

The impact of moral motives on economic decision-making in relationally different situations

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To explore how “salient others” influence economic decisions, we tested the impact of moral motives on economic decision-making in three relationally different situations: (a) anonymous social one-shot interactions, where individuals should draw on situational cues to infer information about how to interpret their relationship to a salient other due to the absence of other sources of social information, (b) non-anonymous social situations within an ongoing interaction, in which the moral motive established in the relationship should override situational cues about moral motives, and (c) anonymous non-social one-shot interactions, in which moral motives should not have an effect given the absence of a salient other. In an experiment (N = 94 participants), we varied these relationally different decision situations and the moral motive framing (unity vs. proportionality). As hypothesized, the two moral motive framings influenced decision behavior, but only in the anonymous social one-shot interaction. By replicating that moral motives matter in economic decision-making and showing that people infer information about morally acceptable behavior in anonymous social situations from moral cues provided by the situation and from prior interactions in case of an ongoing relationship, we offer a moral-psychological explanation for why individuals decide differently in economic decision situations depending on the relationality of the situation.

Keywords: economic decisions, moral motives, tacit coordination, decision design

Consider a call to donate money for a crowdfunding initiative. Would you donate money, if the founders of the initiative appealed to your solidarity? Would you donate, if the founders suggested that you would receive something back in proportion to what you give? It probably depends on whether you believe the initiative deserves your solidarity or whether you believe that giving and receiving should be proportional. Regardless of how you would decide, solidarity or proportionality considerations triggered by cues in the call for donations would influence your decision. Such considerations are inherently social and are rooted in the moral motives you apply to the relationship between you and the founders of the initiative (Fiske, 1992; Rai & Fiske, 2011).

While economic decisions often seem rationally calculable, they are influenced by moral motives as soon as they become social in nature, that is, when other people are involved, affected or influenced by the deci-

sion. As situations in general provide opportunities or affordances to express individual preferences (Kelley et al., 2003), social situations provide the context for relationship regulation. In such social contexts, people’s decision-making processes including the way they think, reason, and ultimately decide vary as a function of how they relate to “the other” person(s) involved in a given situation (Larrick, 2016; Reis, 2008). This regulation of relationships is inherently related to corresponding moral motives, which determine the morally required response in a situation (Fiske, 1992; Rai & Fiske, 2011). In our paper, we add to the body of research addressing the question of how salient others influence economic decisions.

We address this question from the perspective of moral psychology. More specifically, we draw on relationship regulation theory (Rai & Fiske, 2011), and its predecessor, relational models theory (Fiske, 1992). The theory proposes four fundamental moral motives (unity, hierarchy, equality, and proportionality) that are used to regulate relationships and thereby influence individuals’ thinking, feeling, and behavior in social situations (Fiske, 1992; Rai & Fiske, 2011). These four relational models guide all other-related behavior – even when making economic decisions, which was shown by Brodbeck et al. (2013) in a series of experiments.

With our paper, we replicated Brodbeck et al.’s (2013) work by showing that different moral motives lead to different levels of solidarity shown in economic decision situations. However, we also extended Brodbeck et al.’s (2013) work in the following ways: To show that the effect of moral motives on decision-making behavior is indeed limited to social interactions, we supplemented a new non-social interaction situation in which we expected no effect of moral framing. In contrast to Brodbeck, our non-social situation involved a non-human partner, while Brodbeck et al.’s (2013) non-social condition was an “interaction” with oneself. Moreover, by adding a situation with an ongoing relationship (i.e., prior interaction), we went beyond Brodbeck et al. (2013) to show, which kind of information individuals used to infer morally acceptable behavior.

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The influence of social contexts on economic decision-making

Standard economic theory, which was long guided by the assumption of rational, self-interested agents, has now also recognized the influence of social contexts on economic decision-making (Bolton & Ockenfels, 2000; Fehr & Schmidt, 1999, 2006). For example, scholars have noted that people not only focus on own outcomes but consider others' outcomes as well when evaluating choices (Fiddick, Cummins, Janicki, Lee, & Erlich, 2013) and are motivated in doing so by other-regarding preferences (Halali, Kogut & Ritov, 2017).

In response to findings in experimental economics challenging the “legitimacy of the ‘rational agent’ model as a descriptive model of human behavior” (Fiddick et al., 2013, p. 319), normative theories including other-regarding preferences and decision heuristics such as altruism, others' well-being, fairness and reciprocity, the equal division rule (Allison & Messick, 1990) or noblesse oblige (Fiddick et al., 2013) have been proposed (Bolton & Ockenfels, 2000; Fehr & Schmidt, 1999; Levine, 1998; Rabin, 1993, see also Fiddick et al., 2013). Rather than extending the economic research on other-regarding preferences and decision heuristics, we applied a psychological theory on moral motives and relationship regulation to understand other-regarding behavior in economic decisions (Fiske, 1992; Rai & Fiske, 2011). In our opinion, the advantage of relationship regulation theory is that it offers a comprehensive, unifying framework concerning other-regarding behavior, and thus can be used to predict and explain moral motives in any type of social interaction.

Moral motives as mechanisms for relationship regulation in social situations

Moral motives represent moral obligations, or motivational forces to pursue acceptable behavior in relationships. As such, moral motives are mechanisms for relationship regulation and are thus inherently social. Relationship regulation theory (Rai & Fiske, 2011, building on its predecessor, relational models theory, Fiske, 1992; see also Rai, 2020) proposes that in social situations – and only in social situations – individuals universally apply four – and only four – distinct moral motives (also see Brodbeck, et al., 2013) for relationship regulation: *unity*, *hierarchy*, *equality*, and *proportionality*.

Unity serves as motivation to look after in-group members by avoiding threats and providing aid and protection when needed due to a sense of collective responsibility. Decisions are made by consensus, and goods are divided according to needs. *Hierarchy* serves as motivation to respect rank, where deference and obedience towards superiors is exchanged for leadership and guidance as well as protection of subordinates. Decisions are made by the authority, and goods are divided depending on status. *Equality* serves as moral motivation for balanced, in-kind reciprocity and

equal treatment in the sense of “scratch my back and I will scratch yours” as well as “eye-for-an-eye forms of revenge” (Rai & Fiske, 2011, p. 63). Decisions are made by majority, with everyone having the same vote, and goods are divided equally. *Proportionality* serves as motivation for calculations and behavior based on ratios and making judgments according to a utilitarian calculus of costs and benefits. Decisions are made by following market principles, and goods are divided in proportion to contributions. In asocial situations or in situations with null relationship, interactions are not coordinated with reference to a specific relational model or moral motive which leads to moral indifference (see Fiske, 1992; Rai & Fiske, 2011).

