Conformity Effects in Prosocial Behavior

Authors: Wei Zhenyu, Deng Xiangshu, Zhao Zhiying, Wei Zhenyu

Date: 2020-10-31T00:00:00+00:00

Abstract

Prosocial behavior serves as a lubricant for social relationships, and conformist mentality influences the emergence of prosocial behavior. Prosocial conformity behavior includes altruistic conformity, fairness preference conformity, trust conformity, generosity conformity, among others. The psychological mechanisms underlying prosocial conformity behavior encompass imitation theory and motivation change theory. The neural mechanisms of prosocial conformity behavior involve reward processing and error processing neural circuits. Social value orientation, interpersonal trust level, and interpersonal sensitivity exert moderating effects on prosocial conformity behavior. Future research directions may investigate the stability of prosocial conformity effects, individual differences, prosocial conformity behavior in children and adolescents, clinical research, and cross-cultural perspectives.

Full Text

The Conformity Effect in Prosocial Behavior

WEI Zhenyu[1], DENG Xiangshu[1], ZHAO Zhiying[2]
[1]Research Institute of Social Development, Southwestern University of Finance and Economics, Chengdu 611130, China
[2]School of Medicine, Yale University, New Haven, CT 06510, USA

Abstract

Prosocial behaviors serve as a lubricant for social relationships, and conformity psychology can influence the emergence of such behaviors. Prosocial conformity encompasses various forms, including altruistic conformity, fairness preference conformity, trust conformity, and generosity conformity. The psychological mechanisms underlying prosocial conformity involve both imitation theory and motivation change theory. At the neural level, prosocial conformity engages

reward processing and error processing circuits. Individual traits such as social value orientation, interpersonal trust level, and interpersonal sensitivity moderate prosocial conformity effects. Future research directions should examine the stability of prosocial conformity effects, individual differences, prosocial conformity in children and adolescents, clinical populations, and cross-cultural perspectives.

Keywords: prosocial behavior, conformity, neural mechanisms, individual traits
Classification Code: B849:C91

1. Introduction

French philosopher Jean-Jacques Rousseau wrote in *The Social Contract* that "man is born free, and everywhere he is in chains."Human behavior is determined not only by personal values and attitudes but also by numerous social factors. In the 1950s, psychologist Asch (1956) discovered conformity behavior in humans through line judgment experiments. In these studies, participants compared the lengths of two lines, and Asch found that when individuals were placed in a group, they would involuntarily follow the choices of other group members, even when the group' s choice was clearly wrong. Social psychologists define this behavior as altering one' s own actions and attitudes to align with others (Cialdini & Goldstein, 2004). Research indicates that conformity is not exclusive to humans; animals also exhibit conformity behavior (Claidière & Whiten, 2012). Through long-term observational studies, evolutionary psychologists have found that foraging strategies and tool-use preferences in non-human primates are influenced by their social groups (Dindo et al., 2009; van de Waal et al., 2013; Whiten et al., 2005). Other mammals also show conformity. For instance, Norway rats alter their foraging preferences based on other rats' behavior (Galef & Whiskin, 2008; Laland & Plotkin, 1993). Additionally, wild birds'foraging and song preferences are subject to conformity effects (Aplin et al., 2015; Lachlan et al., 2018), and fish schools' avoidance behavior, foraging, and "direction-switching"during migration are similarly driven by conformity (Brown & Laland, 2002; Day et al., 2001; Lachlan et al., 1998; Lecheval et al., 2018; Pike & Laland, 2010). Researchers argue that the existence of conformity in both humans and animals suggests an evolutionary significance, as group culture persists through conformity effects (Laland et al., 2011).

Regarding why humans conform, researchers propose three primary reasons: first, to gain social support and be accepted by the group; second, to make correct decisions; and third, to maintain positive self-regard (Deutsch & Gerard, 1955). Accordingly, conformity can be divided into informational conformity and normative conformity (Deutsch & Gerard, 1955). Informational conformity is motivated by the pursuit of decision-making accuracy, where individuals consciously or unconsciously use others' behavior or opinions as information for judgment and decision-making. Normative conformity, in contrast, aims to obtain social approval and establish friendly alliances, representing a pursuit of

group identity and belonging, driven by fear of being perceived as deviant and subsequently rejected (Deutsch & Gerard, 1955).

Conformity effects have both advantages and disadvantages for human society. McKay (2003) argues that conformity can lead individuals to make distorted, erroneous decisions. Due to conformity psychology, numerous harmful social behaviors increase, such as alcohol addiction, environmental destruction, and selfishness (Cialdini, 2003; Latané & Darley, 1968; Prentice & Miller, 1993). However, conformity also has positive aspects. Research demonstrates that conformity increases human prosocial behaviors, including donations (Frey & Meier, 2004; Götte & Tripodi, 2018; Park & Shin, 2017; Shang & Croson, 2009), fairness considerations (Fowler & Christakis, 2010; Peysakhovich & Rand, 2013), and environmental protection (Goldstein et al., 2008). Thus, prosocial behavior spreads through conformity psychology. Moreover, social psychology research has found that social norms can guide the emergence of prosocial behavior (Blake et al., 2015; House, 2018; House et al., 2020). To comprehensively understand how conformity influences prosocial behavior, this paper reviews relevant literature from the past decade, examining prosocial conformity behavior, psychological mechanisms, neural mechanisms, individual differences, and proposes future research directions.

