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Do Injunctive or Descriptive Social Norms Elicited Using Coordination Games Better Explain Social Preferences?

Robert J. Schmidt

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Abstract: We experimentally study the relationship between social norms and social preferences on the individual level. Subjects coordinate on injunctive and descriptive norms, and we test which type of norm is more strongly related to behavior in a series of dictator games. Our experiment yields three insights. First, both injunctive and descriptive norms explain dictator behavior and recipients´ guesses, but perceptions about descriptive social norms are behaviorally more relevant. Second, our findings corroborate that coordination games are a valid tool to elicit social norm perception on the subject level, as the individuals´ coordination choices are good predictors for their actual behavior. Third, average descriptive norms on the population level accurately predict behavior on the population level. This suggests that the elicitation of descriptive social norms using coordination games is a potentially powerful tool to predict behavior in settings that are otherwise difficult to explore.

Highlights:

- The relationship between social norms and social preferences is examined
- Both injunctive and descriptive norms explain revealed social preferences
- Descriptive social norms are more strongly related to social preferences

Keywords: injunctive social norms, descriptive social norms, social preferences, coordination
JEL Classifications: C70, D70, D91

Corresponding author: Robert Johann Schmidt, Alfred-Weber-Institute for Economics, University of Heidelberg, Bergheimer Str. 58, 69115 Heidelberg, Germany. Phone: +49 152 34181300, email: rojoschmidt@gmail.com. I thank Franziska Lembcke, Christiane Schwieren, Bertil Tungodden as well as seminar audiences in Frankfurt and the Friedrich-Ebert-Foundation in Bonn for valuable comments and suggestions.

1. Introduction

Perceptions about social norms influence how individuals interpret social contexts, and they affect both intentions and behavior.[1] Traditionally, the study of social norms has received less attention in economics than in other fields of social sciences, such as sociology (Coleman, 1990; Merton, 1957) or psychology (Cialdini et al., 1990; Sherif, 1936). During the last decades, however, social norms became a vital topic of research in economics (e.g., Elster, 1989; Ostrom, 2000). By now, it is no longer disputed that social norm perception influences economic decisions, for example saving rates (Cole et al., 1992), consumer behavior (Bagozzi and Warshaw, 1990), financial reporting (Dyreng et al., 2012), job search (Stutzer and Lalive, 2004) or energy consumption (Allcott, 2011), to name just a few.[2]

Cialdini et al. (1990, 1991) argue that it is essential to differentiate between *injunctive* and *descriptive* social norms. Injunctive norms indicate perceptions about normatively appropriate behavior in a specific context. They reflect what kind of behavior is approved or disapproved by the community and thereby motivate actions through the anticipation of social rewards or punishment. By contrast, descriptive social norms refer to prevalent or common behavior, and they reflect perceptions about the likelihood that others engage in the normative behavior themselves.[3] Experimental studies find that both types of norms explain behavior, but also that the two norms are conceptually different constructs that independently affect intentions and behavior (e.g., Kallgren et al., 2000; Reno et al., 1993; Rivis and Sheeran, 2003).[4]

There is also research on which type of norm has more explanatory power for actual behavior. Some studies argue that injunctive social norms are more influential because they refer to broader underlying principles. Therefore, they motivate behavior across a spectrum of situations, while descriptive social norms are to a stronger degree context-dependent (e.g., Cialdini et al., 2006; Manning, 2009; Reno et al., 1993). It is also argued that descriptive norms are associated with a

[1] We refer to social norms as shared perceptions about behavior. As Crawford and Ostrom (1995) formulate, this might be shared understandings about actions that are obligatory, permitted or forbidden.

[2] As a result of that, the relevance of social norms is also often explicitly considered in economic models of human behavior (e.g., Bénabou and Tirole, 2006; Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999; Rabin, 1993).

[3] Cialdini et al. (1990) summarizes injunctive norms as “norms of ought" and descriptive norms as “norms of is”.

[4] A large part of studies on the behavioral relevance of social norms is dedicated to pro-environmental behavior (e.g., Cialdini et al., 2006; Göckeritz et al., 2010; Goldstein et al., 2008; Nolan et al., 2008; Schultz, 1999; Schultz et al., 2008; Smith et al., 2012) and health behavior (e.g., Borsari and Carey, 2003; Elek et al., 2006; Larimer et al., 2004; Lee et al., 2007; Neighbors et al., 2008; Walker et al., 2011). Typically, behavior rates are highest when injunctive and descriptive norms are aligned.

boomerang effect (Cialdini, 2003), i.e., that salient descriptive social norms increase, rather than decrease, problematic behaviors. Therefore, it has been hypothesized that the manipulation of injunctive social norms is a more powerful intervention to affect behavior (e.g., Blanton et al., 2008).

However, there is also ample evidence that the manipulation of descriptive social norms, through the provision of information about peers, affects behavior. Changing descriptive norms can be powerful because of preferences for conformity (Asch, 1956). Also, the provision of information about descriptive norms is potentially effective when subjects tend to overestimate the prevalence of problematic behaviors (e.g., Baer and Carney, 1993; Baer et al., 1991; Carey et al., 2006). Indeed, both lab and field experiments show that the provision of information about peers significantly affects behavior in the desired direction (e.g., Frey and Meier, 2004; Gerber and Rogers, 2009; Goeschl et al., 2018; Mair and Bergin-Seers, 2010; Reese et al., 2014).

The theoretical and empirical evidence on the competing relevance of injunctive and descriptive social norms is inconclusive. One problem with the mentioned evidence is that most studies examine aggregate effects of the provision of information or the manipulation of social norms. This approach helps to understand the behavioral effect of interventions, which in turn sheds light on the competing relevance of different types of norms. However, the approach to examine aggregate or treatment effects does only indirectly explain the association between the perception of a *specific norm* and a *specific action* on the *individual level*.

