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Social distance modulates recipient's fairness consideration in the dictator game: An ERP study

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Responding to Unfair Offers Made by a Friend: Neuroelectrical Activity Changes in the Anterior Medial Prefrontal Cortex

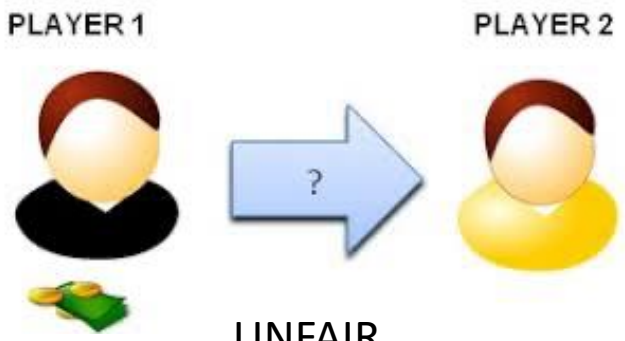
Camila Campanhã, Ludovico Minati, Felipe Fregni, and Paulo S. Boggio

working on Social and Risk Decision Making, Trust, Moral Judgment, Empathy

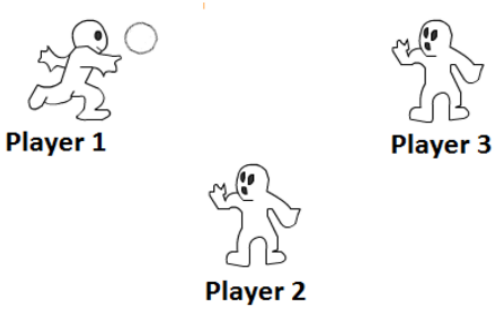
Yang Ziyang

2023.11.02

Introduction



UNFAIR



UNMORAL

"punishment" & "Altruistic punishment"

When making a decision faced with unfairness, we tend to punish others even when this **results in a loss for ourselves** (Fehr and Gächter, 2002)

From an evolutionary perspective, such strategy is minimizes the probability of similar future harm.

- also present in nonhuman primates
- appears to be related to emotional processing and is associated with activation of reward-related networks (de Quervain et al., 2004 ; Brosnan and De Waal, 2003)

Introduction

Social norms, like fairness and morality, play a large role in societies(Coleman, 1990, Deutsch, 1975)

Previous research shows that the application of social norms **depends to some degree on situational factors**.

For example：

- people's preferences are influenced by the valence of a bargained property (**gains vs. losses**)
  (Leliveld et al., 2009 , Zhou and Wu, 2011)
- the **power** of those involved in the transaction
  (Handgraaf et al., 2008)

"Social distance"

Social distance influences people's justice concerns
(Lind and Tyler, 1988 , Mandel, 2006 , Parks et al., 1996 , Singer, 1998)

whether punishment of unfair offers might be affected by the relationship one has with the proposer, such as when an offer comes from a close friend

Introduction

Personal friendships make individuals to extend their own justice concerns to their friends

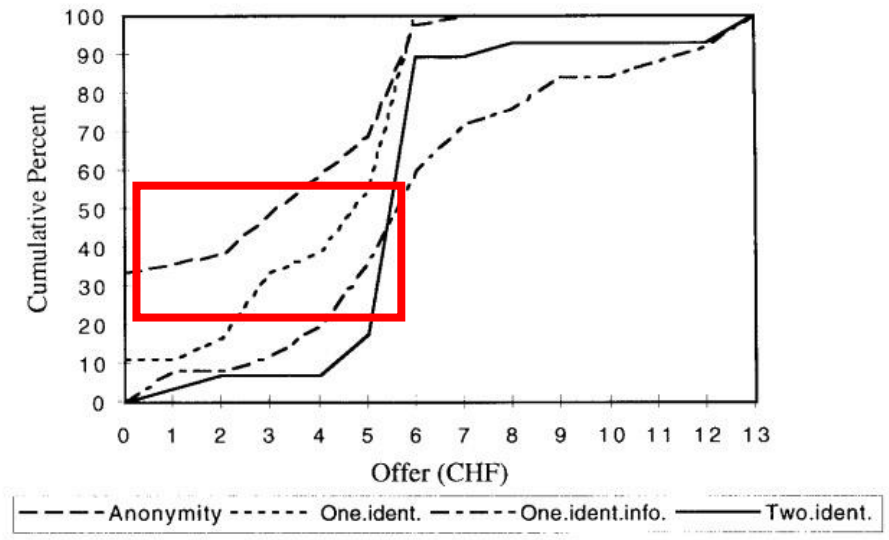
(ie, short social distance)

making justice more important in relationship to friends than to strangers.