In general, humans use the four moral motives to develop, coordinate, evaluate and sustain social relationships. Specific moral motives dominate specific relationships, and specific individuals prefer to regulate relationships with a specific moral motive (Forsyth, 1995; Haslam, 2004). However, all humans use and “understand” all four moral motives. In short, the four moral motives apply to all humans in all cultures. Note, however, that the way moral motives are expressed varies cross-culturally (Fiske, 1992; Rai & Fiske, 2011). In any specific social situation, an individual's behavior can be attributed to one of the four moral motives. Thus, any economic decision that involves others can be attributed to one of the four moral motives as well (individuals' behaviors might vary across situations).

Cues eliciting moral motives in social situations

Moral motives guide (economic decision-making) behavior in social situations. But from where do individuals infer information about “morally correct” behavior? In an ongoing relationship within a context that provides culturally formed prescriptions about acceptable behavior, norms are established and guide individuals' behaviors. At work, for example, managers and subordinates usually establish a relationship of hierarchy in which the managers' instructions are followed. Or when two friends always take turns paying for a round of drinks, they establish and express the moral motive of equality. Within the boundaries of such ongoing interactions, people recognize rules and prohibitions and develop consensus about acceptable moral motives to be applied in interactions (Rai & Fiske, 2011). Established relationships, being relatively stable, should thus be the most salient cue guiding behavior compared to specific situational influences which should be less influential.

However, economic decisions are often made in a social context where individuals do not share a common history and cultural norms might not exist. Coordination in such situations – where explicit communication is also often limited or impossible – can be termed *tacit coordination* (e.g., Abele, Stasser, & Chartier, 2014; De Kwaadsteniet & Van Dijk, 2010; Van Dijk, De Kwaadsteniet, & De Cremer, 2009). In the absence of other information, people base their assumptions

about the relationship on the *most salient cues* (cf. De Kwaadsteniet & Van Dijk, 2010). In *anonymous one-shot social interactions*, that is, in situations in which people who cannot identify each other interact only one time, moral motives cannot stem from the relationship between individuals, and individuals do not share a history or potential future. In such situations, individuals should be particularly susceptible to externally provided cues regarding moral considerations. Cues such as situational framings should evoke moral motives, leading to tacit coordination and indicating “what to do”.

Moral motives eliciting different economic decisions

The four moral motives unity, hierarchy, equality, and proportionality differently direct people’s actions in social situations (Rai & Fiske, 2011), including in economic decision-making in social situations. According to Brodbeck et al. (2013), unity moral motives should lead to higher levels of solidarity than proportionality moral motives, as unity moral motives serve as motivation to look after in-group members, while proportionality moral motives serve as motivation to calibrate costs and benefits (Rai & Fiske, 2011). The authors contrasted these two moral motives (unity versus proportionality) because their effects were expected to be particularly large in the context of their paradigm. In a series of studies, Brodbeck et al. (2013) showed that situational framings and even subtle subliminal primes in economic decision games involving an anonymous other did indeed evoke moral motives, such as solidarity or proportionality, that distinctively guided individuals’ decision behavior: While a unity frame induced more solidarity behavior with more money being saved for an anonymous other, even though this behavior decreased the decision-maker’s expected total utility, a proportionality frame made participants consider costs and benefits with less money being saved for the anonymous other, increasing the decision-maker’s total expected utility.

Relationally different situations

Within our goal of exploring how salient others influence economic decisions, we focused on subtle situational cues providing information on the relationship to the salient other. To explore the effectiveness of the subtle situational cues, we contrasted (a) an anonymous social one-shot interaction with two other conditions: (b) a non-anonymous social situation with an ongoing interaction, and (c) an anonymous non-social one-shot interaction. Decision-making was thus dynamic as we investigated interlinked social and non-social interactions in differently framed contexts with short-term and ongoing relationships and changing moral motives, implying short-term and long-term considerations of decision-makers. Thereby, we built on research by Brodbeck et al. (2013), using their paradigm, the Dyadic Solidarity Game (DSG), to replicate and extend their findings on the influence

of situational cues regarding moral motives on social economic decision-making.

The Dyadic Solidarity Game

In the DSG, two individuals make an economic decision in a one-shot interaction. Even though the decision is made by each individual independently, the revenue is dependent on a probabilistic risk as well as the other person’s decision: Two participants are matched to form one dyad. Both participants in the dyad have EUR 10 at their disposal. Participants can freely divide the EUR 10 into two amounts, Amount A and Amount B (without knowing how the other participant decides). Then a die is rolled: If the die lands on a 1, 2, 3, or 4 (i. e., probability of 2/3) the participants receive their own Amount A, and Amount B is not disbursed. However, if the die lands on a 5 or 6 (i. e., probability of 1/3), each participant receives the Amount B of the other person in the dyad and Amount A is not disbursed. In other words, the participants in a dyad can choose to put money aside for each other, which is disbursed in the case of a loss, that is, when the die lands on a 5 or 6.

The DSG is a static game where players choose their actions simultaneously and interdependently. The actual profit in the game depends on one’s own and the other’s decisions as well as the roll of a die. However, participants are not able to influence the other person’s decision, and can only actively influence their profit through their own decision. Under the assumptions of rationality and von Neumann–Morgenstern utility (von Neumann & Morgenstern, 1953; Schoemaker, 1982), the only variable influencing utility is the payoff. In the DSG, payoff is maximized when each person in the dyad chooses a maximum amount for themselves (i. e., Amount A = EUR 10) and contributes nothing to the other (Amount B = EUR 0). Thus, this distribution, Amount A = EUR 10 and Amount B = EUR 0, represents maximum cost-benefit considerations. Cost-benefit considerations decrease as participants allocate less money to Amount A and more to Amount B. Conversely, solidarity is shown when individuals decide to put money aside for the other, at the cost of potentially receiving less payoff, in order to prevent the other person from getting nothing if the die lands on a 5 or 6. The lower Amount A and the higher Amount B, the higher the solidarity.