One important study in that context is Bicchieri and Xiao (2009). They consider Bicchieri (2006), who differentiates two types of *expectations*, that are conceptually related to injunctive and descriptive norms. *Normative* expectations refer to what an individual believes others think she ought to do and *empirical* expectations refer to what an individual expects others to do.[5] Bicchieri and Xiao (2009) conduct a series of treatments and exogenously manipulate dictators' expectations in the direction of either selfishness or fairness. They find that when normative and empirical expectations conflict, empirical expectations significantly predict a dictator's own choice, while

[5] Note that, although expectations and social norms are closely related, they are not identical. Instead, according to Bicchieri (2006), normative and empirical expectations are a building block for social norms to emerge, including norms for fairness, reciprocity or cooperation.

normative expectations do not have a significant impact on dictator behavior after controlling for empirical expectations.

We contribute to this literature by examining under controlled conditions, whether injunctive or descriptive social norms elicited using coordination games are more strongly related to social preferences measured in a series of dictator games. In a laboratory experiment, we elicit injunctive and descriptive social norms from dictators and recipients as well as beliefs about social norms held by others.[6] That design differs from Bicchieri and Xiao (2009) in three aspects. First, instead of eliciting expectations, subjects coordinate on social norms according to the approach proposed by Krupka and Weber (2013).[7] Second, the subjects´ perceptions are not exogenously manipulated through the provision of information beforehand. Third, injunctive and descriptive social norms are elicited in a between-subject design, which allows for separately assessing and comparing their explanatory power for individual decision-making.

Another paper that we relate to is Kimbrough and Vostroknutov (2016). They also examine social preferences and social norms on the individual level, by examining whether revealed preferences are driven by heterogeneous *sensitivity* to social norms. That hypothesis is motivated by the observation that differences in payoffs hardly explain behavioral shifts across seemingly similar allocation settings (List, 2007). In an experiment, they elicit individual norm-sensitivity and relate that measure to actual choices in a series of standard experimental paradigms.[8] Their results demonstrate that observed behavior is consistent with norm-dependent preferences, i.e., a preference per se to obey a social norm, independent from social preferences. They conclude that the substantial degree of behavioral variation across contexts does not represent inconsistent preferences, but a consequence of the fact that people care about norms and that norms fundamentally differ across contexts.[9] We contribute to that analysis by examining whether

[6] By beliefs about social norms held by opponents, we mean that dictators (recipients) state their beliefs about social norms held by recipients (dictators).

[7] In the approach of Krupka and Weber (2013), subjects are confronted with the description of a particular behavior and they have to coordinate on appropriateness ratings. Their approach assumes that social norms are constituted through shared perceptions (Crawford and Ostrom, 1995), which thereby determine focal points in the coordination setting (Schelling, 1960; Sudgen, 1995). Consequently, subjects´ coordination choices reveal perceptions about prevailing social norms within.

[8] Specifically, they examine the public goods game, trust game, dictator game and the ultimatum game.

[9] As a result of that, social norms are considered to be a potentially powerful tool for nudging (Thaler and Sunstein, 2008). For an experimental analysis of using social norms as an instrument to affect behavior via nudging, see Bicchieri and Dimant (2019).

perceptions regarding the above-described differentiation (*injunctive* versus *descriptive* norms) better explain variations in revealed social preferences.

Finally, our paper is strongly related to the experiment conducted by Krupka and Weber (2013). They elicit injunctive social norms regarding behavior in different versions of the dictator game, and their results demonstrate that average coordination choices about injunctive norms predict behavioral changes between the different versions of the dictator game.[10] The analysis that we conduct is therefore similar to their analysis, as we attempt to explain changes in revealed social preferences by social norm perception elicited using coordination choices, but we differ from their experiment in three aspects. First, we do not apply a between-subject design to predict *average* changes across environments. Instead, preferences and norms are measured in a within-subject design, and they are related to one another on the *individual level*.[11] Second, we do not use variations of the standard dictator game, but a series of varying mini-dictator games.[12] Third, Krupka and Weber (2013) focus on the predictive power of injunctive social norms. Our experimental setup extends that analysis to the measurement of injunctive *and* descriptive social norms.

Our results show that both injunctive and descriptive social norms are significantly related to dictator behavior and recipients´ guesses on the subject level. Likewise, beliefs about social norms of others significantly predict social preferences. Comparing the relative importance of injunctive and descriptive norms shows that descriptive norms are significantly more strongly related to social preferences on the individual level in almost all specifications. We also conduct aggregate level analysis by comparing whether average injunctive or average descriptive norms better predict average behavior on the population level. While the relationship between average injunctive social norms and average allocation behavior is loose, we observe that average descriptive social norms accurately predict average allocation behavior.

Three main insights can be drawn from these results. First, perceptions about descriptive social norms are significantly more strongly related to social preferences on the individual level, than

[10] Krupka and Weber examine four variants of the dictator game: Dana et al. (2007), Lazear et al. (2012), List (2007) and Bardsley (2008).

[11] The approach has already been used to relate coordination choices to decision making on the individual (e.g., Barr et al., 2018; Burks and Krupka, 2012; Gächter et al., 2013; Krupka et al., 2016).

[12] Using a series of mini-dictator games allows us to vary distributive motives of allocation behavior (such as the degree of efficiency), while this is possible only to a smaller degree in the standard dictator game with fixed pie.

injunctive norms. This supports the idea that changing perceptions about prevalent behavior is a more fruitful behavioral intervention than changing perceptions about appropriate behavior (e.g., Bicchieri and Xiao, 2009). Second, the paper corroborates that the Krupka and Weber (2013) approach is a valid tool to elicit social norm perception on the individual level, as the individuals´ coordination choices in both types of norms are strongly related to their actual behavior. This indicates that an individual´s coordination choice in that approach represents a good estimator for their true perception of social norms.[13] Third, comparing the predictive power on the aggregate level indicates that average descriptive social norms are good predictors for behavior, while injunctive norms are almost unrelated to average behavior rates. This suggests that the elicitation of descriptive social norms using coordination games potentially is a powerful approach to predict behavior in settings that are otherwise difficult to explore.

The remainder of the paper is organized as follows. In Section 2, we present the experiment, and in section 3, we report the results. Section 4 summarizes and concludes.