2. Behavioral Research on Prosocial Conformity Effects

Since the 1980s, behavioral economists and social psychologists have investigated human social preference behaviors (Axelrod & Hamilton, 1981). Using various economic game experiments, researchers have studied and analyzed altruistic behavior, fairness, cooperation, and reciprocity. Most current research on prosocial conformity behavior also employs economic game paradigms.

The public goods game paradigm is frequently used to study human cooperation and altruism. Bardsley and Sausgruber (2005) adopted this paradigm to investigate prosocial conformity effects. In traditional public goods games, N participants each receive an initial endowment and must decide how much to contribute to a public project. According to "economic man" assumptions, individuals should contribute nothing. However, experimental results show that in the first round, participants contribute an average of 50% of their initial endowment, with some contributing everything. As rounds progress, contributions decline, reaching zero by the final round (Ledyard, 1995). Moreover, when participants observe others contributing substantial amounts, they tend to contribute more themselves, a phenomenon known as the "contribution effect." To determine whether this effect is driven by prosocial conformity or reciprocity motives, researchers designed a modified public goods experiment (Bardsley & Sausgruber, 2005). Participants were divided into Group A and Group B. Group A participants saw other group members' choices before deciding their contribution, while Group B participants saw choices from both their own group and Group A. Results showed that when Group B participants observed high contributions from Group A, they contributed more; when Group A contributed little,

Group B also reduced their contributions (Bardsley & Sausgruber, 2005). By calculating the difference in average contributions across conditions, researchers found that the total "contribution effect" was 3.58 (difference between high and low contribution conditions within the same group), while the "conformity effect" was 1.18 (difference between high and low contribution conditions from outside the group) (Bardsley & Sausgruber, 2005). Thus, in public goods games, conformity effects explain one-third of the contribution effect, with the remaining two-thirds attributable to reciprocity motives (Bardsley & Sausgruber, 2005).

The ultimatum game is a classic paradigm for examining fairness preferences. Two participants are involved: a proposer and a responder. The proposer suggests a resource allocation scheme. If the responder accepts, the allocation is implemented; if rejected, both receive nothing. Wei et al. (2013) adapted this paradigm to investigate fairness preference conformity. Participants served as responders and made two choices regarding the same allocation proposal. First, they independently decided whether to accept or reject. Then they observed group members' choices. Finally, they made a second decision. Results showed that participants' second-stage choices were influenced by conformity —when their initial choice conflicted with the group, they tended to change it (Wei et al., 2013).

Trust represents a positive psychological state that promotes mutual cooperation and enhances social cohesion. Researchers primarily use the trust game to examine trust preferences. In this game, investors and trustees each hold an initial endowment. The investor can choose to invest all, part, or none of their money with the trustee, which is then multiplied. The trustee can then return some money to the investor or keep everything. Experimental results show that investors tend to invest 50% of their endowment, while trustees typically return some amount (Bohnet & Zeckhauser, 2004). Using this paradigm with added group member choices, researchers designed trust conformity experiments (魏真瑜等, 2017; Wei et al., 2016, 2019). They found conformity effects in trust behavior—when participants observed group members choosing to trust, they were more likely to make trusting decisions themselves (魏真瑜等, 2017; Wei et al., 2016, 2019).

Generosity is a virtue in human society, and the dictator game is commonly used to examine generous behavior. Participants act as allocators who divide a sum of money between themselves and a recipient. Researchers have found that despite having full control, people voluntarily share some money rather than keeping everything (Forsythe et al., 1994). Prosocial conformity effects also exist in dictator games. In modified versions, participants learned about previous allocators' decisions before making their own. Results showed that observing others' generous allocations prompted participants to behave similarly (Krupka & Weber, 2009). Zaki et al. (2011) developed a dictator game variant to examine generosity in resource allocation. In each trial, a computer divided money between the participant and an anonymous partner, but only one could receive the money. As sole decision-makers, participants chose whether to keep

the money or give it to their partner (Zaki & Mitchell, 2011). Building on this, researchers investigated generosity conformity and found that participants' decisions were influenced by group members—when group members chose to give to the partner, participants were more likely to do the same, demonstrating generosity conformity (魏真瑜等, 2017; Wei et al., 2016, 2017). Bicchieri et al. (2009) similarly found that allocation amounts in dictator games were influenced by others' generous decisions.