Research overview and hypotheses

Building on our theoretical argumentation, we assumed that whenever an economic decision involves others which makes the situation a *social situation*, individuals’ behavior is shaped by the moral motives that are salient and assumed to be acceptable in the given situation; *non-social situations*, i.e., situations that do not involve other persons, should not be susceptible to moral motives. Moreover, we assumed that when individuals interact, that is, when a situation is social, they infer an acceptable moral motive from the

most salient cues. In *anonymous social one-shot interactions*, individuals use situational cues, for example, content-related information from situational framing, such as written descriptions, to determine an acceptable moral motive. In *non-anonymous social ongoing interactions*, cues from the interaction should be more salient than situational framing, and moral motives should mainly depend on the quality of prior interaction with one's counterpart and not on the situational framing of moral motives. Building on research by Brodbeck et al. (2013) and applying their experimental approach, we also assumed that in social situations, a unity moral motive leads to more solidarity behavior than a proportionality moral motive, while a proportionality moral motive leads to more cost-benefit analyses than a unity moral motive.

We conducted a laboratory experiment in which participants engaged in the Dyadic Solidarity Game (DSG; Brodbeck et al. 2013). The experiment had a 3 x 2 study design in which we intended to replicate and extend the series of studies conducted by Brodbeck et al. (2013). The first independent variable constituted the decision situation. We created three relationally different situations: (a) *anonymous social one-shot interactions* where two anonymous individuals interacted in the DSG, (b) *non-anonymous social ongoing interactions* where two individuals had a short personal interaction before engaging in the DSG and (c) *anonymous non-social one-shot interactions* where one individual interacted with a computer "deciding" on the basis of a fixed algorithm. The second independent variable constituted the framing of the situation with respect to a moral motive. Analogous to Brodbeck et al. (2013), we compared unity moral motives and proportionality moral motives (Rai & Fiske, 2011).

Based on our theoretical argumentation and experimental design, we tested the following hypotheses:

Hypothesis 1a: In anonymous social one-shot interactions, the situational moral motive framing (unity vs. proportionality) influences participants' decisions in the DSG: Participants receiving a unity moral frame show more solidarity than participants receiving a proportionality moral frame.

Hypothesis 1b: In non-anonymous social ongoing interactions, the situational moral motive framing (unity vs. proportionality) has no effect on participants' decisions in the DSG.

Hypothesis 1c: In anonymous non-social one-shot interactions (i. e., interacting with a computer which is not social), the situational moral motive framing (unity vs. proportionality) has no effect on participants' decisions in the DSG¹. (Given that computers are not social, social cues regarding moral motives should not matter.)

Taking Hypotheses 1a–c together, we expected an interaction effect between the decision situation and the situational moral motive framing:

Hypothesis 1d: There is an interaction effect between the decision situation (anonymous social one-shot vs. non-anonymous social ongoing vs. anonymous

non-social one-shot) and the situational moral motive framing (unity vs. proportionality). The moral motive frame influences the economic decision in the DSG in anonymous social one-shot interactions (high solidarity in the unity condition, low solidarity in the proportionality condition) but not in non-anonymous social ongoing interactions or in anonymous non-social one-shot interactions.

Whereas the hypotheses specify a level of solidarity in the anonymous social one-shot interaction, that is, high solidarity in the unity condition and low solidarity in the proportionality condition, they do not specify a certain level of solidarity in the other two conditions (i. e., non-anonymous social ongoing interaction, anonymous non-social one-shot interaction). We will now close this gap.

First, in the non-anonymous social ongoing interaction, participants engage in a cooperative task with another person prior to the DSG. Due to the cooperative nature of the task, participants were expected to form an in-group (Billig & Tajfel, 1973) and strengthen their team spirit (Deutsch, 1973). They further had to touch each other by shaking hands and holding a pen together². According to Fiske (1992), the feeling of belonging to an in-group and touching should elicit a unity moral motive. We assumed that the unity motive established in the cooperative task would be maintained for the subsequent interaction in the DSG.

Second, in the anonymous non-social one-shot interaction, no social moral motive should apply. We assumed that in this situation, individuals solely draw on rational cost-benefit analysis to make their decisions and decide as would be predicted by subjective expected utility theories. In the DSG, this implies that individuals show no/little solidarity. Combining these considerations and the hypotheses above, we hypothesize:

Hypothesis 2: While participants in non-anonymous social ongoing interactions and participants in anonymous social one-shot interactions with a unity frame show high levels of solidarity, participants in anonymous non-social one-shot interactions and participants in anonymous social one-shot interactions with a proportionality frame show low levels of solidarity.

Experimental conditions and Hypotheses are summarized in Figure 1.

Method

Design

In order to test our hypotheses, we employed a 3 (decision situation: anonymous social one-shot interaction vs. non-anonymous social ongoing interaction vs.

¹Please note that Brodbeck and colleagues (2013) also investigated non-social situations: Participants interacted with themselves in the Self-Insurance Game (SIG). However, interacting with oneself implies non-interdependency and the absence of risk due to either another person (like in the DSG) or a computer (like in the non-social DSG, which we employed).

²Data were collected before the COVID-19 pandemic.

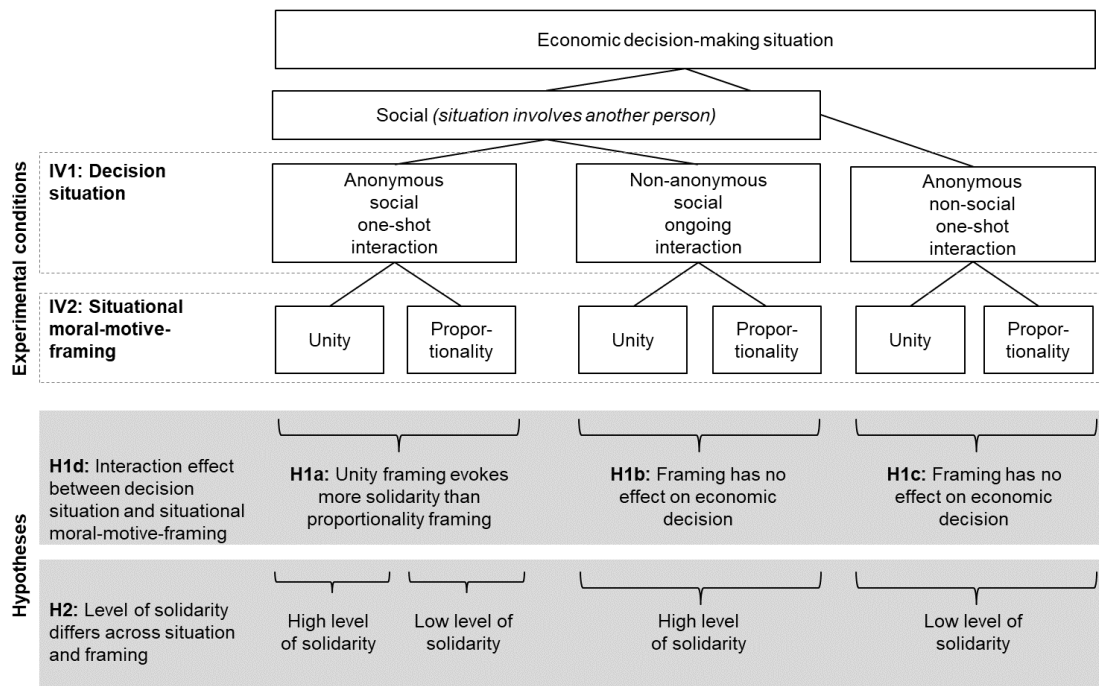


Figure 1. Experimental conditions and hypotheses. IV = independent variable; H = hypothesis.