2. Experimental Design and Procedure

2.1. Experimental Design

All treatments consist of three stages: an allocation stage, a norm elicitation stage and a belief elicitation stage. The allocation stage is identical in all treatments and consists of a series of ten mini-dictator games. In the norm elicitation stage, injunctive and descriptive social norms are elicited using coordination games (Krupka and Weber, 2013). The norm elicitation stage is varied regarding the type of norm and the reference group for coordination, resulting in a 2×2 factorial design. In the belief elicitation stage, beliefs about social norms held by others are elicited. Subjects earn money in each stage and receive the earnings from one randomly drawn stage at the end of the experiment.

[13] Several studies explain why coordination games are suited to reveal a participant´s own perception about the question at hand (e.g., Dawes, 1989; Epley et al., 2004; Schmidt, 2019; Vanberg, 2019). This literature shows that, in order to successfully coordinate with others, subjects use their own type, when making predictions about the type of others (Prelec, 2004). In doing so, they overestimate the degree to which others perceive the question in a similar way as they do (Ross et al., 1977). Consequently, an individual´s coordination choice is indicative for her own perception about the question at hand. In an experiment on the elicitation of beliefs, Schmidt (2019) finds that coordination choices are suited to reveal first-order beliefs about probabilities in an ultimatum game.

Allocation stage: At the beginning of the allocation stage, subjects are randomly assigned to the roles of dictator or recipient, and subsequently matched in pairs.[14] The dictator´s task is to decide in a series of ten mini-dictator games (MDG) how money is divided between herself and the recipient (see Table 1). The MDG are designed such that different distributive motives are varied between the two options.[15] The subjects´ earnings in that stage are determined by the dictator´s decision in one randomly drawn MDG. While the dictators make the allocation decisions, recipients state their guesses about the dictators´ allocation behavior in each of the ten MDG.[16]

Table 1. Mini-Dictator Games used in the Allocation Stage

Decision	Option 1	Option 2	Efficiency	Egalitarianism	Profit
1	7, 4	5, 5	Option 1	Option 2	Option 1
2	5, 4	4, 6	Option 2	Option 1	Option 1
3	6, 4	5, 5	-	Option 2	Option 1
4	6, 3	5, 5	Option 2	Option 2	Option 1
5	5, 5	5, 6	Option 2	Option 1	-
6	11, 0	5, 5	Option 1	Option 2	Option 1
7	5, 0	0, 10	Option 2	Option 1	Option 1
8	10, 0	5, 5	-	Option 2	Option 1
9	7, 1	5, 5	Option 2	Option 2	Option 1
10	5, 5	5, 10	Option 2	Option 1	-

Notes: The numbers represent payoffs in Euro. The first payoff refers to the dictator and the second payoff to the recipient.

Norm elicitation stage: After completing the allocation stage, subjects coordinate on social norms regarding dictator behavior in the MDG. Two aspects are varied in a 2×2 between-subject design. The first aspect that is varied is the type of norm. In treatments *INJUNCTIVE*, subjects coordinate on injunctive norms. In treatments *DESCRIPTIVE*, subjects coordinate on descriptive norms. Subjects always evaluate option 1 of an allocation decision. For injunctive social norms, subjects are asked for each MDG: "How appropriate is it to choose option 1 in the role of dictator?", and they are provided with four answer options: "very appropriate", "somewhat appropriate",

[14] In the instructions, the dictator is labeled as "Player A" and the recipient as "Player B". Subjects are informed that they remain in their role throughout the whole experiment.

[15] Note that the MDG 1-5 correspond to MDG 6-10 in terms of distributive motives.

[16] Recipients are asked to state their guess about the behavior of the dictator that they are matched with. In order to keep the instructions simple, the elicitation of these beliefs is unincentivized. If the recipients´ beliefs were incentivized, their payment in that stage would need to be randomly determined either by the dictators´ decisions or by the accuracy of the recipients´ beliefs.

"somewhat inappropriate" or "very inappropriate". For descriptive social norms, subjects are asked for each MDG: "How many dictators choose option 1 in the role of dictator?", and they are provided with four answer options: "a large majority", "a majority", "a minority", "a small minority". The subjects´ task is to choose the answer option of which they think that it will be chosen by the majority of subjects that participate in the coordination game. Subjects that manage to pick the modal answer in one randomly drawn MDG earn 10€ in that stage (and zero otherwise).

Second, the reference group for coordination is varied. In the current setting, where subjects with different roles coordinate on social norms, two variants of coordination are possible. Dictators and recipients could either *separately* coordinate, or they could *jointly* coordinate on social norms. Both variants are applied in the experiment. In the *SUBJECTIVE* treatments, dictators and recipients coordinate only with participants that have the same role as themselves in a session. In the *OBJECTIVE* treatments, dictators and recipients altogether coordinate on social norms. Table 2 summarizes the 2×2 factorial design of the norm elicitation stage.

Table 2. 2×2 Factorial Design of the Norm Elicitation Stage

		Reference Group for Coordination	
		Subjective	Objective
Type of Social Norm	Injunctive	• Treatment: *INJUNCTIVE_SUBJECTIVE* • Subjects are asked about the *appropriate* behavior of dictators • Dictators and recipients *separately* coordinate on the answers	• Treatment: *INJUNCTIVE_OBJECTIVE* • Subjects are asked about the *appropriate* behavior of dictators • Dictators and recipients *jointly* coordinate on the answers
	Descriptive	• Treatment: *DESCRIPTIVE_SUBJECTIVE* • Subjects are asked about the *most common* behavior of dictators • Dictators and recipients *separately* coordinate on the answers	• Treatment: *DESCRIPTIVE_OBJECTIVE* • Subjects are asked about the *most common* behavior of dictators • Dictators and recipients *jointly* coordinate on the answers

Belief elicitation stage: After completing the norm elicitation stage, subjects state their beliefs about the coordination outcomes of their opponents.[17] In the *SUBJECTIVE* conditions, dictators (recipients) state their belief about the coordination outcome of recipients (dictators). In the

[17] The modal choice of participants is considered the coordination outcome.

