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Evidence on need-sensitive giving behavior: An experimental approach to the acknowledgment of needs☆

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ABSTRACT

We utilize a modified dictator game to analyze whether and how information about the need of recipients affects dictator giving behavior. Need information is presented as objective information about the recipients' living circumstances (income, public transfers, and travel time to the lab) and subjective information about the recipients' self-assessment of their need (stated need). The results show that information per se does not increase dictator giving. On average, dictator giving is need sensitive and acknowledges if objective and subjective needs complement each other. Classifying dictators according to their conditional transfers yields that 139 of the 246 (57%) dictators are need sensitive.

1. Introduction

In comparison to other major distributive justice principles, need-based justice enjoys high support among European Social Survey respondents (Adriaans, Eisnecker, & Liebig, 2019; Hülle, Liebig, & May, 2018). Put simply, the need principle states that individuals who need more shall receive more, even when this implies that they receive more support or exert the same level of efforts than others (e.g., Konow, 2001; Miller, 1999). Thus, applying the need principle requires an individual account of one's need. In this study, we put the popularity of this distribution principle to a rigorous test and examine whether and how individuals apply the need principle in a dictator game (DG), when subjects have *objective information* about the true living circumstances of recipients and *subjective information* about their stated needs. To the best of our knowledge, this study is the first to systematically investigate in an incentivized experiment whether subjects' actual and stated individual needs matter when distributing payoffs in order to help those in need to live a minimally "decent life".

There is robust experimental evidence that people value multiple *fairness ideals*, such as equality, efficiency, equity (proportionality), and need, and that "there is individual and even cultural variation in the interpretation of, or weight placed on different fairness concepts" (Konow & Schwettmann, 2016, p. 99). The significance of needs for *individual* fairness considerations has been shown across psychological (e.g., Diederich, Wyszynski, & Traub, 2020; Lamm & Schwinger, 1980, 1983), political (e.g., Frohlich & Oppenheimer, 1992; Frohlich, Oppenheimer, & Eavey, 1987; Lorenz, Paetzel, & Tepe, 2017; Scott & Bornstein, 2009), sociological (e.g., Kittel, Neuhofer, & Schwaninger, 2020), and economical (e.g., Ahlert, Funke, & Schwettmann, 2012; Cappelen, Moene, Sørensen, & Tungodden, 2013b; Konow, 2001, 2003; Nicklisch & Paetzel, 2020; Schwettmann, 2012; Yaari & Bar-Hillel, 1984) contributions.

While these studies have certainly raised our awareness of the need principle, most of the aforementioned experimental approaches assume homogeneous need and generalize the neediness of a vast group of people, or induce artificial needs and miss the link to the living

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conditions outside the laboratory. Here, we take a different approach and ask whether subjects bring need-based justice as a fairness ideal into the laboratory and if so, is the adherence to this distribution principle conditioned on recipients' living circumstances? We, therefore, extend the literature on need-based justice by introducing real-world information on subjects' living circumstances and their stated need (in terms of a self-assessment of their monetary need), that in combination can be interpreted as a latent indicator of need to consider the principle of need-based justice as appropriate behavioral rule in this situation.

To this end, we develop a laboratory experiment that enables us to systematically study the *acknowledgment* of needs that is based on real-world information about subjects' living circumstances outside the laboratory. In other words, we investigate whether and how giving behavior in the dictator game (Kahneman, Knetsch, & Thaler, 1986), henceforth abbreviated DG, is motivated by information about the recipients' individual living conditions and stated need.

In total, we study four information scenarios: (I) In the baseline scenario, the dictator decides without any specific information about the recipients. (II) In the "subjective info" scenario, the dictator decides knowing the recipient's stated need. Thereby, stated need is based on the minimal amount of money demanded by the subjects as compensation for participation in the experiment in consideration of their specific living conditions. We thus employ an *instrumental* definition of need, that is, subjects themselves assess how much they need of a specific resource in order to achieve a certain goal (Nussbaum, 2007). (III) In the "objective info" scenario, the dictator knows the recipient's relative income, whether she receives public transfers, and whether she spends more time to reach the lab relative to other participants. Hence, the dictator can base her decision on the recipient's need, assuming that the participants share a certain standard or threshold value in each category, below (income) or above (travel time) which they experience harm. Finally, (IV) in the "full information" scenario, the dictator receives both types of information. From the four scenarios, we construct two between-subjects treatments. Both begin with the baseline scenario and end with the full information scenario. In between, we vary whether the dictator receives only subjective or only objective information about the recipient. Both, objective information and the stated need are elicited in a pre-experimental questionnaire.

Measuring reactions to the (latent) need information through the modified DG is ideal for our purposes, because (i) strategic considerations are irrelevant, (ii) the results can easily be compared with other DG studies, and (iii) giving behavior following the need principle can be rationalized by a model of norm-compliant behavior (Krupka & Weber, 2013), henceforth abbreviated KW. That is, by means of the experiment and the KW model, we estimate a conditional giving function for each dictator and explore the share of dictators that can be classified as *sensitive*, *unconcerned*, *lump-sum*, and *punitive* with respect to the need principle. We hypothesize in line with Kittel (2020) that acknowledgment of need is strongest when information about the living circumstances and the stated need align with each other ("acknowledgment effect"). The hypothesis is tested using a sample of 492 student subjects. Additionally, we use the data of 288 participants in a survey which we conducted previous to the main experiment to provide a classification of subjects during the main experiment as relatively more or less needy.

The main results are as follows. First, we show that stated need and objective need information are significantly correlated (except for public transfers). Second, we find that dictators actually trade off their own monetary payoff with fulfilling the recipient's stated need and thus comply clearly with the need principle. In comparison to the standard DG, providing information about a recipient's living circumstances does not lead to an increase of average dictator giving (i.e., subjects are not *information sensitive*). We show that, depending on the sequence in which information is presented, the recipients' living circumstances (income in particular) and stated need matter for dictator giving (*need sensitivity*). With respect to the recipients' travel time to the lab, we find evidence for an *acknowledgment effect*. That is, when a recipient's stated need is confirmed by her longer travel time, dictator giving increases significantly. On the other hand, dictators react significantly less positively to stated need when the recipient receives public transfers. The individual analysis of the dictators conditional giving functions shows that the majority of our sample reacts systematically and positively to the needs of the recipients. Our analysis suggests that 57% of the dictators are need-sensitive. The remaining dictators can be classified as unconcerned (17%), lump-sum (17%) or punitive (7%).

In addition, we find that unconcerned dictators' political orientation is more likely to be on the right compared to the political orientation of need-sensitive dictators. Lump-sum dictators are more likely to be male than need-sensitive dictators. Punitive dictators have lower incomes than need-sensitive dictators. Hence, the "typical" need-sensitive dictator is female, places herself on the middle left on the political orientation scale and has a relatively high income.

The remainder of this paper is organized as follows. Section 2 reviews the related literature and highlights the contribution of the present paper. Section 3 introduces a typology of dictators based on the KW model to derive working hypotheses. Section 4 describes the experiment. Section 5 presents the results. Section 6 offers some final reflections and a conclusion. The comprehensive Supplementary Online Appendix contains, apart from the instructions for the experiment, further materials such as individual classification graphs of all dictators.

2. Related literature

The literature on social norms in economics is relatively young (Elster, 1989), but especially experimental contributions have been rapidly growing in recent years.[1] The key assumption in this line of work is that individuals not only try to maximize own payoffs but also "care about behaving in a manner consistent with social norms" (Krupka & Weber, 2013, p. 496). Here, a social norm is a collective perception regarding behavior one should or should not do. The strength of this approach in comparison to social preference models is the flexibility with respect to the appropriateness of a specific norm, which can explain behavioral responses even to minor variations of the decision context (Kimbrough & Vostroknutov, 2016).

The weakness of the norm approach stems from the fact that "by stipulating that a particular behavior constitutes a social norm, it is possible to explain any behavior, which renders such an approach irrefutable and thus empty" (Fehr & Schurtenberger, 2018, p. 462). Hence, scholars have developed several empirical methods to elicit perceptions about the socially appropriate behavior in a specific context (e.g., Cubitt, Drouvelis, & Gächter, 2011; Fehr & Fischbacher, 2004; Krupka & Weber, 2013). The results reveal that there is often no clear single social norm in the abstract decision-making context of the laboratory. To be sure, the results of the aforementioned studies show that cues framing the situation can shift the average perceptions regarding what the appropriate behavior might be, but unambiguous social norms which are shared and supported to the same degree by virtually all group members are rare in the laboratory.

In this study, we follow Krupka and Weber's (2013) formal modeling approach and assume that the individual inclination to follow norms influences behavior. Yet, instead of eliciting appropriate behavior in the abstract context of the laboratory and inductively formulating a social norm, we follow Cappelen et al.'s (2007) approach and assume that

[1] Studies examining the influence of social norms on prosocial behavior include Krupka and Weber (2013), Reuben and Riedl (2013), Rustichini and Villeval (2014), Schram and Charness (2015), Kimbrough and Vostroknutov (2016), Krupka and Croson (2016), Krupka, Leider, and Jiang (2017), Gächter, Gerhards, and Nosenzo (2017), Barr, Lane, and Nosenzo (2018), Kimbrough and Vostroknutov (2018), Chang, Chen, and Krupka (2019), d'Adda, Dufwenberg, Passarelli, and Tabellini (2020), Bicchieri, Dimant, Gächter, and Nosenzo (2022).

universal fairness ideals imported by the participants to the laboratory moderate what subjects regard as the social norm in the situation. In particular, we aim to understand to what extent subjects follow the need-based justice principle, which has received little attention despite its popularity among survey respondents of social-welfare states. In doing so, we derive the mechanism of the need principle deductively from the philosophical and sociological theory on need-based justice. Examining the power of the imported norm of need-based justice in the abstract situation of the lab (no social cues, no sanctions to deviant behavior, no gains from reputation or reciprocation) constitutes a strong test of the need principle.