anonymous non-social one-shot interaction) \times 2 (situational moral motive frame: unity vs. proportionality) between-subjects experimental design. The experiment was conducted in a laboratory of a large German university. Each session with up to 24 individuals was randomly assigned to one of the three experimental situations: anonymous social one-shot interaction vs. non-anonymous social ongoing interaction vs. anonymous non-social one-shot interaction. Within each session, we randomly assigned 50% of participants to a proportionality moral motive framing and 50% to a unity moral motive framing.

Participants

An a priori power analysis with G*Power (Faul et al., 2007) for an ANOVA with six cells, a targeted power of .80, an alpha level of .05 and an estimated medium to large effect ($f = .30$, $df = 1$) of moral motive framing (cf. the effects found by Brodbeck et al., 2013) resulted in a total sample of 90 persons and thus a cell size of at least 15 participants. For the main effect of decision situation ($f = .30$, $df = 2$) a total sample of 111 persons was estimated. Thus, we recruited 112 students from a large German University. Out of the 112 initial participants, we excluded 18 individuals, who indicated in an open-ended question at the end of the study that they had not understood the experimental game (i.e., DSG), even though we provided a detailed explanation of the game followed by an opportunity to ask comprehension questions. The exclusion of participants was determined by two blind coders who were familiar with the DSG. The coders rated all qualitative responses. The inter-rater reliability was Cohen's $\kappa = .80$; discrepancies were discussed and could be resolved in all cases.

Thus, $N = 94$ participants remained in the sample. Those participants varied in sex (59% women) and age ($M = 24.16$ years, $SD = 4.78$ years). On average, participants earned EUR 10.74 ($SD = 2.58$) for their participation. The payoff included a EUR 4 show-up fee plus the individual's profit from the DSG (Brodbeck et al., 2013).

Material

Dependent variable: *Level of solidarity in the DSG.* All participants engaged in the DSG (Brodbeck et al., 2013). We measured "Level of solidarity in the DSG" with the Amount B participants chose in the DSG. Amount B varied on a continuum from "high cost-benefit considerations and low solidarity" to "low cost-benefit considerations and high solidarity". For ease of reading, we refer to low and high solidarity, which simultaneously implies high and low cost-benefit considerations.

Independent variable 1: *Decision situation.* The DSG was played in three different decision situations using the computer program z-tree 3.3.11 (Fischbacher, 2007):

- In the *anonymous social one-shot interaction*, participants played the DSG with one person who sat in the same room. *Min* = 12 to *Max* = 24 participants engaged in the DSG simultaneously and were randomly matched by the experimental computer. However, participants did not know who the other person was.
- In the *non-anonymous social ongoing interaction*, participants were seated next to their game partners. First, they greeted each other and then engaged jointly and silently in the following cooperative task (Antons, 1992): Participants drew three

pictures (a house, a tree, and a dog) together by simultaneously holding the same pen. Having drawn the three pictures, participants signed their drawings. Thus, participants had a common goal and had to touch each other, two mechanisms that should establish a unity moral motive for the relationship. Then, participants played the DSG using the computer in a cubical but knowing that the other player was the person next to them they had just met and with whom they had completed the cooperative task.

- In the *non-social one-shot interaction* the other player was the computer. Participants were told in the introduction to the game. Thus, participants had the option to put money aside for the computer they “played” with. Participants were further told that the computer *randomly* divided “its” EUR 10 into Amount A and Amount B.

Independent variable 2: Moral motive framing. The entire experiment was either framed as a unity situation or a proportionality situation. Depending on the moral motive frame, participants were either told that the experiment was about “common welfare in groups or in society” (i.e., unity moral motive frame) or that the experiment was about “cost-benefit optimization in free markets” (i.e., proportionality moral motive frame). The frames were developed and published by Brodbeck et al., 2013 and are available in full length there.

Control variables. After the DSG, participants answered a short questionnaire. The questionnaire included a short version of the Positive and Negative Affect Schedule (PANAS; Thompson, 2007). In addition, the questionnaire included an open-ended question about the game and the participants’ decision. We used the latter question to disqualify some of the participants who had not understood the game (see “Participants”).

Procedure

Each session was conducted by the same experimenter. At the beginning of each session, participants were greeted by the experimenter, who explained the experimental procedure and the tasks. Then, partici-

pants read a general introduction to the experiment, which included either a unity frame or a proportionality frame (i.e., independent variable 2). Following this introduction, participants engaged in the DSG (Brodbeck et al., 2013) in one of the three decision situations: anonymous social one-shot interaction, non-anonymous social ongoing interaction, or anonymous non-social one-shot interaction (i.e., independent variable 1). At the end of the session, participants answered a questionnaire including demographic questions and control variables.

Results

Preliminary Analyses

Because previous research has shown that sex influences economic behavior (e.g., Ortmann, & Tichy, 1999; Van den Assem, Van Dolder, & Thaler 2012; Whitaker, Bokemeiner, & Loveridge, 2013), we wanted to test whether sex had an effect in our data as well. Preliminary analyses showed that participants’ sex had no significant effect, $t(92) = 0.70$, $p = .488$, $d = 0.15$, on the level of solidarity (i.e., Amount B). A t -test further confirmed that the frame (proportionality vs. unity) evoked neither positive, $t(92) = 1.73$, $p = .088$, $d = 0.36$, nor negative affect, $t(92) = -1.55$, $p = .125$, $d = 0.32$, which could have influenced participants’ decisions. In the non-anonymous social ongoing interaction condition, we ruled out that the sex constellation of the dyad had an effect. Note that in the anonymous social one-shot interaction the sex of the other person remained unknown. Sex constellation did not have a significant effect on negative affect, $F(1, 22) = 4.11$, $p = .055$, $\eta^2 = 0.16$, positive affect, $F(1, 22) = 1.82$, $p = .191$, $\eta^2 = .08$, or on the level of solidarity, $F(1, 22) = 0.21$, $p = .649$, $\eta^2 = 0.01$.