Beyond behavioral games, social psychology experiments have also documented prosocial conformity. Researchers have found that individuals tend to follow others in making generous donations (Frey & Meier, 2004; Nook et al., 2016). In these studies, participants were assigned to either a generous group (shown high donation averages) or a stingy group (shown low averages) before making their own donation decisions (Frey & Meier, 2004; Nook et al., 2016). Results showed that observing others' generous donations increased participants' own donation amounts, demonstrating prosocial conformity (Frey & Meier, 2004; Nook et al., 2016). Furthermore, in Nook et al.' s (2016) experiments, after observing donation behavior, participants read an unrelated story, rated their empathic experience, and wrote encouraging messages to characters in the story. The stories featured characters experiencing either intense or mild suffering, while observed donations were either generous or stingy. Results indicated that compared to stingy donations, observing generous donations activated stronger self-reported empathy when reading about mildly suffering characters (Nook et al., 2016). Participants also spent more time writing encouraging messages that were more emotionally supportive (Nook et al., 2016). Similarly, in a donation decision experiment, Li and Wang (2019) manipulated social pressure by informing participants that either 9 out of 10 previous donors contributed high amounts (high pressure) or only 3 out of 10 contributed low amounts (low pressure). The high-pressure group donated significantly more money than the low-pressure group (李晴蕾, 王怀勇, 2019). In a field experiment conducted in a park, researchers observed that when citizens learned others had generously donated $2, they were more willing to donate themselves (Alpizar et al., 2008).

Early conformity research primarily involved simple judgment tasks such as line length evaluation, music ratings, and face assessments (Asch, 1956; Berns et al., 2010; Klucharev et al., 2009). These traditional conformity experiments share the characteristic that tasks involve simple judgments with no personal consequences, where individuals face only conformity pressure. However, in prosocial conformity experiments, individuals must process more than just conformity pressure. Prosocial behaviors represent social preferences that reflect individuals' personal inclinations in resource allocation dilemmas. Consequently, compared to traditional conformity experiments, individuals in prosocial conformity experiments face a psychological conflict between their own game preferences and conformity pressure. Their decisions under social pressure reflect how they resolve this conflict, making the psychological mechanisms of prosocial conformity more complex and the internal conflict more intense.

3. Psychological Mechanisms of Prosocial Conformity Effects

Researchers propose two theories to explain the psychological mechanisms of prosocial conformity behavior. Imitation theory suggests that humans tend to mimic others' actions and speech patterns (Dijksterhuis, 2001; Street et al., 1983). According to this view, prosocial conformity may be driven by imitation motives—when individuals observe prosocial attitudes or behaviors in their environment, they involuntarily imitate them, producing conformity effects (Nook et al., 2016). Motivation change theory offers a more complex explanation, suggesting that prosocial conformity involves deeper motivational shifts rather than simple behavioral mimicry (Nook et al., 2016). That is, prosocial conformity represents not just surface-level imitation but the adoption and internalization of others'prosocial motivations and attitudes. Researchers have conducted series of studies to test these competing theoretical explanations.

Nook et al. (2016) conducted five behavioral experiments through a large-scale online survey. In Experiments 1 and 2, participants learned about others' donation amounts before deciding whether and how much to donate. The researchers found that others' donation behavior influenced participants' decisions—generous donations from others prompted participants to donate more (Nook et al., 2016). In Experiment 3, participants observed donation behavior and then wrote messages to strangers in distress. The researchers discovered that observing generous donations activated stronger empathy and prompted more comforting, supportive messages (Nook et al., 2016). Since donation and empathy represent different types of prosocial behavior, the fact that observing generous donations facilitated empathic behavior suggests that prosocial conformity likely involves motivational change rather than simple behavioral imitation. In Experiment 4, participants rated their own empathic responses to textual materials, and researchers found that others' strong empathic ratings influenced participants' own empathy ratings—strong empathic expressions from others induced stronger empathic experiences in participants (Nook et al., 2016). Moreover, Experiment 5 revealed that others' strong empathic expressions prompted participants to make more generous donations (Nook et al., 2016). This series of findings demonstrates that prosocial conformity involves more than simple behavioral imitation; it reflects individuals' acceptance of others' prosocial attitudes.

Social learning theory posits that humans can rapidly acquire social behavior rules through imitation (Legare & Nielsen, 2015). On one hand, imitation enables individuals to quickly learn social rules, adapt to society, and enhance survival. On the other hand, imitation ensures that societal progress moves in a unified direction, maintaining orderly and efficient social functioning. From the imitation theory perspective, prosocial conformity facilitates the spread of prosocial behavior among social members through mutual imitation and learning, reinforcing socially advocated behavioral norms. From the motivation change perspective, prosocial conformity more strongly reflects individuals'adoption and internalization of others' deep-seated attitudes and values rather than superficial

behavioral copying. Ultimately, motivation change also serves the purpose of ensuring individuals do not deviate from their groups, providing social adaptation benefits. Therefore, both theoretically and empirically, these mechanisms are difficult to completely separate. At their core, the internal drives of both psychological mechanisms align with the fundamental motives of conformity behavior itself: individuals seek group acceptance and approval, avoid deviance, and maintain positive self-concepts.