cognitive structures that guide expectancies in a particular situation

people use different scripts when being in an economics setting with friends compared

research on economic games



This finding can be **interpreted** in terms of the activation level of the fairness norm

allocator

it is not clear from these studies how the recipient would react to fair or unfair offers from allocators with different social distances

(1) to examine how the brain responds differentially to fair and unfair offers in DG

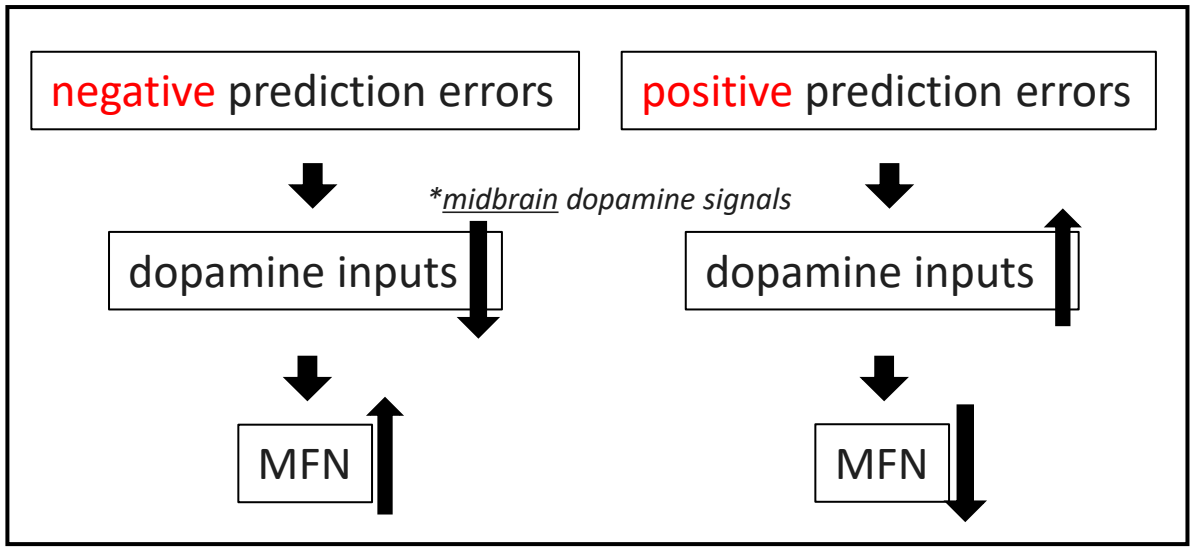
Introduction

specifically focus on the MFN (medial-frontal negativity) and the P300 responses to offers.

MFN *Also called FRN (feedback-related negativity)

The MFN shown to be more pronounced for **negative feedback** (or offers) associated with unfavorable outcomes than for positive feedback. (Holroyd and Coles, 2002 , Nieuwenhuis et al., 2004)

incorrect responses　　monetary loss



*prediction error can be defined not only in terms of the valence of outcome but also **non-valence expectancy** (in terms of whether the outcome fits pre-established)

prediction

Violations of **social expectancy** or **social norms**

- Using the UG, Boksem and De Cremer (2010) found that the MFN amplitude was **influenced by** violations of the equal division rule → Egalitarian distribution

MFN amplitude was more pronounced for unfair than for fair offers

this effect was especially true for participants with higher concerns for fairness

MFN may reflect a graded response to **the degree of social expectancy violation**

Introduction

specifically focus on the MFN (medial-frontal negativity) and the P300 responses to offers.

① higher-order cognitive

selective attention resource allocation

✓ unexpected stimuli evoked more positive P300 than expected stimuli

② outcome evaluation

✓ P300 is sensitive to the **magnitude of reward**, with a more positive response to a **larger** than to a smaller reward

✓ more positive amplitude for **positive feedback** than for negative outcome

③ can be modulated by social cues

✓ P300 is implicated in processes of **attentional allocation** and/or to high-level **motivational/affective** evaluation

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Hypothesis about MFN：

predicted that this MFN effect would be modulated by the social distance between the allocator and the recipient.