Test of Hypotheses

Main effects of moral motives in the three relationally different decision situations. To test Hypotheses 1a, 1b, and 1c, we calculated the main effects of moral motive framing (unity vs. proportionality) in the three decision situations (anonymous social one-shot interaction vs. non-anonymous social ongoing interaction

Table 1. Descriptive results by decision situation and moral motive framing. Means (M) represent level of solidarity (Amount B in the DSG in Euro). The effect size Cohen’s d quantifies the differences between the unity moral motive framing and the proportionality moral motive framing.

Moral motive framing	Decision Situation								
	Anonymous social one-shot interaction			Non-anonymous social ongoing interaction			Anonymous non-social one-shot interaction		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
Total	37	2.20	1.78	28	3.75	1.35	29	0.48	1.12
Unity	18	3.06	1.59	16	3.75	1.34	10	0.60	1.35
Proportionality	19	1.40	1.60	12	3.75	1.42	19	0.42	1.02
Cohen’s d		1.04			0.00			0.15	

vs. anonymous non-social one-shot interaction). All results are summarized in Table 1.

Participants in an *anonymous social one-shot interaction* showed significantly different levels of solidarity (i.e., Amount B) depending on their moral motive framing, $t(35) = -3.16, p = .003, d = 1.04$, with participants in the proportionality frame ($M = 1.40, SD = 1.60$) showing less solidarity than participants in unity frame ($M = 3.06, SD = 1.59$). Thus, Hypothesis 1a was supported.

In non-anonymous social ongoing interactions, the level of solidarity did not vary depending on the moral motive framing, $t(26) = 0.00, p > .999, d = 0.00, M_{\text{proportionality}} = 3.75, SD_{\text{proportionality}} = 1.42, M_{\text{unity}} = 3.75, SD_{\text{unity}} = 1.34$. Because non-significance does not confirm equivalence, further analyses were conducted using the procedure suggested by Rogers, Howard, and Vessey (1993). Equivalence was tested against an assumed large effect size of $d = 0.80$ (Cohen, 1988) based on the results reported by Brodbeck and colleagues (2013). A large effect ($d = 0.80$) translated into a difference of EUR 1.10 in Amount B, which did not fall within the 90% *CI* [-0.86, 0.86]. Hence, for non-anonymous social ongoing interactions, the levels of solidarity between participants with a unity frame and a proportionality frame were equivalent, supporting Hypothesis 1b.

In *anonymous non-social one-shot interactions*, participants in the two framing conditions (unity vs. proportionality) showed no significant difference with respect to their level of solidarity, that is, Amount B, $t(27) = -0.40, p = .691, d = 0.15, M_{\text{proportionality}} = 0.42, SD_{\text{proportionality}} = 1.02, M_{\text{unity}} = 0.60, SD_{\text{unity}} = 1.35$. Again, further analyses testing the equivalence of the two framings were conducted. Following the same assumptions and procedure (Rogers et al., 1993) as for the non-anonymous social ongoing interactions, the assumption of equivalence could be supported. Based on the sample's *SD*, a large difference would amount to EUR 0.96, which was outside the 90% *CI* [-0.55, 0.91]. Hence, Hypothesis 1c regarding the equivalence of the two framing groups (unity vs. proportionality) in anonymous non-social one-shot interactions was supported.

Interaction effect between decision situation and situational moral motive framing. To test Hypothesis 1d, we conducted a 2 x 3 between-subjects ANOVA, which revealed a significant interaction, $F(2, 88) = 3.46, p = .036, \eta^2 = 0.07$. The pattern of the interaction supported Hypothesis 1d: The moral motive frame (unity vs. proportionality) influenced the level of solidarity in the economic decision only in the anonymous social one-shot interaction but not in the non-anonymous social ongoing interaction or the anonymous non-social one-shot interaction. The results are summarized in Figure 2.

Differences in levels of solidarity. Hypothesis 2 predicted that participants in non-anonymous social ongoing interactions, regardless of the moral motive framing, and participants in anonymous social one-shot interactions with a unity frame would show

high levels of solidarity, while participants in anonymous non-social one-shot interactions, regardless of the moral motive framing, and participants in anonymous social one-shot interactions with a proportionality frame would show low levels of solidarity. The descriptive results visualized in Figure 2 support the predicted pattern. To statistically test this result, we combined the anonymous social one-shot interaction with unity framing and non-anonymous social ongoing interaction with both framings conditions into a “high solidarity” condition and the anonymous social one-shot interaction with proportionality framing and anonymous non-social one-shot interaction with both framings into a “low solidarity” condition. Supporting Hypothesis 2, the high solidarity condition and the low solidarity condition differed significantly in the predicted direction, $t(92) = -8.92, p < .001, d = 1.81, M_{\text{high solidarity}} = 3.48, SD_{\text{high solidarity}} = 1.47, M_{\text{low solidarity}} = 0.84, SD_{\text{low solidarity}} = 1.39$.

Exploratory Analyses

Proportionality versus self-interest. The outcome in the DSG paradigm (i.e., Amount A and Amount B) is suited to differentiate between unity and proportionality moral motives. However, is not equally suited to rule out all alternative explanations for the behavior shown. Most apparent, low levels of solidarity or rather high levels of cost-benefit considerations could potentially also stem from pure self-interest besides proportionality moral motives. Presumably, both, individuals with self-interest and individuals with proportionality moral motives, consider costs and benefits and conclude that their payoff is maximized by showing no solidarity. From a theoretical point of view the distinction between self-interest and proportionality moral motive is of interest, because self-interest is explicitly *not* a defining or necessary feature of proportionality. Different from self-interest a proportionality moral motive is relational and other-regarding (Fiske, 1992; see also Brodbeck et al., 2013).

To provide some evidence that the effects of our proportionality framing are different from self-interest (which indeed should be shown in the case when interacting with a computer), we compared Amount B in the anonymous social one-shot interaction with proportionality framing and Amount B in the anonymous non-social one-shot interaction (across both framings). Both amounts differed significantly, with Amount B in the anonymous social one-shot interaction with proportionality framing ($M = 1.40, SD = 1.60$) being significantly higher than in the anonymous non-social one-shot interaction across both framings ($M = 0.48, SD = 1.12$), $t(46) = 2.35, p = .023, d = 0.69$. Post-hoc, we assume that besides cost-benefit considerations, participants with a proportionality moral motive might have considered on average EUR 1.40 (+ show up fee) the least payoff a participant should get proportional to the effort for participating in the study (i.e., “at least a cappuccino on their way home”).

