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**The beautiful complexity of human prosociality:  
On the interplay of Honesty-Humility, intuition, and a reward system**

**Abstract**

Human prosociality is a fascinating and complex phenomenon. The present research takes this complexity into account by examining the *interplay* of three prominent factors that past research has shown to promote prosocial behavior. In two studies (total  $N=1799$ ), we tested the impact of (a) a basic prosocial personality trait (the Honesty-Humility dimension from the HEXACO personality model), (b) intuitive decision making, and (c) the possibility of being rewarded (i.e., a reward system) in the emergence of prosocial behavior (i.e., dictator game giving). Replicating previous research, we found (1) that a reward system increased prosocial behavior, and (2) that Honesty-Humility was positively related to prosocial behavior. In addition, given that there was no reward system, we show that intuition (versus a control condition) reduced prosocial behavior in individuals low in Honesty-Humility, whereas no effect was found for individuals high in Honesty-Humility. Implications for the understanding of prosocial behavior are discussed.

Word count: 149

Keywords: Prosocial behavior; HEXACO; Honesty-Humility; Intuition; Reward

## Introduction

Humans act to benefit others even when this implies personal costs (Rand & Epstein, 2014). There is robust evidence that humans engage in such personally costly prosocial behavior, especially when they have prosocial preferences as expressed by prosocial personality traits (Thielmann et al., 2020; Zhao & Smillie, 2015) or moral preferences for doing the right thing (Capraro & Rand, 2018). Humans costly punish antisocial and reward prosocial others (Balliet et al., 2011); reward and punishment systems in turn foster prosocial behavior (Balliet et al., 2011; Fehr & Gächter, 2002; Ostrom, 1990). There is also evidence that humans increase in prosocial behavior when forced to decide intuitively (Rand, 2016; Rand et al., 2012a, 2014, but see e.g., Kvarven et al., 2020). However, factors promoting or preventing prosocial behavior are often examined in isolation. By contrast, the present research addresses the complexity of human prosociality when it comes to sharing resources with an anonymous other person (i.e., dictator game giving) and investigates several prominent factors *in combination*. Specifically, we examine the interplay of (a) a basic prosocial personality trait (i.e., the Honesty-Humility dimension from the HEXACO personality model), (b) intuitive decision making, and (c) the possibility of being rewarded (i.e., a reward system) in the emergence of prosocial behavior in the context of dictator game giving.

The present contribution advances the literature in several ways. First, by examining the *interplay of three* prominent factors that past research has shown to promote prosocial behavior, the present contribution has the potential to create new knowledge about when prosocial behavior is, and when it is not, to emerge. Second, we aim to replicate that all three central factors examined (a reward system; intuitive decision making; Honesty-Humility) promote costly prosocial behavior. Indeed, amidst recent concerns about reproducibility in psychological and behavioral science (Camerer et al., 2016, 2018; Open Science Collaboration, 2015), independent

replications should be of particular interest to the field (Brandt et al., 2014; Shrouf & Rodgers, 2018).

Third, we examine boundary conditions for these previously found effects. Past research has shown that the basic prosocial personality trait of Honesty-Humility promotes prosocial behavior across differently structured social situations (Hilbig et al., 2014; Hilbig & Zettler, 2009; Zhao et al., 2016; Zhao & Smillie, 2015). We extend this research and test whether Honesty-Humility promotes prosocial behavior depending on individuals' decision-making style and whether a reward system is present. Past research has further shown that intuitive decision making can promote prosocial behavior (Rand, 2019). We examine for whom (individuals low vs. high in Honesty-Humility) and when (whether or not a reward system is present) this might be the case. Given inconsistent findings and non-replications that intuition promotes prosocial behavior (e.g., Bouwmeester et al., 2017; Kvarven et al., 2020; Tinghög et al., 2013, Caprao & Cococcioni, 2016), it seems a worthy approach to examine potential boundary conditions. In this way, the present research can reveal new insights into the conditions under which intuitive decision making might promote prosocial behavior.

### **Fostering prosocial behavior by a reward system**

Support for the assumption that prosocial behavior can be fostered by introducing a reward system is found in the literature on social dilemma and cooperation. Cooperation, that is, when individuals contribute to jointly reach a positive collective outcome, can create substantial benefits on the group level. Yet cooperation is fragile because it is costly for the cooperating individuals; in fact, without any incentives to cooperate, low and over time decreasing levels of cooperation can be documented (Fehr & Gächter, 2002; Herrmann et al., 2008). One discussed solution is the establishment of a reward system, that is, the possibility of group members rewarding cooperative individuals (Balliet et al., 2011). Indeed, research has shown that there are higher cooperation levels in situations where a reward system is present compared to situations

where rewarding is not possible (Balliet et al., 2011; Dickinson, 2001; Rand, Dreber, et al., 2009; Sutter et al., 2009). That is, individuals strategically shift towards cooperative behavior when there is the possibility to obtain rewards. In the present contribution, we examine whether this strategic shift also occurs in the context of prosocial behavior when it comes to simple giving decisions, and we test whether this behavior depends on individuals' basic prosocial preferences (i.e., Honesty-Humility) and their decision-making style.