In their survey on the philosophy of need-based justice, Siebel and Schramme (2020, p. 23) argue that it is necessary to form a common understanding of what a recipient's need is (Miller, 1999). Forming this social (or political) understanding requires, firstly, an agreement about what constitutes a need in contrast to mere desires or wishes and, secondly, information about a person's (relative) living circumstances (Kittel, 2020). Only when both criteria are fulfilled, can needs be acknowledged and resources be distributed according to socially acknowledged needs. Miller's (1999) criterion of *harm avoidance* makes a decisive contribution to the distinction between desires and needs, as harm can be delimited in an objective sense from subjective feelings such as suffering, anxiety or sadness (also see Doyal & Gough, 1991; Thomson, 1987). Expressed differently, harm is what results if human beings are not allowed to live a minimally *decent life* (cf. Siebel & Schramme, 2020). In sum, this literature has identified two key factors which are expected to affect the adherence to the need principle: (i) Potential recipients of need-based benefits have to voice a socially-appropriate demand. (ii) Whether the stated need is recognized as socially appropriate depends on the individual living circumstances of the recipient.

In order to test these hypotheses, we utilize the workhorse experiment – the dictator game (Kahneman et al., 1986) – to analyze how information about the recipient's stated need and living circumstances affect dictator's giving behavior. Thus, our study contributes to the works of Brañas-Garza (2006), Brañas-Garza, Bucheli, and Espinosa (2020), Cappelen, Moene, Sørensen, and Tungodden (2013a) and Eckel and Grossman (1996). These studies show that transfers in a dictator game are higher if recipients are characterized as living in a poor country or being an established charity organization. While these findings offer important insights, the characterization of a subject as living in a poor country does not necessarily say anything about her actual need that can be socially acknowledged. In fact, we agree with Miller (1999), who argues that a transfer from a person living in a rich country to a person living in a poor country is motivated by a humanitarian motive rather than need-based justice.

Our research is also related to DGs that reveal certain pieces of information about recipients to dictators. Overall, this literature shows that this kind of objective information increases dictator giving. The main argument is that the provision of information reduces the social distance between dictator and recipient. Bohnet and Frey (1999) allow, for example, for one-way identification where dictators can identify their respective recipients. They argue that the identification transforms anonymous, faceless entities into visible, specified human beings. Charness and Gneezy (2008) reveal the names of recipients in a dictator game. When names are revealed, dictators allocate a significantly larger portion of the pie. Note, however, that such procedures might reduce the anonymity between dictator and recipient both within and after the experiment. In contrast to these approaches, our experimental design preserves the anonymity of the participants throughout the study.[2]

Furthermore, providing information about stated need relates our work to Rankin (2006). He finds that asking the dictator for a share of the cake enhances the amount sent. If the requested amount is too large relative to the amount the dictator would have given anyway, such a request is crowded out. This result has been replicated by Andreoni and Rao (2011) and Yamamori, Kato, Kawagoe, and Matsui (2008). Bruttel and Stolley (2020) also show that giving is higher if the message mentions why the money is needed. However, in this strand of the literature, the active communication of monetary requests can create a strategic situation between recipient and dictator, which is avoided in our experiment. Additionally, Brañas-Garza et al. (2020) find that providing information about the recipients (sex, wealth, and political orientation) increases dictator giving per se, and they issue the warning not to confuse sensitivity to information with sensitivity to content. In our experiment, we therefore separate between *information sensitivity* and *need sensitivity*.

Finally, our study also connects to various approaches trying to explain the psychological motivation of other-regarding behavior. Compliance with the need principle can rest on a direct preference to comply with the internalized fairness ideal, but individuals may also have a true intrinsic preference to be fair, a preference to sustain a positive self-image, or a preference to appear fair to avoid the feeling of guilt (see, Fehr & Schurtenberger, 2018). The literature on guilt aversion frequently uses the strategy method to enable dictators to condition giving on their beliefs about recipients' expectations[3] (for a survey, see Cartwright, 2019). The crucial difference to our study is, however, that we do not ask recipients what they *believe* should be given by dictators, but what they actually *need* in their specific, personal situation. Conditional dictator giving based on (beliefs about) recipients' expected transfers does not have to coincide with dictator giving based on individually identified need. Hence, we focus on the effect of need on giving behavior, but remain agnostic regarding the specific psychological channel driving this behavior.[4]

To summarize, previous literature has shown that (i) social norms and (ii) information influence dictator giving, (iii) humanitarian concerns matter for dictator giving, and (iv) recipients' requests are benevolently considered by dictators if they are not too greedy. However, none of the aforementioned papers has analyzed how *need*-related information about recipients is *socially acknowledged* by dictators. This study thus aims to fill a gap in the literature by analyzing whether and how subjective and objective need information about recipients triggers giving consistent with the need principle. While this paper focuses on small groups of two, it also contributes to the microfoundation of social policy. The principle of giving to someone in "need" is an integral part of solidarity communities and it is a necessary condition for the functioning of modern welfare states (e.g. Bowles, Gintis, et al., 2000;

[2] The revelation of information about recipients may be interpreted as a form of communication (see Bruttel & Stolley, 2020, for an overview). For example, Andreoni and Rao (2011) provide evidence that, when recipients are allowed to communicate with the dictator, altruism is promoted.

[3] In contrast, Pereda, Brañas-Garza, Rodríguez-Lara, and Sánchez (2017) present a dynamic stochastic model with reinforcement learning to investigate how altruistic behavior emerges as a social norm from dictators' own expectations (aspirations) about previous donations. In various experimental conditions Brañas-Garza, Rodríguez-Lara, and Sánchez (2017), show that the subjects' modal expectation with regard to dictator giving is the equal split, while the Nash prediction that the dictator keeps everything for herself is rarely expected.

[4] Schram and Charness (2015) argue explicitly that the violation of a moral norm is associated with guilt. They differentiate between moral norms and social norms. Both types of norms require social consensus about the existence and content of the norm. Social norms additionally require subjects to observe others to adhere or violate the norm. Therefore, the violation of a social norm can be sanctioned materially or immaterially (e.g., shame). The emotional reaction to the violation of a moral norm is based on internal reflection and, hence, connected to the feeling of guilt when violating the norm. Therefore, it is possible that guilt drives norm-compliant behavior, but also that social norms drive feelings of guilt. In this paper, we focus on *whether* need affects behavior and are less concerned about *why* they do so.

Mau, 2004). However, while small groups rely on knowledge about each other in order to avoid free riding, the welfare state has to resort to institutional mechanisms, such as means-tested benefits (Kittel, 2020).

3. Theory and working hypotheses

This section has three parts. In the first part (Section 3.1), we theoretically examine how information about a recipient's need may affect a dictator's giving behavior under perfect information. As a theoretical framework, we use a model of norm-compliant behavior by Krupka and Weber (2013), hereinafter abbreviated as KW. In the second part (Section 3.2), it is assumed that a recipient's true need cannot directly be observed by the dictator. We then analyze how providing *objective* information about a recipient's living circumstances and *subjective* information about her self assessment of her need influences dictator giving behavior. We derive three working hypotheses for our experiment, which deal with (i) the general effect of information, (ii) the sensitivity to specific need information, and (iii) the interaction of objective and subjective need information. In the third part (Section 3.3), we take into account the heterogeneity of dictator giving behavior. We provide a typology of dictators using a quadratic giving function. To be more specific, we distinguish between *unconcerned*, *lump-sum*, *punitive*, and *need-sensitive* dictators. In addition, the latter type exhibits either *increasing*, *constant*, *decreasing* or *hump shaped* need sensitivity. In the experiment, the giving function is elicited for each dictator separately on the basis of subjective need information. (iv) We hypothesize that a majority of dictators are sensitive to other's needs.

3.1. Theoretical framework

The main research interest of this paper is to study whether and how a dictator's giving is motivated by information about the recipient's well-being in terms of her need, where the potential normative relevance of need is systematically varied by the type of information given. We therefore use the KW model as a theoretical starting point without denying that inequality aversion, altruism, and guilt aversion could influence the dictator's giving behavior as well. A dictator who positively reacts to the information stimulus on the recipient's need is called *need sensitive* in the following.

We consider a finite population of size $n \in \mathbb{N}$ of *recipients* who differ by their need $x \in X = [0, x_{\max}]$, where higher values mean greater need. We assume that X is bounded from below at zero. That is, there is no better state than complete need satisfaction (*no-negative-need* condition). Need is also bounded from above at $x_{\max}$. This is due to the fact that someone's potentially infinite desires are conditioned by the availability of finite resources (*no-plenty* condition). The distribution function of need is given by $F_X(x) = P(X \leq x)$. It determines the share of the population whose need does not exceed x. The density of need is given by $f_X(x)$.

The *dictator* is endowed with a certain amount of money e. She is matched with a randomly chosen recipient with a need of x, and she can transfer an amount t to the recipient, where $0 \leq t \leq e$. In line with the KW model, we assume that the dictator maximizes a concave utility function $u(t) = V(e - t) + \gamma N(t|x)$. The first argument of the utility function captures the utility of the dictator's own consumption. The second argument captures the value of complying to the socially accepted norm that harm should be avoided.[5] The parameter $\gamma \geq 0$ represents the degree to which the individual cares about adhering to social norms (see KW, p. 500). An *unconcerned* dictator ($\gamma = 0$) will maximize her payoff. With respect to the norm component $N(\cdot)$, we additionally assume that it is *conditioned* by the recipient's need x. Under perfect information (P) about x, the dictator's optimal transfer is given by $t^*_{\mathrm{P}} = t(x)$.

3.2. Working hypotheses

From now on, we assume that need is a *latent* variable, that is, need is not directly observable by the dictator. However, there is a third party – the experimenter – who is able to provide the dictator with information $y \in \mathbb{I}$ about a specific recipient's latent need x. More precisely, the experimenter presents the dictator with two types of information, namely, *objective* (O) and *subjective* (S) information, that is, $\mathbb{I} = \{y | y = \mathrm{O}, y = \mathrm{S}\}$.

In our experiment, objective information is about the recipient's living circumstances: her *income*, whether or not she receives a *public transfer*, and how much time she has to devote to participating in the experiment (*travel time*). That is, objective information is a vector of three observable sociodemographic characteristics or indicators of need $\mathbf{z}$ = (income, public transfer, travel time). A specific realization of need indicators is called *profile* in the following.[6]

Subjective information contains a recipient's self-assessment of her need that has been reported to the experimenter by the recipient. That is, subjective information is a nonnegative number $x_r = [0, x_{\max}]$. We will call a specific self-assessment *stated need* in the following.

