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*Editorial*

# A Yin and Yang Perspective on the Trust Game: Trust and Reciprocity

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**Summary**

Trust and reciprocity are fundamental for the cohesion and stability of human society, as they are essential components of cooperative exchange. Researchers from diverse disciplines, including economics, psychology, and neuroscience, have utilized forms of the trust (investment) game to assess variations in trust and reciprocity. Nonetheless, distinguishing between these concepts can be challenging due to the behavioral, psychological, and neural similarities between them. Consequently, further research is necessary to understand the shared and distinct characteristics of these interrelated prosocial behaviors. These investigations could help to enhance our knowledge of the mechanisms underlying trust and reciprocity and inform the development of effective interventions to promote and sustain these crucial elements of social cooperation. This Special Issue comprises a collection of original, pertinent, and contemporary research papers that advance our comprehension of trust and reciprocity using behavioral, psychological, clinical, neural, and theoretical measures by employing the trust game. The papers shed light on various topics, including the framing of trust and reciprocity, a comparison of trust and reciprocity in the trust vs. distrust game, an exploration of trust in groups, trust behavior and attitudes, trust and personality traits, trust and psychosis, and the relationship of salivary oxytocin with trust and reciprocity, which elucidate the commonalities and differences of trust and reciprocity. This collection of papers has the potential to enhance the ecological validity of the trust game as a tool for scientists to understand the interdependence of trust and reciprocity. In alphabetical order using the first authors, a brief summary of each paper is provided below.

Previous research has suggested that oxytocin, a neuropeptide produced in the hypothalamus of the brain, is associated with trust and reciprocity. However, recent replication attempts have been unsuccessful in demonstrating the trust-enhancing effect of oxytocin, and limited evidence exists on the association between oxytocin and reciprocity. Arai et al. [1] aimed to replicate the nonlinear relationships between endogenous oxytocin levels and trust/reciprocity demonstrated in a previous comparison study in male and female college students. The results of this study revealed that salivary oxytocin showed an inverted U-shaped relationship with trust in men and a U-shaped relationship with reciprocity in women in contrast to the previous finding. The oxytocin in the current study was measured in saliva, while it was measured in plasma in the comparison study. Therefore, the authors argue that differences in sample types may explain the inverse nonlinear relationship found in their study, despite them following the same methodology as that in the comparison study (e.g., testing participants with similar demographic, socioeconomic, and cultural characteristics using the same statistical methods). The study's findings highlight the significance of understanding the complex dynamics between oxytocin, trust, and reciprocity. Additional research is necessary to explore the relationship between salivary and plasma oxytocin and their differences because oxytocin's origin in the saliva is still unknown, salivary and plasma oxytocin levels are uncorrelated after intravenous administration, and the baseline oxytocin levels in blood and saliva are not associated.

Despite extensive research on the influence of psychological effects, such as framing and anchoring on trust and reciprocity behaviors, the impact of order effects on those



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prosocial behaviors has yet to be studied. Bayat et al. [2] investigated the influence of order effects on the framing of trust and reciprocity by employing one-shot trust and distrust games with a give and take framework. Participants were divided into two groups, each playing the role of either trustors or trustees in two versions of the one-shot trust/distrust game (give vs. take frame), which was presented in a counterbalanced sequence (either give followed by take or take followed by give). The results revealed that order effects had a significant impact on trust and reciprocity, with there being more trust in the take framework when it was played first, and more reciprocity in the give framework when it was played first, due to strong and weak anchoring, respectively. Furthermore, anchoring to the first decision reversed the framing effect in the second decision for trustors, but not for trustees, which led to the disappearance of an overall framing effect for trust, but not reciprocity. The research emphasizes the significance of order effects in social decision-making research designs and puts forth a theoretical rationale for its underlying mechanism, referred to as the anchoring bias, which has not been previously addressed in the literature. The authors suggest that upcoming studies should investigate whether anchoring is a universal mechanism responsible for the order effect in economic games or if it is limited to particular contexts, such as the take and give frameworks of the trust game.

Although various research fields have examined trusting behavior by identifying different psychoeconomic components, a unified computational formalization of these diverse components in a model of trust is still lacking. Bellucci [3] presents a computational formalization of trust, named the vulnerability model, which combines current and prospective action values with beliefs and expectancies about a trust partner's behavior. By applying the model to the trust game, the paper demonstrated how variations in a single parameter of the vulnerability model generate behaviors that can be interpreted as different "trust attitudes", which can be influenced by an individual's loss aversion and expectations of the partner's behavior. The author argues that the model can also be extended to investigate different partner traits, such as benevolence and competence, which have previously been identified as determinants of trustworthiness impressions that are central to trust. Moreover, the model can be used as a utility function within more complex Bayesian frameworks to fit the participants' behavior in different social environments where actions are associated with subjective values and weighted by individual beliefs about others' behaviors. Overall, the vulnerability model of trust provides a crucial foundation for future theoretical and empirical work in various research fields, presenting a more accurate representation of the psychoeconomic components of trust.