The ‘Golden Rule’. The Golden Rule tells us to

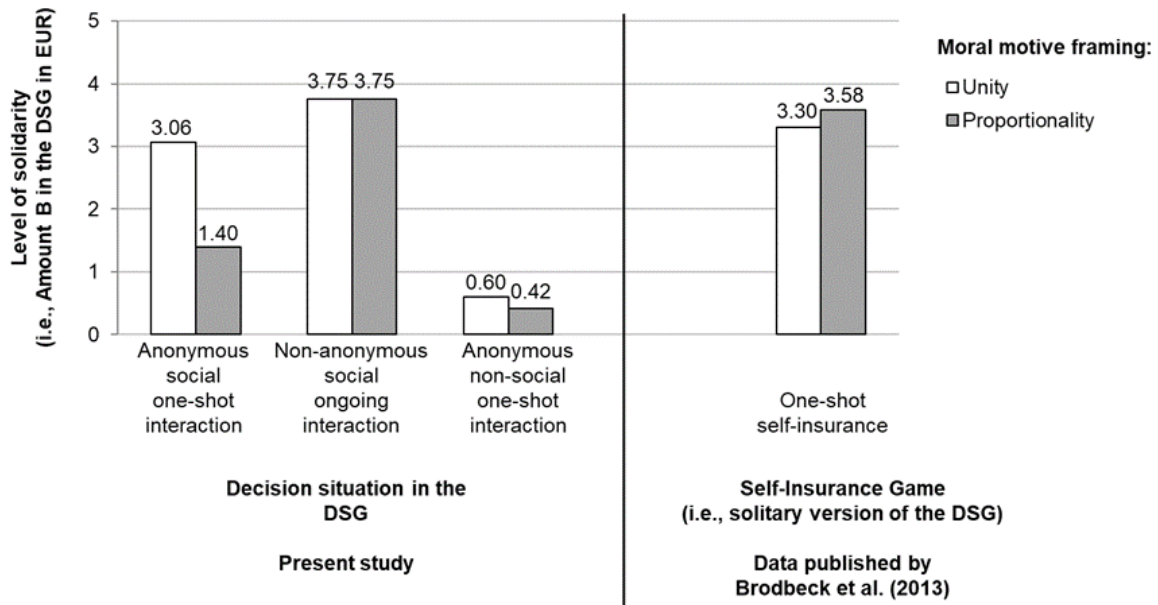


Figure 2. Interaction effect of decision situation and moral motive framing on solidarity. Brodbeck et al.'s (2013) results (Self-Insurance Game) are included as a reference value.

treat others as we would like to be treated. In our experiment, we demonstrated that participants with a unity motive showed high levels of solidarity towards the other person in the DSG. Therefore, one might ask whether individuals with a unity moral motive applied the golden rule and showed solidarity to the extent they would want to be treated themselves. The question's theoretical foundation refers to the fact that a unity motive entails that everyone should be treated the same – oneself and all others (Rai & Fiske, 2011; Fiske, 1992).

To answer the question, we combined our findings with those of Brodbeck et al. (2013). Brodbeck et al., 2013 included a condition in which individuals played the DSG with themselves (i.e., the Self-Insurance Game, SIG; Brodbeck et al. (2013)). In the SIG, moral motives likewise did not matter given the absence of a relationship to someone else. Instead, participants' economic decisions in the SIG provide an answer to how participants treated themselves in the specific economic situation, that is, how much "solidarity" they showed towards themselves.

Thus, we tested the equivalence of the following two groups: (a) the level of solidarity of participants with a unity motive engaging in the DSG in our experiment, that is, the average level of solidarity among participants in the anonymous social one-shot interaction with a unity frame and participants in the non-anonymous social ongoing interaction and (b) the amount people put aside for themselves in the SIG in the experiment by Brodbeck et al. (2013). The descriptive results are visualized in Figure 2. Conducting the test of equivalence described above (Rogers et al., 1993), we found that participants with a unity frame in our experiment put aside the same amount of money for their partner in the DSG as participants put aside for themselves in the SIG conducted by Brodbeck et

al. (2013). Assuming a large effect (Cohen's $d = .80$) based on our and Brodbeck et al.'s (2013) findings, the respective difference of 1.31 EUR was outside the 90% *CI* [-0.62, 0.51].

Discussion

Our study sheds light on the question of how "salient others" in social situations influence economic decisions. Based on the theory of relationship regulation (Rai & Fiske, 2011; Fiske, 1992), we proposed that in social situations – and only in social situations – moral motives influence behaviors, including economic decision-making. In our study, we showed that, on the one hand, moral motives had no effect in non-social situations, that is, when individuals interacted with a computer in the DSG. Conversely, in anonymous social situations, different moral motives led to different economic decisions: (a) the moral motive of unity, underlying relationships with in-group members in which everything is shared according to needs, led to more solidarity and less cost-benefit considerations towards one's partner in the DSG (and the application of the "Golden Rule"), (b) the moral motive of proportionality, underlying relationships that function on the basis of market principles, where costs, benefits, gains, and contributions are divided proportionally, led to less solidarity and more cost-benefit considerations towards one's partner in the DSG.

Differentiating post-hoc between a proportionality moral motive (an other-regarding motive) and self-interest (a self-regarding motive), we could show that participants in anonymous social situations with a proportionality frame donated *more* to the other than people in the non-social situation (which should be guided by self-interest). Showing solidarity in our paradigm (i.e., the Dyadic Solidarity Game, DSG;

Brodbeck et al., 2013) clearly deviated from what rationality, von Neumann–Morgenstern utility (von Neumann & Morgenstern, 1953; Schoemaker, 1982) and pure self-interest would predict. However, this post-hoc exploration is preliminary and requires further investigation.

In addition to showing that moral motives matter in economic decisions involving others, we also shed light on how specific moral motives are activated. In anonymous social one-shot interactions, individuals were susceptible to cues provided by the framing of the situation. Individuals implied the appropriate moral motive for the relationship in the DSG from the most salient cue in the situation (cf. De Kwaadsteniet & Van Dijk, 2010). Thus, the cues tacitly coordinated the participants' decision behavior (e.g., Abele, Stasser, & Chartier, 2014). In non-anonymous social ongoing interactions, such situational cues were ineffective. Instead, individuals “applied” the moral motive in the DSG that had been established in a previous interaction. In our experiment, we established a unity motive, which subsequently led to high levels of solidarity in the DSG and to an application of the “Golden Rule” in economic decisions. From an evolutionary perspective, this contingency between situational cues and respective moral motives can be explained by systematic relationships between information and behavior. Behavior per se cannot be interpreted without considering the informational context upon which it is contingent. In this vein, relationship regulation based on moral motives could be interpreted as “evolved neural architectures [which] are specifications of richly contingent systems for generating responses to informational inputs” (Tooby & Cosmides, 2005, p. 13).