Based on the power set of information, $P(\mathbb{I}) = \{\emptyset, \{\mathrm{O}\}, \{\mathrm{S}\}, \{\mathrm{O}, \mathrm{S}\}\}$, we build four information *scenarios*. *Baseline* (B) provides no information on the recipient at all (which is the standard dictator game), *Objective Info* (O) presents the recipient's profile $\{\mathbf{z}\}$, *Subjective Info* (S) presents her stated need $\{x_r\}$, and *Full Info* (F) presents both the profile and the stated need $\{\mathbf{z}, x_r\}$. If the dictator has imperfect information about her recipient's need, she has to infer x from the available information (if there is any) by some "best guess" $\hat{x}_k$, $k \in P(\mathbb{I})$, in order to determine her optimal transfer $t^*_k = t(\hat{x}_k)$.

If the dictator's best guess exhibits aversion against "need uncertainty", she will increase her giving in response to the amount of information provided by the experimenter. Hence, we hypothesize that dictator giving is lowest in the Baseline scenario and highest in the Full Info scenario, with Objective Info and Subjective Info in between (**H1: Information Sensitivity**). Information sensitivity is tested in Section 5.1 by comparing mean dictator giving between the information scenarios.[7]

Furthermore, we hypothesize that dictators are *need sensitive*, that is, their norm-compliant giving is motivated by information about the recipients' specific need. For any given information scenario k, $k \neq \emptyset$, we expect the dictator to give more if the profile indicates more need of the recipient, that is, $\hat{x}_k > \hat{x}'_k \Rightarrow t^*_k > t^{*\prime}_k$ (**H2: Need Sensitivity**). For instance, a dictator is expected to give more to a recipient whose travel time is longer, and whose stated need is higher. Need sensitivity is tested in Section 5.2 by estimating the average marginal effects of objective and subjective information on dictator giving.

[5] That is, we assume that dictators must resolve a trade-off between compliance with the *social norm* and their own payoff, with γ determining how strongly the norm is accepted. An alternative approach is taken by Aguiar, Brañas-Garza, Espinosa, and Miller (2010), who assume that each dictator has a *personal identity* that determines the amount she should retain. Deviations from this amount then impose a cost in terms of an identity loss. An experimental test of the model shows large individual heterogeneity in the weight given to one's own personal identity.

[6] Strictly speaking, the profiles are also based, to a certain extent, on subjective data, because the associated information was obtained from the subjects themselves. However, at the time of the survey, the subjects were not yet aware that this information would be used in the dictator game, so that at least there were no incentives for strategic responses.

[7] Note that a direct comparison of scenarios O and S does not emerge from Hypothesis 1. Such a comparison would be difficult because S uses the strategy method and O direct choice. The comparison between treatments BSF and BOF, therefore, focuses on whether the information *sequence* has an influence on giving behavior in F.

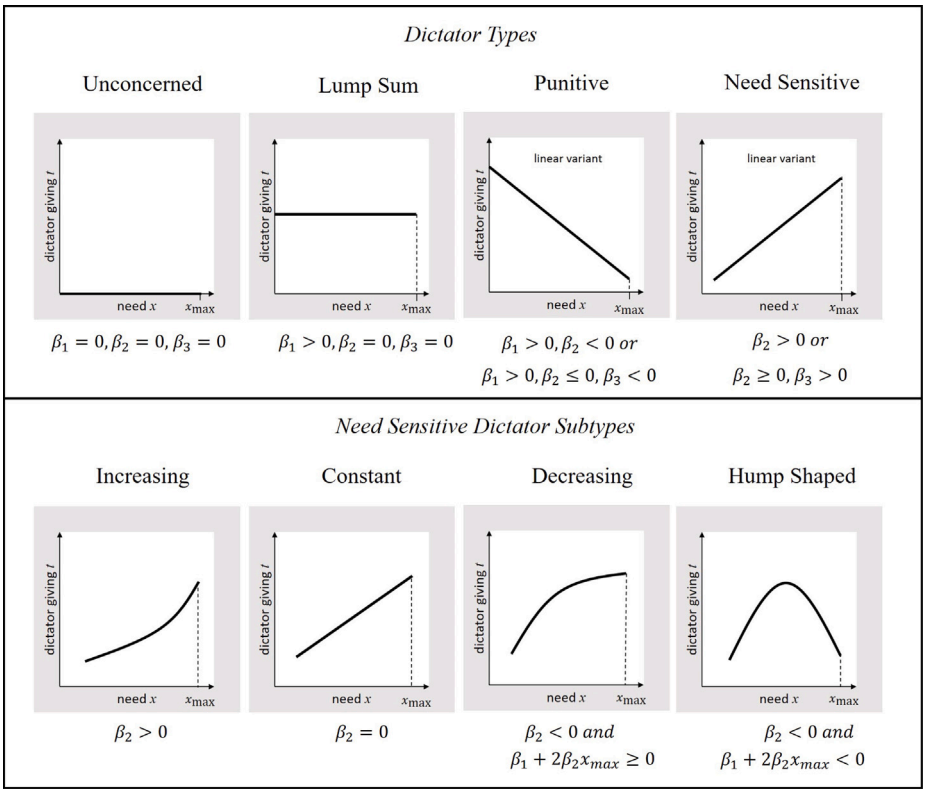

Fig. 1. A typology of dictators. The upper panel shows stylized giving functions for the four dictator types and their parametrization according to Eq. (1). The lower panel shows stylized giving functions for the four need sensitive dictator subtypes and their parametrization according to equation Eq. (1).

Our third working hypothesis addresses the interaction between objective and subjective need information in the Full Information scenario. We hypothesize that dictator giving increases by an extra amount if a relatively high stated need is accompanied by confirming objective information about a recipient's need, that is, if the recipient has a low income, receives public transfers, and has a long travel time. We term this hypothesis the *acknowledgment effect* (**H3: Acknowledgment Effect**). **H3** is tested in Section 5.3 by estimating the average interaction effects of objective and subjective information on dictator giving.

In order to test hypotheses **H1** to **H3**, the dictator games introduced in Section 4 systematically vary the amount and type of need information as well as the recipients' need that is presented to the dictators. Furthermore, in order to control for other motives like inequality aversion, we collect data on the dictators' own need.

3.3. A typology of dictators

In order to explore the heterogeneity of the dictators, we estimate a separate giving function $t(\hat{x}_r)$ for each dictator. Since estimating the parameters of the function requires several observations per dictator, we focus (as explained in detail in Section 4.2) on the stated-need variable. In the experiment, we use the strategy method to elicit the dictator's optimal transfer t_r^* for every possible value $\hat{x}_r \in [0, x_{\max}]$ of stated need. In the following, we assume that the dictator's *giving function* $t(\hat{x}_r)$ is a twice continuously differentiable function that can be approximated by a polynomial of the second degree in need

$$t_r^* = \beta_1 + \beta_2 \hat{x}_r + \beta_3 \hat{x}_r^2. \quad (1)$$

Regarding the impact of need on dictator giving, we distinguish four behavioral types that are shown in the upper panel of Fig. 1. An unconcerned dictator gives nothing; a lump-sum dictator gives more than zero, but her giving is not conditioned by her recipient's need; a punitive dictator gives less, the more her recipient needs; a need sensitive dictator increases her giving in response to her recipient's need (at least for low levels of need). Note that the punitive type is similar to a "spiteful" player (Levine, 1998) in that she derives a negative utility from meeting the recipient's needs. However, the dictator still gives something to the recipient ($\beta_2 > 0$) when she exhibits little need.

As to the need sensitive dictator, we also distinguish four subtypes that are shown in the lower panel of Fig. 1. Applying Jensen's inequality, constant need sensitivity ($\beta_3 = 0$) implies that the dictator's transfer $t_{\bar{x}}^*$ to the recipient with average need $\bar{x} = E_X(X) = \int_0^{x_{\max}} \hat{x} f_X(\hat{x}) d\hat{x}$ equals her average transfer $\overline{t_r^*}$ if she is randomly matched with all n recipients.

Increasing need sensitivity, implies $t_{\bar{x}}^* < \overline{t_r^*}$ because $t(\hat{x}_r)$ is a convex function. Analogously, decreasing need sensitivity implies $t_{\bar{x}}^* > \overline{t_r^*}$ because $t(\hat{x}_r)$ is a concave function. Irrespective of whether the dictator exhibits increasing, constant, or decreasing need sensitivity, her giving function reaches its maximum at $x_{\max}$. In contrast to this, the hump shaped sensitive dictator's giving function has an inner maximum. That is, the dictator "punishes" severe need and, therefore, she is a hybrid case between the decreasing need sensitive and the punitive dictator.

The theoretical model thus allows for several different types of dictators. However, based on the social justice literature summarized in Section 2, we expect that the majority of dictators are need sensitive when need relevant information is available, that is, their norm-compliant giving with respect to subject information is then motivated by information about the recipients' stated need (**H4: Prevalence of Need Sensitivity**). In Section 5.4, we estimate the individual transfer functions for each dictator separately, classify them as a particular type based on this estimate and test their relative frequencies. As can be taken from Fig. 1, all kinds of transfer functions are possible, that is, the type classification is endogenous.

4. Experimental design

In this section, we explain the experimental design. About a month before the main experiment took place, we conducted a survey among

		Objective Information: 1 of 8 profiles: income {≤, >} 700 Euros; public transfer {no, yes}; travel time {≤, >} 40 minutes	
		No	*Yes*
Subjective Information: stated need: $x_r = \{0,1,2,\ldots,16\}$ Euros	*No*	Baseline (B)	Objective Info (O)
	Yes	Subjective Info (S)	Full Info (F)

Fig. 2. The four information scenarios of the dictator game. The figure shows the four information scenarios of the dictator game that were made up of the power set of information $P(I) = \{\emptyset, \{O\}, \{S\}, \{O,\ S\}\}$.

the subjects of another experiment in order to collect information on the distribution of three need-related variables in the subject pool of the WISO Laboratory in Hamburg, where our experiment was conducted. The survey is described in Section 4.1. The main experiment, described in Section 4.2 involved a pre-experimental questionnaire and two different treatments that were composed of four variants of the dictator game (DG). These variants, which are equal to the four information scenarios introduced in the preceding section, differed with respect to the information about the recipients that was provided to the dictators. The decision tasks are explained in Section 4.3. Section 4.4, finally, provides information about the procedure of the experiment.

