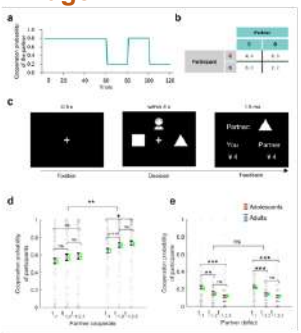
The Selfishness of Adolescents Overrules Cooperation in Social Dilemmas

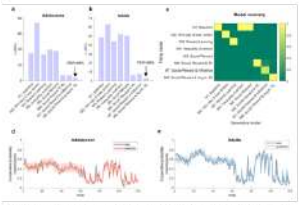
Dr Chao Liu, PhD in Psychology, State Key Laboratory of Cognitive Neuroscience and Learning & IDG/McGovern Institute for Brain Research, Beijing Normal University, Beijing, China

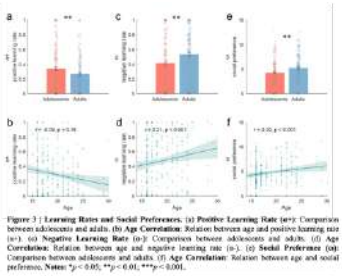
Abstract (300 word limit)

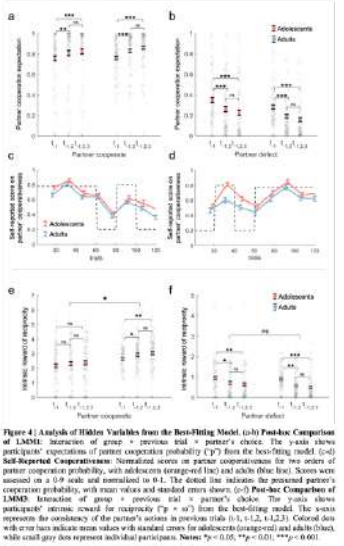
Cooperation skills are crucial for individual success in society. Previous studies have often shown that adolescents exhibited less cooperation than adults in social dilemmas and concluded that adolescents may have a deficiency in forming appropriate expectations of others' cooperative intentions due to underdeveloped mentalizing abilities (Theory of Mind). However, another possibility is that adolescents may simply be driven by a selfish motive to exploit others. To this end, the present study used a repeated version of the Prisoner's Dilemma Game (rPDG) to compare cooperative behaviors between adolescents (n = 127) and adults (n = 134). Participants were cooperating with a computer-simulated partner during rPDG (Figure 1a-c). Computational models with different assumptions were constructed and compared to explore the mental processes underlying cooperative decisions, ultimately testing the hidden variables driving behavioral variations between adolescents and adults. Consistent with previous research, adolescents exhibited less cooperation compared to adults, particularly following their partner's consistent cooperation (Figure 1d). Computational modeling revealed that the social reward model with asymmetric reinforcement learning algorithm provided the best explanation for the behaviors of both adolescents and adults (Figure 2). The best-fitting model revealed that, compared to adults, adolescents applied a higher positive learning rate and a lower negative learning rate when updating their expectations of partners' cooperation intention, and exhibited less social preference for mutual cooperation (Figure 3). In line with our hypothesis, adolescents did not exhibit inappropriate expectations regarding their partner's cooperative intentions compared to adults (Figure 4a-d); however, they perceived less intrinsic reward for reciprocity (Figure 4e-f). The lower levels of cooperation observed in adolescents stem from a selfish motive to exploit others, rather than a deficiency in mentalizing or learning during social interactions. These findings have implications for educational approaches and strategies aimed at fostering cooperative behavior in adolescents.

Image









Recent Publications (minimum 5)

1. Wu, X., Ren, X., **Liu, C***. et al (2024). The motive cocktail in altruistic behaviors. *Nature Computational Science* 4, 659–676.
2. Jin, K.L., Wu, J., Zhang, R., Zhang, S., Wu, X.Y., Wu, T.T., Gu, R.L*., **Liu, C***. (2024). Observing heroic behavior and its influencing factors in immersive virtual environments. *Proceedings of the National Academy of Sciences*.121(17):e2314590121.
3. Wang, H.G., Wu X.Y., Xu J.H., Zhu R.D., Zhang S.H., Xu Z.H., Mai X.Q., Qin S.Z*., **Liu C***. (2024). Acute stress during witnessing injustice shifts third-party interventions from punishing the perpetrator to helping the victim. *PLoS Biology*. e3002195.
4. Liang, Z.L., Wu S.M., Wu J., Wang, W.X., Qin S.Z*., **Liu C***. (2024). Social navigation: distance and grid-like codes support navigation of abstract social space in human brain. *eLife*. 12:RP89025.
5. Zhu, R.D., Liu, C*. (2023). Moral emotions underlie puritanical morality. Behavioral and Brain Sciences, 46, e321.
6. Xu, Z.H., Zhu, R.D., Zhang, S., Zhang S.H., Liang, Z.L., Mai, X.Q., **Liu, C***. (2022). Mortality salience enhances neural activities related to guilt and shame when recalling the past. *Cerebral Cortex* 32(22):5145-5162.

Photograph



Biography (150 word limit)

Dr. Chao Liu he expertise in Social Affective and Cognitive Neuroscience. Dr. Liu's research focuses on social, affective, and cultural neuroscience. Specifically, he is interested in: i) The role of emotion in morality and altruism; ii) The neural mechanisms of human interpersonal behaviors, such as cooperation, competition, and negotiation. Iii) The neural correlates of the Linguistic Relativity Hypothesis, particularly how English and Chinese languages influence cognitive functions and social behaviors in English and Chinese speakers.

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