONE style templates can be found at `http://www.journals.plos.org/plosone/s/file?id=wjVg/PLOSOne_formatting_sample_main_body.pdf` and `http://www.journals.plos.org/plosone/s/file?id=ba62/PLOSOne_formatting_sample_title_authors_affiliations.pdf`

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All files have been renamed as requested and otherwise, the document follows the given LaTeX style template.

2 Comments from first referee

> 1) The authors discussed about as many as 164 strategies, which were trained/generated via different algorithms. Since understanding how the strategies work plays an important role in understanding why some of them succeed, I strongly suggest the authors to introduce the strategies in a more detailed and clear way, especially those based on finite state machines as I find no reference of them yet some of them perform well in the comparisons.

This is a well made point by the referee: ensuring the reader can understand these is vital to the paper. We have clarified the description of the strategies:

- Highlight that the appendix contains references for each strategy including pointing to a recently published paper that goes in to details about the structure of these strategies.

- A more formal definition of a finite state machine explaining how they fit in the framework of the IPD. We also have included numerous references which describes these.

  2) During the training/screening process, strategies generated via different algorithms were trained according to different criteria to determine whether a strategy was well trained or not. As examples, some were trained to maximize their payoff while others were trained with the objective function of mean fixation probabilities of Moran processes. So I am curious about how different criteria influence the features of the strategies? Will the conclusion of this work change if some strategies are trained in terms of other criteria?

The referee asks a good question here, indeed the conclusion would be different if strategies were trained in terms of other criteria. We have added a sentence to this effect at the conclusion section of the paper highlighting that training with evolutionary criteria seems to be fundamental to the appearance of a handshake mechanism.

  3) The concept 'handshake mechanism' is essential to appreciate the results as well as conclusion of this work but is not well defined, hence I suggest the authors to explain this concept clearly.

We have added a better description of the term handshake mechanism after it is first mentioned in the introduction. We have also included a reference to another paper that makes mention of this as well as briefly discussing the biological analogy of 'kin recognition'.

  4) In line 241-242, it looks weird that there is a new paragraph starting in the middle of the sentence 'The top 16 (10%) strategies are shown in Table 4 and figures...'

Thank you to the referee for pointing this out: it was an error and has been fixed.

  5) There are not a few phrases and sentences that may make the readers confusing. One example is 'This is also the N for which...' in line 256.

Thank you for pointing this out. That particular sentence has been clarified and a thorough edit of the paper has been undertaken identifying and modifying further confusing sentences.

3 Comments from second referee

Reviewer #2: This manuscript provides a detailed numerical analysis of agent-based simulations of 164 complex and adaptive strategies for the IPD, using an online GitHub library. The authors presented a lot of insights and empirical results. In my opinion, this paper is excellent, and worth publishing in the present form.

Thank you for the confidence in our work and for the time taken to review.