4. Neural Mechanisms of Prosocial Conformity Effects

With the development of brain imaging technology in psychological research, investigators have increasingly focused on the neural mechanisms underlying behavior. To reveal the internal psychological processes of prosocial conformity, research on its neural mechanisms has become particularly important. Based on previous studies, this paper argues that prosocial conformity effects primarily involve reward processing and error processing neural networks.

4.1 Reward Processing

Wei et al. (2019) used functional magnetic resonance imaging to demonstrate that the neural mechanisms of trust conformity closely resemble reward processing. During trust games, when individuals followed the group' s choice to trust, neural activity in the ventromedial prefrontal cortex (vmPFC), anterior cingulate cortex (ACC), and ventromedial striatum significantly increased (Wei et al., 2019). The vmPFC is a critical region in reward processing circuits (Grabenhorst & Rolls, 2011; Rangel & Hare, 2010; Rushworth et al., 2009, 2011) and participates in subjective value processing. Hayden et al. (2009) found that the ACC was significantly activated when individuals processed fictive rewards. The ventromedial striatum is also associated with reward processing (Knutson & Wimmer, 2007; McCoy & Platt, 2005; Rilling et al., 2002, 2004a, 2004b). Mason et al. (2009) suggest that reward-related brain regions' involvement in conformity indicates that individuals perceive following group choices as correct. From the perspective of game attributes, trust game decisions depend on one' s game strategy (Espin et al., 2013). Within limited decision time, individuals must gather information to assess their partner' s trustworthiness and protect their own interests (魏真瑜等, 2017). The existence of trust conformity suggests that individuals use group behavior as a primary decision-making basis, trusting the group' s choice (魏真瑜等, 2017).

4.2 Error Processing

Social psychologists argue that avoiding social rule violations is an important motive for conformity (Deutsch & Gerard, 1955). When individuals detect inconsistencies between their own behavior or attitudes and the group, error processing-related brain regions become significantly activated (Falk et al., 2010). Scholars in social rule research have found that the human brain has developed special-

ized neural mechanisms to detect whether one' s behavior conforms to social rules, enabling timely adjustments for social adaptation (Montague & Lohrenz, 2007). In fairness preference conformity experiments, researchers found that conformity behavior was closely related to neural activity in the insula and middle frontal gyrus (Wei et al., 2013). Additionally, in altruistic conformity experiments, when individuals observed group altruistic choices, neural activity increased in the inferior frontal gyrus, superior frontal gyrus, and bilateral middle frontal gyrus (Wei et al., 2017). Correlation analyses between neural activity and behavior revealed that individuals'conformity behavior was associated with activity in the dorsolateral prefrontal cortex (dlPFC), rostral ACC, and insula (Wei et al., 2017). Rostral ACC activation is associated with monitoring whether one' s behavior violates social rules (Cohen & Ranganath, 2007; Kerns et al., 2004; Klucharev et al., 2009; Ridderinkhof et al., 2004). The middle frontal gyrus and dlPFC are involved in social rule processing and corresponding behavioral adjustments (Beer et al., 2003; Berthoz et al., 2002; Falk et al., 2010; Mason et al., 2009). Thus, people perceive group behavior as a social rule, and inconsistency between self and group generates error signals that prompt behavioral adjustment to avoid deviating from social norms. Researchers consider conformity associated with error processing-related brain activation as normative conformity (Mason et al., 2009). Therefore, altruistic and fairness preference conformity belong to normative conformity, with error processing regions playing crucial roles in these prosocial conformity processes.

In summary, prosocial conformity effects primarily involve two neural networks: reward processing and error processing. Psychologically, individuals perceive others' prosocial behavior as a learning target, acquiring appropriate social behaviors through imitation and attitude internalization to ensure group integration and social adaptation. Additionally, from a social reward perspective, individuals may anticipate social rewards for prosocial conformity, making it reasonable that prosocial conformity shares neural representations with reward processing networks. The error processing network functions like a "monitoring system" in prosocial conformity, where individuals first detect discrepancies between their attitudes/behaviors and the group, then decide whether to adjust.

5. Prosocial Conformity Effects and Individual Traits

Numerous experiments have confirmed the universality of prosocial conformity behavior. To deepen understanding, researchers have examined interactions between prosocial conformity effects and individual traits, including social value orientation, interpersonal trust level, and interpersonal sensitivity. In decision-making, individuals consider both their own interests and those of others. Researchers propose that people differ in how they weight self versus other interests—that is, they have different social value orientations (Pletzer et al., 2018). Some individuals prioritize self-interest (pro-self), while others consider others' interests more readily (pro-social) (Pletzer et al., 2018). Multiple studies have shown that pro-social individuals display more prosocial behavior in decisions,

whereas pro-self individuals show less. Using social value orientation scales, Wei et al. (2016) classified participants as pro-self or pro-social and had them play trust and dictator games under social pressure. Results indicated that pro-social individuals were more likely to exhibit prosocial conformity (Wei et al., 2016). Moreover, in dictator games, pro-self individuals even altered their behavioral preferences under prosocial pressure, showing increased prosocial behavior (Wei et al., 2016).