4.1. The survey

In the survey, we asked the 288 participants about (i) their monthly disposable income in Euros, (ii) the amount of public transfers they received, for example, according to the German Federal Law for the Promotion of Education ("BAföG") in Euros, and (iii) how much time, in minutes, they had scheduled to reach and leave the WISO laboratory at the University of Hamburg. The median income was 700 Euros, 212 of 288 (73,61%) did not receive BAföG or a similar public transfer, and the median travel time was 40 minutes.

The purpose of the survey was to generate eight three-dimensional information *profiles* **z**. The profiles were used to classify each subject participating in the subsequent main experiment according to her need using the three indicators income, public transfer, and travel time. We used the median income to split the sample along the income dimension into subjects whose income did not exceed 700 Euros and subjects whose income exceeded 700 Euros. Analogously, we used the median of travel time to split the sample along the time dimension into subjects whose travel time did not exceed 40 minutes and subjects whose travel time exceeded 40 minutes. With respect to the public transfer dimension, we split the sample into needy BAföG receivers and non-needy non-receivers of BAFöG.[8] The eight cells of the three-dimensional classification scheme **z** = (income[≤700€,> 700€], public transfer [No, Yes], travel time[≤40min.,> 40min.]) each refer to a certain subgroup of subjects.

[8] Of course, one could argue that receiving a public transfer makes a person less needy, but BAföG is granted only to students whose parents have a relatively low income and therefore cannot afford to support their studying children. Furthermore, the so-called neutrality hypothesis holds that under pure altruism public transfers crowd out voluntary giving (for the theoretical argument and experimental evidence on partial crowding out in the dictator game see, e.g., Bergstrom, Blume, & Varian, 1986; Bolton & Katok, 1998). Whether or not a dictator actually rates a recipient who receives BAföG as more needy than someone who does not, is an empirical question that will be investigated by our experiment.

4.2. Structure of the main experiment

Prior to the main experiment, all 492 subjects completed a short socio-economic questionnaire. Among other questions, they had to provide the same information with respect to income, public transfer, and travel time as the participants of the preceding survey.[9] As described in the previous subsection, the subjects were assigned to one of the eight profiles based on their characteristics. Note, however, that the profile assignment was not announced in advance to avoid provoking strategic responses.

In the main experiment, we utilized the DG to study whether dictator giving behavior is sensitive to information using the four information scenarios – *(B)aseline*, *(O)bjective Info*, *(S)ubjective Info*, and *(F)ull Info* – explained in Section 3. Fig. 2 gives an overview of the four scenarios. Objective information contained the above-mentioned details about a recipient's individual circumstances, which were collected using the pre-experimental questionnaire. These eight profiles were presented to the dictators in the form of *vignettes*.

Subjective information was provided in terms of the recipient's *stated need*, $x_r = \{0, 1, 2, \ldots, 16\}$ Euros. In the pre-experimental questionnaire, we asked each recipient to state how much payment he or she would consider appropriate, given his or her personal circumstances (including disposable income, public transfer, and travel time). The exact wording to elicit the stated need in terms of a monetary compensation was as follows: "This experiment takes about one hour in total. You will receive a flat payment of 5 Euros for a fully completed questionnaire. Please consider your own income situation, whether you receive BAFÖG *[a public transfer to students]* and your travel times to and from the laboratory. In addition to the 5 Euros, what amount do you think is appropriate payment for your personal situation for a one-hour experiment? (You can specify between 0 and 16 Euros.)"[10] The dictators knew the exact wording of this question and that the recipients received, like all participants, 5 Euros as a show-up fee for participating in an one-hour long experiment. Recipients had to state a nonnegative integer number not exceeding 16 Euros (the endowment of the dictator), $t(x_r)$.

In order to create two different information *treatments*, the four information scenarios were implemented in two different sequences: $\{B, O, F\}$ and $\{B, S, F\}$. The flow chart in Fig. 3 illustrates the treatment structure. First, all 492 subjects completed the pre-experimental questionnaire. Then, half of them was randomly assigned to the dictator role ($n = 246$) and the other half was assigned to the recipient role

[9] See Appendix D.5. Answers to questions Q8 (income), Q9 (public transfers), and Q12 (time) were used to assign subjects to their corresponding profiles. The original questionnaire in German can be found in D.7.

[10] We derived this exact wording from several pre-tests among colleagues and student-assistants to secure as accurately as possible that participants would state what they "need" as a monetary compensation for participation in the experiment considering their specific circumstances. If this question is completely irrelevant to the participants, we should find no effects on giving.

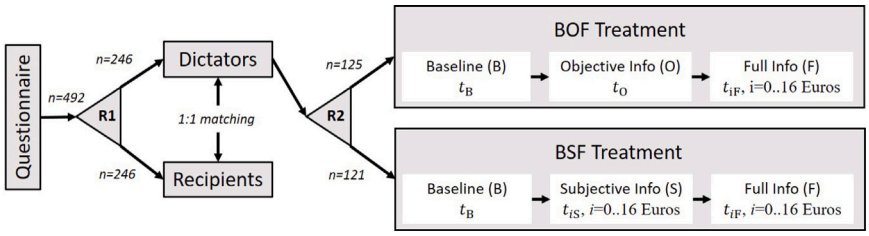

Fig. 3. Flow chart of the experiment. After completing the pre-experimental questionnaire, subjects were randomly assigned to their roles (R1). Each dictator was matched with one recipient. Dictators were randomly assigned to the BOF or the BSF treatment (R2). t_y denotes the dictator's transfer in scenario $y \in \{B, O, S, F\}$ (for stated need $i = \{0, 1, 2, \ldots, 16\}$ Euros).

($n = 246$). Each dictator was matched with only one recipient for the entire duration of the experiment (1:1 matching between dictators and recipients).

About half of the dictators was randomly assigned to the BOF treatment ($n = 125$) and the other half was assigned to the BSF treatment ($n = 121$). All dictators first participated in the Baseline scenario; all dictators completed the experiment with the Full Information scenario. Between *Baseline* and *Full Information*, the BOF dictators were presented the *Objective Info scenario (O)*, and the BSF dictators were presented the *Subjective Info scenario (S)*. Hence, our treatment structure allows us to analyze both the marginal effect of each type of information and the influence of the information sequence.

4.3. Decision tasks

In scenario *Baseline*, which was played first by all dictators, they received no information about the recipient and played a standard dictator game. Dictators were endowed with $e = 16$ points (1 point = 1 Euro) and could choose to transfer any positive integer $t_B \in \{0, 1, 2, \ldots, 16\}$ to the recipient.[11] Accordingly, the payoff in B was $16 - t_B$ for the dictator and t_B for the recipient.

In scenario *Objective Info*, which was played second only by those subjects who were randomly assigned to the BOF treatment, each dictator received objective information about her recipient. Objective information was provided by means of a vignette showing one of eight profiles. The 1:1 matching secured that each dictator was presented with the same profile for the entire duration of the experiment. As in *Baseline*, dictators were endowed with $e = 16$ points and could choose to transfer any positive integer $t_O \in \{0, 1, 2, \ldots, 16\}$ to the recipient. Accordingly, the payoff from O was $16 - t_O$ for the dictator and t_O for the recipient.

In scenario *Subjective Information*, which was played second only by those subjects who were randomly assigned to the BSF treatment, each dictator received subjective information about her recipient. However, instead of directly presenting the recipient's stated need x_r (which was assessed by means of the pre-experimental questionnaire), we utilized the strategy method in order to generate, for each dictator, a full set of 17 conditional transfers t_{iS}, $i = \{0, 1, 2, \ldots, 16\}$. As in *Baseline*, dictators were endowed, in each of the 17 giving decisions, with $e = 16$ points and could choose to transfer any positive integer $t_{iS} \in \{0, 1, 2, \ldots, 16\}$ to the recipient. The 1:1 matching secured the uniqueness of the stated need (x_r) for the entire duration of the experiment. Accordingly, setting $i = x_r$, the payoff from S was $16 - t_{x_r S}$ for the dictator and $t_{x_r S}$ for the recipient.

In scenario *Full Information*, which was played last by all dictators, each dictator received both types of information. As in *Objective Info*, one specific profile vignette was displayed. As in *Subjective Info*, the strategy method was utilized to generate a full set of 17 conditional transfers t_{iF}, $i = \{0, 1, 2, \ldots, 16\}$. As in *Subjective Info*, dictators were endowed, in each of the 17 giving decisions, with $e = 16$ points and could choose to transfer any positive integer $t_{iF} \in \{0, 1, 2, \ldots, 16\}$ to the recipient. The 1:1 matching secured the uniqueness of the profile and the stated need (x_r) for the entire duration of the experiment. Accordingly, setting $i = x_r$, the payoff from F was $16 - t_{x_r F}$ for the dictator and $t_{x_r F}$ for the recipient. A sample screen showing the implementation of the strategy method and the display of objective information is presented in D.9 in Figure 1.[12]

We used the strategy method only with respect to the stated need and not with respect to the recipient's eight profiles in order (i) to keep the number of decisions at an acceptable level (in Full Info each dictator would have had to state 136 transfers) and (ii) to reduce the complexity of the decision task (as it is much easier to state 17 conditional transfers in increasing order of the stated need than to "rank" eight three-dimensional profiles according to their need).[13] Moreover, the conditional transfers of each dictator will be used to classify the dictators into the four main types and, if applicable, the four need sensitive subtypes by fitting a quadratic giving function to their data (see Eq. (1)).

The use of the strategy method only for subjective information means that the two treatments BOF and BSF differ both in terms of the *order* of the information provided and the *response mode*. However, Rauhut and Winter (2010) have shown that offers in the strategy method ultimatum and the "conventional" ultimatum game do not differ. They conclude that the strategy method is particularly suitable for measuring conditional fairness norms. Studying sequential dictator games, Cason and Mui (1998) also found no significant differences between the strategy method and direct choice. Hence, although keeping in mind the possible influence of the response mode, we think that behavioral differences in the between-subjects treatment comparison in Sections 5.2 and 5.3 can mainly be interpreted as the result of the sequence of information provided.