### **Prosocial behavior as automatic intuition**

In a series of experiments, Rand and colleagues (Rand et al., 2012, 2014; Rand & Kraft-Todd, 2014) document that conditions fostering intuitive decision making (e.g., priming of an intuitive thinking style) increase cooperation, whereas conditions that inhibit intuitive decision making (e.g., a time delay prior to decisions) decrease cooperation. While replications (Capraro & Cococcioni, 2016; Tinghög et al., 2013), a registered replication report (Bouwmeester et al., 2017, for a response, see Rand, 2017), and a meta-analysis have found contradictory results (Kvarven et al., 2020), Rand's recent updated meta-analysis (2019) supports the positive link between intuition and cooperation (for a recent review and discussion, see Capraro, 2019).

The theoretical notion that cooperation should emerge intuitively is grounded in the Social Heuristics Hypothesis (SHH; Rand, 2016; Rand et al., 2014, 2016). The SHH postulates that individuals who learned and experienced that cooperation reflects a beneficial strategy in daily life should apply this strategy per default (i.e., intuitively) in new and atypical situations. By contrast, individuals who did not learn and experience that cooperation reflects a beneficial strategy in daily life should possess an uncooperative default mode and therefore should not cooperate intuitively in new and atypical situations. Regarding unilateral giving in zero-sum situations (such as giving behavior in a dictator game), the SHH allows for similar predictions as for cooperation: Intuition favors behavior that is typically beneficial (Rand et al., 2016). Unilateral giving in zero-sum situations could be beneficial in the long run (e.g., through

reputational mechanisms), and therefore intuition may also favor unilateral giving (i.e., dictator game giving; Rand et al., 2016). However, in line with the SHH, cooperation and unilateral giving are only intuitive for those individuals who learned and experienced that this reflects a beneficial strategy (Alós-Ferrer & Garagnani, 2020; Capraro & Cococcioni, 2015; Kieslich & Hilbig, 2014; Mischkowski & Glöckner, 2016; Rand et al., 2012; Rand & Kraft-Todd, 2014).

To sum up, there is mixed evidence for a main effect of intuition on prosocial behavior. Rather, and in line with the SHH, it seems that basic social preferences are revealed when individuals are forced to make decisions intuitively (e.g., Alós-Ferrer & Garagnani, 2018; Pfattheicher et al., 2017). Here, we examine whether intuitive behavior depends on individuals' basic prosocial preferences (i.e., Honesty-Humility) in that when forced to decide intuitively (versus a control condition), individuals high in Honesty-Humility increase in prosocial behavior, whereas individuals low in Honesty-Humility decrease in prosocial behavior.

### **Honesty-Humility and prosocial behavior**

Honesty-Humility is one factor of the HEXACO personality model (Ashton & Lee, 2007). According to Ashton and Lee (2007, p. 156), "Honesty-Humility represents the tendency to be fair and genuine in dealing with others, in the sense of cooperating with others even when one might exploit them without suffering retaliation." In this regard, individuals high in Honesty-Humility are typically sincere, fair, modest, and greed avoidant (Ashton & Lee, 2007).

Past empirical research has convincingly shown the positive impact of Honesty-Humility on a wide variety of prosocial behaviors (for overviews, see Lee & Ashton, 2013; Zettler, I., & Hilbig, 2015; Zhao & Smillie, 2015). It has been documented that Honesty-Humility is positively related to sharing money with an anonymous partner (Hilbig et al., 2014; Hilbig & Zettler, 2009; Mischkowski et al., 2019; Thielmann & Hilbig, 2014; Zhao et al., 2016), trustworthiness (Thielmann & Hilbig, 2015), trusting others (Pfattheicher & Böhm, 2018), interpersonal and intergroup cooperation (Hilbig et al., 2013; Hilbig et al., 2018; Thielmann & Böhm, 2016),

reduced workplace delinquency (De Vries & Van Gelder, 2015; Zettler & Hilbig, 2010), and reduced cheating behavior (Kleinlogel et al., 2018; Pfattheicher et al., 2019; Ścigała et al., 2019; Zettler & Hilbig, 2015).

In summary, there is convincing evidence that Honesty-Humility promotes prosocial behavior. In the present investigation, we examine whether we can replicate this finding and whether individuals low and high in Honesty-Humility change in prosocial behavior when forced to behave intuitively. An overview about the specific hypotheses is outlined in the next section.