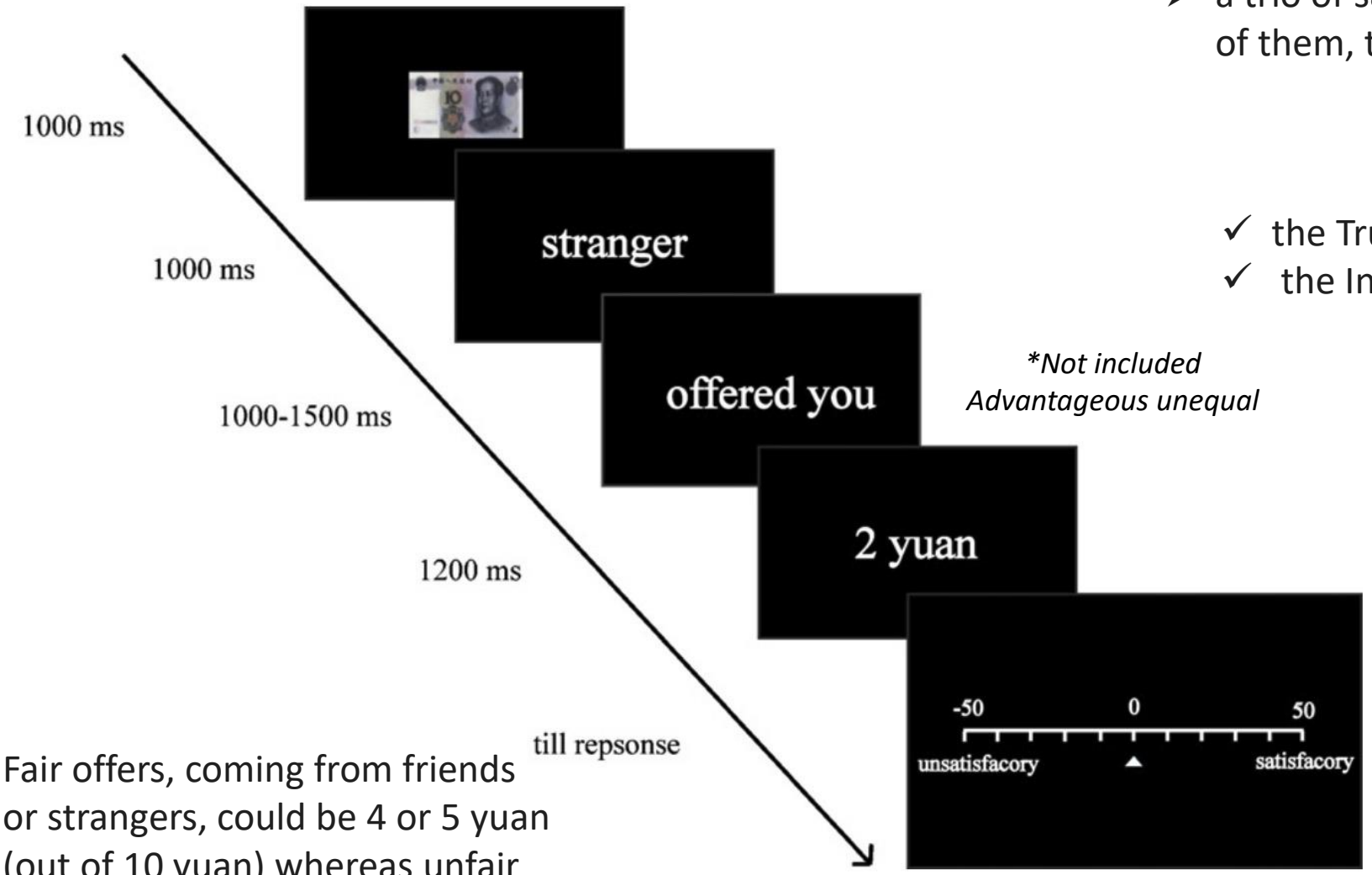
Hypothesis about P300：

compared to unfair offers, fair offers would elicit enhanced P300 responses

how the P300 would be modulated by the manipulation of social distance ?