OBJECTIVE conditions, both dictators and recipients state their belief about the modal choice made by dictators and by recipients. That is, each subject states her belief about the modal choice entered by subjects in the role of dictator and her belief about the modal choice entered by subjects in the role of recipient. In the belief elicitation stage, subjects earn 10€ in case of a correct belief in one randomly drawn MDG (and zero otherwise).

2.2. Procedure

The experiment was programmed in z-Tree (Fischbacher, 2007), and recruitment was done via hroot (Bock et al., 2014) and ORSEE (Greiner, 2015). Experimental sessions were conducted at the experimental laboratories of the University of Heidelberg and the University of Frankfurt (both Germany) between June and December 2016.[18] In total, 328 subjects participated. Sessions lasted about 35 minutes and subjects earned on average 9.01€, including a show-up fee of 4€. Mean age was 22.5 years, 56.1% were female, and 32.0% had an economics background in their studies.[19] Table 3 gives an overview of the treatments and the sample.

Table 3. Number of Subjects by Treatment and Location

Treatment	Subjects in Heidelberg	Subjects in Frankfurt	Total *N* (Subjects)	Total *N* (Pairs)
INJUNCTIVE_SUBJECTIVE	66	18	84	42
INJUNCTIVE_OBJECTIVE	60	24	84	42
DESCRIPTIVE_SUBJECTIVE	58	22	80	40
DESCRIPTIVE_OBJECTIVE	58	22	80	40
	Σ = 242	Σ = 86	Σ = 328	Σ = 164

[18] In each treatment, one session was conducted in Frankfurt. The shares of observations collected in Heidelberg and Frankfurt is thus constant across treatments (between 21% and 29% per treatment).

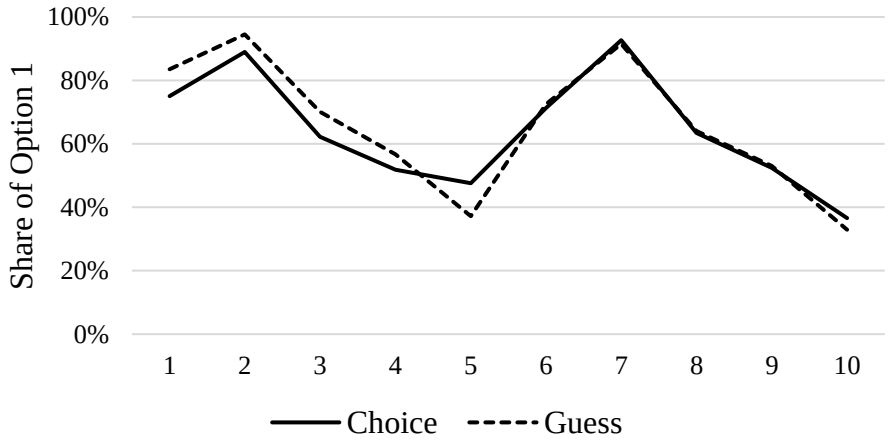
[19] Mann-Whitney-U tests indicate that the two samples do not differ in terms of socio-demographics.

3. Results

3.1. Descriptive Results on the Aggregate Level

To get an impression about social preferences and social norms on the population level, we report average behavior in the allocation stage and the norm elicitation stage. We start by analyzing allocation behavior of dictators and corresponding guesses of recipients (n = 164 pairs of dictator and recipient). Figure 1 shows the share of dictators that chose option 1 in the respective allocation decision, and the share of recipients that believed that the dictator matched with them would choose option 1. Conducting Mann-Whitney-U tests, we find that items 1, 2, and 5 marginally differ between dictators and recipients ($p < 0.1$). These differences vanish after applying the correcting procedure à la Bonferroni.[20] The results indicate that recipients are well able to predict allocation behavior of dictators.[21] This suggests that the two groups have a similar prior regarding actual behavior in the given allocation setting, which implies that subjects have a common ground for the evaluation of social norms.

Figure 1. Allocation Behavior and Guesses



Notes: The figure shows the percentage of dictators choosing option 1 in the mini-dictator games, as well as corresponding guesses from recipients. Recipients are asked to guess the behavior of the dictator that they are matched with.

[20] We account for the fact that multiple items are used to detect differences between dictators and recipients in that test. In order to take care of the inflation of the overall type-I-error rate, we therefore multiply the p-values by the number of items (i.e., by ten).

[21] This indicates that the lack of incentivization of recipients in the allocation stage was not a problem for properly extracting recipients´ beliefs.

To shed light on the predictive power of elicited norms on the aggregate level, and to compare injunctive and descriptive norms in that regard, we conduct simple descriptive analyses.[22] Figure 2 shows the average results from the allocation stage and the norm elicitation stage of the four treatments. To graphically depict norms, these are quantified such that the resulting scores are normalized between -1 and 1.[23] The more positive (negative) the score for injunctive norms, the more appropriate (inappropriate) it is considered to choose option 1 in the respective decision. The more positive (negative) the score for descriptive norms, the more (less) common choosing option 1 is considered in the respective decision. Likewise, dictator choices and recipient guesses depicted in Figure 1 are adapted to that scale.[24]

As can be observed in Figure 2, in all panels the blue lines (average injunctive norm) are rather loosely related to the black line (average choice/guess), while the red lines (average descriptive norms) are remarkably similar to the black lines. In that simple graphical analysis, we thus observe that averages of descriptive norms much better capture the pattern of allocation behavior. This applies independently from the reference group for coordination (*SUBJECTIVE* vs. *OBJECTIVE*), and it applies both for dictators and recipients.