### **On the interplay of Honesty-Humility, intuition, and a reward system**

To predict when Honesty-Humility, intuition, and a reward system promote prosocial behavior in the context of dictator game giving, we build on the notion of weak and strong situations (Cooper & Withey, 2009; Mischel, 1977). According to Mischel (1977, p.347), strong situations “lead everyone to construe the particular events the same way, induce uniform expectancies regarding the most appropriate response pattern, provide adequate incentives for the performance of that response pattern and require skills that everyone has to the same extent.” We argue that situations involving a reward system correspond to a relatively strong situation: There are incentives for prosocial behavior (i.e., the potential reward) and one has the skills to perform the prosocial behavior (in a simple economic game, as applied in the present study). From this assumption, one can expect high levels of prosocial behavior when a reward system is present, which falls in line with previous findings (Balliet et al., 2011; Dickinson, 2001; Rand, Ohtsuki, et al., 2009; Sutter et al., 2009). In the presence of such a strong situational factor, we argue that Honesty-Humility and decision-making style play a minor role in this situation.

In contrast, Honesty-Humility and decision-making style might impact prosocial behavior in a rather weak situation (Cooper & Withey, 2009). We argue that a relatively weak situation is given when no reward is possible. According to Mischel (1977, p.347), weak situations “are not uniformly encoded, do not generate uniform expectancies concerning desired behavior, do not

offer sufficient incentives for its performance, or fail to provide the learning conditions required for successful genesis of behavior.” In such a situation, individuals behave according to their basic social preferences (Hilbig et al., 2014; Hilbig & Zettler, 2009). Accordingly, we expect—given there is no reward system—the basic prosocial preference of Honesty-Humility to promote prosocial behavior.

Based on the SHH (Rand, 2016; Rand et al., 2014, 2016), we also make predictions for the impact of individuals’ decision-making style on prosocial behavior in the context of dictator game giving. Building on the assumption that individuals high in Honesty-Humility have experienced and learned that prosocial behavior can be beneficial (Ashton et al., 2014; Ashton & Lee, 2007), individuals high in Honesty-Humility should, according to the SHH, execute their basic prosocial tendencies as automatic intuitions (even in zero-sum situations; Rand et al., 2016). On this basis, it is assumed that individuals high in Honesty-Humility intuitively show prosocial behavior. Flipped predictions can be made for individuals low in Honesty-Humility. On the basis that individuals low in Honesty-Humility have experienced and learned that *uncooperative, egoistic* behavior is beneficial for them, individuals low in Honesty-Humility should, according to the SHH, execute their antisocial tendencies as automatic intuitions.

In sum, we test several predictions in two studies as reported below. First, we expect higher levels of prosocial behavior in a dictator game when a reward system is present compared to a situation without a reward system. Second, in case there is no reward system, we expect Honesty-Humility to promote prosocial behavior. Third, and also in the case of no reward system, we test whether individuals high in Honesty-Humility increase in prosocial behavior and individuals low in Honesty-Humility decrease in prosocial behavior when forced to behave intuitively.

## **Empirical investigation**

We conducted two studies to test our hypotheses. In both studies, participants played a one-shot dictator game to assess prosocial behavior. In the dictator game, two participants are randomly assigned to one of two different roles: allocator (i.e., the “dictator”) and recipient. The allocator receives a certain amount of money and can divide it between him/herself and the recipient. All participants reported on in this contribution were assigned the role of the “allocator” (see below how we avoided deception).

Before the dictator game, we assessed the HEXACO personality dimensions. We experimentally manipulated (a) decision-making style (intuition vs. reflection vs. a control condition) when deciding how much to give to the recipient, and (b) whether there was the possibility of being rewarded (i.e., a reward system). The procedure is outlined in detail below.

### **Ethics statement**

The two studies reported below were conducted in full accordance with the Ethical Guidelines of the American Psychological Association (APA). Institutional review boards or committees are not mandatory in the countries (Denmark and Germany) where the investigators responsible for the studies are employed (both authors). There was no deception of participants. All participants gave informed consent before starting the study protocol. Data, syntax, and instructions are available on the Open Science Framework (see [https://osf.io/ja6bm/?view\\_only=0e6c5b5f331d46428ce7cbb24ddcaf83](https://osf.io/ja6bm/?view_only=0e6c5b5f331d46428ce7cbb24ddcaf83)). For the second study hypotheses, sample size, exclusion criteria, and planned analyses were preregistered via [aspredicted.org](https://aspredicted.org) (<https://aspredicted.org/blind.php?x=f9u9i6>).

### **Methods**

*HEXACO*. Participants filled out the 60-item version of the HEXACO Personality Inventory-Revised (HEXACO-60; Ashton & Lee, 2009). The HEXACO assesses the basic personality dimensions Honesty-Humility, Emotionality, eXtraversion, Agreeableness,

Conscientiousness, and Openness. A sample item for Honesty-Humility reads: “I would never accept a bribe, even if it were very large.” Participants responded on a scale ranging from 1 = “strongly disagree” to 7 = “strongly agree.” All six dimensions had adequate reliability in both studies (Cronbach’s  $\alpha > .73$ ).<sup>1</sup>

*Dictator Game.* To measure prosocial behavior, we employed a dictator game.