4.4. Procedure

After completing the pre-experimental questionnaire, subjects were provided with written instructions. Subjects knew that the experimental session would consist of three parts, but they did not know the content

[11] I.e., in our experiment the initial endowment was certain and we did not vary the stake size. The meta-study by Engel (2011) shows that a variation (increase) in the stake size has on average no or only a very small (negative) effect on dictator giving, depending on whether all studies or only studies that actually vary stake size are included. However, in the context of ambiguity (the endowment is a lottery with unknown winning probability), Brañas-Garza, Jorrat, Kovářík, and López (2021) show that dictators make significantly less hyper-fair donations at higher stakes.

[12] Note that we randomly varied the presentation of the stated need in vertical or horizontal order.

[13] We derived this design choice from several pre-tests among colleague and student assistants. In these pre-tests, it turned out that ranking different profiles with respect to the three pieces of information as objective information is a complex task for participants. Therefore, we decided to match each dictator with only one recipient and vary only subjective information utilizing the strategy method.

of the future parts of the experiment before the instructions were provided.[14]

At the beginning of the main experiment, right after the questionnaire, the computer program randomly selected the subjects either as dictators or as recipients. Roles remained fix during the entire experiment. While the dictators' decisions were incentivized as explained above, recipients were asked to put themselves in the shoes of a dictator and to make hypothetical decisions, which were not payoff relevant.[15] Additionally, after completing the last scenario, Full Info, all subjects were asked which information had been most relevant for their decisions.

There was no immediate feedback for any receiver after the three games about the decisions made by the dictator. At the end of the experiment, the program selected only one of the three scenarios for each dictator-recipient pair, implemented the dictator's transfer, and converted the earned payoffs into Euros. The laboratory assistants paid the participants separately and in private.

In order to minimize the experimenter demand effect (De Quidt, Haushofer, & Roth, 2018; Zizzo, 2010), we avoid loaded language and the WISO Laboratory minimizes interactions between subjects and experimenter. We did not communicate any research hypothesis to the subjects.[16] In general, we stick to the procedure of the standard dictator game to allow comparability with previous findings.

The sessions were conducted in the WISO Laboratory in Hamburg between October 2018 and June 2019. The experiment was fully computerized using z-Tree (Fischbacher, 2007) and the participants were recruited using hroot (Bock, Baetge, & Nicklisch, 2014). The experimental sessions all lasted less than one hour. The participants earned on average 13 Euros, including the 5 Euros show-up fee.

5. Results

We present the results of the experiment in five parts. In Section 5.1, we analyze mean dictator giving by treatment and scenario, and we present histograms of dictator giving by scenario. In particular, we focus on *information sensitivity* (**H1**). This part of the analysis is based on all dictators' actual giving (and not on their conditional transfers). In Sections 5.2 and 5.3, we test *need sensitivity* (**H2**) and the *acknowledgment effect* (**H3**). The analysis of the marginal effects of objective and subjective information in Section 5.2 is based on the actual giving of dictators in scenarios O, S, and F. In Section 5.3, we study the interactions between objective and subjective information in scenario F by treatment. In Section 5.4, we carry out a classification of all dictators according to their conditional transfers (using the strategy method) in scenario F.[17] Here, we test our hypothesis that the majority of dictators are need sensitive (**H4**). Moreover, using a multinomial logit regression model, we explore differences between the dictator types with respect to the dictators' personal traits. Finally, Section 5.5 deals with the questionnaire data and the external validity of the results.

Recall that, in the beginning of the main experiment, after all 492 subjects had completed the pre-experimental questionnaire, we randomly assigned them either to the dictator or to the recipient role.[18] Thereafter, we performed a one-to-one random matching of dictators and recipients (246 pairs). Finally, 125 pairs were assigned to the BOF treatment and 121 pairs were assigned to the BSF treatment. The imbalance is due to no-shows in some sessions.

Before we proceed to dictators' actual transfers in the next subsection, we look at the pairwise correlations between the need indicators (see Table 1). As was to be expected, stated need and income are highly negatively correlated. Stated need and transfer are not correlated (however, public transfers significantly increase income). Stated need and travel time are significantly positively correlated. This means that dictators are likely to see both low income and long travel time as relevant. In other words, the dictators' giving behavior is about compensating the recipients for their need arising from low income and high travel costs.

The model outlined in Section 3 assumes that dictators weigh their own monetary benefits against the moral gains of acknowledging needs. The correlation between the 246 dictators' own stated need and their giving in the full information scenario is -0.165 ($p = 0.010$) and -0.134 ($p = 0.064$) if we consider only concerned ($\gamma > 0$) dictators. We come back to the trade off between own and recipient's payoff in the type classification in Section 5.4.

5.1. Dictator giving by treatment and scenario

In this subsection, we focus on dictators' actual transfers. Fig. 4 displays dictator giving by treatment and scenario. The bar graph in the upper panel shows the means of dictator giving separately for both treatments and the four different scenarios. The lower panel shows histograms of dictator giving by scenario (that is, for Baseline and Full Info, cases are aggregated across treatments). Since case numbers are not identical across scenarios, the vertical axis shows relative frequencies instead of absolute case numbers.

The means and 90% confidence intervals of dictator giving are $\bar{t}_{\mathrm{B}} = 4.840$ $[4.374, 5.306]$, $\bar{t}_{\mathrm{O}} = 4.776$ $[4.265, 5.287]$, $\bar{t}_{x_r\mathrm{F}} = 5.376$ $[4.776, 5.976]$ in the BOF treatment and $\bar{t}_{\mathrm{B}} = 4.851$ $[4.378, 5.325]$, $\bar{t}_{x_r\mathrm{S}} = 5.116$ $[4.562, 5.669]$, $\bar{t}_{x_r\mathrm{F}} = 4.685$ $[4.143, 5.220]$ in the BSF treatment. There are no significant treatment effects across BOF and BSF dictators presented with Full Info; there are significant within-subjects treatment effects though. In the BOF treatment, dictators significantly increase their transfers if subjective information is added to objective information in the Full Info scenario. In the BSF treatment, dictators significantly decrease their transfers if objective information is added to subjective information. This effect also leads to the clearly visible but insignificant difference of 0.69 $[-0.116, 1.496]$ Euros between actual dictator giving in the BOF and the BSF treatment in the Full Info scenario. This observation will be taken up again in Section 5.3 when we investigate the interplay between objective and subjective information in the Full Info scenario by treatment.

The histograms in the lower panel of Fig. 4 show the usual pattern of dictator giving. In all scenarios, there are spikes at zero and the equal split. Furthermore, in particular in the scenarios with information, a small number of dictators gives away more than half of their endowments. In Baseline, the distribution of dictator giving is independent of the treatment ($\chi^2(9) = 7.535$, $p = 0.582$), supporting the successful randomization of dictators to treatments BOF and BSF. The same applies to the Full Info scenario ($\chi^2(14) = 9.748$, $p = 0.780$). Hence, in the histogram, we aggregate both treatments with respect to giving in Baseline and Full Info. There is also no significant difference between Objective Info and Subjective Info ($\chi^2(15) = 13.739$, $p = 0.545$). Testing for independence of dictator giving in BOF ($\chi^2(28) = 28.633$,

[14] Instructions for each scenario were handed out one after the other in accordance with the sequence of scenarios determined by the treatment. See Appendix D for the instructions of treatment BOF (D.1) and treatment BSF (D.2). The original instructions in German can be found in D.3 for treatment BOF and in D.4 for treatment BSF.

[15] We elicited the recipients' expectation in order to secure anonymity (all subjects had to make the same number of clicks in the same period of time).

[16] De Quidt et al. (2018) estimated upper bounds for the experimenter demand effect in several different decision tasks and games including the dictator game ranging from around 0.1 to 0.3 standard deviations of the size of the proper treatment effect if the experimenter reveals his or her research hypothesis (weak manipulation condition).

[17] As a robustness check the same analysis is provided for scenario S in the Appendix, also see Footnote 24.

[18] The successful randomization of subjects into roles and treatments is demonstrated in the Supplementary Material.

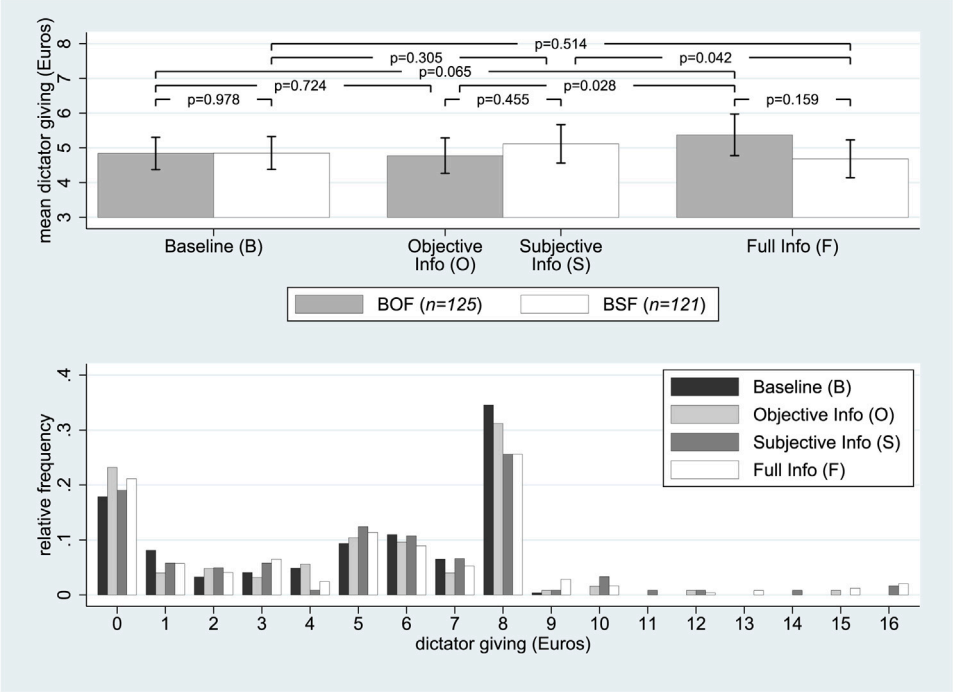

Fig. 4. Dictator giving by treatment and scenario. The figure shows mean dictator giving by treatment and scenario (upper panel) and histograms of dictator giving by scenario (lower panel). Upper panel: Error bars represent 90% confidence intervals for the mean. p value of a Welch test (between subjects) or a paired sample two-tailed t test (within subjects). Lower panel: $n = 246$ in Baseline and Full Info, $n = 125$ in Objective Info, $n = 121$ in Subjective Info.