Design

Dictator Game (DG)



Fair offers, coming from friends or strangers, could be 4 or 5 yuan (out of 10 yuan) whereas unfair offers could be 1 or 2 yuan

- a trio of same-sex friends came to the laboratory, each of them, together with a pair of same-sex strangers

- ✓ the Trust Scale (TS)
- ✓ the Inclusion of Other in the Self Scale (IOS)

**Not included*
Advantageous unequal

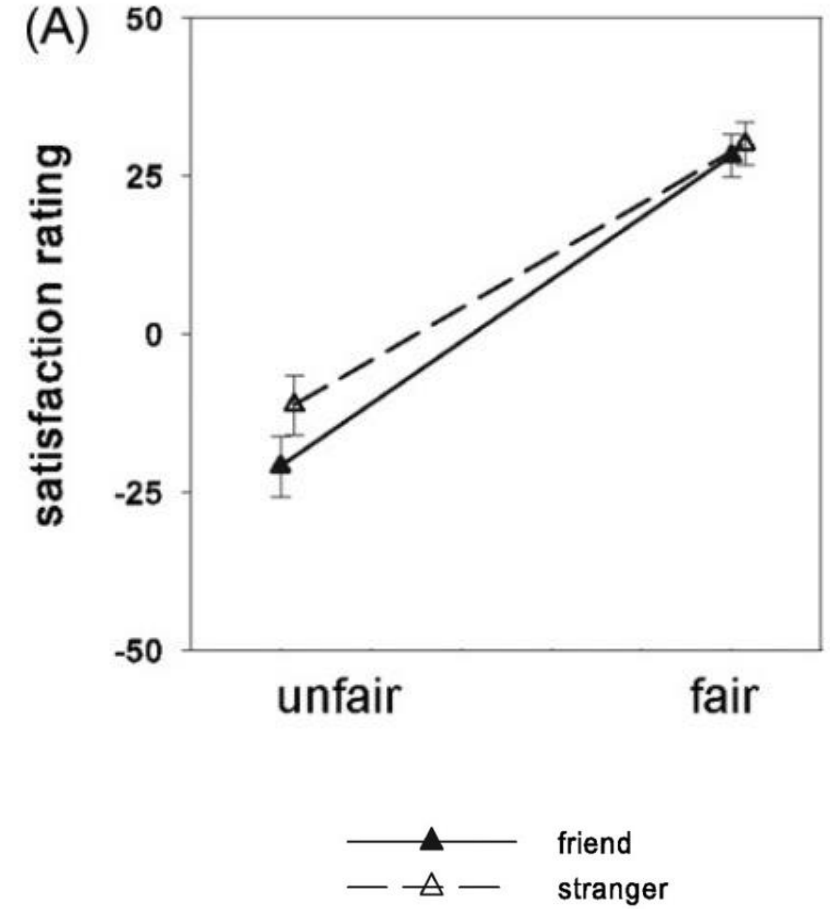
- 24 trios (11 female) were recruited; remaining 17 participants