Participants were told they would be assigned either the role of the allocator or the recipient.

Allocators were granted an endowment of 100 monetary units (MU) and could decide whether to share it with a randomly matched recipient. In Study 1, participants could decide whether they wanted (a) to keep all of it or (b) split it equally between themselves and the recipient. The two options were presented in random order. In Study 2, participants could decide how much of the endowment they wanted to send to the receiver in ten-unit increments. Allocators had control over the final outcome, and recipients had to accept the allocator’s decision. According to the allocators’ decision, a bonus payment was paid to them and to a randomly matched participant in the role of the recipient. Participants had to correctly answer two questions regarding understanding of the instructions to proceed with the study.

All decisions were implemented as announced; there was no deception in this study. 100 MU in the experiment equaled \$0.10 in Study 1 and £0.30 in Study 2. For the present study, only the behavior of allocators was of interest; therefore, all participants were assigned the role of allocator. To avoid deceiving participants, we recruited a matching number of recipients to receive a bonus payment if the allocator decided to share the endowment.

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<sup>1</sup> In Study 1, we also assessed participants’ social value orientation (SVO) with the 6-item slider measure (Murphy, Ackermann, & Handgraaf, 2011). Participants had to decide how to allocate resources between themselves and a randomly matched other person over a defined continuum of joint payoffs. The task was incentivized as one of the decisions was randomly chosen and paid out to the participants. Of the participants, 41 were characterized as competitive, 371 as individualistic, 582 as prosocial, and 5 as altruistic. The SVO-angle ranged between -54.56 and 61.39 ( $M = 23.27$ ,  $SD = 17.91$ ). SVO predicted the decision to share the endowment but did not interact with decision-making style.

*Decision-making style.* In line with Rand et al. (Rand, 2016, 2019; Rand et al., 2012), we experimentally manipulated decision-making style when deciding about the distribution of MU by asking participants to decide intuitively (“We ask you to make your decision from the gut. That is, rely on your intuition and just follow your predominant feelings,” intuition condition, Study 1:  $n = 330$ ; Study 2:  $n = 253$ ) or deliberately (“We ask you to think deliberately about your decision. That is, consider pros and cons and reflect before you make your decision,” reflection condition, Study 1:  $n = 335$ ; Study 2:  $n = 276$ ). In the reflection condition, participants additionally had to wait 20 seconds before they could proceed to the next page to give them time to think about their decision. In the control condition (Study 1:  $n = 334$ ; Study 2:  $n = 271$ ), participants were given no instructions.

*Reward system.* In the reward condition (Study 1:  $n = 479$ ; Study 2:  $n = 398$ ) participants were told that a third person would be informed about their decision and could reward them with up to 100 MU that would be paid to them as an additional bonus payment. In the no reward condition (Study 1:  $n = 520$ ; Study 2:  $n = 402$ ), there was no such information. The decisions of allocators in the reward condition were presented to a matching number of participants in another study who could then decide whether they wanted to reward the allocator. Rewarding the allocator was costly for the rewarder, however, participants in the role of the allocator did not know that.

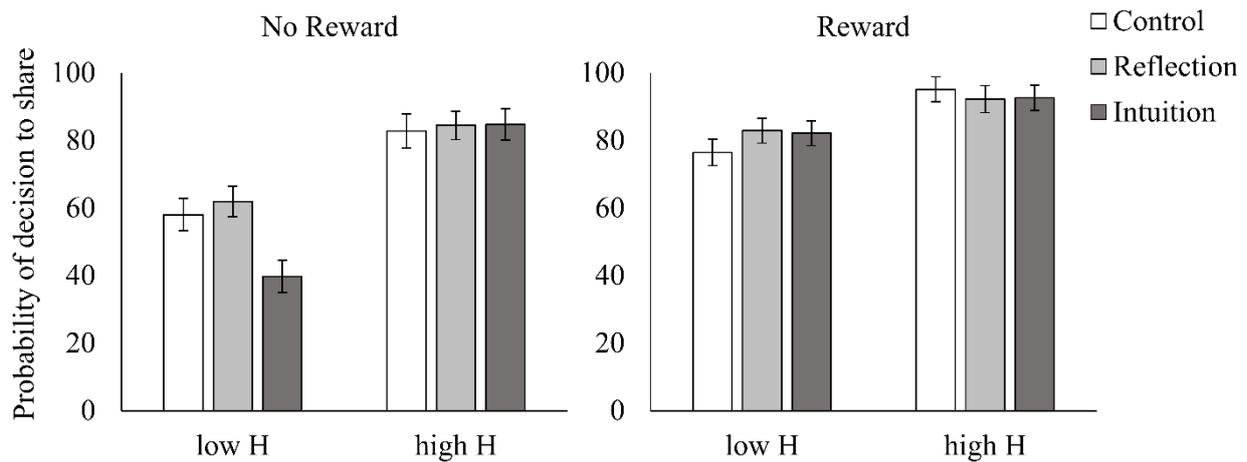
*Participants Study 1.* Using G\*Power (Erdfeiler et al., 2009), we conducted an *a priori* power analysis for a two-tailed test to detect at least small to medium effects for dichotomous predictors in a logistic regression (odds ratio = 1.5; Rosenthal, 1996). Power was set to .80 (Cohen, 1992). This power analysis revealed a required sample size of  $N = 853$  to detect a significant effect (alpha level of .05) given the existence of a true effect. Financial resources made it possible to slightly oversample the study; we recruited 1000 participants through Amazon Mechanical Turk (Buhrmester et al., 2011) to take part in a survey about personality and decision