$p = 0.431$) and in BSF ($\chi^2(32) = 31.558$, $p = 0.489$) across the respective three scenarios does not lead to a rejection of the null hypothesis.

To summarize this subsection, the analysis of the impact of information about recipients' need on mean dictator giving and on the distribution of dictator giving *does not support* our initial hypothesis that providing objective or subjective information, or both, would lead to higher dictator giving (**H1**). The *ordering* in which information is provided to dictators, however, seems to matter for dictator giving.

Table 1
Pairwise correlations.

	Stated need	Income	Transfer
Income	−0.103**		
Public transfer	0.015	0.146***	
Travel time	0.093**	−0.166***	−0.024

$n = 492$. $^{*}p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$.

5.2. Marginal effects of objective and subjective information

In this subsection, we focus on the marginal effects of objective and subjective information on *actual* dictator giving. Recall that objective information in terms of the recipients' profiles (income, public transfer, travel time) was provided to the 125 dictators assigned to the BOF treatment as the second scenario (Objective Info); it was provided to the 121 dictators assigned to the BSF treatment as the last scenario (Full Info), with Subjective Info as the second scenario. Hence, we pool the dictators from the BOF treatment with their giving t_{O} and the dictators from the BSF treatment with their giving $t_{x,\mathrm{F}}$.

We estimate the marginal effects of objective information, as well as the treatment effect of being additionally treated with subjective information in the BSF treatment, by means of a fully interacted tobit model.[19] The profile variable and the treatment enter the model as dummy variables; stated need enters the model as a continuous variable. That is, the model estimates for each profile–treatment combination a slope coefficient of stated need (i.e., 16 slope coefficients altogether). Then, we compute the average marginal effects of income, public transfer, and travel time (for given stated need and treatment) on dictator giving and compare them across the two treatments.

We proceed analogously with subjective information[20] and then compute the average marginal effect (slope coefficient) of the stated need (for given profile and treatment) on dictator giving and compare the slope coefficients of the two treatments.

Fig. 5 shows the marginal effects of objective and subjective information by treatment. The bar graphs refer to income (upper left panel), public transfer (upper right panel), and travel time (lower left panel). The range plot refers to the stated need (lower right panel).

Objective information in terms of the *recipient's income* has a highly statistically significant impact on dictator giving in the BOF treatment and no impact in the BSF treatment. In the BOF treatment, dictators on average give 1.24 [0.37, 2.11] Euros more to recipients who have an income not exceeding 700 Euros. In the BSF treatment, the negative difference is only −0.19 [−1.25, 0.88] Euros. The *public transfer* variable

[19] For the regression table, see model (1) in Table 4 in Appendix. We also control for dictator giving in the Baseline scenario and several personal traits, see model (1) in Table 5 in Appendix.

[20] Subjective information in terms of recipients' stated need was provided to dictators assigned to the BOF treatment in the Full Info scenario (i.e, the last scenario) and to dictators assigned to the BSF treatment in Subjective Info (i.e, the second scenario). Hence, we pool the dictators from the BOF treatment with their giving $t_{x,\mathrm{F}}$ and the dictators from the BSF treatment with their giving $t_{x,\mathrm{S}}$. Again, we estimate the marginal effects of subjective information, as well as the treatment effect of being additionally treated with objective information in the BOF treatment, by means of a fully interacted tobit model. For the regression table, see model (2) in Table 4 in Appendix. We also control for dictator giving in the Baseline scenario and several personal traits, see model (2) in Table 5 in Appendix.

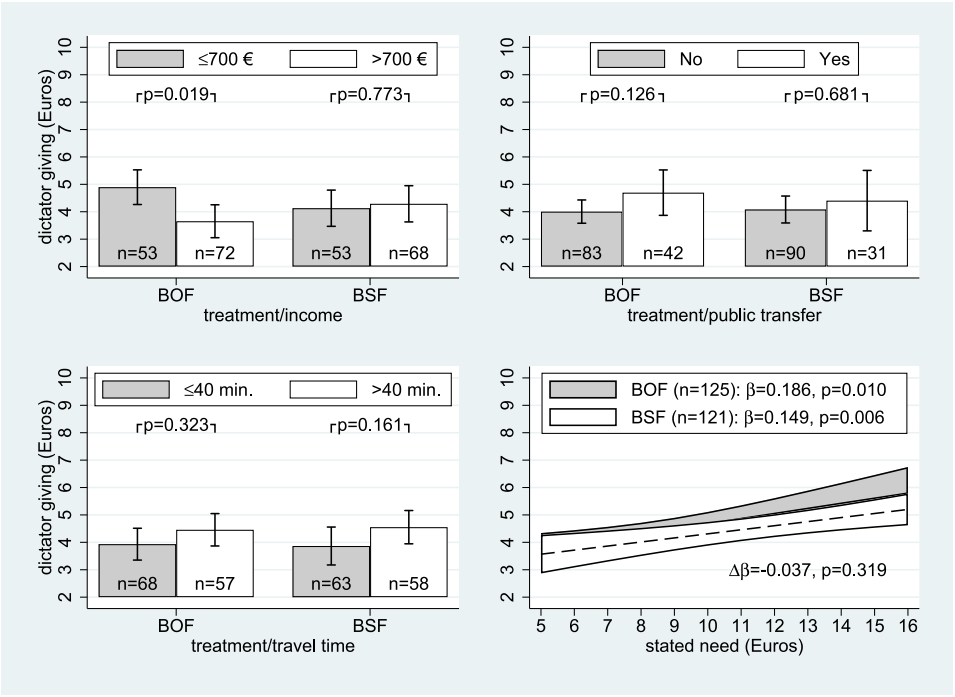

Fig. 5. Marginal effects of objective and subjective information. The figure shows the marginal effects of being presented with a ≤ 700 € or > 700 € income profile (upper left panel); with a "No" or "Yes" public transfer profile (upper right panel); with a ≤ 40 min. or > 40 min. travel time profile (lower left panel); and with the recipient's stated need (the minimum stated need was 5 Euros, the maximum 16 Euros) on actual dictator giving in Euros in the BOF and the BSF treatments. Upper panels and lower left panel: p value of a two-tailed t test; lower right panel: p value of (the difference of the) estimated slope coefficient(s) β ($\Delta\beta$) and 90% confidence interval for the mean. Tobit regression with session clustered standard errors. For the regression table, see models (1) and (2) of Table 4 in the Appendix.

is statistically insignificant in either treatment group, which was to be expected given the almost non-existent correlation with stated need in Table 1. However, in the BOF treatment in particular, there is at least a tendency for dictators to give *more* to recipients who receive public transfers (BOF: 0.69 [−0.05, 1.21]; BSF: 0.32 [−0.96, 1.60] Euros). *Travel time* is neither statistically significant in BOF (0.47 [−0.31, 1.24] Euros) nor in BSF (0.78 [−0.14, 1.69] Euros). Nevertheless, the expected tendency can be seen that dictators reward longer travel time with higher donations.

The lower right panel shows that the estimated average slope coefficient β of the *stated need* is rather similar in both treatments. It is about 19 Eurocents per Euro stated in BOF and about 15 Eurocents per Euro stated in BSF. Their difference is insignificant (−0.04 [−.10, .02] Euros per Euro stated).

We conclude that objective information only has a weak influence on dictators' giving behavior and, with respect to income, the order in which information is given matters. Subjective information in the form of recipients' stated need has a statistically significant influence that is independent of the order. Overall, the experimental evidence therefore supports *need sensitivity* (**H2**).

5.3. Interactions between objective and subjective information

In this subsection, we turn to the interaction effects between objective and subjective information in the Full Info scenario. Thus, we focus on the *acknowledgment effect* (**H3**). We conduct a tobit regression analysis of effects of the interacted profiles, treatments, and stated need on actual dictator giving for all 246 dictators.[21] In contrast to the previous subsection, we use – for both treatments – the actual dictator giving $t_{x,\mathrm{F}}$ in the Full Info scenarios. That is, we analyze and compare the giving of dictators who have been treated with objective *and* subjective information (albeit in a different sequence).

Fig. 6 shows the difference of the estimated average slope coefficients (i.e. the interaction effects $\Delta\beta$) of *stated need* × *public transfer* (left panel) and *stated need* × *travel time* (right panel) by treatment. Since there is no statistically significant interaction effect between stated need and income in either the BOF or the BSF treatment, we relegated the respective figure to the Appendix (see Figure 8). Only the tendency from the lower right panel of Fig. 5 is confirmed that dictators in BOF react more strongly positive to stated need.

With respect to *stated need* × *public transfer* by treatment, we see an interesting highly significant interaction term $\Delta\beta$ in the BOF treatment. When the dictators are also informed about the recipients' stated need, it has a *positive* effect on dictator giving if the recipient does not receive public transfers ("No"). Dictators give about 0.11 [0.04, 0.17] Euros per Euro of stated need more to recipients who do not receive public transfers as compared to transfer recipients ("Yes"). This suggests that dictator giving is partially *crowded out* by public transfers (see the literature stated in Footnote 8) when dictators have full knowledge about their recipients. There is no such effect in the BSF treatment.

In the right panel of Fig. 6, we turn to the interaction of *stated need* × *travel time*. Again, we only observe a statistically significant interaction in the BOF treatment. As expected, dictators give about 0.16 [0.08, 0.24] Euros per Euro stated need more to recipients with long travel times when they have full information.

With regard to the acknowledgment effect (**H3**), we therefore conclude that the combination of objective and subjective information in Full Info leads to the hypothesized interaction effect. However, this is limited to public transfers and travel time in the BOF treatment. Moreover, recipients who receive public transfers are perceived as *less* needy. With respect to income in the BOF treatment, and the BSF treatment in general, dictator giving behavior is clearly dominated by stated need and we do not observe an acknowledgment effect.