- The experiment consisted of 4 blocks of 45 trials each

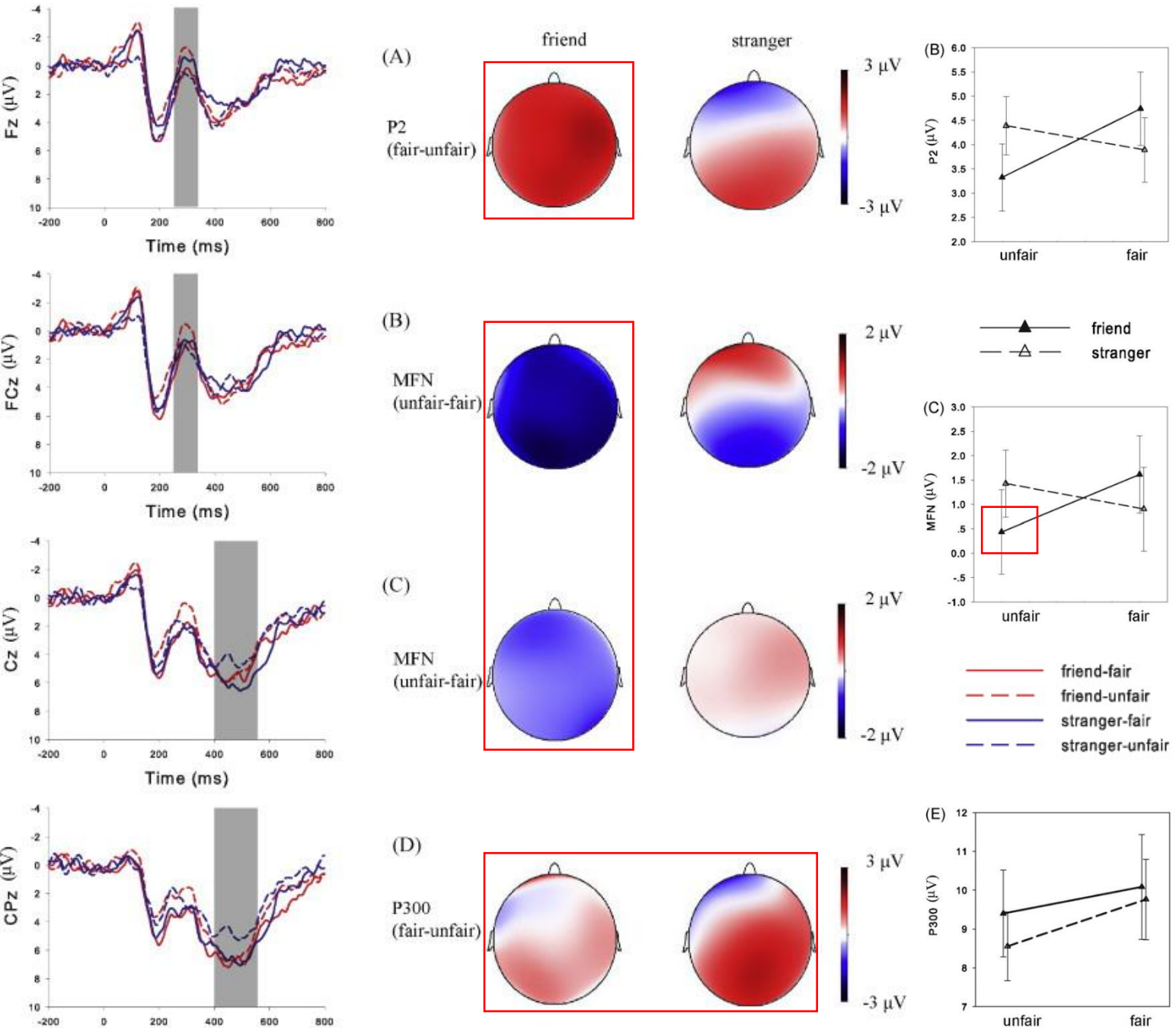
Result

- participants had generally close relationship with their friends
- the scores did differ between the closer friends and the less close friends

these differences could make the fair and unfair offers from friends more realistic



Result



MFN :

- the MFN was more negative-going for unfair than for fair offers in the friend-allocation
- ERP responses being more **negative-going** to **unfair offers from friends than from strangers.**

P2 :

- more **positive** for **fair** than for unfair offers in the friend-allocation condition

P300 :