making. A total of 1339 participants agreed to take part in the study before the quota was fulfilled. Two participants did not finish the survey and 100 failed to answer correctly one of two instructed response items (e.g., “This is an attention check. Please answer with ‘strongly agree.’”). Another 238 failed to correctly answer the questions regarding comprehension of the instructions for the dictator game. Excluding these left a final sample of 999 US participants (605 female, 386 male, 8 n/a) with a mean age of 37.11 ( $SD = 11.97$ ).

*Participants Study 2.* An a priori power analysis indicated that 787 participants were required to be able to detect effects of  $f^2 \geq 0.01$  for single regression coefficients with a power of .80 at an alpha level of .05. We recruited a total of 1040 participants from the UK through the crowdsourcing platform Prolific. Four did not finish the survey. Forty-nine failed to answer correctly one of two attention check items. Another 191 failed to answer correctly two questions regarding comprehension of the instructions. The final sample therefore consisted of 800 participants (526 female, 260 male, 2 diverse, 12 n/a;  $M_{age} = 36.90$ ,  $SD = 13.50$ ).

## **Results**

*Study 1.* In Study 1, 225 of the allocators decided to keep all the money, whereas 774 decided to split it equally between themselves and the recipient. The estimated probability to share the endowment depending on the experimental conditions and Honesty-Humility is displayed in Figure 1.



*Figure 1.* Predicted probability to share the endowment depending on Honesty-Humility, decision-making style, and reward condition; H = Honesty-Humility; predicted values are reported for low levels of H (1 *SD* below the mean, corresponds to a value of 3.74) and for high levels of H (1 *SD* above the mean, corresponds to a value of 5.85); error bars represent standard errors.

Prosocial behavior depended significantly on whether a reward system was present:

Without the possibility to be rewarded, 69% of the allocators decided to share the endowment, while this percentage increased to 87% in the presence of a reward system ( $b = 1.07$ ,  $z = 6.49$ ,  $p < .001$ , *Odds ratio (OR)* = 2.91). There was no main effect of intuition or reflection compared to the control condition (see Table 1, Model 2). The presence of a reward system did not exhibit differential effects depending on decision-making style (see Table 1, Model 4). Prosocial behavior was further significantly predicted by Honesty-Humility ( $b = 0.61$ ,  $z = 7.74$ ,  $p < .001$ ,  $OR = 1.83$ ).<sup>2</sup> The effect of Honesty-Humility in predicting prosocial behavior did not significantly differ between the reward conditions (see Table 1, Model 5) or depending on decision-making style (see Table 1, Model 6).

<sup>2</sup> In Study 1, prosocial behavior was also positively predicted by Emotionality and Openness. Female participants were more likely to show prosocial behavior; the effects of intuition and reward were, however, not moderated by gender; see Supplementary Material on the OSF (<https://osf.io/ja6bm>).