[21] For the regression table, see model (3) in Table 4 in Appendix. We also control for dictator giving in the Baseline scenario and several personal traits, see model (3) in Table 5 in Appendix.

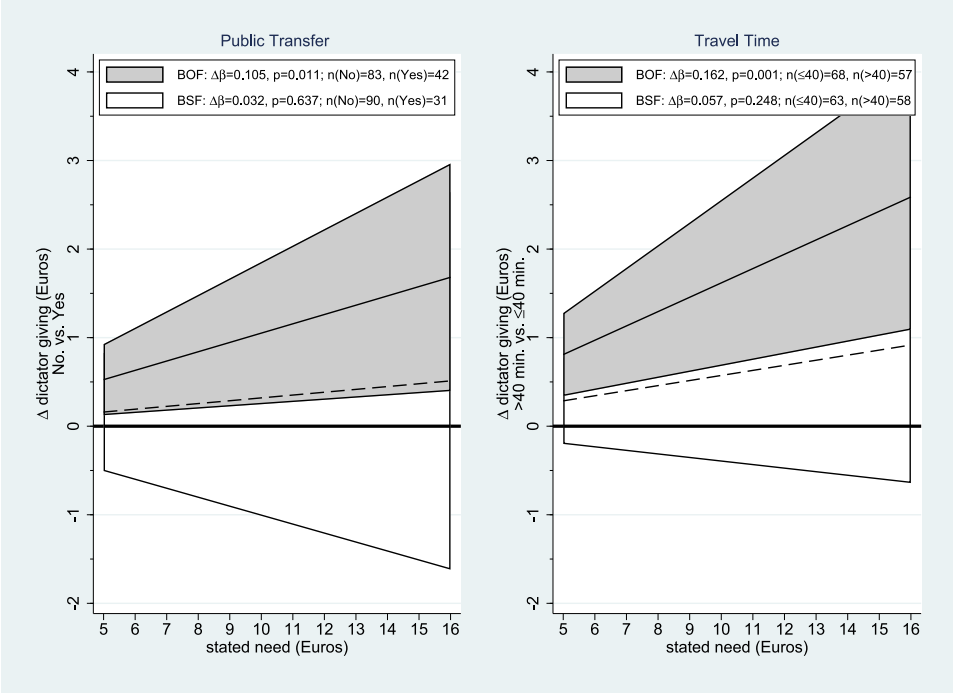

Fig. 6. Interactions between public transfer (travel time) and subjective information. The left (right) panel shows the interaction effect of the recipients' stated need and dictators' being presented with a "No" or "Yes" public transfer profile (a travel time profile > 40 min. or ≤ 40 min.) on actual dictator giving in the Full Info scenario by treatment. p value of difference of estimated slope coefficient(s) $\Delta\beta$ and 90% confidence interval for the mean. Tobit regression with session clustered standard errors. For a regression table see Table 4.

5.4. Type classification of dictators

In this subsection, we analyze the heterogeneity of dictators with respect to their giving behavior (**H4**). For this purpose, we classify each dictator according to her *conditional* giving in the Full Info scenario, $t_{i\mathrm{F}}$, $i = 0, \ldots, 16$ Euros, into the four main types *unconcerned*, *lump-sum*, *punitive*, and *need sensitive* defined in Section 3.3. Need sensitive dictators will further be classified into *increasing*, *constant*, *decreasing*, and *hump shaped* need sensitivity.

Adding an error term to Eq. (1), we fitted a quadratic regression curve separately for each dictator using OLS

$$\mathbf{t}_{\mathrm{F}} = \beta_1 + \beta_2 \mathbf{x}_r + \beta_3 \mathbf{x}_r^2 + \epsilon \tag{2}$$

to her conditional transfers $\mathbf{t}_{\mathrm{F}} = (t_{0\mathrm{F}}, t_{1\mathrm{F}}, \ldots, t_{16\mathrm{F}})$, where $\mathbf{x}_r = (0, 1, 2 \ldots, 16)$. Based on the size, sign, and significance[22] of the β coefficients, the dictator was then classified as one of the four main types and, if applicable, to one of the four need sensitive subtypes. Five dictators could not be classified.[23]

Table 2 summarizes the results of the classification procedure following the rules defined by Fig. 1 in Section 3.3. The individual classifications can be comprehended from Figures 9 to 16 in the Appendix. The table shows that 17.1% of the dictators are classified as unconcerned, 17.1% as lump-sum, and only 7.3% as punitive. A *majority* of dictators are classified as need sensitive (139, 56.5%). Proportion tests show that it is significantly more likely that a subject is classified as need sensitive than as unconcerned, lump-sum or punitive (each, $p \leq 0.01$). The proportion of need sensitive types is also significantly higher than 50% ($p = 0.02$). This supports that need sensitive types are more common than any other type (**H4**). Among the need sensitive dictators, a majority of 83, 59.7% exhibits positive but decreasing need sensitivity. The remaining dictators exhibit either increasing (8.6%), constant (11.5%), or hump-shaped need sensitivity (20.1%).[24]

In total, recipients receive 5.04 Euros in the Full Info scenario (which is the joint mean of $\bar{t}_{x_r F}$ in BOF and BSF from Fig. 4). Lump-sum dictators, on average, give the most (7.19 Euros, that is, a bit less than half of their endowments). Unconcerned give, by definition, almost nothing (0.24 Euros)—remember that the classification is stochastic based on the p values of the β coefficients rather than normative and, hence, we allow for small insignificant deviations from zero at the individual level. Punitive dictators give only 2.39 Euros on average. Need sensitive dictators take a middle position (6.11 Euros). While decreasing, constant, and increasing need sensitive dictators are fairly similar in their average giving, hump-shaped need sensitive dictators stand out a bit due to their lower giving amounts (see Table 2).

Fig. 7 shows the mean conditional dictator giving and 90% confidence intervals by dictator type. A glance at the upper panel of the figure shows that (i) unconcerned' giving function is flat and very close to zero; (ii) lump-sum dictators' giving function is also flat and close to

[22] The significance criterion takes into account the uncertainty of the classification caused by sample size.

[23] Five additional subjects had to be classified manually as it was not possible to assign them automatically using this procedure. The STATA do file as well as the individual classifications are available from the authors on request.

[24] As a robustness check for the classification of dictators, we perform the same classification exercise with the subset of 121 dictators from the BSF treatment in the Subjective Info treatment based on the conditional transfers $t_{i\mathrm{S}}$. Then, we check whether the classification of a dictator changes between scenarios S and F due to the presentation of the profiles in the Full Info scenario. The individual classifications in the Subjective Info scenario can be seen in Figures 17 to 24 in the Appendix. The overall classification of dictators is shown in Figure 25 in the Appendix. Tables 6 (main types) and 7 (subtypes) provide two-way tables of the classification of the dictators in scenarios S and F. The figures and tables confirm that our procedure for the classification of dictators is robust. The relative case numbers of the different dictator types and subtypes are almost identical. 107 (88.7%) of the 121 dictators receive the same main type in both scenarios (χ^2 independence test: $p = 0.000$). 53 (76.8%) of the 69 need sensitive dictators receive the same subtype in both scenarios (χ^2 independence test: $p = 0.000$).

Table 2
Dictator classification by type.

Dictator type	Condition			*n*	%	Giving	
	β_1	β_2	β_3			mean	90% CI
All	–	–	–	246	100.0	5.04	[4.63, 5.44]
Main Types							
Unconcerned	$=0$	$=0$	$=0$	42	17.1	0.24	[−0.08, 0.56]
Lump-Sum	>0	$=0$	$=0$	42	17.1	7.19	[6.39, 7.99]
Punitive	>0	<0	–	18	7.3	2.39	[1.33, 3.45]
	>0	≤ 0	<0				
Need Sensitive	–	>0	–	139	56.5	6.11	[5.68, 6.54]
	–	≥ 0	<0				
Need Sensitive Subtypes ($\beta_2 > 0$)							
Increasing	–	>0	>0	12	8.6	6.92	[4.39, 9.44]
Constant	–	>0	$=0$	16	11.5	6.75	[4.76, 8.74]
Decreasing	–	>0	<0	83	59.7	6.17	[5.77, 6.57]
Hump Shaped	–	>0	$\ll 0$	28	20.1	5.21	[4.33, 6.10]

A β coefficient is equal to zero if the null hypothesis of $\beta_i = 0$ cannot be rejected at least at the 10% significance level. Hump Shaped if the dictator's giving function has an inner maximum. Giving in Euros.

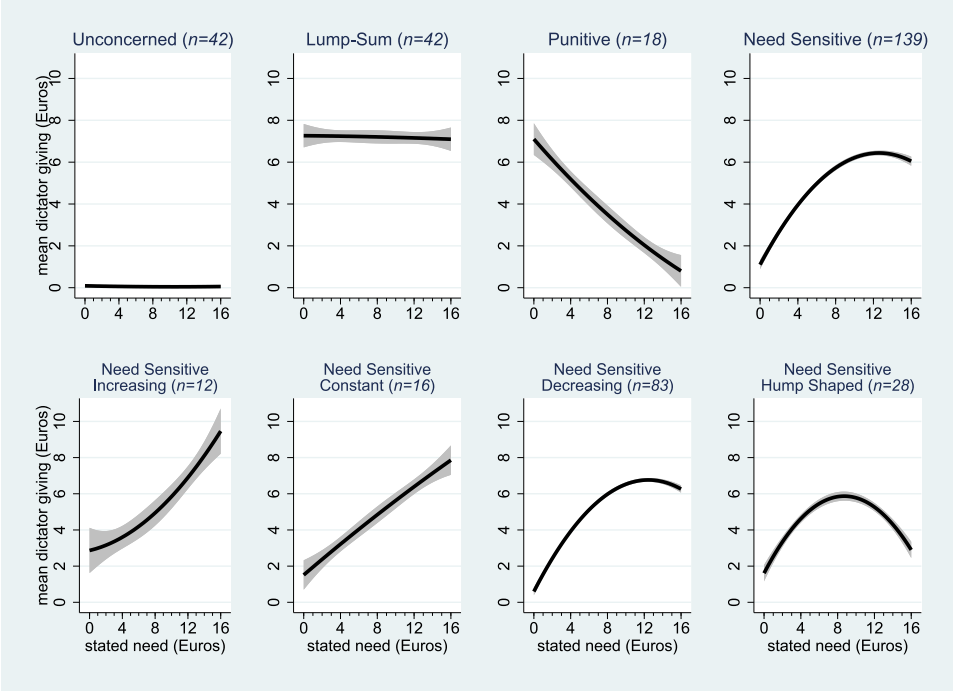

Fig. 7. Conditional dictator giving by dictator type. The figure shows a quadratic fit and 90% confidence interval of conditional dictator giving by dictator type. The upper panel shows the four main types of dictators, the lower panel shows the four subtypes of need sensitive dictators.

the equal split; (iii) punitive' giving function has an intercept of a bit less than 8 Euros and exhibits a negative slope of about 50 Eurocents per Euro stated by the recipient; (iv) the average need sensitive dictator exhibits a concave conditional giving function, reaching its maximum at a stated need of about 12 Euros.