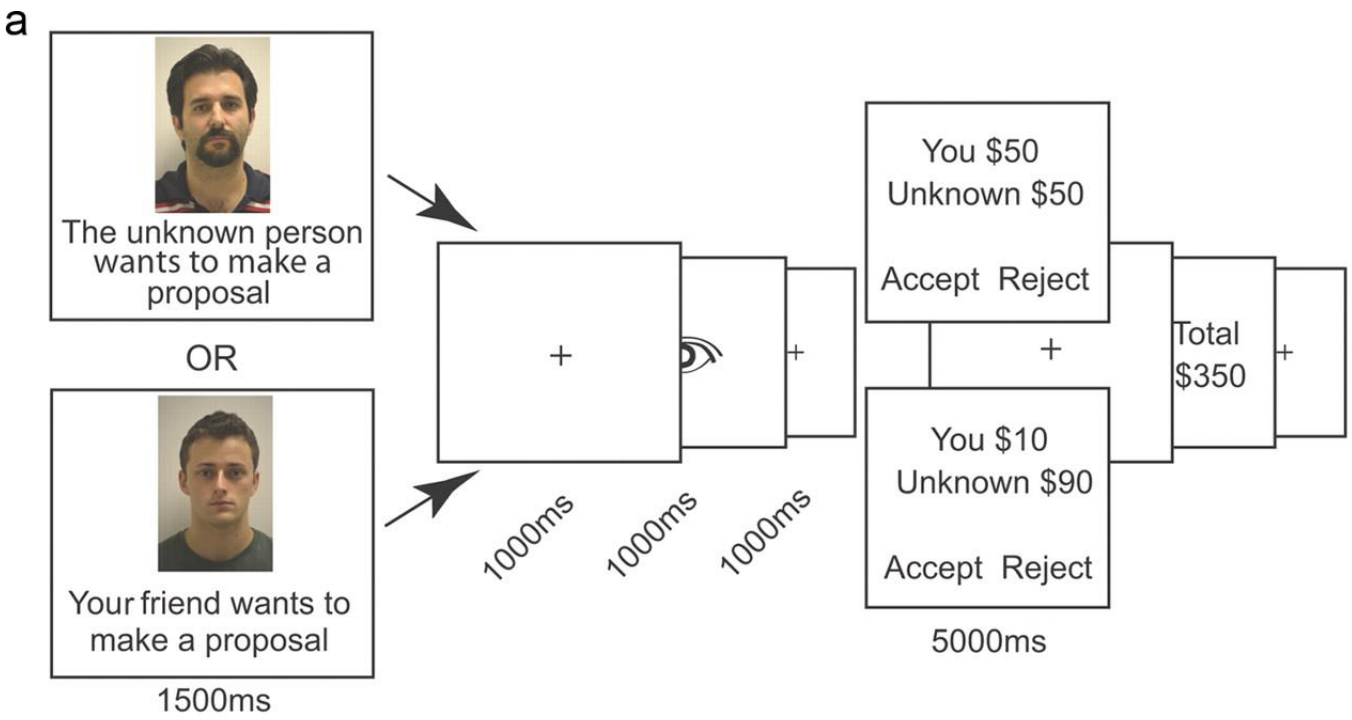
- **more positive for fair** than for unfair offers, **irrespective of friends or strangers** making the offers

⬇

fair offers can be considered as **implicitly positive in valence** whereas unfair offers as implicitly negative

Design

Ultimatum Game(UG)



- Moral Identity score

  recruited participants in the midrange

- adapted version of the KnowI scale

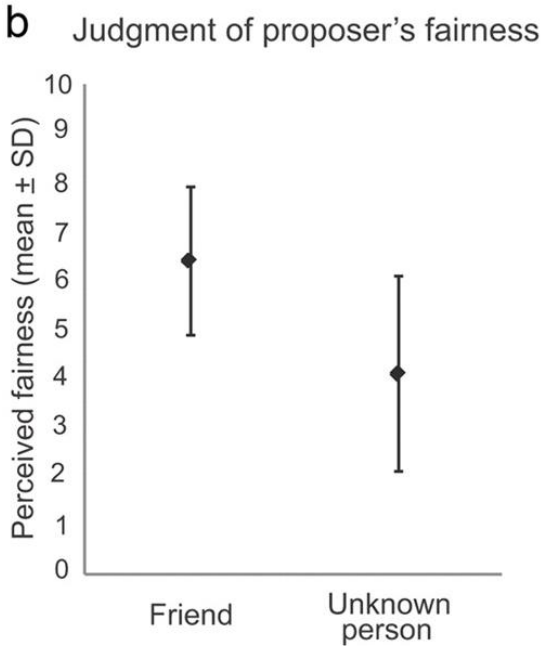
  recruited only if they and their friend had a score >150

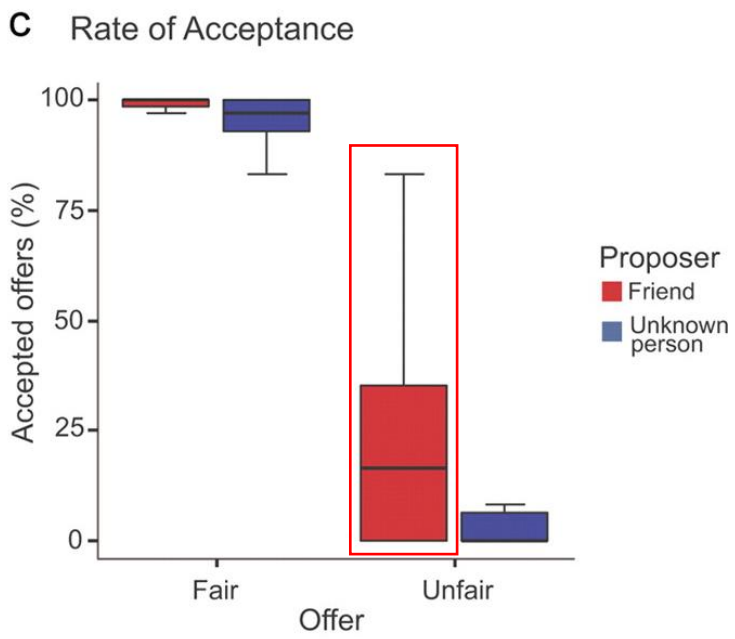
proposals from three categories: fair (50:50 ratio), moderately unfair (70:30), and unfair (80:20 or 90:10)