Interpersonal trust level is an individual trait measuring expectations and beliefs about whether others or groups are trustworthy (Betts et al., 2013). Interpersonal trust scales assess predictability, reliability, and dependability (Betts et al., 2013). Research shows that high-trust individuals trust others more and more readily accept group members' suggestions compared to low-trust individuals (Touré-Tillery & McGill, 2015). Using trust and dictator games with social pressure, researchers found that interpersonal trust level moderates prosocial conformity effects (魏真瑜等, 2017). In trust games, high-trust individuals showed more trust conformity, while in dictator games, low-trust individuals showed more prosocial conformity (魏真瑜等, 2017). The explanation lies in different conformity types: trust conformity in trust games represents informational conformity, whereas generosity conformity in dictator games represents normative conformity. Facing informational conformity, high-trust individuals more readily accept others' advice and follow group choices, showing increased trust investments. Facing normative conformity, low-trust individuals, with weaker resistance to group pressure, are more easily influenced by social pressure and comply with group choices, showing generosity conformity (魏真瑜等, 2017).

Interpersonal sensitivity, another trait affecting social relationships, refers to individuals' perceptual sensitivity to others' emotions and behaviors (Boyce & Parker, 1989). High-interpersonal-sensitivity individuals are deeply concerned with relationships and modify their behavior and attitudes to meet others' expectations (Harb et al., 2002). Researchers have found that due to fear of negative evaluation and group rejection, high-interpersonal-sensitivity individuals are more sensitive to social pressure in donations and show greater prosocial conformity (李晴蕾, 王怀勇, 2019). Under social pressure, high-interpersonal-sensitivity individuals also donate more money when making decisions for others (李晴蕾, 王怀勇, 2019).

Social value orientation examines how individuals view and manage self-other interest distributions, interpersonal trust level measures how individuals perceive others' reliability, and interpersonal sensitivity assesses how individuals perceive others. In resource allocation, prosocial conformity outcomes align with pro-social individuals' expected distributions, making them more likely to show prosocial conformity. Individuals with high trust perceive others as reliable and trustworthy, maintaining stronger interpersonal bonds and more readily following others'prosocial behavior. Additionally, when individuals are highly sensitive to interpersonal information, concerned with others' approval, and avoid group marginalization, they are more susceptible to prosocial conformity pressure. An-

alyzing the behavior attributes, both prosocial behavior and conformity belong to interpersonal behaviors. Thus, individuals' inherent interpersonal cognitive patterns inevitably influence their prosocial conformity behavior. However, it is important to note that individuals' interpersonal patterns affect their baseline prosocial tendencies. Therefore, prosocial conformity experiments require baseline conditions without information about others' choices to measure individuals' original prosocial tendencies. Comparing baseline prosocial tendencies with those under conformity pressure better reflects the strength of prosocial conformity effects.

6. Summary and Outlook

Conformity psychology represents a popular topic in social psychology research. This paper focuses on conformity' s influence on prosocial behavior, reviewing behavioral findings, two psychological mechanisms, neural mechanisms, and individual differences in prosocial conformity effects. Future research can proceed in five directions.

First, Nook et al.' s (2016) findings suggest that different prosocial behaviors can influence each other through prosocial conformity, implying that the psychological mechanism may involve deeper attitude internalization and motivational change. If prosocial conformity primarily reflects individuals' motivational changes, the effect may be relatively stable. Future studies should examine how long prosocial conformity effects persist after individuals display such behavior. Answering this question will help us understand the stability of prosocial conformity effects.

Second, although existing research has explored how social value orientation, interpersonal trust, and interpersonal sensitivity affect prosocial conformity, other individual traits remain uninvestigated. For example, do Openness and Agreeableness from the Big Five personality traits influence prosocial conformity? Do individuals with different empathy levels show different prosocial conformity tendencies? Do different adult attachment styles affect prosocial conformity behavior?

Third, research has found that adolescent groups also exhibit prosocial conformity behavior—when middle school students see peers willing to volunteer for community service, their own participation intentions increase (Choukas-Bradley et al., 2015). This shows that prosocial conformity is not limited to adults. Does prosocial conformity exist in children and adolescents? Research indicates that one-year-old infants already display prosocial behavior (Roth-Hanania et al., 2011). Future studies could focus on prosocial conformity in young children and adolescents, as well as conduct longitudinal studies to enhance our understanding of prosocial conformity development.

Fourth, social functioning deficits in mental illness patients represent an important topic in psychiatry and psychotherapy. Prosocial conformity outcomes are positive and socially adaptive. How do mental illness patients with impaired

social functioning respond to prosocial conformity pressure? For example, do depression patients' abnormal social reward processing affect their prosocial conformity? How do socially anxious individuals with high interpersonal sensitivity handle prosocial conformity pressure?