The lower panel shows (v) a convex shape of increasing need sensitive dictators' giving function; (vi) a linearly increasing shape for constant need sensitive dictators; and (vii) a concave shape for decreasing need sensitive dictators, where the hump is a statistical artefact due to the quadratic fit—as can be seen in Figure 14, almost all decreasing need sensitive dictators increase their giving until it reaches a "plateau"; (viii) the hump-shaped conditional giving function reaches its maximum at a stated need of 8 Euros. Recipients, who stated to need more than half the "cake", are punished with lower transfers.

Note that the assignment of the dictators to the four main categories is independent of the treatment with the three objective information indicators.[25] That is, dictators' conditional giving behavior and therefore their classification as unconcerned, lump-sum, punitive, or need sensitive was exogenous with respect to having been treated with a specific vignette.

The heterogeneity of dictator types enables us to look more deeply into the characteristics of the different dictator types. Table 3 presents the results of a multinomial logit regression using the dictator type as the endogenous variable (with Need Sensitive as the baseline category) with session clustered standard errors. The table shows that (i) unconcerned dictators' political orientation is – according to their self assessment – more right (+0.167) than need sensitive dictators

[25] Income: $\chi^2(3) = 3.243$, $p = 0.356$; public transfer: $\chi^2(3) = 5.000$, $p = 0.171$; travel time: $\chi^2(3) = 5.304$, $p = 0.151$.

Table 3
Multinomial logit regression of dictator types.

Need Sensitive vs.	Unconcerned	Lump-Sum	Punitive
Own Income	−0.437	−0.490	−0.771*
>700 €	(0.329)	(0.349)	(0.463)
Own Public Transfer	−0.131	0.461	−0.191
"Yes"	(0.454)	(0.345)	(0.569)
Own Travel Time	−0.132	0.183	0.273
>40 min.	(0.461)	(0.402)	(0.479)
Female	−0.336	−0.929***	−0.315
"Yes"	(0.438)	(0.277)	(0.545)
Age (Years)	−0.0563	0.0673	0.00303
	(0.0699)	(0.0421)	(0.0551)
Siblings	0.281	0.166	0.552
"Yes"	(0.393)	(0.603)	(0.629)
Experience (No.	0.0235	−0.00424	−0.0251
of Experiments)	(0.0164)	(0.0135)	(0.0210)
Political Orientation	0.263***	0.164	0.236
(L = −5, … , R = 5)	(0.0993)	(0.112)	(0.162)
Constant	0.256	−2.409**	−1.704
	(1.763)	(1.156)	(1.412)
Pseudo R^2		0.067	

The table shows the results of a multinomial logit regression using the dictator type as the endogenous variable with session clustered standard errors (in parentheses). Baseline category: Need Sensitive. $N = 241$ subjects. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

(−0.813);[26] (ii) lump-sum dictators are significantly less likely to be female (38.1%) than need sensitive dictators (62.6%); and (iii) that punitive dictators exhibit a weakly lower likelihood of having an income of more than 700 Euros (38.9%) than need sensitive dictators (64.0%). In contrast to the other types, the typical need sensitive dictator, therefore, is female, has a relatively high income, and places herself on the middle-left on the political orientation scale.

5.5. Questionnaire and external validity

In a post-experimental questionnaire, we asked the dictators to state whether or not the objective information indicators were important in their giving decisions. The evaluation of the answers clearly supports the dominating role of the recipients' income. 202 (82.1%) of the dictators found the income information important, only 111 (45.1%) found the public transfer information important, and a minority of 76 (30.9%) found the travel time information important. Among the 139 need sensitive dictators, income information was significantly more important (86.3%) than for all other dictators (76.6%) (independence test: $\chi^2(1) = 3.870$, $p = 0.049$).

Moreover, all subjects were asked how they will use the earnings from the experiment. An overwhelming majority of subjects answered that they were planning to spend the money on food or dining in the university cafeteria. Hence, we think that we can make a good case for assuming that both dictators and recipients actually thought about monetary needs when making their giving choices and stating their stated need. We interpret the answers from the questionnaire as mild evidence that the elicitation of the "stated need for compensation" captures to some degree a monetary need on part of the participants. We argue that this kind of "compensation need" is one of the mildest forms of need in the real world. The behavioral impact of providing information on a monetary "compensation need" assessed from a sample of German students may thus be considered as a lower bound for the behavioral impact of "real needs" in the real world.

[26] The negative correlation that more conservative voters are more selfish is well documented in the literature (compare e.g. Kerschbamer & Müller, 2020; Müller, 2019).

6. Conclusion

In this paper, we examine whether and how individuals apply need-based justice in a modified DG. We do so by examining the influence of information about recipients' objective and subjective need on dictator giving behavior—expressed by a giving function. Due to the inherent subjectivity of the acknowledgment of individual needs, need-based justice is arguably one of the most complex justice principles and clear evidence for the adherence to the need principle is difficult to identify. Previous laboratory studies have addressed this challenge either by inducing needs within an experiment or by providing background information about the group of recipients. However, induced experimental needs are unrelated to the actual neediness of a person and allow subjects only to equalize final payoffs by allocating resources relative to their experimental needs. Similarly, general background information alone, e.g. the residence of a subject, does not imply that a subject actually needs more. It only provides a rough proxy about the subjects' living circumstances. In contrast to these approaches, we asked the subjects directly how much payoff they need from the experiment as compensation, given their personal traits and living circumstances, and then determined how much dictators are willing to transfer given the stated need by recipients.

As in the study by Brañas-Garza et al. (2020), we examined whether more information per se leads to higher transfers from the dictators to the recipients. However, in contrast to their study, *information sensitivity* could not be confirmed by our experiment. This may be due to the fact that different types and content of information were presented. Only the "family wealth" variable potentially indicates the need of the recipient. Moreover, Brañas-Garza et al. (2020) randomized the order of their 16 information treatments at the within-subjects level, while in our study the subjects always started with the baseline treatment.

Concerning the hypothesis that the dictators are *need sensitive*, we find that subjects who state greater need (considering their living circumstances) on average also receive significantly higher transfers from dictators. In fact, 57% of all dictators can be classified as need sensitive, which means that they condition their transfers directly on the stated need of the recipient. In this sense, this is the first study that provides direct evidence that needs, which are articulated as such in a social context, affect the distribution of available resources. The acknowledgment of needs in giving behavior documents compliance with the need principle and thus rationalizes giving behavior as norm compliance (Krupka & Weber, 2013). From a methodological point of view, our experiment provides a simple and compelling tool for the elicitation of monetary need that in turn allow subjects to apply need-based justice.

In contrast to the recipient's subjective stated need, objective information (income, public transfers and travel time) has only a limited influence on dictator giving behavior, which also depends on the order in which the information is provided. However, our results suggest that transfers increase further when the stated need is supported by information about the recipients' living circumstances (*acknowledgment effect*). Considering that commuting allowances are common in Germany, we expected that travel costs in terms of time would increase the legitimacy of the claim for need-based compensation and, hence, increase transfers. We find that transfers actually increase if dictators receive the information about recipients' travel costs before the subjective self-assessment of need. Presenting travel-time information after the stated need appears not to have the same acknowledgment effect. On the other hand, information about public transfers appears to partially crowd out dictator giving. In other words, when the stated need for a transfer is relatively high, transfers are more likely to match the stated need when the information about the recipient indicates that she does not receive public transfers.

Among our sample, need sensitive dictators usually place themselves in the middle left of the political spectrum, have an income above the median, and are more likely to be female. While this result matches

observations from survey studies, which find that these characteristics explain the tendency to support redistributive policies (e.g. Rueda & Stegmueller, 2016), results from laboratory experiments with student samples always have to be extrapolated carefully. For the research question at hand, we considered the internal validity and the possibility of comparing our results with the experimental results of existing research as more important than the possibility of applying the results directly to a representative population. Studying the need principle within a student sample has the additional advantage of being economically valid, as the students' median income of 700 Euros is distinctly below the German national poverty line[27] of about 1136 Euros, which makes the problem highly relevant to their daily experiences.

One might argue that the huge prevalence of the need sensitive dictator type may be partly due to the fact that the recipients are the dictators' fellow students, that is, dictators and recipients potentially share a common identity as students. Similarly, Lamm and Schwinger (1980) found need considerations to play a greater role in allocation decisions when the recipients were described as close friends, compared to strangers. We regard a critical test of the external validity of our results as an important future research avenue.

Overall, redistributing welfare according to peoples' need is an integral part of solidarity communities and important for the functioning of modern welfare states (e.g. Bowles et al., 2000; Mau, 2004). Our results suggest that subjects take the need of others into account even if there is no strategic reason to do so. In this way, this study makes an important contribution to the microfoundation of social policy. The fact that the social acknowledgment of need requires objectifying information about recipients' personal living circumstances may, however, raise legitimacy concerns regarding the application of the need principle. Clearly, it is necessary to have some information on welfare recipients' need in order to allocate resources to the rightful person. However, the question remains as to how much information can be requested from a person (e.g., by states or welfare agencies) before human dignity is compromised and the need principle loses its moral force.

Data availability

Data will be made available on request.

Appendices A to D

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.socec.2023.102028.

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[27] 60% of the household equivalent net income in 2018 according to the German federal statistical office.

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