- Upon task completion, participants rated the perceived fairness of the proposers through a visual analog scale

15 healthy participants (7 male) a total of 144 trials

Result

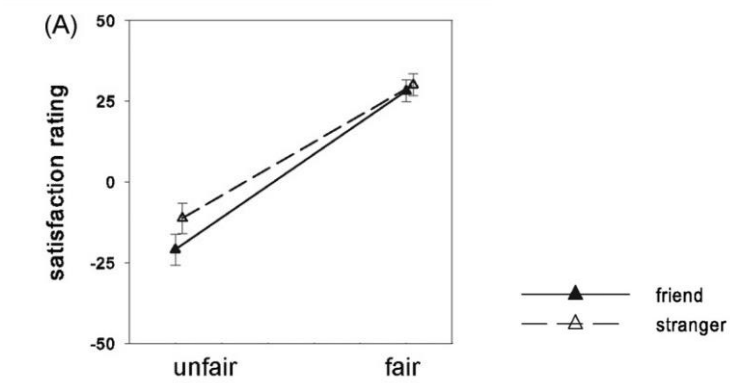




- Participants rated their friend as overall fairer than the unknown proposer

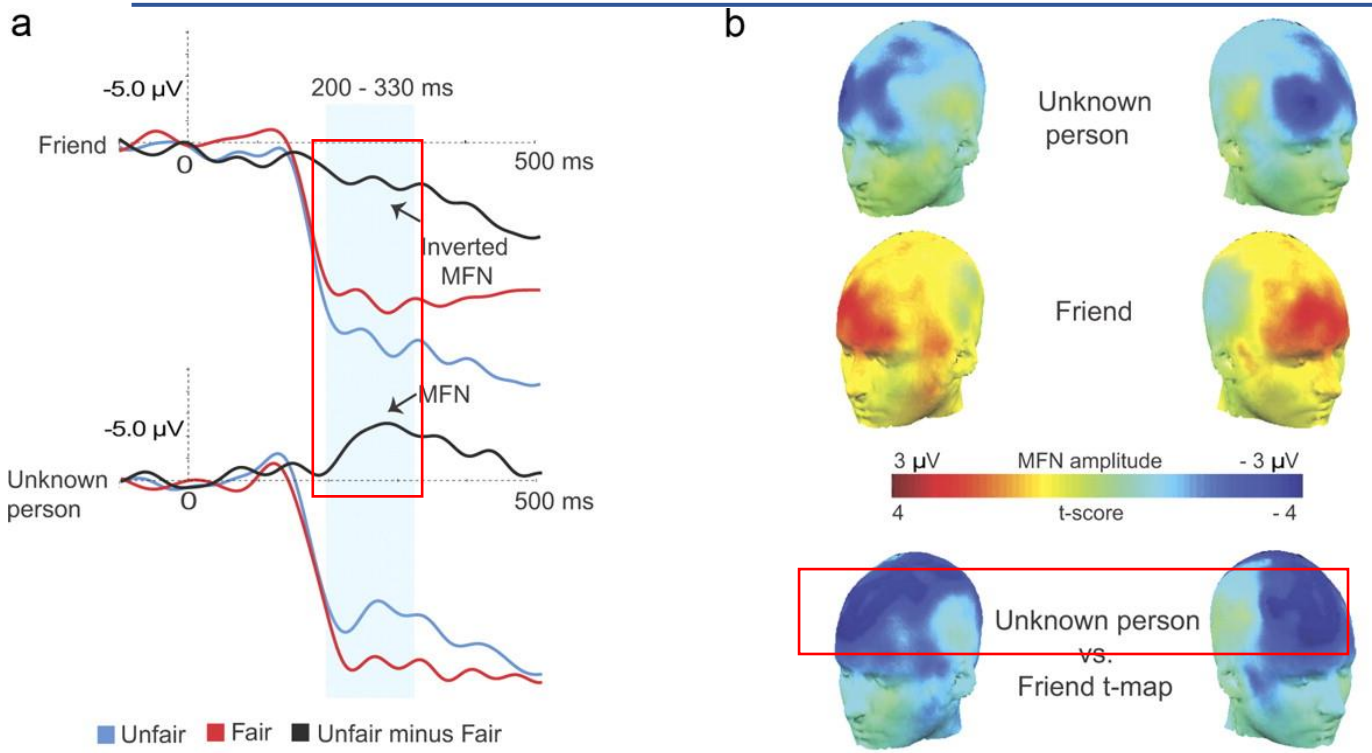
- Participants accepted more fair and unfair offers believed to originate from their friend than from the unknown proposer