In sum, the findings show that individuals deviate from rational decisions in social situations as a result of moral motives underlying their relationship to the other person. Moreover, individuals' actual economic decisions can be predicted by the specific moral motive active in the specific interaction. Whereas in ongoing relationships, the moral motive stems from the relational history, in anonymous one-shot interactions, individuals' decision-making can be influenced by situational frames or peripheral cues. This finding is especially interesting given that individuals nowadays often interact anonymously and only once when making economic decisions. Nowak (2006) refers to such asymmetric kinds of cooperative behaviors as indirect reciprocity. From an evolutionary perspective, helping strangers or donating money helps to establish a good reputation, which then will be rewarded by others in the long run. According to Rai and Fiske (2011, p. 59) “our sense of morality functions to facilitate the generation and maintenance of long-term social cooperative relationships with others”. From this evolutionary perspective, cooperation and the evolution of morality go hand in hand and are mutually conditional.

Our results replicate and extend previous work by Brodbeck et al. (2013). Brodbeck et al. (2013) also showed that moral motives affect economic decisions

when interacting with an anonymous person in the DSG. First, we extend their research by including an anonymous non-social interaction. In doing so, we showed that moral motives only matter in social, not in non-social situations. Note that Brodbeck et al. (2013) compared anonymous social one-shot interactions in the DSG to a structurally equivalent “interaction” with oneself in the Self-Insurance Game. Second, we extended their research by including a non-anonymous social ongoing interaction. In doing so, we shed light on the question of what individuals base their decisions about the appropriate moral motive on and when individuals are especially susceptible to situational cues.

Our findings also provide an alternative explanation for the identifiability effect. In social decision situations, this effect refers to the fact that “willingness to share or give resources to another person is often greater when the recipient is identified rather than anonymous” (Halali, Kogut, & Ritov, 2017, p. 474, see also Small & Loewenstein, 2003). The identifiability effect is often explained with reference to emotions or “ethical motivations” (Halali et al., 2017, p. 481) that are evoked by an identifiable counterpart and subsequently influence decision-making (e.g., Kogut & Ritov, 2005, 2015). According to relationship regulation theory (Rai & Fiske, 2011), these ‘ethical motivations’ could reflect a unity motive activated by the identifiability of the other which then regulates social behavior. This assumption should be tested in future research contrasting ongoing, identifiable relationships in which unity motives are prevalent with ongoing, identifiable relationships in which other motives, such as proportionality motives, are prevalent.

Economic theories and individual preferences

Economic theory suggests that when making economic decisions, people are “strongly motivated by other-regarding preferences” (Halali, Kogut & Ritov, 2017, p. 473). Individual other-regarding preferences are susceptible to “slight changes in the social context” (Fehr & Hoff, 2011, p. 7) within which an interaction takes place and can be influenced by culture, situational framings, anchors, or priming of individuals' identities. For example, the economic environment determines “the preference type that is decisive for the prevailing behavior in equilibrium”: either the fair type or the selfish type (Fehr & Schmidt, 1999, p. 2). Below, we discuss our findings in the light of the economic framing literature and a theory that explicitly models fairness as a decision rationale, the theory of reciprocity (Falk & Fischbacher, 2006).

The economic framing literature explains how changes in the experimental context affect behavior in the short run; for example, individuals contribute more in a one-shot Prisoner's Dilemma if it is called a “community game” than if it is called a “Wall Street game” (Fehr & Schmidt, 1999, p. 27; Liberman, Samuels, & Ross, 2004). We could easily explain the framing effect in our anonymous social one-shot interaction based on

the framing literature. However, the framing literature cannot explain the differential effects of moral motive framings in the anonymous social versus anonymous non-social interactions. To explain those differential effects, a theory is needed that highlights the distinct nature of social interactions, which the framing literature does not do, but relationship regulation theory does (Rai & Fiske, 2011), as does the theory of reciprocity (Falk & Fischbacher, 2006).

The theory of reciprocity (Falk & Fischbacher, 2006) explains why people behave differently when interacting with real persons compared to “interacting” with random devices, drawing on the intentionality of real people’s behavior and non-intentionality of random devices’ “actions”. A random mechanism does not “signal any intentions” (Falk & Fischbacher, 2006, p. 304) which could be intentionally reciprocated. As such, the theory of reciprocity offers an alternative explanation for why participants in our study did not show solidarity towards an algorithm in the non-social situation but did show solidarity towards other humans in the social situations.

Moreover, the theory of reciprocity proposes that when acting in a competitive market, people will accept unfair distributions because they know that “in a competitive market [they have] no chance to achieve a ‘fair’ outcome” (Falk & Fischbacher, 2006, p. 307). By contrast, in cooperative games such as public goods games, people contribute more, the more they expect the others to contribute. Moreover, in bilateral interactions, the theory of reciprocity predicts outcomes tending to be ‘fair’. As such, the theory of reciprocity seems to offer alternative explanations for the effects of our unity and proportionality frames as well as for the higher levels of solidarity in situations with prior bilateral interaction.

However, the theory of reciprocity defines reciprocity as a “behavioral response to perceived kindness or unkindness” (Falk & Fischbacher, 2006, 2006, p. 294), and accordingly builds on multi-shot games. Thus, the theory of reciprocity cannot explain the origin of non-selfish behavior in one-shot games, as we have demonstrated and theoretically explained in our study. Instead, the theory of reciprocity assumes that “unconditional cooperation is practically inexistent” (Falk & Fischbacher, 2006, p. 308), an assumption which we can reject based on relationship regulation theory (Rai & Fiske, 2011).

Taken together, neither the framing literature nor the theory of reciprocity can fully explain the behavioral patterns we identified in our experiment. Thus, economic theory and research on individual preferences (e.g., Falk & Fischbacher, 2006; Fehr & Schmidt, 1999) offer alternative explanations for some of our results but not for the overall pattern. Thus, we encourage the scientific discourse on economic decision-making to more systematically take theories of moral motives into account and further explore the nature of moral motives as a component of utility functions. Although the discourse on individual preferences and their susceptibility to situational changes has been go-

ing on for several decades, more discussion and theoretical integration between economics and psychology would be even better.