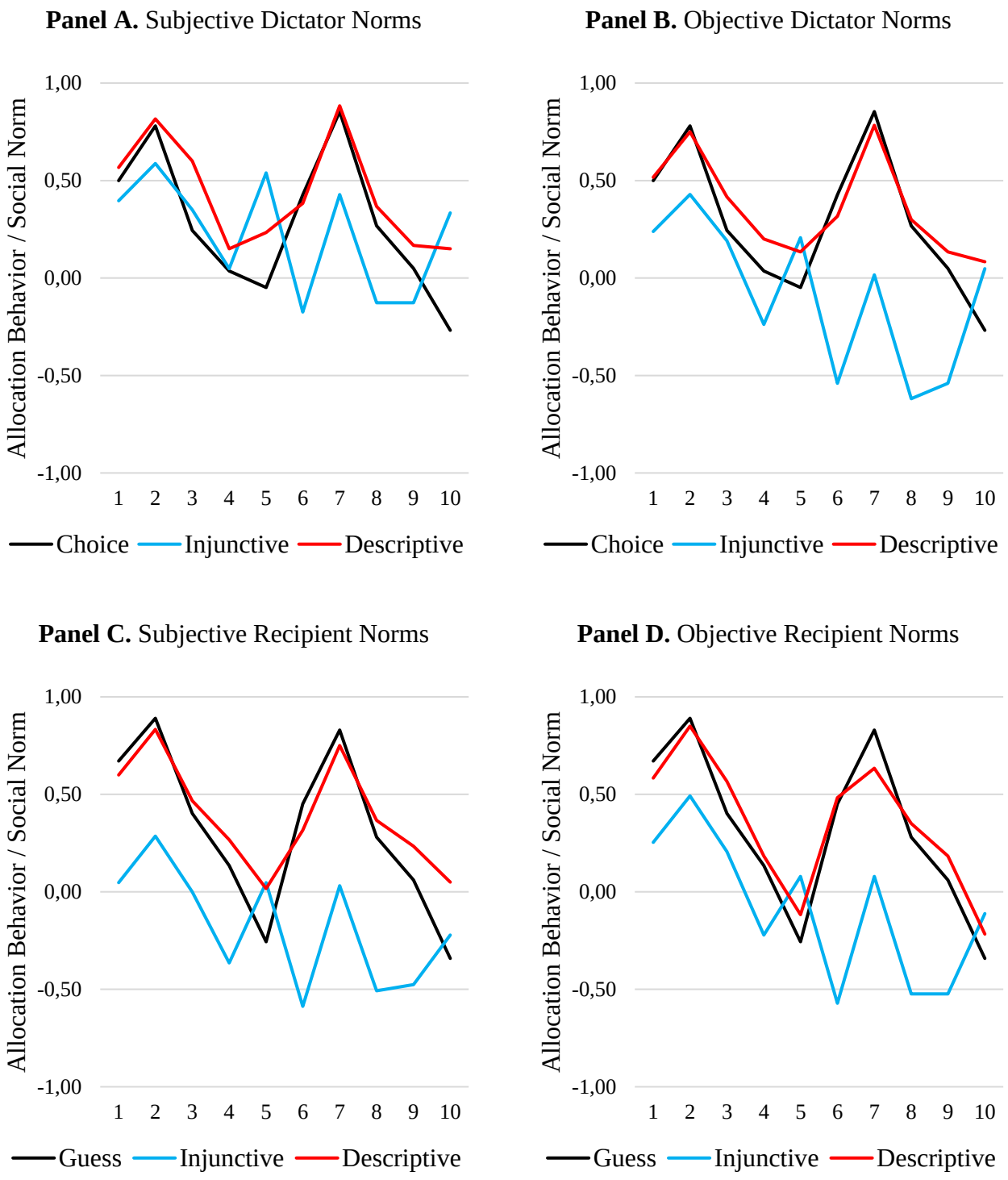
Result 1. Graphical analysis indicates that descriptive social norms better predict average behavior on the population level than injunctive norms.

[22] Note that the comparison of social preferences and social norms on the aggregate level is possible only in a descriptive manner, since the scales used to measure social norms are verbal. This makes it difficult to compare them to behavior rates. Still, the *direction* in which averages of elicited norms vary when actual behavior varies is a sensible comparison in terms of predictive power on the aggregate level.

[23] Coordination choices are quantified as follows. For injunctive norms: 1 = ”very appropriate”, 1/3 = ”somewhat appropriate”, -1/3 = “somewhat inappropriate”, -1 = “very inappropriate”. For descriptive norms: 1 = ”a large majority”, 1/3 = ”a majority”, -1/3 = “a minority”, -1 = “a small minority”. Note that subjects always evaluate the choice of option 1.

[24] For that sake, option 2 is coded with the value -1 instead of 0 (as in Figure 1).

Figure 2. Averages of Allocation Behavior and Social Norms



Notes: "Choice" indicates allocation behavior of dictators, and "Guess" indicates the recipients´ guesses about dictator behavior. In "Choice" and "Guess", option 1 is coded as "1", and option 2 is coded as "-1".

3.2. Individual Level Analysis

We proceed by analyzing the relationship between social norm perception and social preferences on the individual level.[25] For that sake, we regress the choices from the allocation stage on the choices made in the norm elicitation stage.[26] In Table 4, we analyze dictator choices, and in Table 5, we analyze recipient guesses about dictator choices. panels A of these tables refer to elicited injunctive norms, and panels B refer to elicited descriptive norms. Regression analyses are conducted with (i) a Probit-model and (ii) an OLS-model.[27]

We find that, in each specification, the regressor that refers to elicited norms ("Injunctive Norm" in panels A and "Descriptive Norm" in panels B) is statistically significant, independent from the regression model. This holds in either treatment condition *SUBJECTIVE* and *OBJECTIVE*, and it holds for both types of social norms. We interpret this as evidence that injunctive and descriptive norms elicited in the norm elicitation stage are related to social preferences measured in the allocation stage.

Result 2. Both injunctive and descriptive social norms are statistically significantly related to dictator behavior and recipients´ guesses about dictator behavior.

