December  19th, 2017

Dear Editor,

We are submitting a paper entitled “**High mutual cooperation rates in rats learning reciprocal altruism: the role of payoff matrix**”. Please consider it as a candidate for publication in PLOS Biology, as we believe this work will contribute a new sight in the learning of reciprocal altruism in non-related rats.

The reciprocal altruism has been shown in monkeys, while birds and rats failed to reach high levels of cooperation. In order to train this behavior, we have studied the role of size and contrast among reinforcements in the rats´ learning, using iterated prisoner's dilemma (iPD) game with positive and negative reinforcement.

Through this procedure, we have showed for the first time that rats learn reciprocal altruism reaching high mutual cooperación rates without any pre-training to enhance cooperation preference.

Finally, when the size of positive reward was modified by increasing temptation rewards or by increasing mutual cooperation rewards, cooperation rates decreased. In this way, we show that beyond the theoretical relationship among iPD reinforcement necessary to learn reciprocal altruism, it is also the contrast in positive rewards what enhance mutual cooperation. This finding allows to infer that of reciprocal altruism has early appeared in evolution.

This paper is our original unpublished work and it has not been submitted to any other journal for review. We hope this finding is of interest to PLoS Biology readers.

Sincerely,



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