Finally, the psychological motive for prosocial conformity is avoiding deviance and gaining group acceptance. This suggests that individuals with strong prosocial conformity tendencies may view their group as important and 不希望与群体分离. Therefore, we must consider whether different social cultures influence prosocial conformity behavior. For instance, do collectivist versus individualist cultures affect prosocial conformity emergence? Do different ethnic groups show differences in prosocial conformity behavior?

References

李晴蕾, 王怀勇. (2019). 社会压力与决策角色对不同人际敏感性个体助人决策的影响. 心理科学, 3, 626-632.

魏真瑜, 赵治瀛, 郑涌. (2017). 个体的人际信任水平对其从众倾向性的影响. 西南大学学报 (自然科学版), 39,

Alpizar, F., Carlsson, F., & Johansson-Stenman, O. (2008). Anonymity, reciprocity, and conformity: Evidence from voluntary contributions to a national park in Costa Rica. *Journal of Public Economics*, 92, 1047-1060.

Aplin, L. M., Farine, D. R., Morand-Ferron, J., Cockburn, A., Thornton, A., & Sheldon, B. C. (2015). Experimentally induced innovations lead to persistent culture via conformity in wild birds. *Nature*, 518(7540), 538-541.

Asch, S. E. (1956). Studies of independence and conformity: I. A minority of one against a unanimous majority. *Psychological Monographs*, 70, 1-70.

Axelrod, R., & Hamilton, W. D. (1981). The evolution of cooperation. *Science*, 211, 1390-1396.

Bardsley, N., & Sausgruber, R. (2005). Conformity and reciprocity in public good provision. *Journal of Economic Psychology*, 26, 664-681.

Beer, J. S., Heerey, E. H., Keltner, D., Scabini, D., & Knight, R. T. (2003). The regulatory function of self-conscious emotion: Insights from patients with orbitofrontal damage. *Journal of Personality and Social Psychology*, 85, 594-604.

Berns, G. S., Capra, C. M., Moore, S., & Noussair, C. (2010). Neural mechanisms of the influence of popularity on adolescent ratings of music. *Neuroimage*, 49, 2687-2696.

Berthoz, S., Armony, J. L., Blair, R. J. J., & Dolan, R. J. (2002). An fMRI study of intentional and unintentional (embarrassing) violations of social norms. *Brain*, 125, 1696-1708.

Betts, L. R., Rotenberg, K. J., & Trueman, M. (2013). Young children' s interpersonal trust consistency as a predictor of future school adjustment. *Journal of Applied Developmental Psychology*, 34, 310–318.

Bicchieri, C., & Xiao, E. (2009). Do the right thing: But only if others do so. *Journal of Behavioral Decision Making*, 22, 191–210.

Blake, P., Piovesan, M., Montinari, N., Warneken, F., & Gino, F. (2015). Prosocial norms in the classroom: The role of self-regulation in following norms of giving. *Journal of Economic Behavior & Organization*, 115, 18–29.

Bohnet, I., & Zeckhauser, R. (2004). Trust, risk and betrayal. *Journal of Economic Behavior & Organization*, 55, 467–484.

Boyce, P., & Parker, G. (1989). Development of a scale to measure interpersonal sensitivity. *Australian and New Zealand Journal of Psychiatry*, 23, 341–351.

Brown, C., & Laland, K. N. (2002). Social learning of a novel avoidance task in the guppy: Conformity and social release. *Animal Behaviour*, 64(1), 41–47.

Choukas-Bradley, S., Giletta, M., Cohen, G. L., & Prinstein, M. J. (2015). Peer influence, peer status, and prosocial behavior: An experimental investigation of peer socialization of adolescents' intentions to volunteer. *Journal of Youth and Adolescence*, 44, 2197–2210.

Cialdini, R. B. (2003). Crafting normative messages to protect the environment. *Current Directions in Psychological Science*, 12, 105–109.

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, 55, 591–621.

Claidière, N., & Whiten, A. (2012). Integrating the study of conformity and culture in humans and nonhuman animals. *Psychological Bulletin*, 138, 126–145.

Cohen, M. X., & Ranganath, C. (2007). Reinforcement learning signals predict future decisions. *Journal of Neuroscience*, 27, 371–378.

Day, R. L., MacDonald, T., Brown, C., Laland, K. N., & Reader, S. M. (2001). Interactions between shoal size and conformity in guppy social foraging. *Animal Behaviour*, 62(5), 917–925.

Deutsch, M., & Gerard, H. B. (1955). A study of normative and informative social influences upon individual judgment. *Journal of Abnormal Psychology*, 51, 629–636.

Dijksterhuis, A. (2001). Automatic social influence: The perception-behavior links as an explanatory mechanism for behavior matching. In J. P. Forgas & K. Williams (Eds.), *Social influence, direct and indirect processes* (pp. 95–108). New York, NY: Psychology Press.