The ability to trust others is essential for establishing positive and reciprocal social interactions. However, individuals with psychosis often experience a deficit in trust, leading to significant social dysfunction. Lemmers-Jansen et al. [4] employed a novel method to examine the impact of trial-by-trial feedback responsiveness on trust in three groups: individuals with first-episode psychosis, chronic psychosis, and healthy controls. The authors' approach differs from those of previous research, which utilized the trust game to assess an individual's trust responsiveness, with an emphasis on investments. While they were playing multi-round trust games, participants were paired with a computer that was programmed to represent a trustworthy partner by returning at least the invested amount. The results demonstrated that baseline trust was intact in patients with psychosis, contrary to the authors' expectations. However, over repeated interactions, the patients were found to be less responsive to feedback than the healthy controls were, failing to integrate positive information into their decision-making process and behaving distrustfully towards the trustworthy partner. The authors argue that patients with psychosis have social and interactional deficiencies, including a deficit in feedback-learning abilities. According to their argument, the new assessment method exhibited encouraging outcomes and could potentially offer greater precision in understanding feedback responses than other approaches can. However, additional research is required to enhance the methodology and devise efficacious therapies for individuals experiencing psychosis.

Although there have been numerous studies on trust in economics, only a small number have concentrated on trust behaviors within groups. However, recent laboratory and field experiments have highlighted the importance of this topic. In addition, there is inadequate evidence to substantiate the connection between behavioral and attitudinal measures of trust and trustworthiness. Mazzoni an Sbriglia [5] carried out an experimental study in which Italian participants took part in trust games and were asked to fill out questionnaires on trust and trustworthiness, which included attitudinal questions from the European Value Survey. Two measures of trustworthiness were established, one based on questionnaire responses, and the other one based on the strategy method. These measures were compared in terms of ex-ante (unconditional, prior to participants being assigned to a group) and ex-post (conditional on the observed levels of trustworthiness within the group) trust decisions. The findings revealed a significant variation in trust levels once the trustors received information, particularly when the strategy method was employed. Additionally, there was a limited correlation between behavioral measures and attitudinal measures of trust and trustworthiness, which corroborates previous research on trust conducted in specific countries. The study extends previous research on the relevance of trusting behavior in groups, which has received a little bit of attention in economic research. The authors argue that more investigations are necessary to explore the effects of social environments, such as in the family, workplace, and school, on trusting decisions in the real world.

Adolescence is a crucial developmental period for both trust behavior and personality maturation, but how individual differences in trust decisions are associated with different personalities has not been extensively studied. Sijtsma et al. [6] examined the relationship between personality traits and trust behavior in adolescents for three types of trust behavior, including initial trust behavior, adaptation of trust behavior in a trustworthy condition, and adaptation of trust behavior in an untrustworthy condition. The results of the study did not provide evidence for the hypothesized HEXACO personality dimensions being significantly related to trust behavior in young adolescents, providing critical implications for understanding the complex interplay between personality traits and trust behavior in adolescents. According to the authors, the relationship between personality traits and trust behavior is less prominent in adolescence because the personality is still developing during this period. Adolescents' increased sensitivity to their surroundings may lead to contextual cues influencing their trust behavior and decision-making processes, leaving less space for the impact of personality traits. The authors recommend that future research should investigate the connection between personality traits and trust behavior in individuals of varying ages, including children, adolescents, and adults, to determine whether the association is age dependent. In addition, experimental manipulations could be conducted to explore how social contextual factors may impact trust decisions in distinct ways across different age groups.

Trust and reciprocity are essential components of successful social relationships, but whether default matters in those prosocial behaviors is still unexplored. Zhang et al. [7] explored how framing effects, namely giving versus taking frameworks, impact trust and reciprocity decisions. The study employed an iterated one-shot within-subjects design, in which the participants acted both as trustors and trustees. They interacted with human and computer-mediated human partners, operating under either the give (trust game) or take (distrust game) framework. The findings revealed that participants demonstrated higher levels of trust and reciprocity in the give framework, particularly when they were engaging in direct interactions with human partners. Furthermore, the participants had greater expectations of receiving something in return in the give framework. In conclusion, the study revealed that trust and reciprocity decisions are influenced by whether the defaults are conditions involving no trust or full trust and that both trust and reciprocity tend to increase in the give frame compared to the take frame. The authors suggest that adopting distrust as the default option in dealings with unfamiliar individuals or organizations may facilitate trust and reciprocity in social and economic relationships. Moreover, it is essential

to exercise caution when the default is full trust, as shareholders and stakeholders may suffer losses due to misplaced trust in companies and their accounting firms.

The articles collected in this Special Issue have provided valuable insights into various aspects of trust and reciprocity, contributing to the ongoing advancement of these fundamental concepts. This collection of articles offers a wealth of knowledge that can benefit professionals who specialize in trust and reciprocity research, as well as students who aspire to become experts in this area. Those articles provide an opportunity to deepen understanding and explore new directions for research, which can inform the development of effective strategies for building and maintaining the trust and promoting reciprocity in diverse contexts.

**Conflicts of Interest:** The author declares no conflict of interest.

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