**Table 1.** Results of the regression analyses to predict prosocial behavior (i.e., dictator game giving)

		Study 1 ( <i>N</i> = 999)					Study 2 ( <i>N</i> = 800)				
		<i>b</i>	<i>SE</i>	95% <i>CI</i>	<i>p</i>	<i>OR</i>	<i>b</i>	<i>SE</i>	95% <i>CI</i>	<i>p</i>	$\beta$
Model 1	Intercept	0.80	0.09	0.62, 0.99	<.001	2.23	37.96	1.03	35.95, 39.98	<.001	
	Reward	1.07	0.16	0.75, 1.40	<.001	2.91	7.34	1.46	4.48, 10.20	<.001	.18
Model 2	Intercept	1.27	0.13	1.02, 1.54	<.001	3.58	42.14	1.27	39.65, 44.63	<.001	
	Intuition	-0.20	0.18	-0.56, 0.16	.276	0.82	-2.81	1.82	-6.39, 0.77	.123	-.06
	Reflection	0.09	0.19	-0.28, 0.47	.621	1.10	1.05	1.78	-2.45, 4.55	.557	.02
Model 3	Intercept	1.34	0.08	1.18, 1.51	<.001	3.82	41.61	0.72	40.19, 43.03	<.001	
	H	0.61	0.08	0.46, 0.76	<.001	1.83	4.34	0.77	2.83, 5.86	<.001	.20
Model 4	Intercept	0.84	0.17	0.51, 1.18	<.001	2.31	39.72	1.73	36.34, 43.10	<.001	
	Reward	0.98	0.28	0.45, 1.54	<.001	2.67	5.09	2.50	0.19, 9.99	.042	.12
	Intuition	-0.30	0.23	-0.76, 0.16	.203	0.74	-4.56	2.51	-9.47, 0.35	.069	-.10
	Reflection	0.20	0.24	-0.27, 0.67	.402	1.22	-0.93	2.49	-5.80, 3.94	.708	-.02
	Intuition $\times$ Reward	0.36	0.40	-0.42, 1.14	.364	1.43	3.36	3.60	-3.69, 10.41	.351	.06
	Reflection $\times$ Reward	-0.10	0.41	-0.90, 0.70	.799	0.90	3.35	3.52	-3.55, 10.25	.342	.06
Model 5	Intercept	0.89	0.10	0.69, 1.09	<.001	2.43	38.31	1.01	36.32, 40.29	<.001	
	H	0.73	0.10	0.54, 0.94	<.001	2.08	4.93	1.11	2.76, 7.10	<.001	.22
	Reward	1.10	0.18	0.75, 1.46	<.001	2.99	6.76	1.44	3.95, 9.57	<.001	.16
	H $\times$ Reward	-0.22	0.17	-0.56, 0.11	.188	0.80	-1.63	1.53	-4.62, 1.37	.287	-.05
Model 6	Intercept	1.40	0.15	1.12, 1.70	<.001	4.06	42.25	1.24	39.81, 44.69	<.001	
	H	0.66	0.14	0.39, 0.95	<.001	1.94	4.15	1.35	1.51, 6.79	.002	.19
	Intuition	-0.21	0.20	-0.61, 0.18	.295	0.81	-3.04	1.79	-6.55, 0.47	.090	-.07
	Reflection	0.04	0.21	-0.36, 0.44	.840	1.04	0.94	1.75	-2.49, 4.38	.590	.02
	H $\times$ Intuition	0.03	0.20	-0.35, 0.42	.876	1.03	-0.01	1.88	-3.69, 3.67	.994	<.01
	H $\times$ Reflection	-0.19	0.20	-0.58, 0.19	.321	0.82	0.71	1.91	-3.03, 4.45	.711	.02

Model 7	Intercept	0.94	0.19	0.59, 1.32	<.001	2.56	39.99	1.71	36.64, 43.34	<.001	
	H	0.59	0.18	0.25, 0.96	<.001	1.81	2.34	1.89	-1.36, 6.04	.215	.11
	Reward	1.05	0.31	0.45, 1.69	<.001	2.85	4.41	2.47	-0.43, 9.25	.075	.11
	Intuition	-0.32	0.26	-0.83, 0.19	.216	0.73	-4.47	2.47	-9.31, 0.38	.071	-.10
	Reflection	0.14	0.26	-0.36, 0.64	.587	1.15	-1.03	2.45	-5.83, 3.78	.676	-.02
	H × Reward	0.18	0.31	-0.41, 0.80	.552	1.20	3.13	2.67	-2.09, 8.35	.240	.10
	H × Intuition	0.52	0.27	-0.01, 1.07	.056	1.69	3.51	2.66	-1.70, 8.73	.187	.09
	H × Reflection	-0.02	0.25	-0.51, 0.46	.928	0.98	4.54	2.74	-0.84, 9.91	.098	.12
	Intuition × Reward	0.29	0.44	-0.57, 1.16	.505	1.34	3.44	3.55	-3.52, 10.39	.334	.06
	Reflection × Reward	-0.11	0.45	-0.99, 0.78	.812	0.90	3.78	3.47	-3.01, 10.57	.276	.07
	H × Reward × Intuition	-0.90	0.43	-1.75, -0.07	.034	0.41	-7.15	3.72	-14.44, 0.15	.055	-.14
	H × Reward × Reflection	-0.35	0.43	-1.19, 0.49	.417	0.71	-7.01	3.78	-14.42, 0.40	.064	-.13

*Note.* In Study 1, we used logistic regression to predict whether the endowment was shared (= 1) or not (= 0); in Study 2, we used linear regressions to predict the amount of the endowment given to the recipient (0-100); Intuition and Reflection are dummy coded with control as reference; Reward is dummy coded (1 = reward option, 0 = no reward option); H = Honesty-Humility; H is mean-centered.