We proceed by comparing whether injunctive or descriptive norms are more strongly related to choices in the allocation stage. For that sake, one needs to column-wise compare the regressions contained in Table 4 and Table 5. We find that the size of the *p*-values of the relationship between descriptive norms and allocation behavior (contained in panels B) is smaller in all specifications than the corresponding *p*-values for injunctive norms (contained in panels A). This holds for all specifications that refer to dictators (Table 4) and to all specifications that refer to recipients (Table 5). This indicates that social norms elicited in the *DESCRIPTIVE* treatments are more strongly related to social preferences than social norms elicited in the *INJUNCTIVE* treatments. In order to test whether these differences are statistically meaningful, we conduct regression analyses with interaction terms. We first pool the observations from the conditions *INJUNCTIVE* and

[25] For simplicity, we refer to "social preferences" as choices made in the allocation stage, i.e., actual dictator choices as well as recipients´ guesses about dictator choices.

[26] We code the decisions made in the allocation stage by a dummy variable which takes a value of "1" if a dictator chooses option 1 in a MDG (and "0" for option 2). Respectively, the dummy indicates that a recipient´s guess in a MDG is that the dictator chooses option 1. In the norm elicitation stage, the evaluation of injunctive and descriptive norms is coded as in the analyses on the aggregate level in section 3.1.

[27] We employ a Probit-model in order to account for the binary nature of the dependent variable. The OLS-regressions serve as robustness checks.

DESCRIPTIVE. Then, we perform the same analysis, i.e., we regress allocation behavior on norm perception, but we add an interaction term between (i) the variable that indicates norm perception and (ii) a dummy that indicates whether that norm was elicited in the *INJUNCTIVE* or the *DESCRIPTIVE* condition of the respective treatment.[28] The interaction term yields a significance test about whether the relationship between the norm choice and the choice made in the allocation stage is statistically significantly different between injunctive and descriptive norms.

As can be seen in panels C of Table 4 and Table 5, the interaction term is positive and significant in all specifications, i.e., both for dictator behavior and recipient guesses about dictator behavior (again independent from the regression model). We interpret this as evidence for descriptive social norms being more strongly related to behavior in the allocation stage, than injunctive norms.

Result 3. Descriptive norms are statistically significantly more strongly related to dictator behavior and recipients´ guesses about dictator behavior than injunctive norms.

[28] The dummy takes a value of 0, if the norm is injunctive, and a value of 1, if the norm is descriptive.

Table 4. Social Norms and Dictator Choices

Panel A. Injunctive Social Norms

	Treatment *SUBJECTIVE*		Treatment *OBJECTIVE*	
	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice
Injunctive Norm	0.488*** (0.162)	0.169*** (0.056)	0.418*** (0.135)	0.136*** (0.044)
Constant	1.336* (0.811)	0.944*** (0.272)	-0.330 (0.686)	0.414* (0.232)
Model	Probit	OLS	Probit	OLS
# Obs.	420	420	420	420

Panel B. Descriptive Social Norms

	Treatment *SUBJECTIVE*		Treatment *OBJECTIVE*	
	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice
Descriptive Norm	1.042*** (0.180)	0.367*** (0.051)	1.240*** (0.157)	0.401*** (0.041)
Constant	1.092 (0.913)	0.854*** (0.292)	-1.168 (0.800)	0.188 (0.225)
Model	Probit	OLS	Probit	OLS
# Obs.	400	400	400	400

Panel C. Comparison of Injunctive and Descriptive Social Norms

	Treatment *SUBJECTIVE*		Treatment *OBJECTIVE*	
	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice
Norm	0.495*** (0.163)	0.171*** (0.057)	0.412*** (0.133)	0.136*** (0.044)
Norm × Descriptive	0.521** (0.243)	0.187** (0.076)	0.820*** (0.215)	0.262*** (0.061)
Constant	1.611*** (0.594)	1.043*** (0.196)	-0.302 (0.507)	0.453*** (0.157)
Model	Probit	OLS	Probit	OLS
# Obs.	820	820	820	820

Notes: *, **, *** indicates significance at the 10%, 5%, and 1% level. Each participant yields ten observations. Standard errors are clustered on the subject level and reported in parentheses. The independent variable "Dictator Choice" is a dummy variable that indicates whether dictators choose option 1 in a mini-dictator game. In all regressions, we control for gender, age, economics study, and the location of the experimental laboratory (Heidelberg or Frankfurt). In the regressions that analyze interaction effects, we also control for the treatment condition (injunctive or descriptive). As a further robustness check, we conduct logit regressions and find the same results.

Table 5. Social Norms and Recipient Guesses about Dictator Choices

Panel A. Injunctive Social Norms

	Treatment *SUBJECTIVE*		Treatment *OBJECTIVE*	
	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess
Injunctive Norm	0.641*** (0.131)	0.211*** (0.043)	0.625*** (0.140)	0.206*** (0.042)
Constant	0.722 (1.059)	0.770** (0.371)	-1.352 (0.949)	0.081 (0.277)
Model	Probit	OLS	Probit	OLS
# Obs.	420	420	420	420

Panel B. Descriptive Social Norms

	Treatment *SUBJECTIVE*		Treatment *OBJECTIVE*	
	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess
Descriptive Norm	1.366*** (0.211)	0.402*** (0.049)	1.292*** (0.167)	0.417*** (0.034)
Constant	0.341 (0.630)	0.571*** (0.174)	0.260 (0.442)	0.595*** (0.118)
Model	Probit	OLS	Probit	OLS
# Obs.	400	400	400	400

Panel C. Comparison of Injunctive and Descriptive Social Norms

	Treatment *SUBJECTIVE*		Treatment *OBJECTIVE*	
	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess
Norm	0.573*** (0.137)	0.184*** (0.044)	0.618*** (0.133)	0.206*** (0.040)
Norm × Descriptive	0.656*** (0.234)	0.212*** (0.064)	0.691*** (0.214)	0.215*** (0.053)
Constant	0.419 (0.604)	0.663*** (0.190)	0.211 (0.473)	0.595*** (0.139)
Model	Probit	OLS	Probit	OLS
# Obs.	820	820	820	820

Notes: *, **, *** indicates significance at the 10%, 5%, and 1% level. Each participant yields ten observations. Standard errors are clustered on the subject level and reported in parentheses. The independent variable "Recipient Guess" is a dummy variable that indicates whether recipients believe that dictators choose option 1 in a mini-dictator game. In all regressions, we control for gender, age, economics study, and the location of the experimental laboratory (Heidelberg or Frankfurt). In the regressions that analyze interaction effects, we also control for the treatment condition (injunctive or descriptive). As a further robustness check, we conduct logit regressions and find the same results.