Dindo, M., Whiten, A., & de Waal, F. B. (2009). In-group conformity sustains different foraging traditions in capuchin monkeys (*Cebus apella*). *PLOS ONE*,

4(11), e7858.

Espin, A. M., Exadaktylos, F., & Neyse, L. (2016). Heterogeneous motives in the trust game: A tale of two roles. *Frontiers in Psychology*, 7, 728.

Falk, E. B., Berkman, E. T., Mann, T., Harrison, B., & Lieberman, M. D. (2010). Predicting persuasion-induced behavior change from the brain. *Journal of Neuroscience*, 30, 8421–8424.

Forsythe, R., Horowitz, J. L., Savin, N. E., & Sefton, M. (1994). Fairness in simple bargaining experiments. *Games and Economic Behavior*, 6, 347–369.

Fowler, J. H., & Christakis, N. A. (2010). Cooperative behavior cascades in human social networks. *Proceedings of the National Academy of Sciences*, 107, 5334–5338.

Frey, B. S., & Meier, S. (2004). Social comparisons and pro-social behavior: Testing "conditional cooperation"in a field experiment. *The American Economic Review*, 94, 1717–1722.

Galef, B. G., & Whiskin, E. E. (2008). "Conformity" in Norway rats? *Animal Behaviour*, 75(6), 2035–2039.

Götte, L., & Tripodi, E. (2018). Social influence in prosocial behavior: Evidence from a large-scale experiment. *CEPR Discussion Papers*, 13078.

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research*, 35, 472–482.

Grabenhorst, F., & Rolls, E. T. (2011). Value, pleasure and choice in the ventral prefrontal cortex. *Trends in Cognitive Sciences*, 15, 56–67.

Harb, G. C., Heimberg, R. G., Fresco, D. M., Schneier, F. R., & Liebowitz, M. R. (2002). The psychometric properties of the interpersonal sensitivity measure in social anxiety disorder. *Behaviour Research and Therapy*, 40, 961–979.

Hayden, B. Y., Pearson, J. M., & Platt, M. L. (2009). Fictive reward signals in the anterior cingulate cortex. *Science*, 324, 408–410.

House, B. (2018). How do social norms influence prosocial development? *Current Opinion in Psychology*, 24, 87–91.

House, B., Kanngiesser, P., Barrett, H., et al. (2020). Universal norm psychology leads to societal diversity in prosocial behaviour and development. *Nature Human Behaviour*, 4, 1–9.

Kerns, J. G., Cohen, J. D., MacDonald, A. W., Cho, R. Y., Stenger, V. A., & Carter, C. S. (2004). Anterior cingulate conflict monitoring and adjustments in control. *Science*, 303, 1023–1026.

Klucharev, V., Hytönen, K., Rijpkema, M., Smidts, A., & Fernández, G. (2009). Reinforcement learning signal predicts social conformity. *Neuron*, 61, 140–151.

Knutson, B., & Wimmer, G. E. (2007). Splitting the difference. *Annals of the New York Academy of Sciences*, 1104, 54–69.

Krupka, E., & Weber, R. A. (2009). The focusing and informational effects of norms on pro-social behavior. *Journal of Economic Psychology*, 30, 307–320.

Lachlan, R. F., Crooks, L., & Laland, K. N. (1998). Who follows whom? Shoaling preferences and social learning of foraging information in guppies. *Animal Behaviour*, 56, 181–190.

Lachlan, R. F., Ratmann, O., & Nowicki, S. (2018). Cultural conformity generates extremely stable traditions in bird song. *Nature Communications*, 9(1), 1–9.

Laland, K. N., Atton, N., & Webster, M. M. (2011). From fish to fashion: Experimental and theoretical insights into the evolution of culture. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 366(1567), 958–968.

Laland, K., & Plotkin, H. C. (1993). Social transmission of food preferences among Norway rats by marking of food sites and by gustatory contact. *Learning & Behavior*, 21(1), 35–41.

Latané, B., & Darley, J. M. (1968). Group inhibition of bystander intervention in emergencies. *Journal of Personality and Social Psychology*, 10, 215–221.

Lecheval, V., Jiang, L., Tichit, P., Sire, C., Hemelrijk, C. K., & Theraulaz, G. (2018). Social conformity and propagation of information in collective U-turns of fish schools. *Proceedings of the Royal Society B: Biological Sciences*, 285(1877), 20180251.

Ledyard, J. (1995). Public goods: A survey of experimental research. In J. Kagel & A. Roth (Eds.), *The handbook of experimental economics*. Princeton University Press.

Legare, C. H., & Nielsen, M. (2015). Imitation and innovation: The dual engines of cultural learning. *Trends in Cognitive Sciences*, 19, 688–699.

Mason, M. F., Dyer, R., & Norton, M. I. (2009). Neural mechanisms of social influence. *Organizational Behavior and Human Decision Processes*, 110, 152–159.