Limitations and future research

The generalizability of our results, which stemmed from a sample of 94 people with two out of six cells falling below a cell size of 15 persons, might be questionable. However, we were able to replicate Brodbeck et al.’s (2013) findings, which underlines the robustness of the effect of moral motive frames on economic decision-making behavior. Moreover, our propositions and hypotheses were derived from and embedded within a strong theoretical rationale, relationship regulation theory (Rai & Fiske, 2011), which makes our results comparable to other empirical findings in the field of moral psychology and strengthens our results’ interpretability and theoretical relevance.

Regarding our sample, many drop-outs occurred in the anonymous non-social one-shot interaction with unity framing, that is, when solidarity towards a non-social entity was suggested by the situation, and in the non-anonymous social ongoing interaction with proportionality framing, that is, when low solidarity towards a person, with whom a prior cooperative relationship was built, was suggested. In these cases, the experimentally induced moral motive might have contradicted human intuition and thus have caused confusion for some participants. Thus, drop-outs might have been confounded with our experimental conditions. These systematic drop-out effects might be subject to future research investigating the power of human moral intuition and consequences of intuition-situation-incontingencies when interacting with technical or artificial devices. From a broader perspective, insights into such experimental “errors” could also point at general misconceptions of human thinking and reasoning, which can also lead to misconceptions when creating artificial general intelligence (cf. Deutsch, 2019).

In our study design, we included a non-anonymous, social ongoing interaction to test the assumption that moral motives formed by a prior interaction were stronger than a situational framing provided in the experimental task. By instructing participants to complete a cooperative task, they were expected to establish a unity moral motive for the relationship. Future research should also include an experimental condition with a non-anonymous, social ongoing interaction based on proportionality motives, in order to probe whether the overriding effect supported by our data also holds for ongoing relationships based on proportionality motives.

In our research rationale, we did not check for the effectiveness of our manipulations, because a manipulation check would have meant to check the presence of moral motives as mental states and to test the mediating function of these mental states between the induced motive and the subsequent behavior. However, a test of this mediation effect was not the focus of this

study, in which we focused on proofing that moral motives were (or were not) present in relationally different types of situations. We inferred on the existence of moral motives based on different behavioral reactions, which were also identified in prior research (see Brodbeck et al., 2013). Nevertheless, future research could dedicate to the examination of the role of mental states as mediators in morally-loaded social situations.

Regarding the experimental setting, the manipulation of decision situations was randomized at the experimental session level. Thus, the effects of the decision situation on the level of solidarity might have been confounded with potential session effects. However, we tried to keep the experimental setting constant (the same experimenter conducted all sessions) and controlled for effects of positive affect and negative affect, which might have been triggered within specific sessions.

With our paradigm, we demonstrated the moral basis of our experimentally induced motives by showing that the respective motives were active in social situations but not in non-social situations. However, with our paradigm, we cannot entirely rule out that our proportionality framing was confounded with pure self-interest or egoistic behavior. Although self-interest is not a distinctive, defining or necessary feature of proportionality, both can be linked and may co-occur (Fiske, 1992). Future research should contrast situations, in which the moral motive of proportionality leads to decisions which would also be triggered by egoism and situations, in which both lead to distinguishable decisions patterns.

Economists have begun to recognize the influence of other-regarding preferences, norms or decision heuristics on individuals' economic decisions, which cause individuals to deviate from self-interest as the primary source of motivated behavior. These other-regarding preferences, norms or decision heuristics show parallels to the four moral motives suggested by relationship regulation theory, which is not astonishing, because the four moral motives claim universal validity. Future research should investigate whether other-regarding preferences, norms or decision heuristics as investigated in economic studies can be traced back to the moral motives suggested by relationship regulation theory. For example, *noblesse oblige*, "a social norm that obligates those of higher rank to be honorable and generous in their dealings with those of lower rank" (Fiddick et al., 2013, p. 320), might be an expression of *hierarchy*; *altruism*, a "form of unconditional kindness" (Fehr & Schmidt, 2006, p. 619) might be an expression of *unity*; *reciprocity*, which is characterized by being "willing to incur costs with the expectation of immediate or future benefits" (Fiddick et al., 2013, p. 319) and the *equal division rule* ("whatever is being allocated should be divided equally among the participants"; Allison & Messick, 1990, p. 195) might be expressions of *equality*; *rational cost-benefit calculations* might co-occur with *proportionality*. This endeavor might help to bridge the gap between economics and psychology and advance interdisciplinary theorizing.

We also want to offer a normative, ethical perspective on our experimental design and results. Two major views have dominated philosophical approaches to morality: utilitarianism (or consequentialism) and deontology. A utilitarian or consequentialist ethic assumes that the rightness of an action can be determined by its consequences (Holyoak & Powell, 2016). To "bring about the greatest good for the greatest number" (Bartels et al., 2015, p. 488) would be such a utilitarian logic. By contrast, a deontological approach assumes that "the right does not necessarily maximize the good" (Holyoak & Powell, 2016, p. 1180) and that acts are wrong if they violate rules or obligations (Bartels et al., 2015). From this perspective, our proportionality framing might have provided the ground for a utilitarian interpretation. As the expected utility for both persons in the DSG was maximized when each person chose a maximum for themselves, the "greatest good for the greatest number" was reached by contributing nothing to the other. By contrast, our unity framing might have provided the ground for a deontological interpretation, as deontic rules might be "driven by concern for the well-being of others" (Holyoak & Powell, 2016, p. 1181) which is also in the center of a unity moral motive. Future research should disentangle (or reconcile) normative ethical theories, moral principles of relationship regulation and economic theories based on "expected utility".

Practical implications

Our results suggest that how people interact in anonymous social settings, such as online settings, is influenced by the moral motive framing provided in the setting itself. A growing body of research in finance examines textual influences on investor behavior in large-sample real-world data sets (for a review, see Loughran & McDonald, 2016). We demonstrated a possible mechanism for why textual characteristics influence investors in an anonymous social situation: Textual characteristics might serve as a frame shaping investors' moral motives and behavior. Moreover, we examined economic decision situations in which participants had had a short prior interaction. Such short personal interactions can also be found in interactive online tools. Live chats and helplines, for example, support people in search of information while opening an online broker account, deciding on a new energy provider or buying new electric appliances, for example. These short interactions can be powerful sources of moral motives, overruling moral motives provided by a situation's framing. Our results also shed light on moral behavior in non-social situations: People were not receptive to moral cues in a non-social situation. This result might be interesting for the design of interaction situations with non-human devices, such as autonomous vehicles, robo-counselling, or smart home systems.

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