3.3. The Relationship between Beliefs about Social Norms and Social Preferences

We continue by analyzing the relationship between beliefs about social norms and social preferences. We conduct the same analysis as in the previous sections, but instead of using data from the norm elicitation stage, we use the data from the belief elicitation stage. Remember that the belief elicitation stages do slightly differ between the *SUBJECTIVE* and the *OBJECTIVE* conditions. In the *SUBJECTIVE* conditions, dictators (recipients) state their beliefs about the modal choices of recipients (dictators) in the norm elicitation stage. In the *OBJECTIVE* conditions, all subjects (i.e., independent from their roles) state their beliefs about the modal choices of both dictators and recipients. In Table 6, we analyze beliefs from dictators, and in Table 7, we analyze beliefs from recipients.[29] As in the previous section, panels A of these tables refer to injunctive norms, panels B refer to descriptive norms, and panels C contain the combined data with interaction terms.

The separate analyses in panels A and panels B show the same general pattern as observed in the previous section. In most of the specifications, beliefs about injunctive and descriptive norms are significantly related to allocation behavior of dictators (Table 6) and to recipient guesses about allocation behavior (Table 7). However, the relationship between behavior in the allocation stage and beliefs about norms is less strong than the relationship between behavior in the allocation stage and actual norms.

Result 4. In most of the specifications, beliefs about injunctive and descriptive social norms are statistically significantly related to dictator behavior and recipients´ guesses about dictator behavior.

Again, we compare whether the relationship between social preferences is stronger with beliefs elicited in the *INJUNCTIVE* or the *DESCRIPTIVE* conditions in panels C of Table 6 and Table 7. Though the results are less clear than in the previous section, the general pattern is identical. Specifically, most of the interaction terms are positive, and the majority of them are statistically significant. This indicates that beliefs about descriptive social norms are more strongly related to allocation behavior than beliefs about injunctive social norms.

[29] Table 6 and Table 7 are contained in the appendix, in order to increase the content-to-space ratio of the paper. The analyses are, however, fully equivalent to the analyses conducted in tables 4 and 5, except that the choices from the allocation stage are not regressed on the data from the norm elicitation stage, but on the data from the belief elicitation stage.

Result 5. In most of the specifications, beliefs about descriptive norms are statistically significantly more strongly related to dictator behavior and recipients´ guesses about dictator behavior than beliefs about injunctive norms.

4. Summary and Conclusion

We study the relationship between social norms and social preferences in a series of dictator games. Subjects first undergo an allocation stage where dictators decide about the division of money, and recipients state their beliefs about the behavior of dictators. Subsequently, subjects evaluate allocation behavior, by coordinating on injunctive and descriptive social norms as proposed by Krupka and Weber (2013). Finally, both types of players state their beliefs about the coordination outcomes of their opponents. We find that both injunctive and descriptive norms are significantly related to dictator behavior and recipients´ beliefs about dictator behavior. Likewise, beliefs about social norms held by others significantly predict social preferences. Comparing the relative importance of injunctive and descriptive norms shows that descriptive norms are significantly more strongly related to social preferences in almost all specifications.

The paper yields three contributions. The first contribution refers to the literature on the relative importance of different types of social norms as determinants of behavior. While there is mixed evidence on whether injunctive or descriptive social norms are more related to individual decision making, our paper supports the hypothesis that the explanatory power of perceptions about descriptive social norms is behaviorally more relevant than perceptions about injunctive social norms. Apparently, the analysis of this paper does not identify causal effects of injunctive or descriptive norm perception on actual behavior. However, in line with Bicchieri and Xiao (2009), the results support the view that changing perceptions about prevalent behavior is a more fruitful behavioral intervention than changing perceptions about appropriate behavior.

The second contribution is methodological, as the paper provides a direct test on the informativeness of coordination choices à la Krupka and Weber (2013) as a measure for social norm perception on the individual level. Our results suggest that individual coordination choices are a valid tool to elicit social norm perception on the subject level, as the participants´ coordination choices are significantly related to their actual behavior. In line with previous studies, this supports the idea that predictions about others are informative about a subject´s own perception about the

question at hand (Dawes, 1989; Epley et al., 2004; Ross et al., 1977; Schmidt, 2019; Vanberg, 2019), i.e., in this case about the own perception about prevailing social norms. This enlarges the potential scope of the Krupka and Weber (2013) method, as it indicates that not only the aggregate outcome of elicited norms is suited to predict behavioral changes across contexts on the group level. Instead, a subject's coordination choice also explains behavioral changes across different contexts on the individual level.

The third contribution is again methodological. Although the experiment is designed to investigate the relationship between social preferences and social norms on the individual level, we conducted descriptive analyses on the aggregate level. For that sake, we compared average outcomes from the social preference tasks with average behavior from the tasks where subjects coordinate on injunctive and descriptive social norms. While the relationship between average injunctive social norms and average allocation behavior is rather loose, average descriptive social norms accurately predict average allocation behavior. That observation is particularly remarkable as the scale used to measure social norms is verbal, because it was not the focus of the elicitation of descriptive norms to extract *accurate* estimations about behavior rates, which could then serve as a prediction device. That result supports the idea from Krupka and Weber (2013) to use social norms elicited using coordination games as device to predict how behavior changes across environments. In fact, our data suggest that coordination games are not only suited to make prediction about shifts in behavior but to make *point predictions* about precise behavior rates. This is particularly appealing to predict behavior in contexts that are otherwise difficult to explore. We hope that further experiments are conducted to follow up on that observation and to examine coordination games as a tool to predict behavior, both on the individual and the aggregate level.