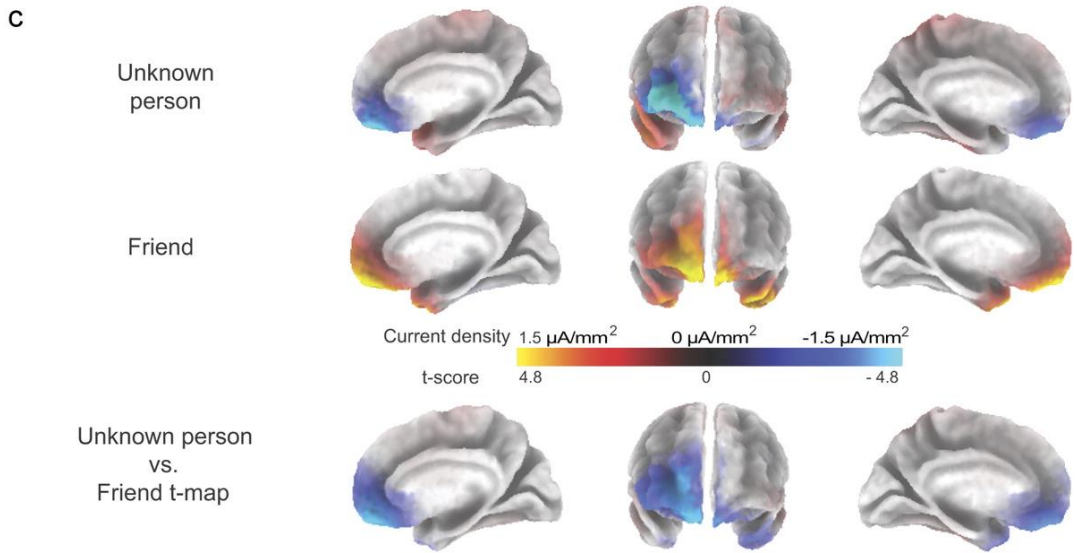
the opposite result



- faster acceptance of fair offers than rejection of unfair offers

Result





- a significant main effect of friendship
- the offers from the friend elicited a significant positivity, whereas those from the unknown proposer elicited a significant negativity
- Proposals from the **unknown proposer** elicited an intense **negative** current difference in inferior-mesial and right inferior-lateral frontal regions
- Proposals from the friend were associated with a similar pattern of opposite polarity

Discussion and Conclusion

In economic exchange games, unfair offers normally evoke more negative-going MFN responses

Campanha replicated this effect for offers from a stranger, but reported a reversed pattern for offers from a friend.

Wu demonstrated that the MFN effect appears for offers from friends but not for offers from strangers.

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① the ultimatum game VS. the dictator game

Hewig et al. (2011) did report that offers in the two games elicited similar patterns of brain responses

② Campanha used only one friend (and one stranger) to pair with one participant, making it very clear with whom the participant was interacting.

Wu used two friends (and two strangers) to pair with one participant and it was made sure that the participant could not know exactly with whom he was interacting in a particular trial.

✓ long-term friendship ✓ after all trials VS. after each trial

responder cared so much about future interaction with the friend

**inhibited his more impulsive responses to (un-)fair offers*

that he would rather prefer the friend to retain a larger proportion of the asset and to be nice or generous towards the responder in future

reflecting the change of context

its subsequent impact upon the responder's expectancy towards fairness of offers from strangers