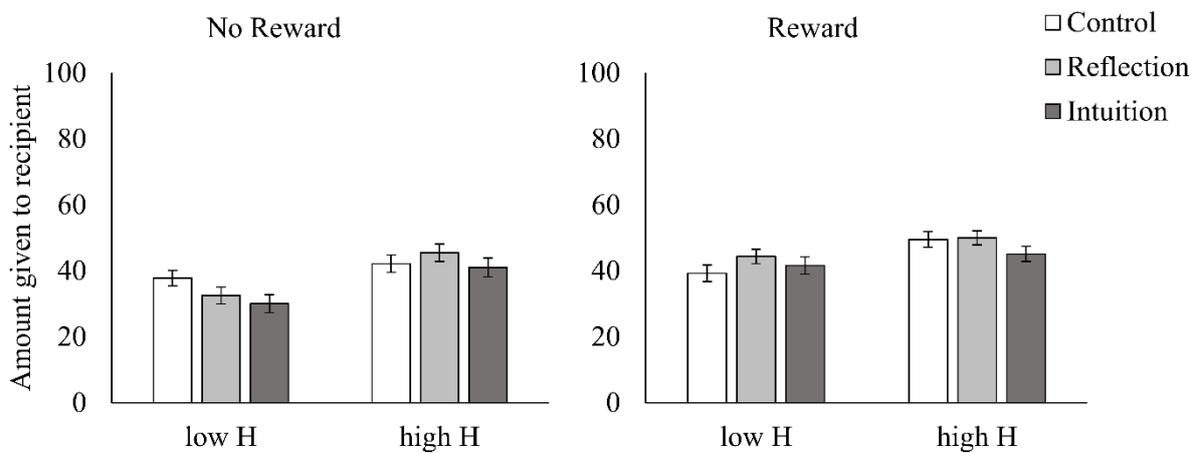
Including Honesty-Humility, decision-making style, and whether a reward system was present in the model revealed a complex interplay of all three factors in predicting prosocial behavior (see Table 1, Model 7, and Figure 1). There was a three-way interaction characterized by a significant decrease in prosocial behavior by individuals low in Honesty-Humility in the no reward condition when forced to decide intuitively; the simple slope of intuition vs. control for those low in Honesty-Humility (1 *SD* below the mean) in the no reward condition was significant ( $b = -0.87, z = -2.55, p = .011$ ). No significant effect of intuition was found for individuals high in Honesty-Humility (1 *SD* above the mean). No interaction between Honesty-Humility and decision-making style occurred in the reward condition.

*Study 2.* In Study 2, participants gave on average 41.61 ( $SD = 20.89$ ) of the 100 MU to the recipient. The average amount given to the recipient depending on Honesty-Humility, decision-making style, and reward condition is displayed in Figure 2. Participants in the reward condition gave on average more ( $M = 45.31, SD = 19.61$ ) than did participants in the no reward condition ( $M = 37.96, SD = 21.51; t(798) = 5.04, p < .001; Cohen's d = 0.36$ ). Again, there was no main effect of intuitive decision making (see Table 1, Model 2). Honesty-Humility was positively associated with prosocial behavior within the no reward condition ( $r = .21, p < .001$ ) as well as across conditions ( $r = .20, p < .001$ ).<sup>3</sup> Without the reward option, individuals low in Honesty-Humility significantly decreased in prosocial behavior under intuition (at 1 *SD* below the mean:  $b = -7.77, t(396) = -2.24, p = .026$ ), whereas there was no significant difference in prosocial behavior between intuition and control for individuals high in Honesty-Humility (1 *SD* above the mean:  $b = -1.16, t(396) = -0.30, p = .762$ ), although the interaction term between Honesty-Humility and intuition did not reach statistical significance ( $p = .205$ ). The data provided further support for the three-way interaction among Honesty-Humility, a reward system, and intuitive

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<sup>3</sup> In Study 2, prosocial behavior was also positively associated with Emotionality and negatively associated with Conscientiousness; prosocial behavior was not associated with gender, and gender did not moderate the effects of intuition or reward on prosocial behavior. See Supplementary Material on the OSF for details.

decision making, although the interaction term did not reach conventional levels of significance ( $p = .055$ ; see Table 1, Model 7, and Figure 2). Specifically, without the option of being rewarded, individuals low in Honesty-Humility gave lower amounts to the recipient, especially when asked to decide intuitively (vs. control), while with the option of being rewarded (vs. no reward), individuals low in Honesty-Humility gave a higher amount to the recipient independent from decision-making style.



*Figure 2.* Predicted amount given to recipient depending on Honesty-Humility, decision-making style, and reward condition; H = Honesty-Humility; predicted values are reported for low levels of H (1 *SD* below the mean, corresponds to a value of 3.84) and for high levels of H (1 *SD* above the mean, corresponds to a value of 5.72); error bars represent standard errors.

## Discussion

The present contribution addressed the complexity of prosocial behavior in the context of dictator game giving by examining the interplay of three factors that past research has shown to promote prosocial behavior: a reward system, Honesty-Humility, and intuitive decision making. Several results were obtained in the present investigation. First, we observed higher levels of prosocial behavior when a reward system was present compared to a situation without a reward system. Second, we document that Honesty-Humility promotes prosocial behavior. Third, contrary to our expectations, we did not find evidence that individuals high in Honesty-Humility increase in prosocial behavior when forced to behave intuitively. However, we found evidence

that individuals low in Honesty-Humility decrease in prosocial behavior when forced to behave intuitively and when no reward system is present. These results have numerous implications for research on reward systems, Honesty-Humility, and intuitive cooperation.