Appendix

Table 6. Beliefs about Social Norms and Dictator Choices

Panel A. Beliefs about Injunctive Social Norms

	Treatment *SUBJECTIVE:* Beliefs about Recipient Norms		Treatment *OBJECTIVE*: Beliefs about Dictator Norms		Treatment *OBJECTIVE*: Beliefs about Recipient Norms	
	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice
Belief Injunctive Norm	0.173	0.060	0.582***	0.193***	0.298**	0.098**
	(0.165)	(0.055)	(0.145)	(0.046)	(0.138)	(0.044)
Constant	1.325	0.964***	-0.657	0.310	-0.310	0.411*
	(0.857)	(0.294)	(0.643)	(0.215)	(0.685)	(0.235)
Model	Probit	OLS	Probit	OLS	Probit	OLS
# Obs.	420	420	420	420	420	420

Panel B. Beliefs about Descriptive Social Norms

	Treatment *SUBJECTIVE:* Beliefs about Recipient Norms		Treatment *OBJECTIVE*: Beliefs about Dictator Norms		Treatment *OBJECTIVE*: Beliefs about Recipient Norms	
	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice
Belief Descriptive Norm	0.048	0.019	1.684***	0.489***	0.103	0.040
	(0.148)	(0.058)	(0.161)	(0.034)	(0.153)	(0.055)
Constant	0.777	0.805**	-1.882**	0.061	-1.039	0.111
	(0.857)	(0.336)	(0.820)	(0.180)	(0.756)	(0.271)
Model	Probit	OLS	Probit	OLS	Probit	OLS
# Obs.	400	400	400	400	400	400

Panel C. Comparison of Beliefs about Injunctive and Descriptive Social Norms

	Treatment *SUBJECTIVE:* Beliefs about Recipient Norms		Treatment *OBJECTIVE*: Beliefs about Dictator Norms		Treatment *OBJECTIVE*: Beliefs about Recipient Norms	
	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice	Dictator Choice
Belief Norm	0.171	0.059	0.558***	0.186***	0.298**	0.100**
	(0.161)	(0.054)	(0.137)	(0.044)	(0.136)	(0.043)
Belief Norm × Descriptive	-0.121	-0.040	1.120***	0.306***	-0.201	-0.062
	(0.217)	(0.078)	(0.207)	(0.055)	(0.204)	(0.069)
Constant	1.215**	0.945***	-0.750	0.351**	-0.438	0.342*
	(0.601)	(0.218)	(0.491)	(0.136)	(0.506)	(0.175)
Model	Probit	OLS	Probit	OLS	Probit	OLS
# Obs.	820	820	820	820	820	820

Notes: *, **, *** indicates significance at the 10%, 5%, and 1% level. Each participant yields ten observations. Standard errors are clustered on the subject level and reported in parentheses. The independent variable "Dictator Choice" is a dummy variable that indicates whether dictators choose option 1 in a mini-dictator game. In all regressions, we control for gender, age, economics study, and the location of the experimental laboratory (Heidelberg or Frankfurt). In the regressions that analyze interaction effects, we also control for the treatment condition (injunctive or descriptive). As a further robustness check, we conduct logit regressions and find the same results.

Table 7. Beliefs about Social Norms and Recipient Guesses

Panel A. Beliefs about Injunctive Social Norms

	Treatment *SUBJECTIVE:* Beliefs about Dictator Norms		Treatment *OBJECTIVE*: Beliefs about Dictator Norms		Treatment *OBJECTIVE*: Beliefs about Recipient Norms	
	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess
Belief Injunctive Norm	0.356**	0.130**	0.680***	0.232***	0.564***	0.188***
	(0.161)	(0.058)	(0.167)	(0.054)	(0.168)	(0.050)
Constant	0.156	0.581	-1.773*	-0.052	-0.996	0.179
	(1.170)	(0.426)	(0.997)	(0.296)	(0.936)	(0.286)
Model	Probit	OLS	Probit	OLS	Probit	OLS
# Obs.	420	420	420	420	420	420

Panel B. Beliefs about Descriptive Social Norms

	Treatment *SUBJECTIVE:* Beliefs about Dictator Norms		Treatment *OBJECTIVE*: Beliefs about Dictator Norms		Treatment *OBJECTIVE*: Beliefs about Recipient Norms	
	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess
Belief Descriptive Norm	1.395***	0.416***	1.289***	0.416***	0.824***	0.292***
	(0.195)	(0.041)	(0.160)	(0.034)	(0.144)	(0.043)
Constant	0.592	0.640***	0.532	0.686***	0.175	0.566***
	(0.679)	(0.187)	(0.433)	(0.133)	(0.438)	(0.146)
Model	Probit	OLS	Probit	OLS	Probit	OLS
# Obs.	400	400	400	400	400	400

Panel C. Comparison of Beliefs about Injunctive and Descriptive Social Norms

	Treatment *SUBJECTIVE:* Beliefs about Dictator Norms		Treatment *OBJECTIVE*: Beliefs about Dictator Norms		Treatment *OBJECTIVE*: Beliefs about Recipient Norms	
	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess	Recipient Guess
Belief Norm	0.281*	0.106*	0.654***	0.227***	0.581***	0.193***
	(0.154)	(0.055)	(0.167)	(0.054)	(0.160)	(0.048)
Belief Norm × Descriptive	0.999***	0.308***	0.619***	0.185***	0.263	0.105
	(0.226)	(0.064)	(0.231)	(0.064)	(0.213)	(0.063)
Constant	0.321	0.634***	0.330	0.614***	0.312	0.610***
	(0.654)	(0.212)	(0.478)	(0.158)	(0.405)	(0.135)
Model	Probit	OLS	Probit	OLS	Probit	OLS
# Obs.	820	820	820	820	820	820

Notes: *, **, *** indicates significance at the 10%, 5%, and 1% level. Each participant yields ten observations. Standard errors are clustered on the subject level and reported in parentheses. The independent variable "Recipient Guess" is a dummy variable that indicates whether recipients believe that dictators choose option 1 in a mini-dictator game. In all regressions, we control for gender, age, economics study, and the location of the experimental laboratory (Heidelberg or Frankfurt). In the regressions that analyze interaction effects, we also control for the treatment condition (injunctive or descriptive). As a further robustness check, we conduct logit regressions and find the same results.

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