McKay, C. (2003). *Extraordinary popular delusions and the madness of crowds*. New York, NY: Dover.

McCoy, A. N., & Platt, M. L. (2005). Expectations and outcomes: Decision-making in the primate brain. *Journal of Comparative Physiology A*, 191, 201–211.

Montague, P. R., & Lohrenz, T. (2007). To detect and correct: Norm violations and their enforcement. *Neuron*, 56, 14–18.

Nook, E. C., Ong, D. C., Morelli, S. A., Mitchell, J. P., & Zaki, J. (2016). Prosocial conformity: Prosocial norms generalize across behavior and empathy.

Personality and Social Psychology Bulletin, 42, 1045–1062.

Park, S., & Shin, J. (2017). The influence of anonymous peers on prosocial behavior. *PLOS ONE*, 12(5), e0176703.

Peysakhovich, A., & Rand, D. G. (2013). Habits of virtue: Creating norms of cooperation and defection in the laboratory. *Social Science Research Network*, 2294242.

Pike, T. W., & Laland, K. N. (2010). Conformist learning in nine-spined sticklebacks' foraging decisions. *Biology Letters*, 6(4), 466–468.

Pletzer, J., Balliet, D., Joireman, J., Kuhlman, D., Voelpel, S., & Van Lange, P. (2018). Social value orientation, expectations, and cooperation in social dilemmas: A meta-analysis. *European Journal of Personality*, 32, 62–83.

Prentice, D. A., & Miller, D. T. (1993). Pluralistic ignorance and alcohol use on campus: Some consequences of misperceiving the social norm. *Journal of Personality and Social Psychology*, 64, 243–256.

Rangel, A., & Hare, T. (2010). Neural computations associated with goal-directed choice. *Current Opinion in Neurobiology*, 20, 262–270.

Ridderinkhof, K. R., Ullsperger, M., Crone, E. A., & Nieuwenhuis, S. (2004). The role of the medial frontal cortex in cognitive control. *Science*, 306, 443–447.

Rilling, J. K., et al. (2002). A neural basis for social cooperation. *Neuron*, 35, 395–405.

Rilling, J. K., Sanfey, A. G., Aronson, J. A., Nystrom, L. E., & Cohen, J. D. (2004a). Opposing BOLD responses to reciprocated and unreciprocated altruism in putative reward pathways. *Neuroreport*, 15, 2539–2543.

Rilling, J. K., Sanfey, A. G., Aronson, J. A., Nystrom, L. E., & Cohen, J. D. (2004b). The neural correlates of theory of mind within interpersonal interactions. *Neuroimage*, 22, 1694–1703.

Roth-Hanania, R., Davidov, M., & Zahn-Waxler, C. (2011). Empathy development from 8 to 16 months: Early signs of concern for others. *Infant Behavior & Development*, 34, 447–458.

Rushworth, M. F., Mars, R. B., & Summerfield, C. (2009). General mechanisms for making decisions? *Current Opinion in Neurobiology*, 19, 75–83.

Rushworth, M. F., Noonan, M. A. P., Boorman, E. D., Walton, M. E., & Behrens, T. E. (2011). Frontal cortex and reward-guided learning and decision-making. *Neuron*, 70, 1054–1069.

Shang, J., & Croson, R. (2009). Field experiments in charitable contributions: The impact of social influence on the voluntary provision of public goods. *The Economic Journal*, 119, 1422–1439.

Street, R. L., Jr., Street, N. J., & Van Kleek, A. (1983). Speech convergence among talkative and reticent three year olds. *Language Sciences*, 5, 79–96.

Touré-Tillery, M., & McGill, A. L. (2015). Who or what to believe: Trust and the differential persuasiveness of human and anthropomorphized messengers. *Journal of Marketing*, 79, 94–110.

van de Waal, E., Borgeaud, C., & Whiten, A. (2013). Potent social learning and conformity shape a wild primate' s foraging decisions. *Science*, 340, 483–485.

Wei, Z., Zhao, Z., & Zheng, Y. (2013). Neural mechanisms underlying social conformity in an ultimatum game. *Frontiers in Human Neuroscience*, 7, 896.

Wei, Z., Zhao, Z., & Zheng, Y. (2016). Moderating effects of social value orientation on the effect of social influence in prosocial decisions. *Frontiers in Psychology*, 7, 952.

Wei, Z., Zhao, Z., & Zheng, Y. (2019). Following the majority: Social influence in trusting behavior. *Frontiers in Neuroscience*, 13, 89.

Whiten, A., Horner, V., & De Waal, F. B. (2005). Conformity to cultural norms of tool use in chimpanzees. *Nature*, 437(7059), 737–740.

Zaki, J., & Mitchell, J. P. (2011). Equitable decision making is associated with neural markers of intrinsic value. *Proceedings of the National Academy of Sciences*, 108, 19761–19766.

Note: Figure translations are in progress. See original paper for figures.