### **Implications**

By showing in two statistically well-powered studies that a reward system substantially increases prosocial behavior, we replicated previous research (Balliet et al., 2011), which is a valuable contribution to knowledge in itself and speaks to the validity of the study. Remarkably, when a reward system was present, individuals low in Honesty-Humility, who without a reward system show less prosocial behavior, also quite often shared the endowment. These findings in fact speak to the idea that situations that involve a reward system reflect relatively strong situations (Cooper & Withey, 2009; Mischel, 1977), providing strong incentives for individuals to cooperate and share resources with others.

The present work also poses implications for research on Honesty-Humility. It has been shown that dictator game giving reflects a preference for doing the right thing, morally speaking (Capraro & Rand, 2018). In line with this idea, we find a positive association between Honesty-Humility—the personality trait that has been linked to proactive prosocial behavior across different moral domains (e.g., Zhao & Smillie, 2015)—and dictator game giving. Past research suggests that individuals high in Honesty-Humility might be unconditionally cooperative, that is, they typically show prosocial behavior independent of their current situation (Allgaier et al., 2015; Chirumbolo, 2015; Hilbig et al., 2012, 2013; Pfattheicher et al., 2019; Ścigala et al., 2019; Thielmann & Hilbig, 2015; Wiltshire et al., 2014; Zettler & Hilbig, 2010; but see Pfattheicher & Böhm, 2018; Zettler et al., 2013). This pattern was also observed in the present study—that is, individuals high in Honesty-Humility often showed prosocial behavior whether or not there was a reward system, and their prosocial behavior did not depend on the decision-making style they were forced to apply.

Individuals low in Honesty-Humility, however, showed relatively low levels of prosocial behavior, especially when forced to decide intuitively. With a reward system, prosocial behavior was increased even in individuals low in Honesty-Humility. Overall, the present research provides interesting insights from the perspective of basic prosocial preferences, and it shows that individuals high in Honesty-Humility show high levels of prosocial behavior independent of contextual factors; on the other hand, individuals low in Honesty-Humility adapt their behavior dependent on the presence or absence of a reward system and on their decision-making style.

The present research did not find a main effect of intuitive decision-making on prosocial behavior. Based on the SHH (Rand, 2016; Rand et al., 2014, 2016), we further tested the idea that intuition fosters decisions in accordance with basic social preferences (Alós-Ferrer & Garagnani, 2020; Pfattheicher et al., 2017). Yet we failed to find support for the idea that intuition promotes prosocial behavior in individuals high in Honesty-Humility. It could be that (a) there actually is a true null effect, or (b) individuals high in Honesty-Humility already were so high in their dictator game giving that intuition had no chance to further increase prosocial behavior (i.e., a ceiling effect). Further research is needed to clarify this aspect. In contrast, we found support for the idea that intuition fosters basic social preferences for individuals low in Honesty-Humility. Specifically, we show that intuition decreased prosocial behavior for those individuals when no reward system was present.

### **Limitations and outlook**

Finally, we want to acknowledge limitations of the present work and point to potential future research. First, we applied a specific manipulation of intuitive decision making. Past research has shown that the effect of intuition on cooperation depends on the manipulation used (Kvarven et al., 2020; Rand, 2016). In this regard, it is unclear whether the present findings generalize across different manipulations of intuitive decision making (cf. Kvarven et al., 2020; Rand, 2016). In addition, in our study the potential reward was quite substantial relative to the

amount participants could share, which might have fostered high sharing rates overall. In this regard, a question for future research to examine is whether the present results hold under different implementations of a reward system. Still, we argue that this does not undermine the findings of the present study. It is that the mere generalizability is so far unclear.

Second, using dictator game giving, we examined a specific form of prosocial behavior. In the dictator game, the prosocial choice reflects motives of fairness and altruism. Prosocial behavior can, however, be modelled in different games, and different games may allow different motives to operate when choosing to behave prosocial (Thielmann et al., 2015). The prisoner's dilemma game, for instance, adds the motive of social welfare (Thielmann et al., 2015). Thus, the present research's findings apply only to dictator game giving; it is an open question whether they generalize across different games, different operationalization of prosocial behavior, and different situations (e.g., prosocial behavior in applied settings in "the real world").

To conclude, in the present contribution, we have included basic personality traits (Honesty-Humility), a cognitive factor (intuitive decision making), and a strong situational factor (a reward system), as well as their interactions in the analysis to better understand the complexity of prosocial behavior. As such, the present work can reflect a model for future research that does not only investigate a single factor but also focuses on the *interplay* of several factors to explain the complexity of human behavior.

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